



Dental practice: overview of diagnosis and management

The information included in this topic is appropriate for dental practice and may not be applicable to other areas of medicine.

Provision of oral and dental care is guided by a code of conduct shared by health practitioners; it is available from the [Australian Health Practitioners Regulation Authority](#).

The general principles of managing oral and dental conditions are summarised in [Figure 13.1](#).

Figure 13.1 General principles of managing oral and dental conditions

Identify the disease and its cause – establish a diagnosis.

Provide acute care.

Address the cause to prevent recurrence.

Address the effect of the disease.

Restore normal function.

Monitor healing.

Provide ongoing monitoring and management, particularly for chronic or recurrent diseases.

Establishing a diagnosis involves taking a thorough history (see [Dental practice: taking a history](#)), conducting a clinical examination, and performing diagnostic tests if appropriate (see [Dental practice: examination and diagnostic tests](#)). Diagnoses include oral and dental diseases, oral manifestations of systemic disease and adverse effects of drugs.

It is usually possible to establish a diagnosis before starting dental or oral treatment (unless emergency or acute treatment is required). If the diagnosis is unclear, the clinician should either defer treatment while awaiting further information (eg test results) or refer the patient to a specialist.

It is essential to **identify the cause** of the disease to plan effective management. The cause may be simple (eg dental caries as a cause of pulp disease) or complex (eg a systemic disease with oral manifestations). Complex conditions may require additional nondental management and consultation with or referral to the patient's medical practitioner (see [Dental practice: referral](#)). Risk factors for the disease should also be identified and modified, if possible.

Once the diagnosis and cause have been established, the clinician should **decide on an appropriate management strategy** including treatment choices to present to the patient; see [a summary of rational treatment](#) for advice on informed consent. There is a distinction between 'management' and 'treatment'. Treatment refers to a systematic course of medical or surgical care; management is a broader concept that includes a sensitive approach to providing care.

Most conditions that lead patients to visit their dentist require dental treatment. Drugs are usually only needed as adjuncts, with consideration of the likely benefit and potential adverse effects (see [an overview of the role of drug therapy](#)).

Drug therapy or irreversible dental treatment should not be started until the diagnosis has been confirmed; this approach reduces the risk of providing inappropriate treatment or masking signs or symptoms of a particular diagnosis.

Dental practice: taking a history

When a patient attends a dental practice, establish the reason for their visit. Assess the patient's overall capacity to provide an accurate history, understand and consent to treatment, and understand and adhere to post-treatment care requirements; for more information, see [advice on assessing decision-making capacity](#). If needed, consult the patient's carer, medical practitioner or other healthcare practitioner to help provide the history.

Take a **dental history**, which includes an overview of the patient's previous dental problems and treatment, and a detailed history of the presenting condition. This assists with forming a provisional diagnosis – several potential diagnoses (differential diagnoses) may be likely. Ask specific questions to narrow the field but phrase them as open-ended questions because these are more effective than closed (and potentially leading) questions. For example, ask 'What particular things cause pain in your tooth?' rather than asking 'Do hot or cold drinks cause you pain?'. For factors to include in history-taking, see [advice on assessing a patient with dental pain](#).

Take a **medical history**, which includes:

- age and weight, particularly for children
- medical conditions
- past surgical history and any adverse reactions to anaesthetics
- mental health, including dental anxiety
- family history of conditions relevant to dental treatment (eg if a patient has not had any procedures to inform their own risk, a family history of excessive periprocedural bleeding or a significant bleeding disorder can be important)
- pregnancy and breastfeeding status
- a comprehensive **medication history**, including:
 - prescription medicines, duration and dose, including those associated with osteonecrosis of the jaw (see [Table 13.36](#))
 - over-the-counter and nonprescription medicines
 - complementary medicines (eg vitamins, supplements, herbal medicines)
 - drug allergies and non-immune-mediated adverse drug reactions (see examples in [Types of adverse effects of antimicrobials](#))
- smoking status (past or current), including vaping
- alcohol intake – chronic excessive intake can increase periprocedural bleeding risk and influence choice of agent for minimal sedation; see [Terminology in alcohol use](#) in the Addiction guidelines for information on assessing alcohol consumption
- use of illicit drugs such as cocaine, amphetamines, cannabis, opioids, gamma-hydroxybutyrate [GHB]; for more information on these substances, see the [Addiction guidelines](#).

If the patient is unsure of the medicines they are taking, ask them to obtain a current list from their medical practitioner, pharmacist or electronic health record. For information on how patients and healthcare practitioners can access centralised electronic health records, see My Health Record [\[Note 1\]](#) at the [Digital Health website](#). Crosscheck the medicine list with the medical history – there may be conditions the patient has forgotten to mention or has not disclosed.

Take a **social history**, which includes asking about family, occupation, housing and recreation. This is relevant for assessing a patient's support systems after a procedure, as well as evaluating dental risks (eg the risk of dental trauma associated with some sports).

At each appointment, check the patient's medical history for any changes.

Review the patient's complete history regularly and the patient's medical history for changes at each appointment.

Dental practice: examination and diagnostic tests

Perform a comprehensive oral examination, with particular attention to features of a provisional diagnosis suggested by the history. Target diagnostic tests toward confirmation of the diagnosis. Diagnostic confirmation is particularly important if the dental treatment being considered is irreversible (eg root canal treatment, tooth extraction).

Involve the patient in any decision to perform a test. Tests recommended should be evidence based, assist decision-making and offer clinical benefit that outweighs any associated risks (eg radiation exposure).

Cumulative radiation exposure, particularly in childhood and adolescence, has been associated with an increased incidence of cancer. Aim to achieve the lowest possible radiation exposure without limiting the diagnostic value of the test. For information on radiation exposure during pregnancy, see [advice on dental treatment during pregnancy and breastfeeding](#).

Dental practice: the process of rational treatment

After taking a patient history and establishing a diagnosis, determine the therapeutic objective (eg pain relief, treating infection) and choose an appropriate treatment. Consider consultation with a patient's medical practitioner or a medical or dental specialist. Involve the patient in the decision; for more information on shared decision-making, see the [Australian Commission on Safety and Quality in Health Care](#). A rational dental framework [\[Note 2\]](#) designed for population groups with complex needs may be helpful.

Treatment involves obtaining informed consent, performing appropriate oral or dental treatment, writing an accurate prescription for appropriate drug therapy, if required, and monitoring progress. In dentistry, drugs are usually an adjunct to dental treatment (see [an overview of the role of drug therapy](#)).

Discuss the condition and the balance of benefits and harms of treatment options, ideally providing written and verbal information; for further guidance on informed consent, see Section 4.2 of the health practitioner Shared Code of Conduct on the [Australian Health Practitioners Regulation Authority website](#) and [advice on consent for health care in people with cognitive disability](#). Some patients with cognitive disability can be supported (by a family member, close friend or unpaid support person) to make decisions; others may have a substitute decision maker.

If recommending drug therapy, see [Dental practice: the role of drug therapy](#).

The above process is in line with [Australia's National Strategy for Quality Use of Medicines](#).

Dental practice: the role of drug therapy

Overview of the role of drug therapy in dental practice

Appropriate dental treatment can minimise or avoid the need for drugs (eg dental treatment of a localised odontogenic infection usually avoids the need for antibiotics). The use of drugs can often be deferred until the response to dental treatment has been reviewed; drugs are more likely to be effective as an adjunct after dental treatment than as sole therapy. Drug choice is based on efficacy, safety, suitability (taking into account factors such as adherence issues, patient comorbidities, the availability of specific formulations) and cost.

Inappropriate prescribing can lead to ineffective or unsafe treatment, exacerbate or prolong illness, distress or harm the patient and be costly; antimicrobial use contributes to antimicrobial resistance in the wider community. In Australia, medication-related problems cause a high annual incidence of hospital admissions and emergency department presentations. Many adverse medication events can be prevented by taking a detailed history and prescribing rationally.

Patients may attend a dental appointment with an expectation of a particular treatment (eg analgesics, antibiotics), possibly influenced by advertising, unrealistic expectations or drug dependence. Always consider alternatives to drug treatment and involve the patient in treatment decisions. Patients are more likely to choose conservative treatment strategies when a shared decision-making approach is adopted.

Consider the balance of benefits and harms of drug therapy. If drug therapy is appropriate, choose an evidence-based treatment, with consideration of individual patient factors. Consider principles such as antimicrobial stewardship and rational choice of analgesics. Evaluate drug information to determine the therapeutic value; new or expensive drugs should be critically evaluated in comparison to established treatments.

For advice on prescription-writing, see Dental practice: writing the prescription. Provide the patient with recommended information and advice about the prescription (see Dental practice: discussing the prescription with the patient), including discussion about any off-label prescribing.

Off-label prescribing in dental practice

Off-label use refers to use of a medicine in a manner that is not approved by the Therapeutic Goods Administration (TGA); examples are use of a different dose or route of administration, or use for an unapproved indication or patient group. The manufacturer of the medicine does not carry any legal responsibility for off-label prescribing – should an issue arise, such as a serious adverse reaction, legal liability lies solely with the prescriber. Appropriate off-label prescribing requires evidence of efficacy and safety, and consideration of the balance of benefits and harms. Evaluate all intended off-label use against the guiding principles summarised in this article in Australian Prescriber.

Off-label prescribing should be discussed with the patient as part of obtaining their informed consent. It may incur additional cost to the patient.

Inform a patient if their prescription is for off-label use and explain the implications.

Use of compounded medicines in dental practice

Compounded medicines are medicines made by a pharmacist from raw ingredients for an individual patient [Note 3]. Compounded medicines should only be prescribed when no suitable medicine registered by the Australian Therapeutic Goods Administration (TGA) is available. Patients should be told why a compounded medicine is being recommended and how it differs from a commercially available medicine.

Compounded medicines do not undergo the same quality assurance assessments (to establish safety and efficacy) that are undertaken for TGA-registered products, but their preparation is subject to legislation. Guidelines for pharmacists on compounding are published by the Pharmacy Board of Australia.

Dentists can prescribe compounded medicines for individual patients but cannot prescribe batches of medicines to be used as stock for multiple patients in a practice.

Prescriptions for compounded medicines must detail the active ingredients, their strengths and the formulation required, as well as the other details listed in [Figure 13.2](#).

Overprescribing and underprescribing in dental practice

It is important that the dose, duration of treatment and quantity of drugs prescribed are appropriate for the patient's condition.

Overprescribing is wasteful and increases the risk of adverse effects and overdose. Of particular concern are drugs that cause dependence or are prone to nonmedical use [\[Note 4\]](#) (eg opioids, benzodiazepines), and drugs whose therapeutic dose is very close to their toxic dose. Overprescribing of antimicrobials can promote antimicrobial resistance.

Underprescribing is also wasteful and potentially harmful because it can result in ineffective treatment.

Sporting authorities and the use of drugs in dental practice

Sporting authorities prohibit the use of some drugs by people competing in sporting events. Some of the drugs prohibited in sport may be prescribed or administered by dentists. Most elite athletes are aware of the requirements for their particular sport.

Information about drugs and their status for use in sport is available from [Sport Integrity Australia](#) and from the [World Anti-Doping Agency \(WADA\)](#).

Dental practice: referral

The treating dental practitioner should consider referral when the patient's condition and treatment is beyond their scope of practice or when the patient could benefit from expertise or specific services not available at their clinic. A referral from a dental practitioner should:

- be in writing
- outline the presenting oral or dental complaint, suspected diagnosis (if known) and relevant patient details
- be recorded in the patient's history.

If a dental practitioner receives a referral, they should provide a written clinical summary of the consultation and treatment plan to the referring practitioner.

Dental practice: clinical records

Clinical records should be kept in accordance with the [Dental Board of Australia guidelines on dental records](#).

Dental practice: infection control

A list of resources to assist practices with infection control is available at the [Australian Dental Association website](#). Guidance includes advice on standard precautions, and precautions for patients with known or suspected infectious diseases (transmission-based precautions), including preprocedural rinsing.

Dental treatment during pregnancy and breastfeeding

Most dental treatment can be carried out safely during pregnancy. Emergency care should not be delayed during pregnancy.

In general, elective treatment is best performed in the second trimester (the fourth, fifth and sixth months) of pregnancy. Treatment is avoided if possible (or undertaken with additional considerations):

- in the first trimester because patients are more likely to feel unwell and can have a strong gag reflex
- in the third trimester (from mid-trimester onward) because of the risk of supine hypotension. If a procedure is required, precautions such as positioning a patient in the chair so that they are tilted to their left can reduce the risk of hypotension.

Elective procedures requiring general anaesthesia or intravenous sedation should be deferred until after the birth and, preferably, until after breastfeeding has stopped. If the patient is unsure whether they are pregnant, defer elective treatment decisions until pregnancy status is known.

If intraoral radiographs are necessary for assessment or diagnosis of infection or trauma, concern about radiation exposure is not a reason to defer them. The [Australian Radiation Protection and Nuclear Safety Agency \(ARPANSA\) guidelines](#) state that intraoral radiographs are not contraindicated during pregnancy; however, a leaded drape is recommended when the X-ray beam is directed downwards towards the patient's trunk (eg when taking occlusal views of the maxilla).

Before prescribing a drug for a patient who is pregnant or breastfeeding, consider the general principles of drug use in [pregnancy](#) or [breastfeeding](#), as well as the safety of the individual drug. Advice on prescribing in pregnancy is available from [drug information sources](#) including medicines information services. Local anaesthetics can be used for dental procedures in patients who are breastfeeding without the need to disrupt their usual schedule, because distribution into breast milk is minimal.

For advice on pregnancy-associated oral health conditions and their management, see [Oral and dental health in people planning pregnancy or who are pregnant: advice for medical practitioners](#). Patients can call 1300 MEDICINE (1300 633 424) for information from a pharmacist about use of medicines during pregnancy and breastfeeding.

References: Principles of diagnosis and management in dental practice

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Principles of safe prescribing for dentists

Principles of safe prescribing for dentists

The information included in this topic is appropriate for dental practice and may not be applicable to other areas of medicine.

For legislation pertaining to obtaining, possessing, prescribing, selling, supplying or administering medicines in each of the states and territories, see [Legislative Acts and Regulations relevant to prescriptions and prescribing](#). Dentists should follow the appropriate legislation for their state or territory because it defines their rights and responsibilities regarding prescribing in their state.

Prescribing rights are specific to an individual practitioner and cannot be delegated or shared. Safe and competent prescribing requires dentists to know when and when not to prescribe. Dentists may prescribe prescription-only drugs and drugs available over the counter, provided the drug is for the dental treatment of a patient under their care and the prescription complies with the relevant state or territory legal requirements. Dentists should not prescribe drugs to treat conditions outside their scope of practice, even if a condition arises as a result of another drug the dentist prescribed. Prescriptions must be written for use by the person named on the prescription; a prescription must not be written for a specific patient to obtain stock for use in the practice on multiple patients.

A prescription must not be written for a specific patient to obtain stock for use in the practice on multiple patients.

Dentists may not order repeat prescriptions on the Pharmaceutical Benefits Scheme (PBS). State and territory legislation regulates repeat prescribing of non-PBS items by dentists.

Legislation about prescribing for staff, family or friends, or for the purpose of self-administration, varies between individual states and territories; however, self-prescribing and prescribing for staff, family or friends is generally not recommended.

Expectations for how prescribers will undertake judicious, appropriate, safe and effective prescribing are outlined in the Australian national [Prescribing Competencies Framework](#). An approach to good prescribing is summarised in [Ten Principles of Good Prescribing](#), a printable poster from the British Pharmacological Society. Requirements for safe and competent prescribing include reviewing the patient's medical and medication history (see [Dental practice: taking a history](#)) and screening for potential adverse drug reactions and drug interactions (see [Sources of drug information for dentists](#)).

Considerations when prescribing drugs of dependence in dental practice

Considerations when prescribing drugs of dependence in dental practice

Drugs of dependence include some Schedule 4 drugs (eg most benzodiazepines) and all Schedule 8 drugs (controlled drugs), as outlined in the relevant [state and territory legislation](#). Dentists should be aware of the relevant legislation for their state or territory that regulates their rights to prescribe drugs of dependence and how to write the prescriptions.

Additional considerations apply when prescribing drugs of dependence.

In most states and territories, dentists can prescribe a drug of dependence for a patient under their care provided all the following points are fulfilled:

- They do so in accordance with legal requirements.
- They have taken all reasonable steps to ascertain the identity of that person.
- They have ensured that a therapeutic need exists.
- The drug is required for dental treatment.

Nonmedical use (use that does not align with the directed use) of drugs of dependence, particularly opioids, is increasingly prevalent. The Addiction guidelines include this as a disorder of substance use; the most severe form is substance dependence. If a patient requests drugs of dependence, particularly if they exhibit a good level of knowledge or preference for a specific drug, consider that they may have a disorder of substance use; for more advice, see Psychiatric disorders and disorders of substance use: dental considerations. Contact police as well as state or territory health departments for advice on reporting lost or stolen prescription pads, which could be used to fraudulently obtain drugs of dependence; some states or territories have online notification systems.

When prescribing drugs of dependence to any patient, check the **state- and territory-based real-time prescription monitoring systems** (a mandatory requirement in some states). These systems monitor prescribing and dispensing of drugs of dependence and provide alerts in high-risk situations (eg prescriptions from multiple providers, high-risk combinations of drugs or when the opioid dose threshold has been exceeded); for contact details of real-time prescription monitoring systems, see Table 22.2 in the Addiction guidelines.

The Prescription Shopping Program can be contacted for information on whether a patient has reached certain thresholds for several categories of Pharmaceutical Benefits Scheme (PBS) items dispensed; monitoring includes some drugs of dependence and items prescribed by multiple providers.

Legislative Acts and Regulations relevant to prescriptions and prescribing

Legislative Acts and Regulations relevant to prescriptions and prescribing

The Poisons Standard is a federal government document that classifies medicines and chemicals into Schedules 1 to 10, to describe how their use and availability in Australia should be regulated. States and territories incorporate the Poisons Standard classification into their own state drugs and poisons Regulations. These Regulations vary significantly between individual states and territories.

For more information, see the Poisons Standard and the relevant state or territory Acts and Regulations that define a practitioner's prescribing rights, listed below. Drugs and poisons legislation is constantly updated.

Australian Capital Territory

Drugs of Dependence Act 1989

Drugs of Dependence Regulation 2009

Medicines, Poisons and Therapeutics Goods Act 2008

Medicines, Poisons and Therapeutics Goods Regulation 2008

New South Wales

Medicines, Poisons and Therapeutic Goods Act 2022 No 73

Poisons and Therapeutic Goods Act 1966

Poisons and Therapeutic Goods Regulation 2008

Northern Territory

Medicines, Poisons and Therapeutic Goods Act 2012

Medicines, Poisons and Therapeutic Goods Regulations 2014

Queensland

Medicines and Poisons Act 2019

Medicines and Poisons (Medicines) Regulation 2021

South Australia

Controlled Substances Act 1984

Controlled Substances (Poisons) Regulations 2011

Tasmania

Poisons Act 1971

Poisons Regulations 2018

Victoria

Drugs, Poisons and Controlled Substances Act 1981

Drugs, Poisons and Controlled Substances Regulations 2017

Western Australia

Medicines and Poisons Act 2014

Medicines and Poisons Regulations 2016

Costs of medicines prescribed by dentists

Costs of medicines prescribed by dentists

The Pharmaceutical Benefits Scheme (PBS) subsidises certain medicines prescribed by dentists (Dental Items) – see the [PBS website](#). Medicines not listed as Dental Items by the PBS can be prescribed by dentists, but the patient will have to pay the full cost when the medicine is dispensed. Prescription-only nonsubsidised medicines can be prescribed as a ‘private’ (‘non-PBS’) prescription. For details on how to write PBS and private prescriptions, see [Dental practice: writing the prescription](#).

The role of the dentist in supplying medicines

The role of the dentist in supplying medicines

The roles of prescribing and supplying medicines to patients are usually separated to avoid a conflict of interest and promote medication safety. Dentists supplying medicines directly to patients should do so to the same dispensing standard [\[Note 1\]](#) as a pharmacist, including labelling, packaging, recording and patient advice. For a summary of the legal and professional requirements for supply of medicines, see [Table 13.1](#). Medicines supplied by a dentist are not subsidised by the Pharmaceutical Benefits Scheme (PBS); for more information, see [advice on the costs of medicines prescribed by dentists](#). It is outside a dentist’s training and scope of practice to compound medicines for supply to patients [\[Note 2\]](#); for more detail, see [Use of compounded medicines in dental practice](#).

Dentists supplying medicines directly to patients should adhere to the same dispensing standards and legal requirements expected of a pharmacist. Table 13.1 Guidance for the supply of medicines by a dentist to a patient Check that the medicine is suitable for supply

Check that the medicine contains the exact ingredients and strengths intended.

Check that the medicine is within its expiry date.

Consider whether the medicine requires reconstitution before supply.

Label the container in English in accordance with state legislation and Appendix L of the Poisons Standard

Include the following in the label of the medicine:

- generic or brand name of the ingredient drug(s)
- strength and form of the ingredient drug(s)
- total quantity in the container
- patient name
- name of supplying dentist, practice address and telephone number
- date of supply
- comprehensive instructions for use, including advice on whether to take the medicine with food and how to store the product
- safety warnings about sedation – these are required by law if the drug is listed in Appendix K of the Poisons Standard
- the words KEEP OUT OF REACH OF CHILDREN (in red on a white background)
- the word POISON or FOR EXTERNAL USE ONLY (in red on a white background) if the product is for external use only.

Batch and expiry date on a container must not be obscured by the label.

Recheck safety aspects, educate the patient and document the supply

Recheck the patient's name, age, and history of allergy and adverse drug reactions before supplying the medicine.

Explain the purpose of the medicine, the duration of use, how to use it safely and what to do if adverse effects occur.

Provide a consumer medicine leaflet if available and the patient has not had the product before.

Record in the patient history the medicine given, indication, brand of medicine supplied, dose recommended, quantity given and advice provided including whether a consumer medicine leaflet was given.

Note 1: The Pharmacy Board of Australia guidelines define dispensing as 'the review of a prescription and the preparation, packaging, labelling, record keeping and transfer of the prescribed medicine, including counselling to a patient, their agent, or another person who is responsible for the administration of the medicine to that patient'.

Note 2: A dentist can prepare a small amount of a medicine (eg crush a tablet in water to create a mouth rinse) for use during a dental appointment but it is outside a dentist's training and scope of practice to compound a medicine for a patient to use at home.

Dental practice: writing the prescription

Dental practice: writing the prescription

A prescription is a legal document, written as a communication tool between a prescriber and a pharmacist, for preparing and dispensing a drug for a patient. Who can write prescriptions and how they should be written are outlined in the relevant state and territory legislation (see [Legislative Acts and Regulations relevant to prescriptions and prescribing](#)). For more information on the approach to safe prescribing, see [Principles of safe prescribing for dentists](#).

To reduce the potential for error, the prescriber must provide a prescription that is legible, clear and unambiguous. Although computer-generated prescriptions can be easier to read than handwritten prescriptions, errors can still occur.

Electronic prescribing (e-prescribing) provides prescriptions through electronic tokens (eg in text messages or email); it does not refer to printing a computer-generated prescription. Electronic prescribing requires software that conforms with requirements of the [Australian Digital Health Agency](#) that provides infrastructure with decision support tools and links to the Pharmaceutical Benefits Scheme (PBS) and Medicare.

Essential information required for a legal prescription written by a dentist varies slightly between individual states and territories, but generally comprises the items listed in [Figure 13.2](#).

[Figure 13.3](#) is an example of the format required for a legal prescription written by a dentist. [Figure 13.4](#) is an example of a prescription for a drug of dependence, which illustrates the additional safety considerations for a drug of dependence, such as the need to:

- include the patient's date of birth
- prescribe only for a short duration (rather than a full packet)
- use numbers and words to indicate the quantity of medication to be supplied.

Figure 13.2 Instructions for writing a prescription in dental practice

[Printable figure](#)

Use computer-generated prescriptions if possible to eliminate the use of handwriting.

Handwritten prescriptions should be in the writing of the authorised prescriber only. Prescriptions with more than one handwriting style may be rejected by a pharmacy on suspicion of fraud.

For an **item on the Pharmaceutical Benefits Scheme (PBS)**:

- a PBS prescription form may be used (available from Medicare Australia)
- in addition to the information specified below (see 'Items to include in the prescription'), place a tick in the PBS box.
- repeat prescriptions may not be ordered by dentists.

For an **item that is not on the PBS**:

- a PBS form may be used [NB1] but all references to PBS must be crossed out and the form endorsed with the words 'non-PBS prescription'
- PBS items and non-PBS items must be written on separate prescriptions.

Aim to make the prescription tamper-proof (unalterable); use indelible ink. If space is unused on the prescription, put a line across the area to prevent fraudulent addition of items.

Use plain English.

Do not use abbreviations or Latin terms, except for standard recommended abbreviations (eg mg for milligram, mL for millilitres, but do not abbreviate microgram) [NB2].

Avoid using decimal points if possible (eg write quantities less than 1 gram as milligrams, and quantities less than 1 milligram as micrograms).

If using a decimal point for a quantity less than 1, put a '0' in front of the point (eg '0.5' not '.5').

Limit the number of items on a prescription to 3, or limit it to one if prescribing a drug of dependence.

Items to include in the prescription:

- prescriber's name, address, telephone number and qualifications
- prescriber number
- patient's full name (given and family names) and address
- date of birth, age and weight (for children)
- date of birth on prescriptions for drugs of dependence and monitored medicines [NB3]
- date the prescription is written
- drug name in full – prescribing by active ingredient (use of the generic name) is mandatory for printed or electronic prescriptions and is good practice for all prescribers
- drug strength (eg 250 mg, 500 mg)
- drug form (eg tablet, capsule, mixture)
- drug dose, route of administration and frequency, written clearly (in plain English) – it is not appropriate to write 'take as directed'
- duration of treatment, especially for antibiotics (a requirement of the PBS)
- quantity of drug to be supplied – for a **drug of dependence**, the prescription must **use numbers and letters** to specify the quantity
- further instructions necessary for the pharmacist. For off-label use (eg use of topical corticosteroids inside the mouth), include a comment that the intended use is off-label but appropriate and ask the pharmacist to reassure the patient that it is safe.
- the words 'For dental treatment only'
- handwritten signature of the prescriber.

NB1: Instructions for writing a prescription for a non-PBS item are outlined on the flap of the PBS prescription pad.

NB2: For further detail, see the Australian Commission on Safety and Quality in Healthcare publication [Recommendations for terminology, abbreviations and symbols used in medicines documentation](#).

NB3: Monitored medicines are medicines subject to real-time prescription monitoring (see [Considerations when prescribing drugs of dependence in dental practice](#)).

Figure 13.3 Example of the format required for a legal prescription written by a dentist for an item on the Pharmaceutical Benefits Scheme (PBS)

<p>Prescriber details</p> <p>Dr J Smith BDSc Address Telephone number PBS prescriber number</p>	
<p>Patient's details</p> <p>Patient's Medicare number 1234 56789 1 2 Patient's name Jane Citizen Patient's address 1 Sample St, Sample Town</p>	
<p>Child's date of birth, age and weight</p> <p>Date of birth: 30 / 12 / 2019 Age: 4 yrs Weight: 18 kg</p>	
<p>Ticked PBS box</p> <p><input checked="" type="checkbox"/> PBS <input type="checkbox"/> RPBS <input type="checkbox"/> Brand substitution not permitted</p>	
<p>Drug dose, route of administration, frequency and duration in plain English</p> <p>Rx Phenoxymethypenicillin 50 mg/mL suspension Give 225 mg (4.5 mL) orally, 4 times a day at 6-hourly intervals for 5 days 300 mL x 3</p>	
<p>Quantity to be supplied</p> <p>Quantity to be supplied</p>	
<p>All handwriting to be that of the authorised prescriber only</p> <p>All handwriting to be that of the authorised prescriber only</p>	
<p>Lines across unused space</p> <p>Lines across unused space</p>	
<p>Prescriber's signature and date of prescription</p> <p>Signature  Date 1 / 12 / 2024</p>	
<p>Include 'For dental treatment only'</p> <p>For dental treatment only</p>	

Figure 13.4 Example of the format required for a legal prescription written by a dentist for a drug of dependence

to illustrate the additional safety considerations

<div style="border: 1px dashed #ccc; padding: 5px; margin-bottom: 10px;">Date of birth is required</div> <div style="border: 1px dashed #ccc; padding: 5px; margin-bottom: 10px;">Specify the quantity of drug in numbers and words</div> <div style="border: 1px dashed #ccc; padding: 5px; margin-bottom: 10px;">Only one item per script. Cross out empty space to prevent additions</div>	<p>Dr J Smith BDSc Address Telephone number PBS prescriber number</p> <p>Patient's Medicare number 1234 56789 1 2 Patient's name John Citizen Patient's address 1 Sample St, Sample Town</p> <p>Date of birth: 30 / 30 / 1989</p> <p><input checked="" type="checkbox"/> PBS <input type="checkbox"/> RPBS <input type="checkbox"/> Brand substitution not permitted</p> <p>Rx</p> <p>Oxycodone immediate-release 5 mg tablet Take ONE tablet every 4 to 6 hours as needed for severe dental pain 30 (ten) tablets. No repeats</p> <p>Signature _____ Date 1/32/2024</p> <p>For dental treatment only</p>
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Dental practice: discussing the prescription with the patient

Dental practice: discussing the prescription with the patient

When prescribing drugs, provide the patient with specific information about the drug, including:

- the generic or approved name of the drug
- the expected therapeutic effect of the drug and how long it will take to start working
- instructions on how to use the drug, including the dose, route, timing in relation to food, duration and frequency of use (eg whether to take the drug regularly or as needed)
- potential adverse effects and what to do if they occur
- other precautions (eg possible interactions, maximum dose)
- when to return for review

- advice on who to contact if needed.

If a prescription is for off-label use, make the patient aware of this and inform them of the potential benefits and harms; for more advice on off-label prescribing, see [advice on off-label prescribing in dental practice](#).

Patients often do not remember the verbal instructions they are given during a consultation, so it is preferable to give both verbal and written instructions. Consumer medicine information (CMI) leaflets are available for the majority of medicines prescribed in Australia and should be offered when a drug is prescribed or supplied. These leaflets are available from pharmacies, some clinical software packages and online (eg the [Therapeutic Goods Administration \(TGA\) website](#)). For a printable patient information leaflet on use of opioids for acute pain at home, see [Opioid use patient information sheet](#).

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Common drugs used in dentistry

Common drugs used in dentistry

These guidelines include practical information on using the following drugs in dentistry:

- antimicrobial drugs
- analgesic drugs
- corticosteroids
- mouthwashes and other topical formulations
- local anaesthetics
- anxiolytic drugs.

For comprehensive drug information, including precautions, contraindications, adverse effects and drug interactions, consult an appropriate drug information resource.

If prescribing a drug for a dental indication, consider the balance of benefits and harms of the drug in the individual patient; this requires knowledge of the patient's medical and medication history, including prescription, over-the-counter and complementary medicines. For more information, see Dental prescriptions and prescription-writing.

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Sources of drug information for dentists

Sources of drug information include services, journals, books, electronic resources and websites.

Medicines information services

Medicines information services are available to support specific queries about medicines, for example via the [directory of medicines information services from Advanced Pharmacy Australia](#) (which may only be available in certain jurisdictions or health services), the [Australian Dental Association website](#), or other private providers.

Journals

Australian Dental Journal (ADJ) (can be accessed via the [Australian Dental Association website](#))

Australian Prescriber (can be accessed [online](#))

Books and electronic resources

Australian Medicines Handbook (AMH) – evidence-based medicines information; also includes drug interactions, calculators and average weight and height for children (can be accessed via the [Australian Dental Association website](#))

Therapeutic Guidelines – a source of independent and practical treatment advice for a wide range of clinical conditions

AusDI – a comprehensive medicines database that includes independent drug monographs, product summaries, and pharmaceutical company information (can be accessed via the [Australian Dental Association website](#))

MIMS – contains product information as provided by pharmaceutical companies and approved by the Australian Therapeutic Goods Administration (TGA), with additional features to support medicines choice and usage (available by subscription from the [MIMS website](#), including MIMS Drugs4dent)

Drugs and Lactation Database (LactMed) – contains information on excretion of drugs into breastmilk and their possible effects on a breastfeeding infant (available from the [National Institute of Health website](#))

Any recent textbook on clinical pharmacology and therapeutics

Websites

[Pharmaceutical Benefits Scheme \(PBS\)](#)

[Australian Dental Association](#)

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Overview of the principles of appropriate antimicrobial prescribing in dental practice

Overview of the principles of appropriate antimicrobial prescribing in dental practice

This topic outlines the principles of appropriate antimicrobial use for prophylactic, empirical and directed therapy in dental practice. More detailed advice for medical practitioners is available in the Antibiotic guidelines. Appropriate antimicrobial therapy improves patient outcomes, reduces unnecessary antimicrobial use and reduces adverse consequences for the patient and the community.

Appropriate antimicrobial prescribing includes the following steps:

- decide whether antimicrobial therapy is indicated, considering the balance of benefits and harms of antimicrobial therapy, including direct and indirect adverse effects
- consider whether antimicrobial therapy is prophylactic, empirical or directed
- collect samples for microbiological testing if possible (eg when draining pus in a spreading odontogenic infection); for details on sample collection, see Spreading odontogenic infections without severe local or systemic features
- select an appropriate antimicrobial agent for the indication (see Selecting an appropriate antimicrobial in dental practice)
- select an appropriate antimicrobial regimen, considering:
 - dose
 - frequency
 - route
 - in children, palatability and availability of an appropriate formulation
- prescribe the shortest possible duration of therapy, taking into consideration the condition being treated and the patient's clinical response (see Choosing the duration of antimicrobial therapy in dental practice)
- document the prescribed antimicrobial therapy in the patient's medical record or medication chart, including the dose, indication and the intended duration of therapy before further review or stopping therapy.

Principles of prophylactic antimicrobial therapy in dental practice

Principles of prophylactic antimicrobial therapy in dental practice

Prophylactic antimicrobial therapy aims to prevent infection when there is a significant clinical risk of infection developing. However, antimicrobial prophylaxis is usually not required for common dental procedures (for more detail, see Antibiotic prophylaxis for dental procedures).

Principles of empirical antimicrobial therapy in dental practice

Principles of empirical antimicrobial therapy in dental practice

Empirical antimicrobial therapy is used to treat an established infection when the pathogen has not been identified. Antimicrobial choice is based on the clinical presentation and the expected antimicrobial susceptibility of the most likely or important pathogen(s). Empirical therapy is reasonable in the following circumstances:

- when treatment must be started before the results of culture or susceptibility testing are available
- when the infection is not serious enough to warrant taking samples for culture
- if a sample for culture cannot be obtained.

Review empirical therapy as soon as possible. In hospital patients, therapy should be reviewed daily.

If the diagnosis excludes infection, stop antimicrobial therapy.

If a **pathogen is not identified**, re-evaluate the clinical and microbiological justification for therapy. If ongoing therapy is indicated, consider de-escalation (eg change parenteral therapy to oral therapy, or change a broad-spectrum to a narrower-spectrum antimicrobial).

If a **pathogen is identified**, follow the Principles of directed antimicrobial therapy in dental practice.

Principles of directed antimicrobial therapy in dental practice

Principles of directed antimicrobial therapy in dental practice

Directed antimicrobial therapy is used to treat an established infection when the pathogen has been identified, and an antimicrobial with activity against the pathogen can be selected.

Preliminary microbiology results (eg Gram stain) may allow targeting of antimicrobial therapy before definitive results are available; modify ongoing therapy once the pathogen and susceptibility are known.

Selecting an appropriate antimicrobial in dental practice

Selecting an appropriate antimicrobial in dental practice

To select the most appropriate antimicrobial for empirical antimicrobial therapy in general dental practice, factors to consider include:

- the required spectrum of activity (use the narrowest spectrum therapy required)
- potential adverse effects of the antimicrobial
- drug interactions
- patient factors, including:
 - patient preference
 - whether the patient has a history of antimicrobial hypersensitivity
 - whether the patient is pregnant or breastfeeding
 - whether the patient has a condition that alters pharmacokinetics (eg kidney impairment, cirrhosis)
- whether a suitable formulation is available – see Oral and enteral route of administration for antimicrobials in dental practice
- antimicrobial availability (see Antimicrobial drug shortages in the Antibiotic guidelines)
- antimicrobial stewardship principles.

Choosing a suitable route of administration for antimicrobials in dental practice

Choosing a suitable route of administration for antimicrobials in dental practice

Oral and enteral route of administration for antimicrobials in dental practice

Oral and enteral route of administration for antimicrobials in dental practice

For most infections, oral antimicrobial therapy is appropriate. Intravenous therapy may be required under specific circumstances – see Intravenous route of administration for antimicrobials to treat oral and dental infections.

If oral therapy is used, ensure that:

- the patient can tolerate the antimicrobial and has reliable gastrointestinal absorption
- the selected antimicrobial
 - is appropriate for the indication
 - has adequate tissue penetration at the infection site
 - has good bioavailability (see [Figure 13.5](#)).

Figure 13.5 Examples of antimicrobials used in dental practice with good oral bioavailability in adults[NB1]

The following examples are antimicrobials that have oral bioavailability over 90% at standard oral dosing:

- doxycycline
- metronidazole.

The following examples are antimicrobials that have oral bioavailability between 50 and 90% [NB2]:

- amoxicillin
- amoxicillin+clavulanate
- cefalexin
- clindamycin.

NB1: Bioavailability is the fraction of an administered drug that is absorbed into the systemic circulation in an unchanged form. This figure should not be extrapolated to children as bioavailability of antimicrobials in children differs from adults.

NB2: These antimicrobials may be given orally rather than parenterally; however, intravenous therapy is still required in patients with severe infection or where the chosen antimicrobial does not have adequate tissue penetration at the infection site.

For children unable to swallow tablets, the availability of a suitable drug formulation can affect antimicrobial choice. The *Australian Medicines Handbook Children's Dosing Companion* [[Note 1](#)] includes information about the administration of medicines to children (including information about palatability).

To enable administration in children, it may be possible to crush or disperse oral solid-dose formulations of antimicrobial. Considerations include:

- the suitability of the oral solid-dose formulation for crushing or dispersing – see the *Don't Rush to Crush* handbook [[Note 2](#)] for detailed advice
- the ability of carers to perform preparation steps
- patient acceptability (eg taste).

If the oral route is unsuitable, the enteral route (eg nasogastric [NG], nasoenteric, percutaneous endoscopic gastrostomy [PEG]) may be used.

Note 1: The Australian Medicines Handbook Children's Dosing Companion is available for purchase from the [Australian Medicines Handbook website](#).

Note 2: *Don't Rush to Crush* is available for purchase from the [Advanced Pharmacy Australia website](#) or through a subscription to *eMIMSplus*.

Intravenous route of administration for antimicrobials to treat oral and dental infections

Intravenous route of administration for antimicrobials to treat oral and dental infections

Intravenous antimicrobial administration is required to treat oral and dental infections when:

- urgent treatment is required for severe and rapidly progressing infection
- higher doses than can be administered or tolerated orally are required to achieve an effective concentration at the site of infection
- oral administration is not tolerated or not possible
- gastrointestinal absorption is likely to be significantly reduced (eg vomiting, gastrointestinal pathology)
- there is no oral antimicrobial with a suitable spectrum of activity.

Other routes of administration for antimicrobials in dental practice

Other routes of administration for antimicrobials in dental practice

Topical administration of antibacterials is associated with the emergence of resistant organisms and can cause hypersensitivity reactions.

Topical antifungals are used in the treatment of infections such as oral and oropharyngeal candidiasis; for more information on candidiasis, see [Oral and oropharyngeal infection caused by Candida and related species](#). Inappropriate use of topical antifungals may contribute to antifungal resistance.

Choosing the duration of antimicrobial therapy in dental practice

Choosing the duration of antimicrobial therapy in dental practice

Advice on duration is included in the clinical topics in these guidelines. The duration of therapy for some indications is based on clinical practice and experience because it is not clearly defined from published studies. In general, use the shortest possible duration of therapy, taking into consideration the condition being treated and the patient's clinical response.

If antibiotic therapy is necessary for dental infections, a short duration is usually sufficient because the key component of management is a dental procedure. For example, oral regimens of up to 5 days are appropriate for nonsevere [spreading](#)

odontogenic infections without severe local or systemic features or necrotising gingivitis. However, there are certain indications that require prolonged therapy (eg mandibular osteomyelitis).

Prolonged duration of antimicrobial therapy is associated with direct and indirect adverse effects, including gastrointestinal symptoms, rash, life-threatening hypersensitivity reactions, *Clostridioides difficile* (formerly known as *Clostridium difficile*) infection, infection caused by *Candida* and related species, selection of antibiotic-resistant organisms, and increased costs.

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What is antimicrobial stewardship (AMS) in dental practice?

Processing

Antimicrobial-stewardship-in-dental-practice c DTG Antimicrobial-stewardship-in-dental-practice topic 2

References

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Antimicrobial-stewardship-in-dental-practice r DTG Antimicrobial-stewardship-in-dental-practice topic 3

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Introduction to antimicrobial hypersensitivity in dental practice

Introduction to antimicrobial hypersensitivity in dental practice

This topic includes information for dental practitioners on:

- taking a clinical history to assess patients who report antimicrobial hypersensitivity
- implications of the clinical history of a reaction to an antimicrobial
- assessing and managing patients with penicillin hypersensitivity.

More comprehensive topics on antimicrobial hypersensitivity for non-dental practitioners are included in the Antibiotic guidelines. Information in the Antibiotic guidelines that may be useful to dental practitioners includes:

- an overview of antimicrobial hypersensitivity, including common misconceptions about antimicrobial allergy
- definitions of commonly used antimicrobial hypersensitivity terms, including features of immediate immune-mediated (IgE) and delayed immune-mediated (T-cell) hypersensitivity reactions.

Principles of assessing patients reporting antimicrobial hypersensitivity in dental practice

Principles of assessing patients reporting antimicrobial hypersensitivity in dental practice

Clinical history for initial assessment of patients reporting antimicrobial hypersensitivity in dental practice

Clinical history for initial assessment of patients reporting antimicrobial hypersensitivity in dental practice

Clinical history is critically important in the diagnosis of antimicrobial hypersensitivity. If a patient reports having antimicrobial hypersensitivity (allergy), see Figure 13.6 for questions to ask the patient. The main aims are to evaluate:

- the details of symptoms and signs – to distinguish between a hypersensitivity reaction and a predictable drug intolerance (eg nausea; vomiting; diarrhoea; headache; dizziness; itch without rash, fever or internal organ involvement)
- the severity of the reaction (eg a severe reaction requiring hospital treatment)
- timing to help distinguish between immediate and delayed hypersensitivity reactions
- whether the patient has tolerated the same antimicrobial, or an antimicrobial from the same class, since the reaction
- what other antimicrobials the patient may have taken since the reaction in question and how the patient reacted to the other antimicrobials.

A family history of antimicrobial allergy does not justify avoidance of the implicated drug.

Figure 13.6 Questions to ask patients reporting an antimicrobial allergy in an antimicrobial allergy assessment in

dental practice

Severity and type of reaction

Do you remember the details of the reaction?

How was the reaction managed? Did it require treatment or hospitalisation?

Timing

How long after taking the antibiotic did the reaction occur?

How many years ago did the reaction occur?

Antibiotic use since reaction

Are there other antibiotics that you have taken without problems since the reaction?

For an approach to interpreting the history from a patient reporting **hypersensitivity to penicillins**, see [Figure 13.7](#).

Implications of the clinical history of a reaction to an antimicrobial for dental practice

Implications of the clinical history of a reaction to an antimicrobial for dental practice

Communicate any new details of the clinical history of a drug reaction to the patient's medical practitioner.

If the clinical history suggests that the reported reaction is a drug intolerance (eg gastrointestinal disturbance) rather than a hypersensitivity reaction, **direct delabeling** of the patient's allergy (ie removal of a patient's reported antibiotic allergy based on their history alone) by a medical practitioner is appropriate. This step assists antimicrobial selection by removing an inappropriate restriction on antimicrobial choice.

If the clinical history supports hypersensitivity, the patient's medical practitioner can consider whether **allergy testing** (using skin prick or oral challenge) and, rarely, **desensitisation**, are appropriate. Allergy testing should only be performed by someone with expertise in antimicrobial allergy testing with appropriate consultation, consent, medical supervision and equipment to manage severe allergic reactions. Desensitisation (induction of temporary tolerance) is a specialised allergy management strategy that may be considered by medical practitioners for specific patients (eg patients with severe immediate IgE-mediated hypersensitivity) if a specific antimicrobial is preferred or no alternative antimicrobials are available. Desensitisation is contraindicated in patients with severe delayed hypersensitivity.

In patients whose clinical history supports **penicillin hypersensitivity**, further assessment and management advice is summarised in [Figure 13.7](#).

For management of patients with a history of **cephalosporin hypersensitivity**, seek expert advice.

Seek medical advice if unsure of the implications of a possible reaction (to any drug) for dental prescribing.

Penicillin hypersensitivity: information for dentists

Penicillin hypersensitivity: information for dentists

Assessing patients reporting penicillin hypersensitivity in dental practice

Assessing patients reporting penicillin hypersensitivity in dental practice

To assess a possible penicillin hypersensitivity reaction:

- take a thorough clinical history

- interpret the significance of the history, including whether the reported reaction is a drug intolerance or whether the clinical history supports hypersensitivity.

These steps inform decisions on managing patients reporting penicillin hypersensitivity.

Managing patients reporting penicillin hypersensitivity in dental practice

Managing patients reporting penicillin hypersensitivity in dental practice

Management of patients reporting penicillin hypersensitivity depends on many factors, including the likelihood of cross-reactivity with a cephalosporin. Consider whether antimicrobial therapy is necessary, and the balance of benefits and harms.

Figure 13.7 provides a guide for clinicians to classify penicillin hypersensitivity reactions; subsequent antibiotic choice is described for patients with:

- immediate severe penicillin hypersensitivity
- immediate nonsevere penicillin hypersensitivity
- delayed severe penicillin hypersensitivity
- delayed nonsevere penicillin hypersensitivity.

The guidance in this topic is a simplified summary of a complex clinical problem; the Antibiotic Expert Group recognises that there are variations in how penicillin hypersensitivity is managed, and that specialists may choose to manage patients differently after weighing up the balance of benefits and harms in an individual.

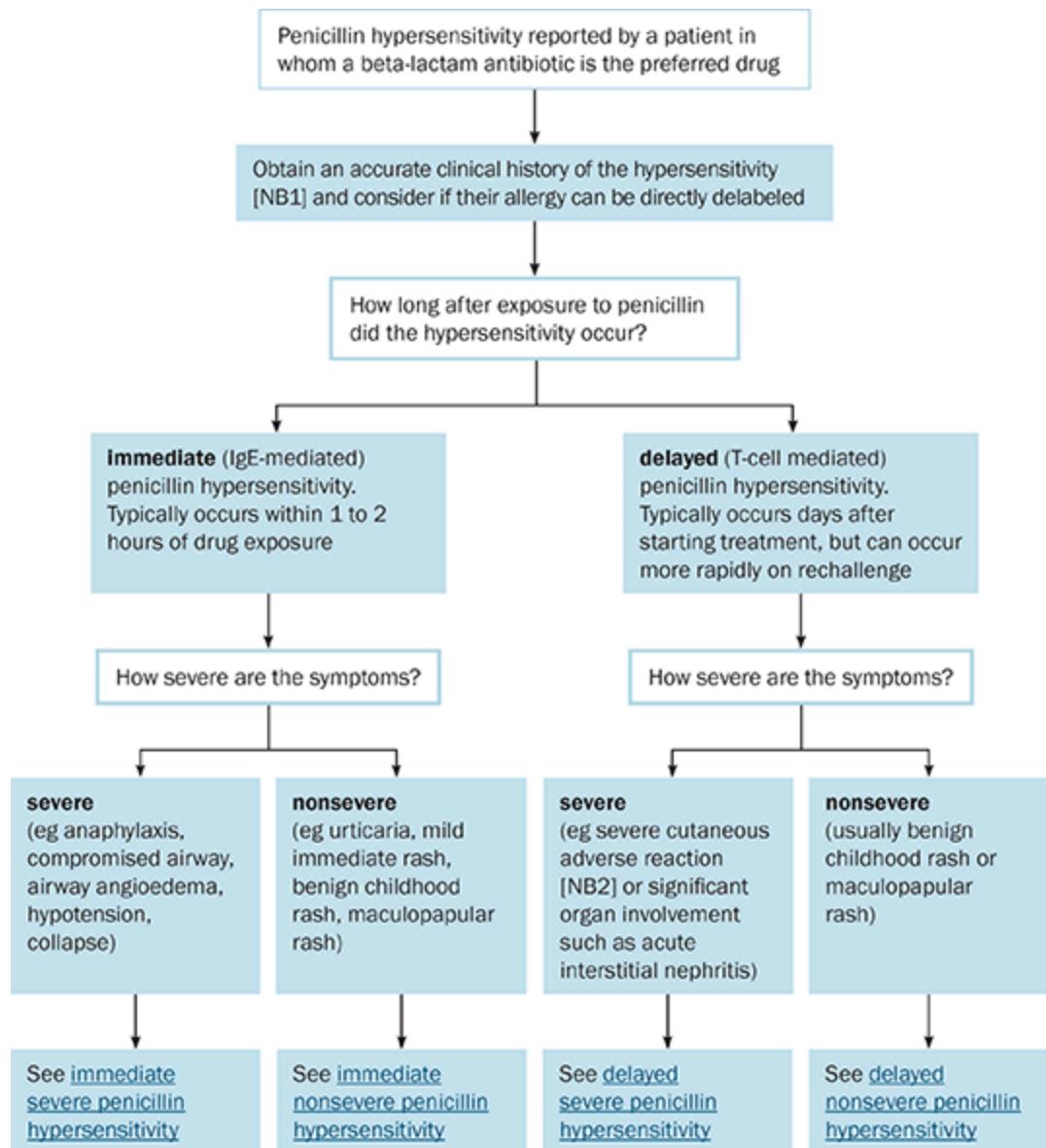
The likelihood of cross reactivity between penicillins and cephalosporins affects the safety of using certain antimicrobials; advice on appropriate alternatives to penicillins has been provided within drug recommendations in these guidelines.

If the nature or severity of a reaction to any penicillin is unclear despite careful history-taking, dental practitioners should consult with the patient's medical practitioner to investigate further, if possible, before prescribing a non-beta lactam. Risks of non-beta-lactam alternatives (eg clindamycin) include antibiotic-associated diarrhoea and antimicrobial resistance.

For management of patients with a history of **cephalosporin hypersensitivity**, seek expert advice.

Figure 13.7 Approach to assessment and management of patients reporting hypersensitivity to penicillins in whom a beta-lactam antibiotic is the preferred drug

[Printable figure](#)



NB1: For more detail on clinical features of immediate severe hypersensitivity, see [Figure 13.77](#).

NB2: For advice on intravenous antibiotic choice in a hospital setting, see [here](#) in the Antibiotic guidelines.

Figure 13.9 Antibiotic choice in dental practice for community-based patients with an immediate nonsevere penicillin hypersensitivity[NB1] [NB2]

Liaise with a medical practitioner so that they can consider whether the patient's allergy can be directly delabeled or whether allergy testing under specialist supervision is appropriate (where such testing is available).

Avoid:

- penicillins (eg amoxicillin, benzylpenicillin, phenoxycephalothin)

Safe to administer:

- cephalosporins (eg cefalexin [NB3])

NB1: Features of immediate nonsevere hypersensitivity include mild urticaria (hives), mild immediate rash, benign childhood rash or maculopapular rash. For more details, see [Immediate immune-mediated \(IgE\) hypersensitivity reactions](#).

NB2: For advice on intravenous antibiotic choice in a hospital setting, see [here](#) in the Antibiotic guidelines.

NB3: Cefalexin may be used in patients who have had a nonsevere (immediate or delayed) reaction to penicillins, including amoxicillin or ampicillin. However, because cross-reactivity between cefalexin and either amoxicillin or ampicillin is possible, consider the extent of the amoxicillin or ampicillin reaction, patient acceptability, and the suitability of non-beta-lactam options (eg clindamycin).

Figure 13.10 Antibiotic choice in dental practice for community-based patients with a delayed severe penicillin hypersensitivity[NB1] [NB2]

Avoid:

- penicillins (eg amoxicillin, benzylpenicillin, phenoxycephalothin)
- cephalosporin (eg cefalexin)
- penicillin desensitisation

Safe to administer:

- non-beta-lactam antibiotics (eg clindamycin)

NB1: Severe delayed hypersensitivity reactions include cutaneous adverse drug reactions (eg drug rash with eosinophilia and systemic symptoms [DRESS], Stevens–Johnson syndrome / toxic epidermal necrolysis [SJS/TEN], severe blistering or desquamative rash), and significant internal organ involvement (eg acute interstitial nephritis). For more details, see [Delayed immune-mediated \(T-cell\) hypersensitivity reactions](#).

NB2: For advice on intravenous antibiotic choice in a hospital setting, see [here](#) in the Antibiotic guidelines.

Figure 13.11 Antibiotic choice in dental practice for community-based patients with a delayed nonsevere penicillin hypersensitivity[NB1] [NB2]

Liaise with a medical practitioner so that they can consider whether the patient's allergy can be directly delabeled or whether allergy testing under specialist supervision is appropriate (where such testing is available).

Avoid:

- penicillins (eg amoxicillin, benzylpenicillin, phenoxyethylpenicillin)

Safe to administer:

- cephalosporins (eg cefalexin [NB3])

NB1: Delayed nonsevere hypersensitivity reactions include benign childhood rash and maculopapular rash. For more information on delayed nonsevere hypersensitivity reactions, see [Delayed immune-mediated \(T-cell\) hypersensitivity reactions](#).

NB2: For advice on intravenous antibiotic choice in a hospital setting, see [here](#) in the Antibiotic guidelines.

NB3: Cefalexin may be used in patients who have had a nonsevere (immediate or delayed) reaction to penicillins, including amoxicillin or ampicillin. However, because cross-reactivity between cefalexin and either amoxicillin or ampicillin is possible, consider the extent of the amoxicillin or ampicillin reaction, patient acceptability, and the suitability of non-beta-lactam options (eg clindamycin).

Cross-reactivity between penicillins and cephalosporins: information for dentists

Cross-reactivity between penicillins and cephalosporins: information for dentists

The prevalence of cross-reactivity between beta lactams is not known precisely. It is a common misconception that cephalosporin allergy occurs in approximately 10% of patients who are allergic to a penicillin. Immune-mediated penicillin hypersensitivity was historically thought to be due solely to the beta-lactam ring structure that is common to all beta-lactam antibiotics (penicillins, cephalosporins, carbapenems and monobactams). However, clinical data show that most reactions occur in response to antigenic molecules in the R1 side-chain that distinguishes individual penicillins and cephalosporins from one another. Cross-reactions are uncommon unless drugs share the same or similar R1 side-chains; for examples of drugs with identical or similar R1 side-chains, see [Table 13.3](#). Recent evidence suggests that less than 1.5% of patients with a confirmed penicillin allergy have a cephalosporin allergy; this rate is similar to the incidence of new drug allergies or reactions to structurally dissimilar medications in patients with prior drug allergies.

The [American Academy of Allergy, Asthma, and Immunology \(AAAAI\)](#) and the [American College of Allergy, Asthma, and Immunology \(ACAAI\)](#) practice parameter update suggests around 2% of patients with a confirmed penicillin allergy will experience a reaction to a cephalosporin. It also suggests that less than 5% of patients with an unconfirmed penicillin allergy are truly allergic; when patients with an unconfirmed penicillin allergy are given cephalosporins, the chance of a reaction is very low, with a probability of around 0.1% (ie $0.05 \times 0.02 = 0.001$).

The permissibility of cephalosporins in patients with penicillin hypersensitivity depends on the type of allergy; see:

- nonsevere (immediate or delayed) hypersensitivity
 - severe immediate hypersensitivity – also consider the similarity of the beta-lactam R1 side-chain
 - severe delayed hypersensitivity.

For definitions of the types of hypersensitivity, see Definition of commonly used antimicrobial hypersensitivity terms.

Advice on appropriate alternatives to penicillins is also provided within drug recommendations in these guidelines.

Table 13.3 Examples of beta-lactam antibiotics with similar or identical R1 side-chains

amoxicillin, ampicillin cefalexin, cefaclor

cefaclor amoxicillin, ampicillin, cefalexin

cefalexin amoxicillin, ampicillin, cefaclor

cefazolin

-

cefuroxime	cefepime, ceftriaxone, cefotaxime, ceftazidime
cefepime	cefuroxime, ceftriaxone
ceftriaxone	cefuroxime, cefepime, cefotaxime
cefotaxime	cefuroxime, cefepime, ceftriaxone
ceftazidime	cefuroxime, aztreonam

Nonsevere (immediate or delayed) hypersensitivity: information for dentists on implications of cross-reactivity between penicillins and cephalosporins

Nonsevere (immediate or delayed) hypersensitivity: information for dentists on implications of cross-reactivity between penicillins and cephalosporins

Cephalosporins are safe to administer to patients with nonsevere (immediate or delayed) penicillin hypersensitivity.

Although cefalexin (an aminocephalosporin) contains a similar R1 side-chain to aminopenicillins (ie amoxicillin and ampicillin), it can still be administered in patients with nonsevere (immediate or delayed) hypersensitivity to penicillins (including amoxicillin or ampicillin). However, because cross-reactivity between cefalexin and either amoxicillin or ampicillin is possible, consider the extent of the amoxicillin or ampicillin reaction, patient acceptability, and the suitability of non-beta-lactam options (eg clindamycin).

Severe immediate hypersensitivity: information for dentists on implications of cross-reactivity between penicillins and cephalosporins

Severe immediate hypersensitivity: information for dentists on implications of cross-reactivity between penicillins and cephalosporins

For patients with severe immediate penicillin hypersensitivity in **community dental practice**, avoid all penicillins and cephalosporins. Although cross-reactivity is generally unlikely, it is more challenging to manage a severe immediate hypersensitivity reaction in the community than in hospital (where resuscitation facilities are more readily available). A non-beta-lactam is the recommended alternative.

Avoid prescribing any cephalosporins in the community to a patient with immediate severe penicillin hypersensitivity.

In a **hospital setting**, antibiotics that do not share the same or similar R1 side-chain to penicillins (eg cefazolin) are considered safe to administer to patients with severe immediate hypersensitivity to penicillins, provided certain factors are considered; see **Severe immediate hypersensitivity: Implications of cross-reactivity between penicillins and cephalosporins** in the Antibiotic guidelines. In contrast, the aminocephalosporins (cefalexin and cefaclor) share the same or similar R1 side-chain with the aminopenicillins (amoxicillin and ampicillin) so should not be administered to a patient with severe immediate hypersensitivity to amoxicillin or ampicillin. Most cross-reactivity reported in the literature is between aminopenicillins and aminocephalosporins; rates of cross-reactivity between drugs that do not share a similar R1 side-chain are exceedingly low.

Cefalexin or cefaclor should not be administered to a patient with severe immediate hypersensitivity to amoxicillin or ampicillin because of their similar R1 side-chains.

Severe delayed hypersensitivity: information for dentists on implications of cross-reactivity between penicillins and cephalosporins

Severe delayed hypersensitivity: information for dentists on implications of cross-reactivity between penicillins and cephalosporins

Avoid all penicillins and cephalosporins in patients with severe delayed penicillin hypersensitivity (eg drug rash with eosinophilia and systemic symptoms [DRESS], Stevens–Johnson syndrome / toxic epidermal necrolysis [SJS/TEN], severe blistering or desquamative rash, significant internal organ involvement [eg acute interstitial nephritis]).

Avoid all penicillins and cephalosporins in patients with severe delayed penicillin hypersensitivity.

Cross-reactivity between penicillins and cephalosporins is less well described in patients with severe delayed penicillin hypersensitivity than in those with immediate hypersensitivity. Rarely, patients may be allergic to the beta-lactam ring structure (common to all penicillins and cephalosporins) and not the R1 side-chains (which vary between drugs).

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Introduction to practical information on using antimicrobials in dental practice

Introduction to practical information on using antimicrobials in dental practice

This topic covers practical information on using the antimicrobial drugs recommended in these guidelines. For comprehensive drug information, including precautions, contraindications, adverse effects and drug interactions, consult an appropriate drug information resource. If prescribing an antibacterial drug, consider the balance of benefits and harms of the drug in the individual patient; this requires knowledge of the patient's medical and medication history, including prescription, over-the-counter and complementary medicines. For more information, see Dental prescriptions and prescription-writing.

For a more comprehensive discussion of antimicrobial drugs see the Antibiotic guidelines.

Beta lactams used in dental practice

Beta lactams used in dental practice

Beta lactams are antibiotics that have a beta-lactam ring in their structure. Beta lactams include cephalosporins, penicillins and carbapenems.

Beta lactams have a wide therapeutic index (a wide difference in drug concentration between effective and toxic thresholds). In most patients, beta lactams do not cause significant adverse effects. Serious, but infrequent, adverse effects of beta lactams include neurological toxicity, nephrotoxicity, hepatotoxicity, hypersensitivity, and neutropenia.

Beta lactams used in dental practice: cephalosporins

Beta lactams used in dental practice: cephalosporins

Widespread use of cephalosporins is linked to an increasing prevalence of infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), multidrug-resistant gram-negative bacteria and *Clostridioides difficile* (formerly known as *Clostridium difficile*).

Cefalexin and **cefazolin** have a moderate spectrum of antibacterial activity. They are active against streptococci, staphylococci and a narrow range of aerobic gram-negative bacteria, but are inactive against methicillin-resistant *Staphylococcus aureus* and some anaerobes. In some circumstances, cefalexin or cefazolin can be used as a penicillin alternative in patients hypersensitive to penicillins (see Penicillin hypersensitivity).

Beta lactams used in dental practice: penicillins

Beta lactams used in dental practice: penicillins

Benzylpenicillin (penicillin G) and **phenoxyethylpenicillin** (penicillin V) are narrow-spectrum penicillins. They are active against numerous oral pathogens, including *Peptoniphilus* (formerly *Peptostreptococcus*) species, *Actinomyces* species, most *Streptococcus* species and other oral anaerobes (eg *Fusobacterium* species). They are inactivated by strains that produce beta-lactamase enzymes.

Benzylpenicillin is given parenterally. For susceptible infections (such as spreading odontogenic infections), it is the treatment of choice because of its narrow spectrum of activity.

Phenoxyethylpenicillin is given orally. For susceptible organisms, phenoxyethylpenicillin is preferred to amoxicillin because of its narrower spectrum of activity. Ideally, it should be dosed at 6-hourly intervals, but for practical purposes, it is reasonable to space the 4 doses evenly during waking hours.

Amoxicillin and **ampicillin** are moderate-spectrum penicillins. They are active against the pathogens treated by benzylpenicillin and phenoxycephalothin but are more active against some gram-negative bacteria (eg *Escherichia coli*, *Haemophilus influenzae*). Like benzylpenicillin and phenoxycephalothin, amoxicillin and ampicillin are inactivated by strains that produce beta-lactamase enzymes.

Combining **amoxicillin** with **clavulanate** significantly broadens the spectrum of activity of amoxicillin. Clavulanate is a beta-lactamase enzyme inhibitor with little inherent antibacterial activity; it inhibits the beta-lactamase enzymes produced by *Staphylococcus aureus*, *Bacteroides fragilis* and *Haemophilus influenzae*, and some of the beta-lactamase enzymes produced by *Escherichia coli* and *Klebsiella* species.

Because of its broad spectrum of activity, amoxicillin+clavulanate has a limited role in the treatment of odontogenic infections. It is used when narrower spectrum regimens are not suitable. Additional treatment (eg metronidazole) for anaerobic bacteria is usually not required with amoxicillin+clavulanate.

Although there is limited clinical evidence to support the commonly used dose of oral amoxicillin+clavulanate (875+125 mg orally, 12-hourly) for some indications, it is widely used in practice without notable clinical failures. However, this dose may not be adequate to treat some pathogens, including *Haemophilus influenzae*. For treatment of odontogenic infections in these guidelines, the recommended dosage of amoxicillin+clavulanate is 875+125 mg orally, 8-hourly, because *Haemophilus influenzae* is a potential pathogen.

Intravenous amoxicillin+clavulanate is recommended for a limited number of infections in these guidelines. At the time of writing, there is limited clinical evidence to determine the optimal dosage regimen of intravenous amoxicillin+clavulanate:

- For adults and children who weigh 40 kg or more, amoxicillin+clavulanate 1+0.2 g intravenously, 6-hourly or 2+0.2 g intravenously 8-hourly can be used; pharmacokinetic/pharmacodynamic modelling suggests that both regimens reach similar target attainment. The choice of regimen is influenced by patient factors (eg impaired kidney and liver function) and drug availability.
- For children who weigh less than 40 kg, there are few data to determine intravenous amoxicillin+clavulanate dosing. In these guidelines, the recommendations reflect the dosages commonly used in Australian clinical practice, with a consideration of pharmacokinetic and pharmacodynamic principles.

Lincosamides used in dental practice

Lincosamides used in dental practice

The lincosamides **clindamycin** and **lincomycin** are active against most anaerobic bacteria (eg *Peptoniphilus* [formerly *Peptostreptococcus*] species, *Porphyromonas gingivalis*, *Prevotella oralis*, *Bacteroides fragilis*) and some aerobic bacteria (eg *Staphylococcus aureus*, most *Streptococcus* species).

In dental practice, lincosamides should be reserved for the treatment of susceptible infections in patients with severe hypersensitivity to a penicillin [[Note 1](#)].

There are more clinical and microbiological data to support the use of clindamycin than lincomycin. Intravenous lincomycin can be used at an equivalent dosage if clindamycin is unavailable or if a local protocol recommends its use.

Clindamycin and lincomycin have similar adverse effects; they can both cause antibiotic-associated diarrhoea.

Note 1: **Severe immediate** hypersensitivity reactions include anaphylaxis, compromised airway, airway angioedema, hypotension and collapse. **Severe delayed** hypersensitivity reactions include cutaneous adverse drug reactions (eg drug rash with eosinophilia and systemic symptoms [DRESS], Stevens–Johnson syndrome / toxic epidermal necrolysis [SJS/TEN], severe blistering or desquamative rash), and significant internal organ involvement (eg acute interstitial nephritis).

Macrolides used in dental practice

Macrolides used in dental practice

Azithromycin is a macrolide that has a broad spectrum of activity. Its use in these guidelines is limited to prophylaxis against infective endocarditis, and only in patients in whom penicillins and cephalosporins are inappropriate because of hypersensitivity.

Azithromycin can prolong the QT interval on an electrocardiogram, which is associated with a rare risk of life-threatening cardiac arrhythmias in patients with risk factors (eg congenital long QT syndrome, use of other drugs that prolong the QT interval). For more information on drugs that prolong the QT interval, see the [CredibleMeds website](#). Before prescribing azithromycin, consult the patient's medical practitioner to clarify whether the patient has contraindications to, or precautions for, use of azithromycin (eg congenital long QT syndrome, current use of another drug that prolongs the QT interval).

Nitroimidazoles used in dental practice

Nitroimidazoles used in dental practice

The nitroimidazole **metronidazole** has activity against almost all gram-negative anaerobic bacteria (eg *Bacteroides fragilis*) and most gram-positive anaerobic bacteria (eg *Clostridium* species).

Metronidazole may cause nausea, vomiting, flushing, headache and palpitations if taken concomitantly with alcohol. Although clinical data on the frequency of this reaction are conflicting, avoidance of alcohol during treatment and for at least 24 hours after completing the course of metronidazole is suggested.

For the treatment of mixed aerobic and anaerobic infections in these guidelines, the recommended dosage of metronidazole is 400 mg orally or 500 mg intravenously, 12-hourly. The 12-hourly dosing regimen is based on pharmacokinetic data and minimum inhibitory concentrations of the pathogens involved, in addition to limited clinical studies and extensive clinical experience with its use.

Tetracyclines used in dental practice

Tetracyclines used in dental practice

The tetracycline doxycycline has a broad spectrum of activity, which includes activity against gram-positive and gram-negative bacteria.

Short courses (up to 10 days) of doxycycline have not been associated with tooth discolouration, enamel hypoplasia or bone deposition, even in children. However, use in children who have difficulty swallowing tablets is limited because an oral liquid formulation is not marketed in Australia.

Oesophagitis can occur with oral doxycycline. Oral doxycycline should be taken with food and a large glass of water, and the patient should be instructed to remain upright after administration, for least 30 minutes. Photosensitivity reactions can occur with doxycycline; warn patients to avoid sun exposure.

Doxycycline has many clinically significant drug interactions. Consult an appropriate resource on drug interactions if starting or stopping these drugs in patients taking other drugs.

Antifungal drugs used in dental practice

Antifungal drugs used in dental practice

Topical azole antifungals used in dental practice

Topical azole antifungals used in dental practice

Miconazole and clotrimazole are broad-spectrum antifungals available in topical preparations, either alone or in combination with hydrocortisone. Use of topical azoles on the skin is generally well-tolerated. Oral miconazole gel can cause mild gastrointestinal adverse effects. Systemic absorption of miconazole can occur when applied topically to the oral mucosa.

Azoles have many clinically significant drug interactions. Consult an appropriate resource on drug interactions if starting or stopping azoles in patients taking other drugs.

Topical polyene antifungals used in dental practice

Topical polyene antifungals used in dental practice

Topical **nystatin** and **amphotericin B** are active against *Candida* species. They are poorly absorbed orally and not absorbed through the mucosa when applied topically, so do not cause systemic effects or drug interactions.

Nystatin suspension has a high sucrose content (approximately 50%), which may promote plaque accumulation and dental caries. Otherwise, topical intraoral polyenes have few adverse effects. Taking amphotericin lozenges after food reduces the risk of nausea.

Antiviral drugs used in dental practice

Antiviral drugs used in dental practice

Aciclovir, **famciclovir** and **valaciclovir** are active against herpes simplex and varicella zoster viruses. Aciclovir is poorly and erratically absorbed after oral administration, and even less so after topical administration. Valaciclovir, a prodrug of aciclovir, and famciclovir are well absorbed after oral administration; they are dosed less frequently than aciclovir.

In Australia, valaciclovir is not licensed for use in children younger than 12 years; however, it is licensed internationally for use in children older than 2 years. Famciclovir is not used in children.

Oral famciclovir is available for adults in a single dose as a pharmacist-only (Schedule 3) medicine for the treatment of mild recurrent herpes simplex virus infection of the lips (herpes simplex labialis or cold sores). Alternatively, topical aciclovir can be used but adherence can be challenging because it must be applied 5 times per day. Topical aciclovir should not be used inside the mouth because it may be irritant.

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Introduction to drugs used to treat acute pain in dentistry

Introduction to drugs used to treat acute pain in dentistry

This topic covers practical information on drugs used to treat acute and postprocedural dental pain. It includes advice on nonsteroidal anti-inflammatory drugs, paracetamol and opioids. Benzodiazepines are not appropriate for managing acute pain because they are not analgesics and their use may result in short- and long-term harms (eg excessive sedation, risk of dependence).

For comprehensive drug information, including precautions, contraindications, adverse effects and drug interactions, consult an appropriate drug information resource. If prescribing an analgesic drug or local anaesthetic, consider the balance of benefits and harms of the drug in the individual patient; this requires knowledge of the patient's medical and medication history, including prescription, over-the-counter and complementary medicines. For more information, see [Dental prescriptions and prescription-writing](#).

Before prescribing pain relief, take a thorough medication history, including use of over-the-counter analgesics. For a more comprehensive discussion of analgesic drugs, see:

- [Principles of NSAID use for musculoskeletal pain](#) and [Principles of paracetamol use for musculoskeletal pain](#) in the Rheumatology guidelines
- [Nonopioid analgesics in pain management](#) and [Opioids in pain management](#) in the Pain and Analgesia guidelines.

For information on local anaesthetics used in dentistry, see [Local anaesthetics in dentistry](#). For a more comprehensive discussion of local anaesthetics, see [Local anaesthetics for acute pain management](#) in the Pain and Analgesia Guidelines.

Nonsteroidal anti-inflammatory drug use in dentistry

Nonsteroidal anti-inflammatory drug use in dentistry

Overview of NSAIDs used in dentistry

Overview of NSAIDs used in dentistry

Nonsteroidal anti-inflammatory drugs (NSAIDs) include **nonselective** cyclo-oxygenase (COX) inhibitors (eg ibuprofen, naproxen) and **COX-2-selective inhibitors** (eg celecoxib, etoricoxib). COX-2-selective inhibitors are sometimes referred to as coxibs.

NSAIDs are the preferred drug class for acute and postprocedural dental pain; however, they can cause significant renal, cardiovascular, gastrointestinal, respiratory and haematological adverse effects – these are summarised in [Table 13.4](#).

Table 13.4 Major adverse effects of NSAIDs used in dentistry

System Adverse effects

renal acute or chronic kidney impairment

cardiovascular increased blood pressure, fluid retention, worsening of heart failure, myocardial infarction, stroke, death from a cardiovascular cause

gastrointestinal upper abdominal pain, peptic ulcer disease (oesophageal, gastric, duodenal ulceration), gastric erosions, gastrointestinal bleeding, gastrointestinal perforation

respiratory bronchospasm in patients with NSAID-exacerbated respiratory disease [NB1]

haematological impaired platelet function [NB1]

reproductive maternal and fetal risks

NSAID = nonsteroidal anti-inflammatory drug

NB1: This adverse effect occurs with nonselective NSAIDs but not COX-2-selective NSAIDs.

Assessing whether NSAID use is appropriate in dentistry

Assessing whether NSAID use is appropriate in dentistry

NSAIDs are the preferred analgesics for acute and postprocedural dental pain in most patients because they have anti-inflammatory actions, are effective for bone pain, reduce opioid requirements (which reduces risk of opioid-induced nausea and vomiting) and improve pain management when used as part of multimodal analgesia [[Note 1](#)].

Before prescribing an NSAID, weigh the balance of benefits and harms (see [Table 13.4](#)) in the individual; the risk of harm depends on patient factors and the NSAID used. If unsure of the safety of short-term NSAID use for a patient, consult a medical practitioner.

The risk of harm from NSAIDs increases with age, higher doses, duration of treatment, and concomitant use of some drugs.

NSAID use is contraindicated in some people because of significant risk of harm – see [Figure 13.12](#) for a list of patients who should not be prescribed an NSAID by a dentist. Paracetamol is preferred in people who cannot use an NSAID; if paracetamol is not suitable or does not provide sufficient analgesia, consider a short course of an opioid. If neither option is suitable, seek medical advice on pain management.

Figure 13.12 Patients who should not be prescribed an NSAID by a dentist[NB1]
patients with severe **kidney impairment** (eGFR of less than 30 mL/min)

patients with **cirrhosis** of the liver (see [Principles of analgesic use in patients with cirrhosis](#))

patients with severe **heart failure**

patients with a recently diagnosed **peptic ulcer** or **gastrointestinal bleeding**

patients at higher risk of **bleeding** because of reduced clotting factors (eg patients with haemophilia or von Willebrand disease) or low platelet counts (eg in bone marrow disorders such as leukaemia or aplastic anaemia)

patients with **multiple risk factors** for increased NSAID toxicity (eg older patients with a history of gastrointestinal bleeding)

eGFR = estimated glomerular filtration rate; NSAID = nonsteroidal anti-inflammatory drug

NB1: Consider asking the patient to access their electronic health record during the consultation (see [advice on taking a history](#)) to obtain more information on their health status).

To decide whether it is safe to prescribe NSAIDs in patients with without contraindications for NSAID use, consider the patient's risk factors for:

- renal toxicity
- cardiovascular toxicity
- gastrointestinal toxicity.

Consider the cumulative risk of NSAID toxicity if more than one risk factor is present.

The use of NSAIDs in older patients and pregnant or breastfeeding patients and patients who may have NSAID-induced respiratory symptoms requires extra consideration.

In all patients, NSAID use should be restricted to the **shortest possible duration**. Use for more than 5 days is not recommended in any patient for managing acute pain without medical consultation. Durations shorter than 5 days are preferred if NSAIDs are used in patients at increased risk of NSAID toxicity (provided contraindications have been excluded). Even in patients at low risk of NSAID toxicity, steps should be taken to minimise harm; see practical advice to minimise harms from NSAIDs.

Note 1: Although most of the evidence for NSAIDs as part of multimodal analgesia comes from postoperative pain, the findings are considered relevant for most acute pain settings.

Renal toxicity of NSAIDs and its impact on choice of NSAID in dentistry

Renal toxicity of NSAIDs and its impact on choice of NSAID in dentistry

NSAIDs should not be prescribed by a dentist for patients with severe kidney impairment; for other contraindications, see Figure 13.12.

Acute kidney injury is a serious adverse effect associated with all NSAIDs. Risk factors for NSAID-induced acute kidney injury include:

- older age
- pre-existing kidney impairment
- conditions that reduce blood flow to the kidneys (eg dehydration, sepsis, heart failure, cirrhosis, nephrotic syndrome)
- current use of some classes of drug used to treat hypertension or heart failure
 - angiotensin converting enzyme inhibitors (ACEIs) such as perindopril
 - angiotensin II receptor blockers (ARBs) alone (eg candesartan), or in combination with other drugs (eg sacubitril+valsartan, which is used to treat heart failure)
 - diuretics
- current use of other nephrotoxic drugs (such as immunosuppressant drugs used in patients undergoing a transplant).

The risk of acute kidney injury is cumulative – for example, the risk is significantly increased if an NSAID is co-administered with an ACEI (or an ARB) plus a diuretic, or if an older patient taking an NSAID develops an acute illness associated with dehydration.

To choose an appropriate analgesic regimen for patients at increased risk of renal toxicity, consult a medical practitioner to determine whether NSAID use is appropriate, unless paracetamol alone is expected to provide sufficient analgesia.

Cardiovascular toxicity of NSAIDs and its impact on choice of NSAID in dentistry

Cardiovascular toxicity of NSAIDs and its impact on choice of NSAID in dentistry

NSAIDs should not be prescribed by a dentist for patients with severe heart failure; for other contraindications, see Figure 13.12.

All NSAIDs have some cardiovascular risk. If possible, avoid all NSAIDs in people with established cardiovascular disease (eg heart failure, stroke) or who are at high risk of cardiovascular disease. Paracetamol is an alternative to NSAID use for mild to moderate pain. In adults with severe pain, use paracetamol with oxycodone (see [Analgesic regimens for severe acute and postprocedural dental pain in adults](#)).

If alternatives to NSAIDs are not suitable, short-term use (eg for less than 5 days) of NSAIDs other than diclofenac may be appropriate for people who have increased cardiovascular risk.

Risk factors for increased cardiovascular toxicity with NSAID use include:

- established cardiovascular disease (eg myocardial infarction, stroke)
- risk factors for cardiovascular disease (including smoking, older age, hypertension, dyslipidaemia and diabetes).

If a patient has a concurrent increase in risk of [renal](#) or [gastrointestinal](#) toxicity from NSAIDs, NSAIDs should not be prescribed by a dentist.

If a decision is taken to use an NSAID in a patient at increased risk of cardiovascular toxicity:

- consider that ineffective pain relief can cause tachycardia, which may cause adverse cardiovascular effects
- limit treatment to less than 5 days
- use celecoxib [[Note 2](#)] or ibuprofen (naproxen can be used, but has been associated with a higher risk of gastrointestinal adverse effects)
- avoid diclofenac and COX-2-selective NSAIDs other than celecoxib.

Note 2: Celecoxib is not subsidised on the Pharmaceutical Benefits Scheme for dental prescribers.

Gastrointestinal toxicity and its impact on choice of NSAID in dentistry

Gastrointestinal toxicity and its impact on choice of NSAID in dentistry

NSAIDs should not be prescribed by a dentist for patients with recently diagnosed peptic ulcer or gastrointestinal bleeding; for other contraindications, see [Figure 13.12](#).

Risk factors (which may not all be independent of each other) for increased gastrointestinal toxicity with NSAID use include:

- older age (age-related changes in the gastrointestinal mucosa may make it more vulnerable)
- history of upper gastrointestinal bleeding or peptic ulcer disease
- *Helicobacter pylori* infection
- current use of drugs that increase the risk of upper gastrointestinal bleeding or perforation (eg anticoagulants, antiplatelet drugs, selective serotonin reuptake inhibitors [SSRIs], serotonin noradrenaline reuptake inhibitors [SNRIs], systemic corticosteroids)
- smoking.

Consult a medical practitioner about the balance of benefits and harms before prescribing NSAIDs for patients taking corticosteroids or anticoagulants.

If a patient has a concurrent increase in risk of [renal](#) or [cardiovascular](#) toxicity from NSAIDs, NSAIDs should not be prescribed by a dentist.

If a decision is taken to use an NSAID in a patient at increased risk of gastrointestinal toxicity:

- limit treatment to less than 5 days
- use a COX-2-selective NSAID (eg celecoxib [[Note 3](#)])
- avoid nonselective NSAIDs (eg ibuprofen, diclofenac, naproxen).

Note 3: COX-2-selective NSAIDs have a lower risk of gastrointestinal adverse effects than nonselective NSAIDs; however, this advantage is reduced if the patient is taking low-dose aspirin concurrently. COX-2 inhibitors are not subsidised on the Pharmaceutical Benefits Scheme for dental prescribers.

Considerations regarding NSAIDs for older people in dentistry

Considerations regarding NSAIDs for older people in dentistry

Assess the need for NSAIDs in older people particularly carefully by asking if they have a history of kidney, cardiovascular or gastrointestinal disease and reviewing their medical records, including test results; ask for records from the patient's medical general practitioner (see [advice on taking a history](#)). Older people are generally at increased risk of adverse effects of NSAIDs because they are more likely than younger people to have multiple medical conditions and be taking multiple medications; for example, NSAID use is contraindicated in an older person with a history of gastrointestinal bleeding (see [Figure 13.12](#) for other contraindications). However, age without other risk factors is not an automatic contraindication to prescribing NSAIDs.

If a decision is taken to use an NSAID in an older patient, limit treatment to less than 5 days.

Considerations regarding NSAIDs in dentistry for people who are pregnant or breastfeeding

Considerations regarding NSAIDs in dentistry for people who are pregnant or breastfeeding

Avoid NSAID use in pregnancy (other than in very limited circumstances) because of potential harms including:

- **risks to the patient** – in the first 8 weeks of pregnancy, miscarriage risk may be increased [[Note 4](#)]; in the third trimester, risks include prolonged labour and postpartum haemorrhage (bleeding during or after delivery)
- **risks to the fetus** – in second and third trimesters, risk are premature closure of the ductus arteriosus (altering blood flow in the fetal heart), kidney impairment, oligohydramnios (reduced amniotic fluid).

Avoid **COX-2-selective NSAIDs** (eg celecoxib, etoricoxib) from planned conception and throughout pregnancy because of a lack of data to demonstrate their safety).

A **nonselective NSAID** (eg ibuprofen, diclofenac, naproxen) may be considered (before 30 weeks gestation only) provided all the following apply:

- no alternative analgesic is suitable
- the potential patient benefits outweigh potential fetal harms and the balance of benefits and harms has been discussed with the patient
- nonpharmacological measures for reducing pain have been used
- the lowest dose of a nonselective NSAID is prescribed for the shortest duration. Do not prescribe NSAIDs for more than 48 hours after 20 weeks gestation unless on medical or obstetric advice; NSAIDs must not be continued after 30 weeks gestation.

Avoid NSAID use in pregnancy except in very limited circumstances.

Small amounts of NSAIDs are excreted into breast milk; however, these amounts are unlikely to cause harm to breastfed infants. Ibuprofen is the preferred NSAID for patients who are breastfeeding. Advise a breastfeeding patient to feed their baby just before taking their medication, to minimise the amount of drug in the breastmilk.

Before prescribing an NSAID for a patient who is pregnant or breastfeeding, consider the general principles of drug use in pregnancy or breastfeeding as well as the safety of the individual drug.

Note 4: A 2014 population-wide cohort study that adjusted for potential confounders found no increase in the risk of miscarriage in people taking NSAIDs in early pregnancy. However, guidelines still recommend avoiding NSAIDs or using them with caution in pregnant people up to 8 weeks gestation because older data suggest an increased risk of miscarriage.

Considerations regarding NSAIDs in dentistry for people who may have NSAID-induced respiratory symptoms

Considerations regarding NSAIDs in dentistry for people who may have NSAID-induced respiratory symptoms
In patients who have experienced new-onset or worsening of respiratory symptoms (eg nasal congestion, runny nose, chest tightness or difficulty breathing) after taking an NSAID:

- use a COX-2-selective NSAID (eg celecoxib [[Note 5](#)])
- avoid nonselective NSAIDs (eg ibuprofen, diclofenac, naproxen).

Asthma is not a contraindication to NSAIDs unless the patient has experienced an exacerbation after taking NSAIDs; reactions are unlikely if a patient has previously used NSAIDs without difficulties. Seek medical advice if unsure of the significance of the patient's respiratory history.

Note 5: Celecoxib is not subsidised on the Pharmaceutical Benefits Scheme for dental prescribers.

Practical advice to minimise harms when prescribing short-term NSAIDs for acute dental or postprocedural pain

Practical advice to minimise harms when prescribing short-term NSAIDs for acute dental or postprocedural pain
To minimise harms in all patients prescribed short-term NSAIDs for acute dental or postprocedural pain, advise the patient to:

- combine the NSAID with paracetamol
- take the NSAID regularly for 1 to 2 days rather than as required, using the lowest effective dose
- switch the NSAID from regular to as-required use as the pain reduces, then stop the NSAID, then stop paracetamol
- use the NSAID for the shortest duration possible, and not more than 5 days without medical consultation (shorter use is advised for patients at increased risk of NSAID toxicity)
- contact the prescriber for review if the NSAID is still required after 5 days to avoid inadvertent long-term use.

It is no longer advised that NSAIDs be taken with food to reduce adverse effects, because there is no evidence to support this approach. Additionally, taking NSAIDs with food delays the peak concentration, reduces the rate of absorption, and can result in less effective relief of acute pain.

Paracetamol use in dentistry

Paracetamol use in dentistry

Paracetamol has analgesic and fever-reducing actions and a low incidence of adverse effects compared with other analgesic drugs. However, in overdose, it can lead to severe hepatotoxicity (see Paracetamol poisoning: advice for primary care providers in the Toxicology and Toxinology guidelines).

Although generally less effective than nonsteroidal anti-inflammatory drugs (NSAIDs) for acute dental or postprocedural pain, paracetamol is the drug of choice (if NSAIDs are contraindicated) because of its favourable safety profile.

Combining paracetamol with other analgesics can be more effective than monotherapy with any analgesic in treating acute dental or postprocedural pain. When used in combination with an opioid, paracetamol reduces the dose and/or duration of opioid required.

Paracetamol is available in multiple formulations (eg immediate-release, modified-release) and in combination with other drugs. Consider whether the patient is taking over-the-counter paracetamol and whether paracetamol is an ingredient in any of their medications. Make the patient aware that the maximum paracetamol dose is 4 g per day (6 modified-release tablets or 8 immediate-release tablets) and warn them to avoid inadvertent ingestion of higher-than-recommended doses.

Consider the paracetamol content of all of the patient's medications to avoid exceeding the maximum daily dose of 4 g per day.

In **adults** with liver disease, or who are underweight, cachectic or frail, usual doses of paracetamol are appropriate because paracetamol toxicity is rare at therapeutic doses; dose reduction is not routinely indicated and may result in inadequate analgesia and use of more harmful analgesics. If an adult has liver failure, or a combination of factors that together reduce the clearance of toxic paracetamol metabolites (eg they have liver disease and are underweight or frail), seek medical advice on paracetamol dosing.

For paracetamol dosing in **children** with any single factor that reduces clearance of toxic paracetamol metabolites (eg liver disease, being underweight or frail), seek expert advice on paracetamol dosing.

In adults and children at risk of impaired clearance of toxic paracetamol metabolites, the risk of liver damage is increased if supratherapeutic doses (doses greater than 4 g per day) are inadvertently taken.

In **children with obesity**, the dose of paracetamol should be calculated using ideal body weight rather than actual body weight (for more information on dosing, see advice on [Analgesic regimens for acute and postprocedural dental pain in children and adolescents](#)).

When prescribing paracetamol, the dose should be stated in grams or milligrams rather than the number of tablets or volume of liquid, unless the exact formulation to be administered has been specified.

Opioid use in dentistry

Opioid use in dentistry

Overview of opioid use in dentistry

Overview of opioid use in dentistry

In combination with nonopioid analgesics and nonpharmacological measures (eg a dental procedure), an immediate-release opioid may be used for acute severe nociceptive dental pain in adults (eg pain associated with major trauma, severe postoperative pain). For a definition of pain types, see [Overview of orofacial pain: information for dental practice](#). For drug recommendations, see [Analgesic regimens for severe acute and postprocedural dental pain in adults](#). Unless prescribed by a specialist, opioids should not be used for pain that is chronic, neuropathic or nociceptive, or for pain in patients younger than 16 years. For requirements for safe prescribing of opioids, see [Figure 13.13](#).

Figure 13.13 Requirements for safe prescribing of opioids in dentistry

Be familiar with the indications for which opioid use is appropriate.

Be familiar with the suitability of opioid use in specific populations (eg older or frail patients, patients with tolerance to opioids) because there is significant variability between patients in their responses to opioids.

Be aware that combinations of opioids are not recommended because they provide no additional benefit over use of a single opioid.

Weigh potential benefits of opioid use in an individual against potential harms.

Be familiar with the opioids suitable for use in dentistry and their available formulations (see [advice on choice of opioid in dentistry](#)).

Know how to manage potential drug interactions and adverse effects, and provide appropriate verbal and written education to patients about sedative effects (see [Harms of opioids use in dentistry](#), which contains a link to a printable patient information sheet).

Be aware of [legislation regulating prescribing drugs of dependence](#) including the need to check real-time prescription monitoring services.

Prescribe the lowest dose of an immediate-release preparation to be taken no more frequently than every 4 hours for the shortest duration possible to maximise benefits and minimise risk of adverse effects.

Supply the smallest quantity of opioids to limit excessive use and the chance of leftover doses being used indiscriminately afterward.

Be aware that long-term opioid use often starts with use in the acute pain setting.

Explain to a patient already taking a modified-release opioid preparation for chronic pain that their usual formulation will not be suitable for acute pain; discuss how to use their current plan for managing breakthrough pain to manage acute dental or postprocedural pain.

Prescribe the lowest dose of immediate-release opioid with dosing no more frequently than every 4 hours for the shortest duration possible. The smallest quantity should be supplied.

Harms of opioid use in dentistry

Harms of opioid use in dentistry

The spectrum and incidence of adverse effects does not vary markedly between individual opioid drugs (when comparing equianalgesic doses) but responses may vary significantly between individual patients. Older or frail patients may be particularly sensitive to opioids, so require careful monitoring.

Harms associated with opioids include:

- adverse effects – serious adverse effects (eg opioid-induced respiratory depression, accidental death) are more likely to occur when opioids are used in high doses or concomitantly with other sedative drugs (eg benzodiazepines, alcohol, cannabis, [gamma-hydroxybutyrate \[GHB\]](#)). [Table 13.5](#) lists adverse effects that can occur with short-term opioid use; for a more detailed discussion of the adverse effects of opioids, see [Opioid-related harms](#) in the Pain and Analgesia guidelines
- diversion of opioids to someone other than the person for whom they were prescribed
- nonmedical use – use that does not align with the directed use (eg use for a symptom other than the clinician intended or use to become intoxicated); this ranges in severity from hazardous use to substance dependence as outlined in the [Addiction guidelines](#)
- risk of overdose – increased opioid prescribing rates have been associated with a significant increase in the number of fatalities involving opioids
- neuroadaptive and physiological changes (eg opioid tolerance, dependence, and opioid-induced hyperalgesia) – can occur after as little as 7 to 10 days use.

Table 13.5 Adverse effects of short-term use of opioids in dentistry[NB1]

System

Adverse effects

respiratory

impaired ventilation – increases risk of accidental death [NB2]

	increased risk of central or obstructive apnoea
	cough suppression
	delirium, sedation, dysphoria or euphoria, impaired cognition
neurological	miosis
	muscle rigidity, myoclonus, seizures
cardiovascular	bradycardia, vasodilation and hypotension (including postural hypotension) – usually only seen after the use of large intravenous doses during anaesthesia or if the patient is hypovolaemic
dermatological	flushing, itching and hives – may be pseudoallergy [NB3]
	widespread urticaria ('hives') – suggests an allergic response
gastrointestinal	nausea, vomiting, constipation, abdominal pain
urinary	urinary retention and difficulty with micturition

NB1: For a more detailed discussion of the adverse effects of opioids, see [Opioid-related harms](#).

NB2: Excessive sedation or reduced respiratory rate impair ventilation, particularly during sleep. Sedation is a more sensitive indicator of opioid-induced ventilatory impairment than a decrease in respiratory rate.

NB3: Opioids can produce pseudoallergy by causing histamine release through a pathway separate to immunoglobulin E-mediated anaphylaxis. Pseudoallergy is usually limited to the skin, rarely causing bronchospasm or hypotension. Itch is most common, but hives and flushing can occur. Pseudoallergy does not require prior exposure to the particular opioid and can be dose dependent, so use the lowest dose of opioid for the shortest duration possible.

Provide appropriate verbal and written education to patients and their carers about the sedating effects of opioids, including instructions:

- to avoid driving or operating machinery
- on how to recognise excessive sedation (eg difficulty staying awake or being roused from sleep)
- to seek medical attention if the patient becomes excessively sedated (sedation is a potential early indicator that their breathing is inadequate) or experiences other concerning adverse effects.

For a printable patient information leaflet on use of opioids for acute pain at home, see [Opioid use patient information sheet](#). **Advise patients and their carers of the sedating effects of opioids.**

Constipation is a frequent adverse effect of opioids – advise patients to reduce the risk by increasing fluid and fibre intake and exercise; if constipation does develop, the patient should promptly start a stimulant laxative (eg docusate with senna). For more advice on management of opioid-induced constipation, see [Opioid-induced constipation in adults](#) in the Gastrointestinal guidelines.

Choice of opioid in dentistry

Choice of opioid in dentistry

Immediate-release opioids used for acute pain management in dentistry include oxycodone and tapentadol. Oxycodone is a full agonist at the main opioid target, the mu-opioid receptor. Tapentadol is sometimes referred to as an atypical opioid, because it has multiple mechanisms of action in addition to stimulating the mu-opioid receptor.

For information on the immediate-release opioids used in management of acute and postprocedural dental pain, see [Table 13.6](#).

Tramadol is an atypical opioid. It is a prodrug with active metabolites, so its effects can be unpredictable. Tramadol is not recommended in these guidelines for use in dentistry because it has serious adverse effects (which include increasing risk of seizures) and drug interactions (which can cause serotonin toxicity [\[Note 6\]](#)).

Despite significant clinical experience with its use, **codeine is no longer recommended for pain management** [\[Note 7\]](#) because its use is associated with more harm than benefit. There is high-certainty evidence that codeine (even in doses of 60 mg) is no more effective than the combination of paracetamol and ibuprofen. Potential harms of codeine use include:

- consequences of nonmedical use (use that does not align with directed use, such as use to become intoxicated)
- significant interpatient variability in the conversion of codeine (a prodrug) to morphine; as a result, some patients experience either minimal analgesic effect or morphine toxicity
- increased risk of toxicity in certain patient groups, including
 - patients who are ultrarapid metabolisers of codeine
 - children breastfed by patients taking codeine who may be undiagnosed ultrarapid metabolisers
 - children younger than 12 years
 - children aged 12 to 18 years who have recently had a tonsillectomy, adenoidectomy or both, for obstructive sleep apnoea.

Table 13.6 Immediate-release opioids used in acute and postprocedural dental pain management

oxycodone

preferred opioid because of:

- widespread experience with its use
- fewer drug interactions than tramadol
- more predictable pharmacokinetics and greater efficacy than codeine

the smallest dosage unit allows for a lower equivalent starting dose than tapentadol

tapentadol

an alternative in patients who cannot tolerate other opioids (eg opioids that trigger histamine release causing symptoms such as flushing, itching, hives, wheeze)

prescribing can be considered by experienced clinicians (eg dentists in a hospital setting, medical practitioners)

has a more potent opioid effect than tramadol, fewer adverse effects and interactions, and effects are more predictable than tramadol

limitations include:

- immediate release tapentadol is not available on the PBS [\[NB1\]](#)
- not legal for dentists practising outside of hospitals to prescribe tapentadol in New South Wales or for any dentists to prescribe tapentadol in Queensland at the time of writing

- the smallest dosage unit of immediate-release tapentadol is 50 mg; this is equivalent to 10 mg oxycodone, which is a high dose

risk of serotonin toxicity in patients taking drugs with serotonergic effects (eg selective serotonin reuptake inhibitors) [NB2]

NSAID = nonsteroidal anti-inflammatory drug; PBS = Pharmaceutical Benefits Scheme

NB1: Modified-release tapentadol is available on the PBS for prescription by medical and nurse practitioners (not dentists) but it is not suitable for managing acute pain because (like other modified-release opioids) it cannot be safely or rapidly titrated.

NB2: Signs of serotonin toxicity include altered mental status (eg agitation, anxiety, restlessness, confusion), autonomic stimulation (eg increased heart rate, increased blood pressure, fever, sweating, dilated pupils) and neuromuscular excitation (eg tremor, clonus, hyperreflexia, myoclonus, rigidity).

Note 6: Signs of serotonin toxicity include altered mental status (eg agitation, anxiety, restlessness, confusion), autonomic stimulation (eg increased heart rate, increased blood pressure, fever, sweating, dilated pupils) and neuromuscular excitation (eg tremor, clonus, hyperreflexia, myoclonus, rigidity).

Note 7: For more detail, see the [Therapeutic Goods Administration \(TGA\) Codeine information hub](#).

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Introduction to corticosteroids used in dentistry

Introduction to corticosteroids used in dentistry

This topic covers practical information on using corticosteroids in dentistry. For comprehensive drug information, including precautions, contraindications, adverse effects and drug interactions, consult an appropriate drug information resource. For a more comprehensive discussion of corticosteroids, see [Principles of immunomodulatory drug use](#) in the Rheumatology guidelines.

If prescribing a corticosteroid, consider the balance of benefits and harms of the drug in the individual patient; this requires knowledge of the patient's medical and medication history, including prescription, over-the-counter and complementary medicines. For more information, see [Dental prescriptions and prescription-writing](#).

Corticosteroids are used in the management of many dental and oral mucosal inflammatory conditions. In dentistry, routes of administration of corticosteroids include:

- [topical](#) (on the oral mucosa)
- [intralesional](#) (by specialists only)
- [intradental](#) (within a tooth)
- [systemic](#) (oral or intravenous administration).

The route of administration should be tailored to the clinical situation. In dentistry, intradental or topical corticosteroids are preferred because they are associated with fewer systemic adverse effects, and a local effect is often sufficient. Local intraoral injection of corticosteroids by general dental practitioners is neither appropriate nor recommended for dental procedures.

Topical corticosteroids used in dentistry

Topical corticosteroids used in dentistry

In dentistry, topical corticosteroids (eg creams, ointments, mouthwashes, sprays) are used to manage the symptoms of immune-mediated oral mucosal diseases, including conditions that present with recurrent or persistent oral ulceration. Although there is substantial clinical experience with intraoral use of topical corticosteroids, this practice is off-label and supported by little published evidence.

In the general dental practice setting, only mild or moderate potency corticosteroid creams or ointments should be used. Potent or very potent creams or ointments, or other formulations of topical corticosteroids, should not be started without specialist advice. [Table 13.7](#) lists the relative potency of corticosteroid creams and ointments.

Prolonged or sustained use of moderate, potent or very potent topical corticosteroids requires regular monitoring. Use of these higher potency corticosteroids increases the risk of systemic absorption, either through the oral mucosa or if inadvertently swallowed. Adrenal suppression has been documented with the use of high-potency topical corticosteroids.

Local adverse effects include candidiasis, mucosal atrophy, capillary fragility, telangiectasia, delayed wound healing and altered pigmentation. Predisposing factors for candidiasis and impaired wound healing include immune compromise, smoking, denture use and hyposalivation.

Table 13.7 Properties of topical corticosteroids used on the oral mucosa

Comparative potency on oral mucosa [NB1]	Drug [NB2]	Strength
Suitable for use on the oral mucosal use without specialist advice		
mild	hydrocortisone	0.5%, 1%
	hydrocortisone acetate	0.5%, 1%
moderate	triamcinolone acetonide	0.02%, 0.1%
Do not prescribe for oral mucosal use without specialist advice		
moderate	betamethasone valerate	0.02%, 0.05%
	betamethasone dipropionate	0.05%
	betamethasone valerate	0.1%
potent	methylprednisolone aceponate	0.1%
	methylprednisolone furoate	0.1%
	betamethasone dipropionate	0.05% in optimised vehicle
very potent	clobetasol propionate [NB3]	0.025 to 0.05%

NB1: Topical corticosteroids are more potent when applied to the oral mucosa than when applied to the skin.

NB2: Formulations include creams, ointments and pastes. Formulation of a drug can affect potency; a topical drug prepared as a cream is less potent than the same drug prepared as an ointment.

NB3: Clobetasol propionate as a cream or ointment is not registered for use in Australia, but is available via the [Special Access Scheme](#) or compounding pharmacies. Use only under specialist supervision.

Select a topical corticosteroid based on potency, lesion size and location, and the patient's preference and ability to adhere to instructions. Creams are water-based and easily applied to the oral mucosa, whereas oil-based ointments may be more difficult to apply; however, patients may have a preference because of taste, texture and ease of use.

The patient's pharmacist or medical practitioner may not be familiar with intraoral use of topical corticosteroids. Provide patients with written instructions that can be shared with their healthcare practitioner to explain the practice. See [Figure 13.14](#) for instructions on application of topical corticosteroids to the oral mucosa.

Figure 13.14 Patient instructions for applying a topical corticosteroid to the oral mucosa
[Printable figure](#)

It is not necessary to dry the mucosa first.

Apply a pea-sized amount of the cream or ointment to a clean fingertip, then smear a thin layer onto the affected area.

Hold in the mouth for 1 to 2 minutes without swallowing, and then spit out excess.

Follow the dentist's instruction for frequency of application.

Ideally, apply the corticosteroid after meals or oral hygiene practices.

Although the cream will be labelled 'For external use only', use on the oral mucosa is safe – systemic absorption from the mouth is minimal if used as instructed.

A compounded topical corticosteroid mouthwash may be used only on specialist advice for conditions such as oral lichen planus and oral lichenoid lesions, recurrent aphthous ulcers, mucous membrane pemphigoid and pemphigus vulgaris. Corticosteroid mouthwash should only be prescribed (by specialists or other practitioners experienced in its use) after a diagnosis has been confirmed.

Intralesional corticosteroids used in dentistry

Intralesional corticosteroids used in dentistry

Intralesional corticosteroids may be indicated for the management of localised ulcerative disease that is unresponsive to topical corticosteroids. Isolated ulcers occur in conditions such as oral lichen planus, oral graft-versus-host disease, lupus, traumatic ulcerative granuloma with stromal eosinophilia (TUGSE). Patients with these conditions should be referred for diagnostic work-up and management by an appropriate specialist.

Intradental corticosteroids used in dentistry

Intradental corticosteroids used in dentistry

Intradental corticosteroid and antibiotic combinations can be used in conjunction with procedures to manage pulp and periapical diseases, which are caused by bacteria and inflammation.

Two forms of corticosteroid and antibiotic combinations are commercially available for intradental use – a **water-soluble paste** and a **hard-setting paste that forms a cement**. The form used depends on the condition being treated and where the compound is to be placed.

Combination corticosteroid and antibiotic water-soluble **pastes** (eg triamcinolone with clindamycin or demeclocycline) can be used within the root canal system of a tooth (intracanal application). Pastes can be used:

- during endodontic treatment
- to reduce periapical inflammation and pain associated with irreversible pulpitis or an infected root canal system
- to prevent and manage several forms of inflammatory root resorption (eg internal inflammatory resorption, external apical inflammatory resorption, external lateral inflammatory resorption)
- to reduce external replacement resorption following tooth avulsion and intrusive luxation injuries.

Combination corticosteroid and antibiotic **cements** typically contain additional substances (eg calcium hydroxide, zinc oxide, eugenol). To prepare the cement, a powder and liquid are mixed to form a paste. The paste is placed on the dentine or exposed pulp [[Note 1](#)], and sets to form a hard cement. Cements can be used:

- within the crown of a tooth as part of a cavity lining or base
- as an indirect pulp cap
- as a direct pulp cap
- as a pulpotomy agent before restoring cavities in teeth that have reversible pulpitis.

Note 1: Advice for medical practitioners on temporary coverage of exposed dentine or dental pulp is available in [Figure 13.60](#).

Systemic corticosteroids used in dentistry

Systemic corticosteroids used in dentistry

Systemic corticosteroids are rarely appropriate for treating oral or dental conditions because they are associated with significant adverse effects – local applications are usually effective (see [advice on use of topical corticosteroids](#)).

Systemic corticosteroids should only be prescribed by a dental specialist. Indications for systemic corticosteroids include:

- limitation of severe postoperative swelling by use of a single intraoperative dose (evidence is insufficient to recommend use of corticosteroids postoperatively)
- severe trauma
- periapical nerve sprouting and acute apical periodontitis following removal of acutely inflamed pulp
- inflammatory mucosal disease.

For advice on postoperative pain and swelling, see [Complications of oral surgery](#).

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Introduction to mouthwashes and other topical formulations used in dentistry

This topic covers practical information on:

- [mouthwashes](#)
- [topical antiseptics for intraoral use](#)
- [topical benzodiazepine for intraoral use](#)
- [topical remineralising agents](#).

For advice on the use of topical corticosteroids, see [Topical corticosteroids used in dentistry](#).

For comprehensive drug information, including precautions, contraindications, adverse effects and drug interactions, consult an appropriate drug information resource. If prescribing a mouthwash or another topical formulation, consider the balance of benefits and harms of the drug in the individual patient; this requires knowledge of the patient's medical and medication history, including prescription, over-the-counter and complementary medicines. For more information, see [Dental prescriptions and prescription-writing](#).

Mouthwashes used in dentistry

[Antiseptic mouthwashes](#) decrease the number of microorganisms in the oral cavity and can be used for periodontal disease, dental caries, and pre- and postprocedural mouth rinsing.

Fluoride mouthwashes have significant benefits in patients at high risk of dental caries, but should only be used on the recommendation of a dentist. For advice on the use of fluoride mouthwashes, see [Table 13.17](#).

An anti-inflammatory and analgesic mouthwash provides symptomatic relief of some inflammatory oral mucosal diseases (see [Topical intraoral benzodiazepine for intraoral use](#)).

Lubricating mouthwashes (eg artificial salivary products, oral lubricants, sodium bicarbonate) can provide temporary symptomatic relief of [dry mouth](#).

Alcohol-containing mouthwashes may be associated with increased risk of oral cancer, and should be avoided, if possible. In addition, patients with oral mucosal disease and dry mouth should avoid alcohol-containing mouthwashes because they cause profound drying of the oral mucosa.

Topical antiseptics for intraoral use

Overview of topical antiseptics for intraoral use

Antiseptic mouthwashes decrease the number of microorganisms in the oral cavity.

Antiseptic mouthwashes can reduce plaque formation but do not reduce existing plaque, which must be removed with mechanical cleaning. Antiseptic mouthwash is not required as part of a standard oral hygiene routine (see [advice on oral hygiene](#) for more information).

The use of antiseptic mouthwashes in periodontal disease is controversial. They are only effective against supragingival plaque, and are not effective beyond the gingival crevice or periodontal pocket. Patients should be informed that the principal treatment for chronic periodontal disease is professional intervention with debridement of involved teeth and meticulous oral hygiene. Although antiseptic mouthwashes are not appropriate as the sole treatment for periodontal disease, they can be beneficial in some circumstances (eg for short-term use in patients with [gingivitis](#) or [necrotising gingivitis](#) when inflammation restricts normal toothbrushing).

Chlorhexidine for intraoral use

Chlorhexidine is bactericidal and fungicidal, and has activity against some viruses. Chlorhexidine adsorbs onto oral surfaces so is effective over a prolonged period. It prevents plaque formation on a clean tooth surface, but does not reduce pre-existing plaque.

Intraoral chlorhexidine formulations include mouthwash (as chlorhexidine gluconate in concentrations of 0.12% and 0.2%) and gel.

It was previously thought that chlorhexidine mouthwash was inactivated by the detergent sodium lauryl sulfate used in standard toothpaste; however, research has shown this is not the case. Although it is unlikely that there is an interaction between sodium lauryl sulfate and chlorhexidine gel, further evidence is required to confirm this.

Chlorhexidine can cause skin reactions, irritate mucosal surfaces and interrupt wound healing. Intraoral use can cause a burning sensation, altered taste and increased calculus formation; it can also cause brown discolouration of the teeth, tongue, buccal cavity and margins of dental restorations. Extrinsic staining can occur within a few days but is not permanent and can be professionally removed from the teeth. Chlorhexidine use is usually limited to short periods (up to 2 weeks) to minimise adverse effects.

Chlorhexidine allergy has been reported, sometimes life threatening. If a patient reports a history of allergy to chlorhexidine, it must be avoided via all routes of administration, including topical application. Subgingival irrigation using chlorhexidine is not recommended in any patient, because of a risk of allergy.

Hydrogen peroxide for intraoral use

Topical hydrogen peroxide has antiseptic properties. Short-term use of low-concentration hydrogen peroxide mouthwash (eg 1.5%) does not adversely affect the hard or soft tissues of the mouth. However, higher concentrations (eg 30 to 35%), such as in tooth-bleaching products, can cause mucosal burns. Reversible hypertrophy of the papillae of the tongue can occur with continued use of hydrogen peroxide mouthwash.

Other topical antiseptics for intraoral use

Cetylpyridinium chloride is a quaternary ammonium compound with surfactant, detergent and antibacterial properties; intraoral formulations include mouthwash, gargle and lozenges. Some formulations combine cetylpyridinium chloride with a local anaesthetic or an anti-inflammatory.

Povidone-iodine has antibacterial, antifungal and antiviral properties; intraoral formulations include mouthwash and gargle. Povidone-iodine can cause irritation of skin and mucous membranes. It is absorbed through damaged skin so application over a large area of broken skin is not recommended. Povidone-iodine should not be used during pregnancy or lactation because it can cause hypothyroidism in the neonate.

Mouthwashes containing **essential oils** (eg eucalyptol, menthol, thymol, methyl salicylate) have been found to have antiseptic properties and reduce plaque formation, but there is limited independent evidence of benefit.

Triclosan is not recommended; concerns include antimicrobial resistance and its environmental effects, particularly on aquatic organisms.

Topical benzodiazepine for intraoral use

Benzodiazepine is a nonsteroidal anti-inflammatory drug (NSAID) with analgesic properties, used for temporary relief of painful inflammatory oral mucosal conditions. Benzodiazepine formulations include mouthwash, intraoral gel and spray, in concentrations of 0.15 to 1%. Some formulations combine benzodiazepine with an antiseptic.

Local adverse reactions of benzodiazepine, such as numbness, burning, erythema and rash, have been occasionally reported. Systemic adverse reactions are uncommon.

Topical remineralising agents in dentistry

Fluoride for dental remineralisation

Fluoride significantly reduces the incidence of dental caries. Topically applied fluoride promotes enamel remineralisation through the formation of fluoride-containing apatites (eg fluorohydroxyapatite, fluorapatite), which are more resistant to future acid challenge than the carbonated hydroxyapatites of normal tooth enamel.

Fluoride ions have an antimicrobial effect at very high concentrations. Formulations with a low pH (eg acidulated phosphate fluoride) also have some antimicrobial activity.

Fluoride formulations include toothpaste, mouthwash, gel and varnish. The recommended concentration of fluoride toothpaste varies according to age and risk of dental caries (see [Fluoride use in dental practice](#)). For patients at elevated risk of dental caries, other topical products are available to [use at home](#) or to be [applied by a dental practitioner](#). For patients not willing to use fluoride, see advice on nonfluoride toothpaste in [Nonfluoride remineralising agents in dental practice](#).

Casein phosphopeptide-amorphous calcium phosphate for dental remineralisation

Casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) contains bioavailable calcium and phosphate ions, which can be used as an adjunct to fluoride to promote enamel remineralisation. CPP-ACP formulations include sugar-free chewing gum, paste and varnish, some of which also contain fluoride. Avoid CPP-ACP in patients with allergies to dairy products because the casein component is a milk protein. For more information on the use of CPP-ACP for dental caries, see [Nonfluoride remineralising agents in dental practice](#).

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General information about local anaesthetics in dentistry

General information about local anaesthetics in dentistry

Local anaesthetics are commonly used in dental practice. They provide effective pain control (analgesia) and have a low incidence of adverse effects. However, before administering a local anaesthetic, clinicians must understand the local and systemic complications that can arise.

In dentistry, the most common methods of local anaesthetic administration are:

- **infiltration** – local anaesthetic is injected adjacent to the site where analgesia is required
- **regional block** – local anaesthetic is injected adjacent to the nerve, proximal to the site where analgesia is required. A regional block aims to prevent pain being experienced in the nerve distribution distal to the injection site (eg mandibular [inferior alveolar nerve] blocks are usually used for procedures on the lower molars).

Topical administration of a local anaesthetic [\[Note 1\]](#) is indicated for minor procedures that cause pain (eg band removal, crown placement). It may also facilitate injection of local anaesthetic, particularly in anxious or needle-phobic patients by eliminating pain on the mucosal surface; however, patients may still experience discomfort upon injection of local anaesthetic into the deeper tissues.

The time to onset of local anaesthetic effect depends on the method used; analgesia occurs approximately 2 to 3 minutes after an infiltration injection, 4 to 5 minutes after a block injection, and 3 minutes after topical administration. Pulpal analgesia takes longer than analgesia of the soft tissues. The duration of effects depends on the local anaesthetic used, the dose and the method of administration. Advise patients of the likely duration of effect and the need to seek advice if they have not recovered in the expected timeframe.

Medical practitioners experienced in the use of local anaesthetic via infiltration or regional block may use these techniques for temporary relief of acute severe dental pain (eg irreversible pulpitis). Some local anaesthetics are available in single-use dental cartridges, which may be easier to use than vials containing multiple doses.

For comprehensive drug information, including precautions, contraindications, adverse effects and drug interactions, consult an appropriate drug information resource. If using a local anaesthetic, consider the balance of benefits and harms of the drug in the individual patient; this requires knowledge of the patient's medical and medication history, including prescription, over-the-counter and complementary medicines. Some conditions are contraindications to the use of adrenaline-containing solutions.

Note 1: Topical local anaesthetic formulations intended for use on the skin can be used off-label in the mouth; ensure any excess is spat out.

Adding vasoconstrictors to local anaesthetics in dentistry

Adding vasoconstrictors to local anaesthetics in dentistry

Local anaesthetics may be used in combination with a vasoconstrictor to prolong local anaesthetic effects. Vasoconstriction reduces the rate of local anaesthetic loss to the circulation and reduces bleeding, both during and after the procedure.

Adrenaline (epinephrine) is a commonly used vasoconstrictor in dental practice. Avoid adrenaline-containing solutions in patients with known sensitivity to sulfites [\[Note 2\]](#), because these solutions contain metabisulfites, used as preservatives (as antioxidants). For advice on management and follow up of patients who experience allergic reactions during dental procedures, see Allergies in dental practice.

Avoid adrenaline-containing solutions in patients who have had a myocardial infarction in the previous 6 months, unstable angina, uncontrolled hypertension, uncontrolled arrhythmias or uncontrolled hyperthyroidism.

If adrenaline cannot be used, local anaesthetic solutions containing felypressin (or local anaesthetic solutions without vasoconstrictors) are alternatives. **Felypressin** is an alternative vasoconstrictor to adrenaline (epinephrine) because it has minimal effects on the myocardium at the concentration used in dental cartridges (0.03 international units/mL). Felypressin is safe for dental use during pregnancy.

Note 2: There is no cross-reactivity between sulfite preservatives and sulfonamide antibiotics, sulfur or sulfates, although people can have multiple allergies.

Adverse effects of local anaesthetics in dentistry

Adverse effects of local anaesthetics in dentistry

General considerations regarding adverse effects of local anaesthetics in dentistry

General considerations regarding adverse effects of local anaesthetics in dentistry

Adverse effects of local anaesthetics include local complications, systemic toxicity and allergic reactions. Although local anaesthetic adverse effects are rare, clinicians should be familiar with their diagnosis and management. Resuscitation drugs and equipment, including oxygen, should be available for the immediate management of systemic toxicity. If adverse effects occur (or are suspected), stop administration of the local anaesthetic and provide appropriate management. Acute emergencies can arise with administration of local anaesthetics – for first-aid management, see Introduction to medical emergencies in dental practice.

Problems with injection technique or use of an incorrect site (due to interindividual anatomical variation) can result in:

- complete or partial failure of local anaesthetic effect – if this occurs, reassess the patient's anatomy and review the injection technique. A repeat injection may be attempted, provided the maximum dose is not exceeded
- trauma to the nerves and surrounding tissues – see Local complications of local anaesthetics in dentistry
- profound systemic effects if local anaesthetic is injected into a blood vessel (particularly if combined with a vasoconstrictor) – to mitigate the risk of intravascular injection, aspirate to exclude the presence of blood, then inject slowly and monitor the patient's response.

For more information on adverse effects of local anaesthetics, including in combination with vasoconstrictors, consult a comprehensive source of drug information.

Local complications of local anaesthetics in dentistry

Local complications of local anaesthetics in dentistry

Local neurological complications of local anaesthetic injections include paraesthesia, dysaesthesia, temporary facial nerve paralysis (eg paralysis of the periocular muscles) and prolonged anaesthesia. Most prolonged anaesthesia resolves spontaneously; permanent anaesthesia is rare. Causes of neurological complications include direct nerve trauma, indirect nerve trauma (from bleeding within the nerve sheath), or localised neurotoxicity.

The risk of nerve damage is also increased with repeated injections into a partially anaesthetised site.

Earlier retrospective studies on articaine use suggested an increased possibility of prolonged or permanent paraesthesia; however, more recent prospective studies have not supported this finding and generally show no significant difference when compared with other local anaesthetics, although data are limited because paraesthesia is a rare adverse event. Management of neurological symptoms following local anaesthetic injection usually involves reassurance and observation. Further treatment is rarely required; however, consider referral to an oral and maxillofacial surgeon if sensation has not improved after 3 months.

Trauma to the tissues (eg haematoma) can occur during injection of local anaesthetic. Accidental intramuscular injection of local anaesthetic can cause trismus, either as a direct effect of the drug or due to bleeding within the muscle. If trismus occurs, promptly seek specialist advice or refer to an oral medicine or oral surgical specialist because early management can improve outcomes.

Rarely, local complications can arise from equipment failure (eg cartridge explosion or needle breakage).

Systemic toxicity of local anaesthetics in dentistry

Systemic toxicity of local anaesthetics in dentistry

Systemic toxicity of local anaesthetic describes adverse systemic effects resulting from the plasma concentration of the anaesthetic; toxicity can follow inadvertent intravascular injection of local anaesthetic, excessive dose administration, impaired drug clearance or, rarely, rapid systemic absorption. Toxicity is particularly relevant in children in whom maximum dosages must not be exceeded.

Adverse systemic effects are usually seen in a continuum as plasma concentration increases, so use the lowest effective dose and do not exceed the maximum recommended dose (see Doses of local anaesthetics in dentistry).

Systemic toxicity of local anaesthetics is more likely at higher plasma concentrations, so do not exceed the maximum recommended dose.

The clinical presentation of systemic toxicity is variable and can include neurological, psychiatric, cardiovascular and respiratory effects and, rarely, methaemoglobinemia [Note 3]. Minor central nervous system (CNS) effects (eg restlessness, anxiety, tinnitus, dizziness, blurred vision, tremors, CNS depression, drowsiness) are early indicators of systemic toxicity. However, cardiovascular effects may occur before CNS effects if a longer-acting local anaesthetic is used (particularly bupivacaine). Serious systemic effects include seizures and cardiovascular toxicity.

If signs of systemic toxicity occur (or are suspected), stop administration of the local anaesthetic and provide appropriate management; first-aid advice for dental practitioners is available in these guidelines (see Introduction to medical emergencies in dental practice). For the medical management of local anaesthetic poisoning, see Local anaesthetic poisoning in the Toxicology and Toxinology guidelines.

If systemic adverse effects of local anaesthetics occur, stop administration of the local anaesthetic and provide appropriate management.

Note 3: For further information on local anaesthetic systemic toxicities, see the Therapeutic Goods Administration safety update.

Allergic reactions to local anaesthetic in dentistry

Allergic reactions to local anaesthetic in dentistry

Allergic reactions may be caused by the local anaesthetic itself (but this is extremely rare) or another component of a local anaesthetic solution (eg metabisulfites used as preservatives in solutions containing adrenaline [epinephrine]). Patients who have had an allergic reaction should have medical assessment of their history to determine the actual allergen. For patients with allergy to metabisulfites, use a local anaesthetic containing felypressin or avoid a vasoconstrictor.

Methaemoglobinemia following local anaesthetic use in dentistry

Methaemoglobinemia following local anaesthetic use in dentistry

Methaemoglobinemia is a rare, but potentially life-threatening condition that requires emergency referral to hospital if the diagnosis is suspected; an increase in methaemoglobin [Note 4] reduces the blood's ability to transport oxygen to body tissues. The most distinctive clinical feature is slate-grey or blue skin, lips and nail beds. This can be the first sign. Other clinical features include headache, shortness of breath, fatigue, drowsiness, confusion and tachycardia.

Methaemoglobinemia can follow the administration of certain local anaesthetics, especially if used in high doses. Notably, prilocaine, particularly at doses greater than 600 mg, has been linked to methaemoglobinemia. Other anaesthetics, such as benzocaine, lidocaine, articaine and tetracaine, have been occasionally associated with the condition. Risk of methaemoglobinemia is increased with use of unregulated high-concentration local anaesthetic preparations.

While anyone can develop methaemoglobinemia, certain individuals with a genetic predisposition (glucose-6-phosphate dehydrogenase [G6PD] deficiency) are more susceptible, even at therapeutic doses of local anaesthetics. If a patient reports a diagnosis of G6PD deficiency, seek advice from the clinician managing the condition about which drugs to avoid because patients can be sensitive to a range of drugs [\[Note 5\]](#).

In dental practice, for first-aid management of patients with suspected methaemoglobinemia, see [Figure 13.91](#). For the medical management of methaemoglobinemia, see [Methaemoglobinemia](#) in the Toxicology and Toxinology guidelines.

Note 4: Methaemoglobin is a form of haemoglobin that cannot bind to oxygen; it constitutes less than 1% of total haemoglobin in normal blood.

Note 5: G6PD deficiency is often asymptomatic but infections, foods (eg fava beans) and a range of drugs can trigger episodes of jaundice and anaemia or, less commonly, methaemoglobinemia. This enzyme deficiency occurs worldwide, but is most prevalent in populations of African and Asian origins.

Choosing a local anaesthetic in dentistry

Choosing a local anaesthetic in dentistry

[Table 13.8](#) outlines properties of local anaesthetic preparations for infiltration or regional block in dentistry. Consult a [source of drug information](#) for precautions, contraindications, drug interactions and adverse effects.

Table 13.8 Local anaesthetics for infiltration or regional blocks in dental practice

Shorter-acting local anaesthetic preparations

Intermediate-acting local anaesthetic preparations

Long-acting local anaesthetic preparations

Local anaesthetic	Comments
Shorter-acting local anaesthetic preparations	
lidocaine	shorter-acting – use in dentistry may be limited [NB1]
mepivacaine [NB2]	shorter-acting – use in dentistry may be limited [NB1] do not use in children younger than 3 years
prilocaine [NB2]	shorter-acting – use in dentistry may be limited [NB1]
Intermediate-acting local anaesthetic preparations [NB2] [NB3]	
articaine with adrenaline (epinephrine)	intermediate-acting commonly used for routine dental procedures do not use in children younger than 4 years
lidocaine with adrenaline (epinephrine)	intermediate-acting commonly used for routine dental procedures

mepivacaine with adrenaline
(epinephrine)

intermediate-acting

do not use in children younger than 3 years

prilocaine with adrenaline
(epinephrine)

intermediate-acting

intermediate-acting [NB1]

prilocaine with felypressin

first-line for routine dental procedures when adrenaline (epinephrine) is contraindicated;
see advice on adding vasoconstrictors to local anaesthetics

Long-acting local anaesthetic preparations

bupivacaine

similar indications to ropivacaine (see below)

more cardiotoxic than ropivacaine

cardiac toxicity may manifest before neurological toxicity

do not use in children younger than 12 years

bupivacaine with adrenaline
(epinephrine) [NB3]

similar indications to ropivacaine; often used to provide long duration of pain relief after
oral surgery

more cardiotoxic than ropivacaine

cardiac toxicity may manifest before neurological toxicity

do not use in children younger than 12 years

ropivacaine

useful for situations in which prolonged analgesia (eg 12 to 18 hours) is required,
postoperative pain, and refractory acute dental pain

concentrations up to 0.5% can be used in children

NB1: Local anaesthetics without adrenaline (epinephrine) may be indicated when a patient is allergic to the antioxidant preservatives in adrenaline-containing combinations, or in patients in whom adrenaline may be contraindicated (eg patients with unstable elevated blood pressure or recent myocardial infarction).

NB2: Available in dental cartridges.

NB3: The addition of vasoconstrictors to local anaesthetics prolongs duration of action and reduces bleeding.

Doses of local anaesthetics in dentistry

Doses of local anaesthetics in dentistry

Use the lowest dose of local anaesthetic necessary to prevent the patient from experiencing dental pain. Table 13.9 gives the maximum safe single doses of local anaesthetics available in dental cartridges. For maximum safe single doses of local anaesthetics available in other presentations, see here in the Pain and Analgesia guidelines. The dose required to prevent the patient from experiencing dental pain is usually much lower than the maximum dose, provided the method of administration is

appropriate for the indication, and the local anaesthetic is injected into the correct site. The product information may provide a guide to the usual dose.

The dose required for an individual patient will depend on the area to be anaesthetised, the vascularity of the tissues, whether infiltration or regional block is used, and the age of the patient. Overdose can occur relatively easily in children, particularly young children. Older adults may require a lower dose because of age-related physiological changes.

Calculating a maximum safe single dose of local anaesthetic in dentistry

Calculating a maximum safe single dose of local anaesthetic in dentistry

Before administering local anaesthetic, always calculate the maximum safe single dose. [Figure 13.15](#) shows a worked example of a dose calculation.

Use the lowest dose necessary to prevent the patient from experiencing dental pain – do not exceed the maximum dose. [Figure 13.15](#) A worked example of calculating the maximum volume of a safe single dose of local anaesthetic

A 70 kg patient requires a local anaesthetic for a dental procedure. Lidocaine 2% (20 mg/mL) with adrenaline (epinephrine) 1:80 000 (12.5 micrograms/mL) will be used [NB1].

Calculate the maximum dose in milligrams based on the patient's weight

maximum safe single dose of lidocaine (with adrenaline) is 7 mg/kg

$$7 \text{ mg/kg} \times 70 \text{ kg} = 490 \text{ mg}$$

Use the concentration of solution (mg/mL) to convert the calculated dose to volume

$$490 \text{ mg} \div 20 \text{ mg/mL} = 24.5 \text{ mL}$$

Convert the calculated volume to number of 2.2 mL dental cartridges [NB2]

$$24.5 \text{ mL} \div 2.2 \text{ mL/cartridge} = 11 \text{ cartridges}$$

Therefore, the total volume administered must not exceed 24.5 mL or 11 cartridges containing 2.2 mL each.

NB1: To convert a percentage concentration to mg/mL, multiply by 10 (eg 2% = 20 mg/mL).

NB2: Dental cartridges are available in a variety of volumes (eg 1.7 mL, 1.8 mL, 2.2 mL).

Multiple doses within a short time can result in accumulation of local anaesthetic and systemic toxicity. If a local anaesthetic dose has insufficient effect, a repeat dose may be attempted, provided the total dose administered to the patient does not exceed the maximum single dose (see [Table 13.9](#)).

Table 13.9 Maximum safe single doses of local anaesthetics available in dental cartridges in Australia [NB1]

lidocaine 2% (20 mg/mL) with adrenaline (epinephrine) 1:80 000 (12.5 micrograms/mL)

mepivacaine 2% (20 mg/mL) with adrenaline (epinephrine) 1:100 000 (10 micrograms/mL)

mepivacaine 3% (30 mg/mL)

prilocaine 3% (30 mg/mL) with felypressin 0.03 international units/mL (0.54 micrograms/mL)

prilocaine 3% (30 mg/mL) with adrenaline (epinephrine) 1:300 000 (3.3 micrograms/mL)

prilocaine 4% (40 mg/mL)

articaine 4% (40 mg/mL) with adrenaline (epinephrine) 1:100 000 (10 micrograms/mL)

articaine 4% (40 mg/mL) with adrenaline (epinephrine) 1:200 000 (5 micrograms/mL)

lidocaine 2% (20 mg/mL) with adrenaline (epinephrine) 1:80 000 (12.5 micrograms/mL) [NB2]

maximum mg/kg dose of local anaesthetic [NB3]	7 mg/kg
---	---------

approximate maximum volume for a 70 kg adult [NB4]	24.5 mL
--	---------

approximate maximum volume for a 20 kg child [NB4]	7 mL
--	------

mepivacaine 2% (20 mg/mL) with adrenaline (epinephrine) 1:100 000 (10 micrograms/mL) [NB2]

mepivacaine 3% (30 mg/mL)

a maximum mg/kg dose is not specified in the Australian product information. The Australian product information specifies:

- child 3 to 6 years – maximum 1.8 mL
- child 6 to 14 years – maximum 2.7 mL
- adolescent 14 to 17 years – maximum 4.4 mL
- adult – maximum 6.6 mL

prilocaine 3% (30 mg/mL) with felypressin 0.03 international units/mL (0.54 micrograms/mL) [NB2]

prilocaine 3% (30 mg/mL) with adrenaline (epinephrine) 1:300 000 (3.3 micrograms/mL) [NB2]

maximum mg/kg dose of local anaesthetic [NB3]	9 mg/kg
---	---------

approximate maximum volume for a 70 kg adult [NB4]	21 mL
--	-------

approximate maximum volume for a 20 kg child [NB4]	6 mL
--	------

prilocaine 4% (40 mg/mL)

maximum mg/kg dose of local anaesthetic [NB3]	6 mg/kg
---	---------

approximate maximum volume for a 70 kg adult [NB4]	10.5 mL
--	---------

approximate maximum volume for a 20 kg child [NB4]	3 mL
--	------

articaine 4% (40 mg/mL) with adrenaline (epinephrine) 1:100 000 (10 micrograms/mL) [NB2]

articaine 4% (40 mg/mL) with adrenaline (epinephrine) 1:200 000 (5 micrograms/mL) [NB2]

maximum mg/kg dose of local anaesthetic [NB3]	7 mg/kg
---	---------

approximate maximum volume for a 70 kg adult [NB4]	12.25 mL
--	----------

approximate maximum volume for a 20 kg child [NB4]	3.5 mL
--	--------

NB1: Dental cartridges are available in a variety of volumes (eg 1.7 mL, 1.8 mL, 2.2 mL).

NB2: For preparations containing different concentrations of vasoconstrictor, the maximum doses in this table may not apply – consult the product information.

NB3: Maximum doses are expressed in terms of the local anaesthetic, not the vasoconstrictor. These doses are a guide only – the dose required for dental indications is usually much lower, and varies depending on area to be anaesthetised, the vascularity of the tissues, whether infiltration or regional block is used, and the age and physical condition of the patient. Use the lowest dose necessary.

NB4: The approximate maximum volumes in this table are provided to assist clinicians to evaluate their dose calculations.

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Overview of anxiety management in dentistry

Overview of anxiety management in dentistry

Anxiety in patients in dentistry may be addressed using nonpharmacological strategies such as distraction, suggestion, or relaxation techniques; if these are not sufficient or appropriate, pharmacological management (sedation) can be considered.

Sedation is classified by its depth:

- **Minimal sedation** (also known as anxiolysis) is a drug-induced state of diminished anxiety, during which patients are conscious and respond purposefully to verbal commands or light tactile stimulation. The drugs used are oral benzodiazepines or inhaled agents (nitrous oxide or, less commonly, methoxyflurane). Cognitive function and coordination may be impaired during minimal sedation, but no interventions are required to maintain a patent airway, spontaneous ventilation or cardiovascular function.
- **Moderate sedation** is a drug-induced state of depressed consciousness, during which patients retain the ability to respond purposefully to verbal commands and tactile stimulation. It involves the use of intravenous drugs or a combination of oral drugs and inhalational techniques. In exceptional circumstances, interventions to maintain a patent airway, spontaneous ventilation or cardiovascular function may be required.
- **Deep sedation** is a drug-induced state of depressed consciousness, during which patients are not easily roused and may respond only to noxious stimulation. Features of deep sedation include impaired ability to maintain an airway, inadequate spontaneous ventilation and impaired cardiovascular function.

Dentists are restricted to providing minimal sedation, unless endorsed by the Dental Board to provide moderate sedation. Deep sedation is restricted to appropriately trained medical practitioners and anaesthetists in approved facilities. Moderate sedation, deep sedation and general anaesthesia are beyond the scope of this topic; moderate and deep sedation are discussed in the topic on procedural sedation and analgesia in the Pain and Analgesia guidelines.

Nonpharmacological strategies to reduce anxiety in dentistry

Nonpharmacological strategies to reduce anxiety in dentistry

Use nonpharmacological strategies before considering drugs to reduce patient anxiety. Strategies include modifying the patient's environment and using calming communication techniques.

For specific considerations for reducing anxiety in children, see Special considerations for anxiety management for children in dentistry.

For specific considerations for reducing anxiety in people with cognitive disability, see Dental anxiety in people with cognitive disability: information for dental practice.

Patients can also consider using deep breathing techniques, progressive muscle relaxation and guided imagery to help them manage anxiety during a dental procedure.

Environmental modification to reduce patient anxiety in dentistry

Environmental modification to reduce patient anxiety in dentistry

Consider how the patient's senses (sight, touch, hearing and smell) are stimulated in the surgery. To reduce patient anxiety through altering sensory inputs, consider using:

- soft calming colours
- soothing background music to mask the sounds of procedures
- a weighted blanket to provide a feeling of security
- aromatherapy to mask clinical smells.

Options to assist in distracting the patient include:

- a television on the ceiling (showing calming scenes or programs selected by the patient)
- headphones playing calming music or a guided meditation
- virtual reality glasses to immerse the patient in a calming environment.

Communication strategies to reduce patient anxiety in dentistry

Communication strategies to reduce patient anxiety in dentistry

A welcoming environment creates a situation in which patients feel more comfortable to share their fears and to participate in shared decision-making about their treatment. To demonstrate active listening and promote discussion:

- Use nonverbal clues, such as nodding and eye contact, to show interest and understanding.
- Avoid interrupting or rushing the patient.
- Express empathy and reassurance by
 - validating the patient's feelings without belittling their fears
 - offering comforting statements such as, 'We'll take this step by step' or 'Let me know if you have any concerns.'
- Provide clear explanations
 - using simple nontechnical language with brochures or your own drawings to explain procedures
 - allowing the patient to ask questions and providing clear, concise answers

- using nonthreatening language appropriate to the patient.

Safety considerations for minimal sedation in dentistry

Safety considerations for minimal sedation in dentistry

There is significant interpatient variability in the effects of drugs used for minimal sedation – practitioners involved in the administration and monitoring of minimal sedation must be aware of the associated risks, including:

- oversedation or loss of consciousness, which can occur rapidly and unexpectedly
- airway obstruction or respiratory depression
- cardiovascular depression
- drug interactions, adverse reactions or anaphylaxis.

Safe and effective practice of minimal sedation in dentistry requires that the dentist:

- is competent in basic life support and first aid, including providing airway support (eg airway opening with jaw thrust); see [Introduction to medical emergencies in dental practice](#)
- maintains sufficient knowledge and training (through continuing professional development courses) in minimal sedation techniques, including awareness of contraindications and precautions
- undertakes a thorough [assessment of the patient](#) and makes the appropriate [choice of drug](#)
- obtains [informed consent](#) from the patient or their substitute decision-maker
- provides patients with [written instructions](#) before the procedure on what to expect, preparing for the procedure and postprocedural care (including advice on the need for supervision on discharge and on avoiding driving until the following day)
- monitors the patient after the sedation is administered until they have recovered sufficiently to be discharged.

Patient assessment for minimal sedation in dentistry

Patient assessment for minimal sedation in dentistry

Careful patient assessment is essential for the safe and effective use of minimal sedation with either an [oral benzodiazepine](#) or an inhaled agent ([nitrous oxide](#) or, less commonly, [methoxyflurane](#)). Take a medical, surgical, dental and medication history to [assess for factors](#) that warrant medical review before minimal sedation or that affect choice of drug.

Figure 13.16 Patient factors affecting suitability for minimal sedation in dentistry

Take a medical, surgical, dental and medication [history](#), including:

- conditions that warrant medical review before any form of minimal sedation
 - severely limiting heart, cerebrovascular, lung, liver or kidney disease
 - allergies or other adverse events due to drugs used in sedation, analgesia or anaesthesia
 - severe anxiety that has not been previously manageable with adequate doses of minimal sedation
- factors affecting [choice of drug](#) including contraindications specific to oral benzodiazepines or to inhaled nitrous oxide

If in doubt about the suitability of a patient for minimal sedation, seek medical advice.

If in doubt about the suitability of a patient for minimal sedation, seek medical advice.

Choice of drug for minimal sedation in dentistry

Choice of drug for minimal sedation in dentistry

[Oral benzodiazepines](#) and [inhaled nitrous oxide](#) are the most commonly used drugs for minimal sedation in a general dental practice. [Inhaled methoxyflurane](#) has a limited role.

The choice between an oral benzodiazepine and nitrous oxide depends on patient factors (eg contraindications, potential drug interactions, preference), the clinical setting and the dentist's expertise – for a summary, see [Table 13.10](#). Only use a single drug for minimal sedation in a dental procedure, not a combination.

Administer a single drug for minimal sedation for a dental procedure: either an oral benzodiazepine or inhaled nitrous oxide may be used, but not both. [Table 13.10](#) Comparison of oral benzodiazepines and inhaled nitrous oxide for minimal sedation in dentistry

[oral benzodiazepines](#)

[inhaled nitrous oxide](#)

Advantages

Disadvantages

[oral benzodiazepines](#)

well-accepted by patients

[advantages](#)

easy to administer

provides some anxiolysis before the procedure

slow onset and long duration of action; requires supervision after procedure

widely variable response

dose cannot be titrated to rapidly lighten or deepen the level of sedation

adverse effects include [NB2] [NB3]:

- impaired memory and cognition
- lack of coordination
- delirium
- dry mouth
- blurred vision
- hypotension
- respiratory depression
- paradoxical reactions in children

age younger than 13 years

older age or frailty

cognitive disability

contraindications in dentistry

use of sedative substances [NB1]

obesity and/or obstructive sleep apnoea

lack of social support (important for postprocedural care with oral benzodiazepines)

inhaled nitrous oxide

rapid onset and offset of action

easy to administer

advantages

can be titrated to rapidly lighten or deepen the level of sedation

reduces gag reflex in patients troubled by gagging during dental procedures

requires specialised equipment with associated costs

disadvantages

requires patient co-operation to accept the nasal mask

inability to breathe through the nose

contraindications in dentistry

air trapped in a body cavity (eg pneumothorax, bowel obstruction, recent middle ear surgery, recent eye surgery) [NB4]

current bleomycin therapy [NB5]

NB1: Use of oral benzodiazepines for minimal sedation in patients who use sedatives (eg benzodiazepines, opioids, gabapentinoids, alcohol, illicit substances) can cause oversedation or inadequate sedation; nitrous oxide is preferred.

NB2: Rebound anxiety can occur with use of very-short-acting benzodiazepines but is not associated with drugs recommended in these guidelines for use in dental practice.

NB3: Tolerance and dependence can develop with continued use of benzodiazepines; see the [Addiction guidelines](#) for information on management of disorders of benzodiazepine use.

NB4: Pressure changes in closed spaces can occur during use of nitrous oxide because of differences in diffusion rates between nitrous oxide and other gases.

NB5: Nitrous oxide is contraindicated in patients undergoing chemotherapy with bleomycin because there is an increased risk of pulmonary toxicity which can cause lung fibrosis.

Older or frail patients are especially vulnerable to the cognitive and psychomotor impairment from benzodiazepines, which can lead to falls and fractures, confusion, memory dysfunction (both retrograde and anterograde amnesia) and delirium. Benzodiazepines have a longer duration of action in most older patients compared to younger individuals; adverse effects can last for days in older patients, even after a single dose.

Minimal sedation with benzodiazepines is not recommended for children younger than 13 years, unless the practitioner is a paediatric specialist with expertise in sedation or is endorsed by the Dental Board. [Nitrous oxide](#) is preferred in children. If a child's treatment plan requires multiple visits, nitrous oxide use from the first procedure can reduce the likelihood of the child becoming anxious over the course of treatment.

Periprocedural management of minimal sedation in dentistry

Periprocedural management of minimal sedation in dentistry

Informed consent for minimal sedation in dentistry

Informed consent for minimal sedation in dentistry

Informed consent for minimal sedation requires discussion of the effects of minimal sedation, including potential adverse effects. The patient, or their substitute decision-maker, must consent (before the day of the procedure) to both the sedation and the dental procedure.

For patients in residential aged care, prescription and administration of drugs such as benzodiazepines or nitrous oxide are regulated to safeguard residents against restrictive practices such as sedation for inappropriate indications. Although minimal sedation to facilitate dental treatment is not considered a restrictive practice, it is essential that informed consent for the sedation is obtained from the patient (or their substitute decision-maker; see guidance on consent for health care in adults with cognitive disability). For more information on restrictive practices in aged care, see the Department of Health and Aged Care website.

For further information about consent, see Section 4.2 of the health practitioner shared code of conduct on the Australian Health Practitioners Regulation Authority website.

Preparation and monitoring of patients having minimal sedation in dentistry

Preparation and monitoring of patients having minimal sedation in dentistry

Provide patients with written instructions on how to prepare for the appointment and what to expect afterwards. Figure 13.17 gives examples of instructions.

On the day of the procedure, confirm that the patient has not taken any potentially sedating substances (eg alcohol, illicit substances, extra doses of medications [\[Note 1\]](#)) and that they have suitable travel arrangements. For more information, see advice on use of oral benzodiazepines for minimal sedation.

During the procedure, patients must be monitored clinically; pulse oximetry is strongly recommended. Protection of the patient's airway is paramount. Good suction and appropriate instrumentation (eg lingual retractors) assist in reducing water and saliva collecting in the oropharynx. Use a rubber dam if possible, to protect the airway. For preventive measures to minimise the risk of inhaled or swallowed objects during dental treatment, see Figure 13.86.

After the procedure, supervision is recommended until the patient is fully recovered. Patients who have been given nitrous oxide recover quickly and can be discharged from the practice once fully recovered. Patients who have been given a benzodiazepine or methoxyflurane generally must be discharged to a responsible adult (even if the patient appears alert) and supervised until fully recovered (generally for several hours). Advise all patients who have had minimal sedation (oral benzodiazepines, nitrous oxide or methoxyflurane) not to drive until the following day.

Patients receiving minimal sedation must be monitored clinically during the procedure and supervised until fully recovered. Figure 13.17 Instructions for patients having minimal sedation for a dental procedure - patient information [Printable figure](#)

Before the appointment

You can have a light meal on the day of your appointment, but do not have anything to eat or drink within 2 hours of your appointment.

Do not drink alcohol or use illicit drugs or take extra sedatives for anxiety on the day of your appointment because these can interact with medications in the procedure.

If you are taking other medications, take them at the usual times unless otherwise advised.

Oral medication to reduce anxiety should be taken at the dental clinic approximately 1 hour before your treatment starts.

Wear loose-fitting clothes, and do not wear jewellery. Remove contact lenses.

Let your dentist know if you are unwell on the day of your appointment, because it may affect your treatment.

After the appointment

Stay at the clinic until you have sufficiently recovered.

If you were given an oral medication (or used a 'green whistle' inhaler during the procedure) to reduce anxiety, you must be escorted home by a responsible adult and supervised for several hours.

Rest and do not do anything strenuous for the rest of the day.

If you are hungry, you can have a light meal. Avoid hot food and drinks because your mouth may still be numb from the local anaesthetic.

Do not drive or operate heavy machinery until the day after your appointment.

Do not drink alcohol, return to work, make important decisions or sign important documents until the day after your appointment.

Note 1: If a patient's regular medications include a potentially sedating substance, they should still take their usual dose but additional or higher doses should be avoided.

Oral benzodiazepines for minimal sedation in dentistry

Oral benzodiazepines for minimal sedation in dentistry

Low-dose oral benzodiazepines are well-accepted by patients and readily administered at the dental practice preprocedurally; the goal is to reduce anxiety that may occur before and during dental treatment.

Before prescribing benzodiazepines for minimal sedation, assess patient suitability for minimal sedation, including the need for medical review before sedation.

For the advantages, disadvantages and contraindications for oral benzodiazepines, see Table 13.10. Nitrous oxide is preferred for patients with contraindications to benzodiazepines.

Warn patients that the adverse effects of benzodiazepines can affect behaviour, coordination and ability to drive or operate machinery safely.

Carefully consider whether benzodiazepines are suitable on each occasion; it can be difficult to predict a patient's response or adverse effects, and to titrate the dose.

Choice of benzodiazepine and dosing for minimal sedation in dentistry

Choice of benzodiazepine and dosing for minimal sedation in dentistry

Options for benzodiazepine use for minimal sedation in dentistry include temazepam, lorazepam and diazepam. Choice is influenced by pharmacokinetic properties; see Table 13.11. A short time to reach peak plasma concentration correlates with a faster onset of action. A short duration of action minimises the risk of prolonged drowsiness; drowsiness can persist the day after

administration, especially with longer-acting benzodiazepines (eg diazepam).

Temazepam is often used because it has a relatively fast onset, and a shorter duration of action than lorazepam and diazepam. Lorazepam may be preferred by clinicians familiar with its use. Diazepam is an option when a longer duration of anxiolysis is required.

Do not give the injectable formulation of midazolam orally because efficacy, adverse events and titration are not well-documented, and there is a risk of oversedation with this practice.

Table 13.11 Pharmacokinetic properties of benzodiazepines used in dentistry

Drug	Time to peak plasma concentration after oral administration [NB1]	Approximate duration of action
diazepam	30 to 90 minutes	longer than 24 hours [NB2]
lorazepam	120 minutes	12 to 24 hours
temazepam	30 to 120 minutes	6 to 12 hours

NB1: Benzodiazepines are generally fully absorbed after oral administration. Short time to peak plasma concentration reflects faster absorption.

NB2: Diazepam has an elimination half-life of 1 to 2 days; its active metabolite has an elimination half-life of 2 to 5 days.

For all patients having oral benzodiazepines for minimal sedation, use the lowest dose possible and do not use more than one benzodiazepine concurrently. Prescribe only the quantity of tablets required for the procedural anxiolysis, not a full packet.

Use the lowest dose of benzodiazepine possible and do not use more than one benzodiazepine concurrently.

Benzodiazepine regimens for minimal sedation in dentistry

Benzodiazepine regimens for minimal sedation in dentistry

For patients aged 13 years or older, typical regimens for anxiolysis (minimal sedation) for a dental procedure using short-acting benzodiazepines are:

- 1 temazepam 10 mg orally, 1 hour before the procedure, administered at the dental practice. If anxiolysis proves to be insufficient, consider increasing the dose to 20 mg for subsequent appointments, provided the patient is not at increased risk of adverse outcomes (see [Figure 13.16](#))

OR

- 2 lorazepam 1 mg orally, 1 hour before the procedure, administered at the dental practice. If anxiolysis proves to be insufficient, consider increasing the dose to 2 mg for subsequent appointments, provided the patient is not at increased risk of adverse outcomes (see [Figure 13.16](#)).

If a longer duration of anxiolysis for a dental procedure is required for patients aged 13 years or older, use:

diazepam 2 to 5 mg orally, 1 hour before the procedure, administered at the dental practice. Use the lower end of the dose range for older or frail patients.

Do not give repeat doses of any benzodiazepine even if the level of anxiolysis appears inadequate.

Nitrous oxide for minimal sedation in dentistry

Nitrous oxide for minimal sedation in dentistry

Nitrous oxide (combined with oxygen and administered via a nasal mask) is an established, safe and effective technique for minimal sedation in dental practice. The use of nitrous oxide for sedation is also known as relative analgesia.

Before prescribing nitrous oxide for minimal sedation, assess patient suitability for minimal sedation, including the [need for medical review before sedation](#).

For the advantages, disadvantages and contraindications for nitrous oxide, see [Table 13.10](#). If minimal sedation is required in children, nitrous oxide is the preferred agent. If a child's treatment plan requires multiple visits, nitrous oxide use is recommended to reduce the likelihood of the child becoming anxious over the course of treatment.

Nitrous oxide is the preferred agent to facilitate dental treatment in children.

Practitioners require adequate training before using nitrous oxide for minimal sedation.

The remote possibility of producing a loss of consciousness cannot be discounted, so the patient should be monitored for their ability to respond to commands throughout the procedure. Cough and gag reflexes may be impaired.

Resuscitation equipment must be available; see [Drugs and equipment to manage medical emergencies in dental practice](#).

Resuscitation equipment must be available.

Use nitrous oxide in a well-ventilated area with an appropriate scavenging device to minimise room air contamination and staff exposure. Historically, repeated nitrous oxide exposure in theatre staff in poorly ventilated theatres was rarely associated with spontaneous first-term miscarriage. While there is no evidence that this occurs in modern, well-ventilated dental surgeries where there is adequate scavenging, it may still be prudent to inform pregnant staff of this very low risk.

Nitrous oxide administration involves titrating slowly to clinical effect, which is usually achieved at concentrations of 35 to 45%; however, variation in patient sensitivity may require adjustment of the concentration. Contemporary equipment has an inbuilt safety feature that ensures a minimum 30% oxygen concentration is delivered to the patient.

Nitrous oxide has a rapid onset of action. Response varies between individuals although peak effect would be expected within 3 to 5 minutes. Monitor the patient clinically at all times; pulse oximetry is recommended.

When nitrous oxide administration is stopped, recovery is rapid because nitrous oxide is not metabolised within the body; instead, it is rapidly exhaled. If nitrous oxide has been administered for 10 minutes or longer, it is common practice to administer supplemental oxygen for 3 to 5 minutes after stopping nitrous oxide, to prevent an abrupt decrease in oxygen saturation of arterial blood and to allow exhaled gas to be scavenged. Monitor the patient's clinical response and recovery.

Other drugs for minimal sedation in dentistry

Other drugs for minimal sedation in dentistry

Methoxyflurane is an inhaled analgesic indicated for emergency relief of pain associated with trauma, and for analgesia in monitored conscious patients during surgical procedures. Although studies comparing its use with nitrous oxide for minimal sedation in dentistry are limited, methoxyflurane is used in Australian dental practice. Methoxyflurane use is off-label in a dental setting and has a limited role. It can be considered for shorter procedures, particularly those associated with severe pain (eg treatment of dry socket); nitrous oxide is recommended for longer procedures. Methoxyflurane is absorbed into fatty tissues; this prolongs recovery compared to recovery after nitrous oxide use; see [advice on postprocedural care](#). If methoxyflurane is used for minimal sedation in a dental setting, the practitioner should ensure that they:

- address the [safety considerations](#) outlined for all forms of minimal sedation, including monitoring (pulse oximetry is strongly recommended)
- have sufficient training and competence in monitoring and supervising a patient's self-administration of methoxyflurane
- have a guideline in their practice for the recognition of malignant hyperthermia (a rare adverse reaction caused by a genetic disorder) [\[Note 2\]](#), including instructions for emergency transfer to a hospital for treatment
- ensure that the procedure room is adequately ventilated and that the activated carbon (AC) chamber is attached to the inhaler (to adsorb exhaled methoxyflurane)
- restrict usage to the recommended dosages (maximum daily dose is 6 mL per day and maximum weekly dose is 15 mL).

Other sedative drugs (eg sedating antihistamines) are not recommended for minimal sedation for dental procedures.

Note 2: For information on malignant hyperthermia, see the [Malignant Hyperthermia Australia and New Zealand website](#). A downloadable resource kit includes advice on signs and symptoms to aid diagnosis.

Special considerations for anxiety management for children in dentistry

Special considerations for anxiety management for children in dentistry

To make the dental practice environment welcoming to children:

- Use child-friendly decorations, such as bright colours, cartoon posters and other decorations oriented to children.
- Provide children's television programs to help with distraction.
- Use simple, playful language to explain procedures.
- Demonstrate dental tools and procedures using toys or models.
- Praise cooperation with words or small rewards (eg stickers) for positive reinforcement.
- Structure a child's management plan to minimise anxiety and nonadherence. If multiple visits are required (or if the techniques above do not reduce a child's anxiety to a sufficient extent) consider early use of [nitrous oxide](#). If this is not appropriate or successful, refer the child to a paediatric specialist or colleague experienced in treating children.

Minimal sedation with benzodiazepines is not recommended for patients younger than 13 years, unless the practitioner is a paediatric specialist with expertise in sedation or is endorsed by the Dental Board. [Nitrous oxide](#) is preferred.

General anaesthesia may be required in children who remain too anxious to co-operate despite these modifications.

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References: Anxiety management in dentistry

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Overview of antibiotic use for dental procedures

Overview of antibiotic use for dental procedures

The reasons to consider antibiotic use in dental practice are to treat existing infection, to prevent infection at the surgical site or the site of a replanted avulsed tooth, or to prevent infective endocarditis. Only use antibiotics before a dental procedure if there is a clear indication for their use.

Before determining whether antibiotic prophylaxis (to prevent infection) is required, **treat existing infection** such as some acute odontogenic infections or necrotising gingivitis.

The indications for **surgical antibiotic prophylaxis** (use of antibiotics to prevent local infection at the surgical site) are rare in general dental practice – see Indications for surgical antibiotic prophylaxis in dentistry.

Consider prophylaxis when **replanting an avulsed tooth** – for advice on avulsions, see Management of an avulsed tooth after replanting and splinting.

It is also important to determine whether infective endocarditis prophylaxis (use of antibiotics to prevent infective endocarditis) is needed. This is only indicated for patients with specific cardiac conditions who are undergoing specific dental procedures (see herein the Antibiotic guidelines).

For all patients undergoing dental procedures, consider nonantibiotic measures to minimise postoperative risk of infection, such as avoiding inappropriate prescription of postoperative systemic corticosteroids to reduce pain and swelling (see Pain and swelling after oral surgery).

Indications for surgical antibiotic prophylaxis in dentistry

Indications for surgical antibiotic prophylaxis in dentistry

Recommendations on surgical antibiotic prophylaxis involve evaluating the efficacy of antibiotics in reducing postoperative infections (for specific procedures and patient groups) against the risk of harms. Potential harms of antimicrobial use include diarrhoea, hypersensitivity reactions and bacterial resistance; for more detail, see discussion of adverse effects of antimicrobials and the importance of antimicrobial stewardship.

In patients without profound immune compromise, surgical antibiotic prophylaxis is indicated for some oral and maxillofacial surgical procedures, but not for most other dental procedures because the potential benefit is outweighed by potential harms. For a summary of which procedures require surgical prophylaxis and which do not, see Dental procedures and their requirements for surgical antibiotic prophylaxis.

In patients with profound immune compromise, the need to consider broader indications for surgical antibiotic prophylaxis (than for patients with intact immune function) is uncertain because evidence of the balance of benefits and harms is lacking. Consider consulting the treating specialist or multidisciplinary team about surgical antibiotic prophylaxis in patients with profound immune compromise; for examples of relevant dental procedures, see Table 13.29.

Surgical antibiotic prophylaxis is rarely indicated for dental procedures.

Joint prostheses, breast implants, ventriculoperitoneal shunts and ventriculo-atrial shunts (used to manage hydrocephalus) and deep brain stimulators (used in managing Parkinson disease) do not affect advice on surgical prophylaxis before dental procedures. For more detail on the considerations for patients with joint prostheses or breast implants, see Indications for surgical antibiotic prophylaxis in the Antibiotic guidelines.

Do not use prophylactic antibiotics to prevent alveolar osteitis (dry socket) which is a postextraction complication caused by premature clot lysis rather than infection.

Prophylactic antibiotics do not prevent alveolar osteitis (dry socket). Table 13.12 Dental procedures and their requirements for surgical antibiotic prophylaxis[NB1] [NB2]

Procedures that DO NOT require surgical antibiotic prophylaxis

third molar (wisdom tooth) surgery

tooth extractions

insertion or removal of dental implants [NB3] and peri-implant surgery

periodontal surgery

periapical surgery

soft- and hard-tissue removal (eg biopsies, removal of exostoses, alveoloplasty)

Procedures that DO require surgical antibiotic prophylaxis

some oral and maxillofacial surgical procedures such as:

- procedures involving insertion of prosthetic material, with the exception of dental implants
- open reduction and internal fixation of mandibular fractures or midfacial (eg Le Fort or zygomatic) fractures
- intraoral bone grafting procedures
- orthognathic surgery (major jaw realignment surgery)
- cleft lip and palate repairs

NB1: Surgical antibiotic prophylaxis is the use of antibiotics to prevent local infection at the surgical site. Consider as separate issues whether there are other reasons to consider antibiotic use, such as treatment of some acute odontogenic infections, necrotising gingivitis, an avulsed tooth or prophylaxis of infective endocarditis.

NB2: For patients with profound immune compromise, also consider discussing with the multidisciplinary team or treating specialists whether surgical prophylaxis is indicated for certain dental procedures; see Table 13.29.

NB3: Surgical antibiotic prophylaxis (use of antibiotics to prevent local infection at the surgical site) is not routinely indicated for implant insertion because it does not reduce the risk of postoperative infection. It is associated with a marginal increase in implant retention of 1 to 2%.

Antibiotic choice for surgical prophylaxis in dentistry

Antibiotic choice for surgical prophylaxis in dentistry

Surgical antibiotic prophylaxis (use of antibiotics to prevent local infection at the surgical site) is rarely indicated for dental procedures other than some oral and maxillofacial surgical procedures outlined in Table 13.12. For advice on antibiotic choice before oral and maxillofacial surgery, see Surgical prophylaxis for oral maxillofacial procedures. If surgical antibiotic prophylaxis is being considered for a dental procedure because a patient has profound immune compromise, discuss the potential indication with the treating specialist or multidisciplinary team. If surgical prophylaxis is given, it must be administered before either the surgical incision or the start of the procedure. The choice of drug and timing of dosing (which varies with the drug given) should be determined by the treating specialist or multidisciplinary team.

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Overview of complications of oral surgery

Overview of complications of oral surgery

The oral surgical procedures considered in this topic do not include maxillofacial surgery; the complications discussed are relevant to:

- dentoalveolar surgery (surgery involving teeth and their supporting gums and bone) such as:
 - dental extractions
 - implant insertion and removal
 - periodontal surgery
 - surgical endodontic treatment (eg open debridement and removal of an infected tooth root tip)
- oral biopsies.

Advice on managing hypochlorite extrusion after nonsurgical endodontic treatment (closed root canal therapy) is also included.

For advice on management of infections after oral surgery (excluding maxillofacial surgical procedures), see [Odontogenic infections following dentoalveolar surgery](#). For advice on managing infections after maxillofacial surgery, see [Principles of managing surgical site infections](#).

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Risk factors for pain and swelling after oral surgery

Risk factors for pain and swelling after oral surgery

Pain and swelling follow most oral surgical procedures, usually caused by inflammation from trauma, rather than infection. Even after difficult third molar (wisdom teeth) extractions, the incidence of infection is low (2 to 5%).

The risk factors for more significant postoperative swelling after oral surgery include female gender, smoking [[Note 1](#)], age over 25 years at time of surgery, mandibular third molar removal, deeper impactions, and preoperative pathology.

Note 1: Vaping is likely to have a similar impact to smoking on postoperative swelling and pain, but evidence is lacking.

Initial management of pain and swelling after oral surgery

Initial management of pain and swelling after oral surgery

Normal postoperative swelling increases in the first 48 hours after oral surgery and may take up to 3 days to reach its maximum.

Swelling normally increases in the first 48 hours after oral surgery and may take up to 3 days to reach its maximum.

Initial management of pain and swelling includes:

- reassurance
- local measures (eg external application of a cold compress intermittently for up to 20 minutes at a time during the first 24 hours, followed by mouth rinsing with warm saline)
- nonsteroidal anti-inflammatories and other analgesics (see [Choice of analgesic for acute and postprocedural dental pain](#))
- consulting the practitioner who performed the oral surgery if particular concerns arise
- monitoring the patient's condition.

Intraoperative corticosteroids (eg intravenous or submucosal dexamethasone [[Note 2](#)]) reduce postoperative swelling and trismus following dentoalveolar surgery but have negligible effect on postoperative pain; they should only be prescribed by an experienced clinician.

Routine postoperative corticosteroids are not recommended because evidence of benefit is insufficient.

Pain that increases in severity 1 to 4 days after a tooth extraction may be a result of alveolar osteitis (dry socket).

Note 2: Dexamethasone is a potent steroid; a 4 mg dose of dexamethasone has similar anti-inflammatory potency to a 25 mg dose of prednisolone.

Management of prolonged pain and swelling after oral surgery

Management of prolonged pain and swelling after oral surgery

Normal postoperative swelling may take up to 3 days to reach its maximum. Although infection is uncommon, features that suggest an infection (rather than expected postoperative swelling) include:

- worsening pain and increasing swelling (both occurring after day 4 postoperatively)
- purulent discharge
- foul taste
- progressive trismus
- fluctuant swelling
- systemic signs (eg fever).

Refer patients with suspected infection to the practitioner who performed the oral surgery if concerns arise. Urgent hospital transfer is required if the patient has signs of severe local or systemic infection. For further information on managing infection after dentoalveolar surgery, see Odontogenic infections following dentoalveolar surgery. For advice on managing infection after maxillofacial surgery, see Principles of managing surgical site infections.

For advice on chronic pain after dentoalveolar surgery, see Overview of orofacial pain: information for dental practice.

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Definition of and risk factors for alveolar osteitis (dry socket)

Alveolar osteitis (dry socket) is a localised painful osteitis of an extraction socket following premature lysis of the blood clot. It complicates approximately 5% of tooth extractions. The condition presents as postoperative pain (in and around an extraction socket) that increases in severity between 1 and 4 days after the extraction. A disintegrated blood clot within the socket, with or without halitosis, is diagnostic. Although alveolar osteitis is caused by a failure of healing, it is commonly misdiagnosed as an infection. Antibiotic therapy has no place in the management of alveolar osteitis.

The risk factors for developing alveolar osteitis are contentious, but several risk factors have been reported, including:

- female gender
- smoking [\[Note 1\]](#)
- surgical trauma
- poor oral hygiene
- use of combined oral contraception
- mandibular tooth removal
- history of dry socket.

Management of alveolar osteitis (dry socket)

Although alveolar osteitis usually resolves spontaneously over 2 to 3 weeks, start interventions to reduce pain early because symptoms are severe. Antibiotic therapy has no place in the management of alveolar osteitis.

Initial management strategies for alveolar osteitis include:

- use of a long-acting local anaesthetic that contains adrenaline (epinephrine) for tissue infiltration (eg as an interim measure by a medical practitioner) or in a nerve block by a dentist; see [Table 13.8](#) for examples of preparations
- socket irrigation with warm sterile saline until there is no more debris present
- use of analgesics (see [Choice of analgesic for acute and postprocedural dental pain](#))
- use of an obtundent (pain-reducing) dressing such as a dry socket paste [\[Note 2\]](#); any residue remaining at review must be removed.

Antibiotics are of no benefit for alveolar osteitis (dry socket).

If pain persists for more than 3 weeks or there are signs outside the tooth socket (such as swelling or soft-tissue overgrowth), review the diagnosis. Differential diagnoses include mandibular osteomyelitis, medication-related osteonecrosis of the jaws, alveolar squamous cell carcinoma, and localised odontogenic infections with retained tooth fragments.

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Overview of bleeding during or after oral surgery

Overview of bleeding during or after oral surgery

Bleeding during or after oral surgery can be minimised by preoperative planning. If bleeding occurs, use local haemostatic measures before assessing the site and contributing factors.

Management can be considered according to its timing:

- bleeding during oral surgery
- bleeding after the patient has been discharged from oral surgery
- delayed bleeding after oral surgery.

Timing of bleeding may be influenced by the use of vasoconstrictors in local anaesthetic preparations; bleeding may occur when vasoconstriction subsides.

Preoperative planning to limit bleeding during or after oral surgery

Preoperative planning to limit bleeding during or after oral surgery

Bleeding during or after oral surgery (or other dental procedures) can be minimised by preoperative risk assessment and planning (see Periprocedural bleeding risk: dental considerations). Planning includes considering periprocedural local haemostatic measures to use as outlined in Table 13.13.

It is essential to provide patients with written information on postprocedural care, including contact information in an emergency. Advise patients to seek urgent medical attention if there is persistent ooze or bleeding, bleeding that restarts, or any bleeding of concern. Explain that extensive bruising (including facial bruising) may occur.

Advise patients to seek urgent medical attention if there is persistent ooze or bleeding, bleeding that restarts, or any bleeding of concern.

Assessment of bleeding during or after oral surgery

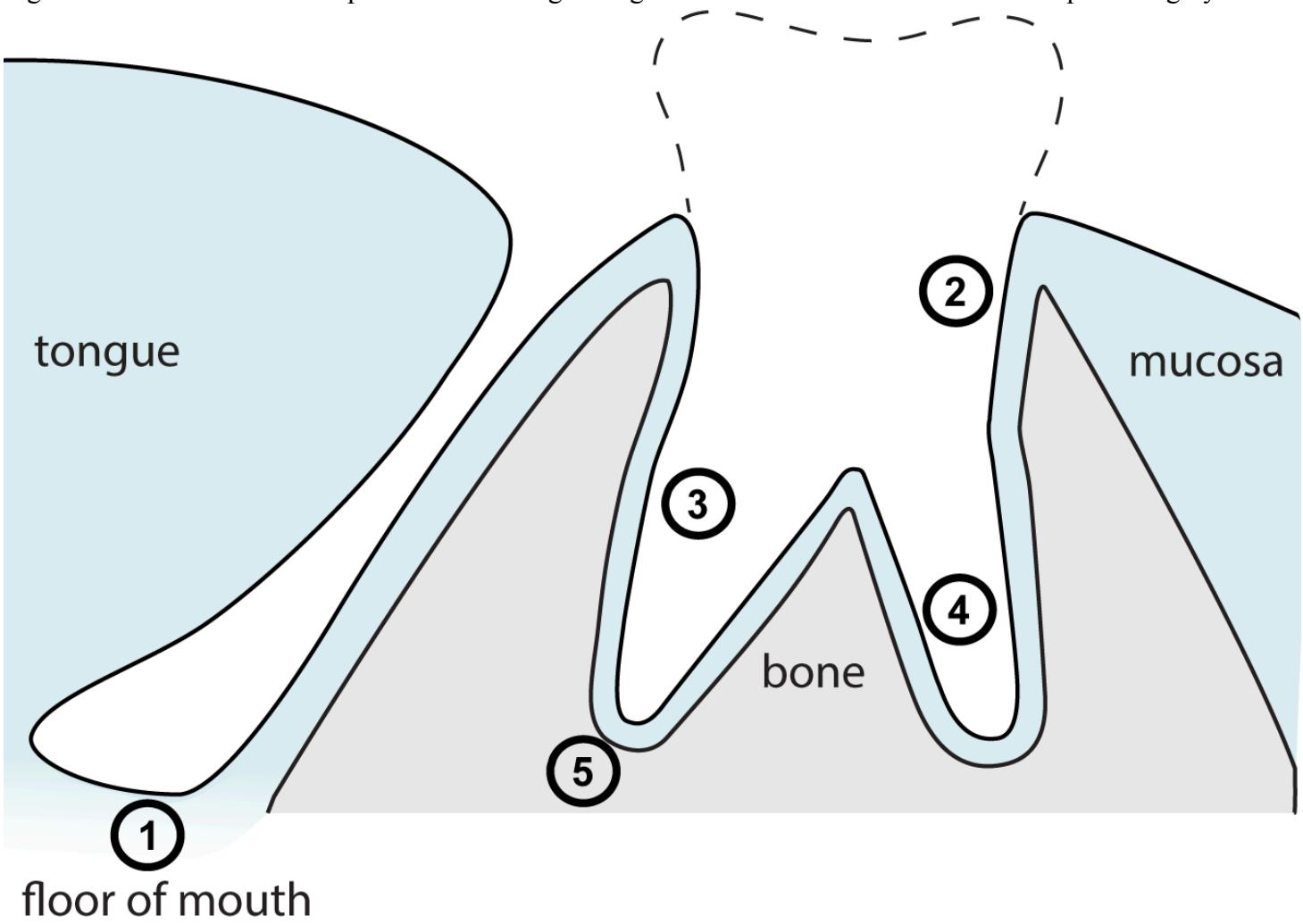
Assessment of bleeding during or after oral surgery

Sites of bleeding during and after oral surgery

Sites of bleeding during and after oral surgery

Possible sites of bleeding during or after oral surgery are shown in Figure 13.18. In patients who have had multiple tooth extractions, bleeding from one extraction site is likely to have a local cause. Conversely, if the bleeding occurs from multiple extraction sites, consider systemic causes.

Figure 13.18 Possible sites of persistent bleeding during or after tooth extraction or dental implant surgery



1. mucosa near the floor of the mouth
2. subgingival region in tooth socket
3. socket wall – uncommon bleeding site
4. apical region in tooth socket
5. neurovascular bundle

Sites of bleeding during and after dental implant surgery

Sites of bleeding during and after dental implant surgery

Bleeding during implant surgery can arise from sites similar to those in dental extractions or periodontal surgery; however, there are unique considerations. Excessive bleeding from the bone during preparation of implant osteotomy could result from damage to the neurovascular bundle, especially in the anterior maxilla or the posterior mandible. If this occurs, clinicians should pack the site and review the imaging used to plan surgery; this is to ensure that the neurovascular bundle has not been disrupted. If there is concern that the neurovascular bundle has been injured, pack the socket and close the wound. If it is unlikely that the neurovascular bundle has been disrupted, then bleeding from the osteotomy site is often controlled by placing the implant as this fills the bony defect.

In the anterior mandible, especially in older, edentulous patients, care needs to be taken to avoid injuring small nutrient vessels that extend from soft tissues of the floor of the mouth into the mandible. These vessels are often marked by a small lingual

foramen and are visible on cross-sectional imaging. Injuring these vessels can cause severe postoperative sublingual bleeding, which is often noticed late and can be life threatening.

Factors that contribute to bleeding during or after oral surgery

Factors that contribute to bleeding during or after oral surgery

If bleeding occurs during or after oral surgery, check the patient's medical and medication history. Consider the possibility of a previously undiagnosed medical condition affecting haemostasis (eg von Willebrand disease, liver disease), as listed in [Table 13.31](#). For a list of drugs that impair haemostasis, see [Table 13.32](#). Identification of factors that contribute to bleeding can help gauge the likelihood that bleeding will be controlled with local measures, and the urgency of a dental practitioner seeking advice or referring to an emergency department. Advice for medical practitioners on management of bleeding for patients on anticoagulants is available in the Cardiovascular guidelines, including advice on:

- DOACs – [apixaban](#), [dabigatran](#) and [rivaroxaban](#)
- [warfarin](#)
- [low molecular weight heparin](#).

Measures to control bleeding during oral surgery

Measures to control bleeding during oral surgery

If bleeding occurs during oral surgery, see [Table 13.13](#) for a suggested management approach. First, apply firm pressure at the surgical wound and consider using an absorbable haemostatic pack. This is sufficient to stop the bleeding in most instances, even in patients taking antiplatelet or anticoagulant therapy; if bleeding persists, assess the area to determine the [site of the bleeding](#), which is influenced by procedure type. Perform further local haemostatic measures.

Do not send a patient home until bleeding after oral surgery has stopped. [Table 13.13 Measures to control bleeding during oral surgery](#)

[Local haemostatic measures during oral surgery](#)

[Intraoperative measures to manage bleeding not controlled with local measures](#)

[Postoperative measures before discharge](#)

[Local haemostatic measures during oral surgery](#)

Apply pressure to the wound during the procedure; pressure is the most important factor in achieving haemostasis.

Minimise tissue trauma.

Use an absorbable haemostatic agent to pack the surgical wound. Haemostatic agents available include oxidised cellulose sheets, resorbable porcine skin gelatin sponges, and thrombin powders or solutions. Ribbon gauze is an alternative if a haemostatic agent is not available, but needs to be removed after 24 hrs.

Suture the socket with a resorbable suture. This compresses the soft tissues into the adjacent bone of the socket and supports the maturing blood clot within the extraction socket.

If pressure is insufficient to stop the bleeding, consider using a tranexamic acid rinse to stabilise an existing blood clot. This may be particularly useful in patients taking [warfarin or other antithrombotics](#) [NB1]. A 5% tranexamic rinse is prepared by crushing a 500 mg tablet of tranexamic acid in 10 mL of water. Either rinse the bleeding site or use a gauze pad soaked in the rinse to dress the bleeding site.

Intraoperative measures to manage bleeding not controlled with local measures

If bleeding is not controlled with local measures, use adequate lighting and suction to examine the bleeding site thoroughly. If a bleeding vessel is identified, apply thorough pressure, suture the vessel proximal to the bleeding point if accessible, pack the site tightly and arrange urgent transfer to the nearest hospital with an oral and maxillofacial surgery service.

Possible causes of bleeding persisting despite local measures include:

- an arterial bleed from an aberrant vessel within the socket or other surgical site
- an arteriovenous malformation (AVM)
- systemic factors, such as an undiagnosed bleeding disorder or antithrombotic use.

Postoperative measures before discharge

Provide written information on postprocedural care to all patients, including contact information in an emergency.

Do not discharge a patient after oral surgery until bleeding has stopped.

For patients taking warfarin or a direct acting oral anticoagulant (eg apixaban, rivaroxaban, dabigatran), consider prescribing 5% tranexamic acid mouthwash as a postoperative measure. It is best prepared in a pharmacy [NB1].

Ensure that patients who have temporarily interrupted antithrombotic therapy understand when to restart their medication (see Table 13.34).

NB1: Topical tranexamic acid reduces bleeding after dental procedures in patients taking warfarin (with similar efficacy to other haemostatic measures). More limited data support topical tranexamic acid use for patients taking direct-acting oral anticoagulants; a single randomised controlled trial of pre-operative and postoperative mouthwash demonstrated fewer delayed bleeds and fewer bleeds after multiple extractions.

NB2: Tranexamic acid mouthwash is not commercially available. It can be prepared by a compounding pharmacy, but the cost may be prohibitive. Alternatively, provide a prescription for a small quantity of tranexamic acid tablets. Instructions must be provided on the label for a 500 mg tablet to be crushed and mixed with 10 mL water and swirled in the mouth for 1 to 2 minutes before being spat out. The rinse can be used 6-hourly for up to 48 hours after the procedure. Instructions should stipulate not to swallow tablets or mouthwash. Patients must have sufficient cognitive function, manual dexterity and visual acuity to be able to prepare the mouthwash. It is not within a dentist's scope of practice to compound tranexamic acid mouthwash for a patient to use at home; if tranexamic acid tablets are supplied by a dentist, labelling must include detailed instructions for use and packaging requirements must be met because it is a prescription-only drug (see The role of the dentist in supplying medicines).

Bleeding after a patient has been discharged following oral surgery

Bleeding after a patient has been discharged following oral surgery

If bleeding occurs after a patient has been discharged, see Table 13.14 for a suggested management approach.

Table 13.14 Management of bleeding after patient discharge from oral surgery

Initial follow-up and management (can be conducted in person or by phone)

Reassure the patient – in most cases, the following approach stops the bleeding.

Advise the patient to:

- sit upright
- place a small gauze square or small clean cloth directly and firmly over the surgical wound
- apply pressure – bite hard or press a finger firmly over the wound for 15 minutes, then check if the bleeding has stopped.

Pressure is the most important factor in achieving haemostasis.

Common mistakes that result in inadequate pressure at the site of bleeding include:

- placing gauze over the adjacent teeth, rather than at the site of bleeding
- using excessive amounts of gauze.

Advise the patient **not** to:

- keep rinsing or spitting
- use paper tissues or cotton wool
- remove the gauze or cloth too soon to look at the bleeding site.

Consider whether the patient needs urgent review or transfer to an emergency department taking into account medical conditions or medications that impair haemostasis.

Alert the practitioner who performed the oral surgery about the bleeding so that they can follow up. If bleeding is not controlled by the measures above, the patient will require review as below, ideally by the practitioner who performed the surgery.

Measures to manage bleeding not controlled by initial management

If the initial follow-up was by phone, advise the patient to attend a dental practice or emergency department for management.

Use suction and a good light to examine the patient's mouth to identify the bleeding site (see Figure 13.18).

Check for active bleeding. Brisk bleeding is usually from torn soft tissues rather than the socket.

Ensure adequate pressure is applied to the site of bleeding. Pressure is the most important factor in achieving haemostasis.

If bleeding is not controlled with pressure, infiltrate the bleeding site with a local anaesthetic containing a vasoconstrictor and apply further local haemostatic measures as outlined for bleeding during oral surgery in Table 13.13.

Delayed bleeding after oral surgery

Delayed bleeding after oral surgery

Bleeding that initially stops and then restarts several days after oral surgery is most commonly caused by a localised infection. For management advice, see Odontogenic infections following dentoalveolar surgery.

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Diagnosis of an oroantral communication after oral surgery

Diagnosis of an oroantral communication after oral surgery

An oroantral communication is an abnormal communication between the maxillary antrum (maxillary sinus) and the oral cavity that occurs following extraction of a posterior maxillary tooth. The incidence after maxillary third molar extractions is reported to be 3 to 13%. The risk of oroantral communication may be higher after extraction of a first or lone-standing molar or a procedure adjacent to a large pneumatised (fully developed) sinus.

After extraction of any maxillary teeth, examine the patient carefully using a mirror to ensure that there is no oroantral communication. Avoid use of a Valsalva manoeuvre [Note 1] as part of the assessment because this can cause or worsen an oroantral communication when the sinus lining is still intact.

Note 1: The Valsalva manoeuvre is a forceful exhalation against a closed airway. In this setting, it is performed by pinching the nostrils closed and trying to exhale through the nostrils.

Management of an oroantral communication after oral surgery

Management of an oroantral communication after oral surgery

Immediate management of an oroantral communication depends on the size of the communication.

For an oroantral communication **smaller than 2 mm**, place sutures across the socket to support the blood clot, and recommend sinus precautions for 2 weeks. Precautions include avoiding:

- nose-blowing
- drinking through a straw
- open-mouth sneezing.

Lightly place a haemostatic agent (eg cellulose or collagen) into the socket without inserting it into the sinus, place a figure-of-8 suture over the socket, and recommend sinus precautions for 2 weeks. Arrange for a review within 2 weeks to ensure that the communication has sealed.

For communications **larger than 3 mm**, primary repair is required; it usually requires a buccal advancement flap and periosteal release, with or without buccal fat pad transposition. This requires urgent surgery that should only be performed by a surgeon experienced in this technique (eg an oral and maxillofacial surgeon). Multiple failed attempts at repair makes any future repair much more challenging. Sinus precautions are required for 2 weeks after the repair.

Regardless of the size of the oroantral communication, a nasal decongestant is recommended. For patients aged 6 years or older, use:

oxymetazoline (500 micrograms/mL) intranasally, 1 to 2 sprays into the nostril on the affected side, 8-hourly for

up to 5 days.

There is insufficient evidence to recommend routine use of antibiotics for a patient with an oroantral communication. However, consider antibiotic therapy if there is concurrent dentoalveolar infection associated with the extracted tooth, or sinusitis; treat as for Odontogenic infections following dentoalveolar surgery.

If an oroantral communication is not recognised at the time of tooth extraction, it will develop an epithelial lining (form an oroantral fistula). Symptoms of a fistula include nasal regurgitation of liquids, air escape from the sinus to the oral cavity, foul taste and potentially recurrent sinusitis. Diagnosis of a fistula can be established with a cone-beam computed tomography (CT) scan that confirms the presence of air between the oral cavity and sinus cavity, and a bony defect apical to the tooth extracted. Fistula repair requires specialist management by an oral and maxillofacial surgeon.

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Causes and risk factors for nerve injury after dentoalveolar surgery

Causes and risk factors for nerve injury after dentoalveolar surgery

Nerve injury after dentoalveolar surgery most commonly affects the inferior alveolar nerve (causing paraesthesia to the lip and chin) or lingual nerve (paraesthesia of the tongue and loss of taste). Occasionally, the effect of nerve injury is abnormal unpleasant sensation known as dysaesthesia, which can manifest as pain. If nerve injury is permanent, it can cause considerable functional and psychological disability.

Nerve injury can result from a variety of procedures, including tooth extraction, dental implant placement and removal, endodontic therapy, and local anaesthetic injection. The incidence of inferior alveolar nerve injury from third molar removal ranges from 0.5 to 5% (0.9% permanent injury). For lingual nerve injury after third molar surgery, incidence ranges from 0.4 to 1.5% (0.5% permanent injury).

Risk factors for nerve injury from third molar surgery include:

- radiographic signs of proximity of the impacted tooth to the nerve
- patient age greater than 25 years
- degree of impaction
- surgeon inexperience
- surgical techniques used.

Mesioangular and horizontal molar impactions increase the risk of inferior alveolar nerve injury. Lingual retraction, lingual split technique, and distoangular impactions increase the risk of lingual nerve injury [[Note 1](#)].

Implant placement can cause inferior alveolar nerve injury by:

- direct contact with the nerve during osteotomy preparation, or implant placement or removal
- compression by debris
- compression by a haematoma developing around the nerve.

To reduce the risk of implant-related nerve injury, ensure a 2 mm minimum buffer from the implant to the nerve. Careful planning and measurement are crucial to reducing the risk of implant-related nerve injury.

Note 1: For an overview of the approach to management of third molar surgery, including images of types of impaction, see this chapter in the publication *Oral and Maxillofacial Surgery for the Clinician*.

Management of nerve injury after dentoalveolar surgery

Management of nerve injury after dentoalveolar surgery

If there is suspicion of nerve injury at the time of implant placement, or the patient experiences persistent numbness after implant placement (at a time when the local anaesthetic effect is expected to have resolved), immediate management is required to avoid

permanent nerve damage. This requires removal of the implant, and urgent referral to an oral and maxillofacial surgeon for further assessment and management.

If partial or complete severance of a nerve is observed at the time of any procedure, early referral to a specialist is indicated as earlier repair improves long-term outcome.

If a patient reports altered sensation consistent with a nerve injury after surgery (at a time when the local anaesthetic effect is expected to have resolved), perform a thorough clinical assessment to determine the extent of the injury. A detailed history should carefully record the type of sensation reported, including any changes over time since the injury. Consider early discussion with an oral and maxillofacial surgeon. Neurosensory testing should evaluate changes over time in senses such as temperature sense, crude touch, light touch and 2-point discrimination. If there is little or no improvement in symptoms, referral to an oral and maxillofacial surgeon should be made within 3 months.

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Hypochlorite extrusion injury following closed (nonsurgical) root canal therapy

Hypochlorite extrusion injury following closed (nonsurgical) root canal therapy

In closed (nonsurgical) root canal therapy, the root canal is accessed by drilling the tooth surface, the nerve pulp is removed and the canal irrigated for disinfection before it is filled; unlike surgical root canal treatment, closed root canal therapy does not involve incision of the gingivae. Sodium hypochlorite is the most commonly used irrigation solution in closed root canal therapy, with a concentration ranging from 0.5 to 5.25%. It is effective at dissolving organic matter and disinfecting the root canal system. If sodium hypochlorite leaks out of the root canal system, it causes soft-tissue damage including ulceration, swelling, erythema and necrosis. If in contact with nerves, it can produce permanent paraesthesia and dysaesthesia.

Immediate management of a hypochlorite extrusion injury is debridement and thorough irrigation of the site of extrusion with water or saline, followed by cold compresses and analgesics. For advice on managing pain, see [Mild to moderate acute and postprocedural dental pain in adults](#) or [Severe acute and postprocedural dental pain in adults](#).

Urgent specialist referral (on the day of the injury) is required in hypochlorite extrusion injury because it can produce severe soft-tissue damage and necrosis if left untreated.

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Tooth or root displacement during extractions

Tooth or root displacement during extractions

Accidental displacement of a tooth or tooth fragment during extraction is uncommon. Maxillary teeth or roots can be displaced into the maxillary sinus or the infratemporal fossa. Mandibular teeth can be displaced into the sublingual, submandibular or pterygomandibular spaces or into the mandibular canal. Displacement of teeth or roots is more likely to occur with:

- ectopically erupted or positioned teeth
- roots that naturally perforate the lingual or buccal plate
- inadequate exposure of the tooth or root during extraction
- surgeon inexperience.

When removing teeth, take care to observe the movement of the tooth during extraction to ensure that it has a clear path of removal and will not be obstructed by bone or soft tissue. If a tooth or its root appears to be displacing in an unexpected direction, consider the following approaches:

- Stop applying any further elevation on the displacing tooth or root.
- Improve visibility by optimising lighting and exposure, and irrigating the operative field with saline.
- If the tooth or its root is visible through the socket, carefully attempt to retrieve it.
- To improve access and leverage for careful elevation, remove bone with a surgical handpiece, if safe to do so.
- If displacement worsens, or the tooth or root is not visible through the socket, consider raising or extending a subperiosteal flap to improve exposure. Try to retrieve the tooth or root fragment if it is clearly visible. This should only be done by experienced clinicians.
- If the tooth or root is displacing further, or is still not visible, refer the patient urgently to an oral and maxillofacial surgeon.

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Maxillary tuberosity fracture during molar extractions

Maxillary tuberosity fracture during molar extractions

Maxillary tuberosity fracture is a potential complication of removal of the maxillary second or third molar. The incidence of tuberosity fracture is low, but it is likely underreported. The risk factors for a tuberosity fracture include a lone-standing maxillary molar, an older patient, bulbous divergent roots, and use of excessive force during removal.

A tuberosity fracture can usually be identified by a cracking sound, or mobility of the segment during extraction. Care must be taken to separate the tooth, if possible, from the tuberosity by using elevators with appropriate technique, while stabilising the bony fragment. Sectioning the tooth may also facilitate safer removal. If possible, preserve the tuberosity because it is a vital structure for full upper denture support and retention.

If a tuberosity fragment is large but has adequate soft-tissue cover, leave it in place and suture the soft tissue.

If a tuberosity fragment is highly mobile (regardless of size), or has minimal soft-tissue cover, remove the fractured tuberosity, examine for an oranoanal communication and close the wound. Follow up after a week to ensure adequate healing.

Lingual plate fracture during molar extractions

Lingual plate fracture during molar extractions

Lingual plate fracture can occur during extraction of mandibular second or third molars. The incidence is estimated to be 2 to 4%, occurring more commonly in older patients. Lingual plate fracture is caused by thinning of the plate over time, ankylosis of third molars, deeper impaction, or tooth roots perforating the lingual plate.

Lingual plate fractures can be difficult to notice. If the fractured plate is stable and attached to periosteum, fragment removal is not required; it can be treated with analgesia and reassurance. If a plate fragment is mobile, or detached from soft tissue, it should be carefully removed; dissect the soft tissue off the fragment subperiosteally to avoid injuring the lingual nerve.

Lingual plate exposure also occasionally occurs, especially after removal of multiple mandibular molars. Exposure of the lingual plate can be very painful, but can be managed with monitoring and analgesia. For advice on managing pain, see Mild to moderate acute and postprocedural dental pain in adults or Severe acute and postprocedural dental pain in adults. Avoid surgical reduction of the exposed bone because this risks damage to the lingual nerve and often does not expedite healing. Lingual plate exposure usually resolves spontaneously by soft-tissue healing and coverage. If healing does not occur, the exposed part of the lingual plate may necrose and become mobile; removal of the mobile bone is indicated because it significantly improve symptoms.

Mandibular fracture during molar extractions

Mandibular fracture during molar extractions

Mandibular fracture during tooth extraction is a rare complication. It is more common with removal of mandibular third molars. Risk factors include age older than 40 years, an atrophic mandible, male sex, third molar pathology, osteoporosis and surgeon inexperience. Fracture can occur at the time of extraction or 10 to 14 days after surgery (at the peak of bony osteolysis during healing). Patients may report hearing a crack sometime during healing, followed by a malocclusion, pain and increased swelling.

For advice on managing pain, see Mild to moderate acute and postprocedural dental pain in adults or Severe acute and postprocedural dental pain in adults.

If a mandibular fracture is suspected, an orthopantomogram (OPG) and a posteroanterior (PA) X-ray of the mandible should be performed.

If a mandibular fracture is diagnosed, refer the patient urgently to an oral and maxillofacial surgeon; most mandibular fractures require open reduction and internal fixation.

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Definition and causes of halitosis

Definition and causes of halitosis

Halitosis is an unpleasant odour emanating from the oral cavity.

Halitosis is **transient** if it can be rectified by eating, rinsing the mouth with water, or oral hygiene; otherwise, intraoral and extraoral causes of ongoing halitosis should be considered (see [Table 13.15](#)).

Transient halitosis is common on waking, usually due to low salivary flow and lack of oral cleansing during sleep, particularly in mouth breathers. Oral malodour is the result of microbial degradation of proteins (eg from food, cell debris) into volatile compounds, such as sulfur. The dorsal surface of the tongue is the most likely location of the microbial population causing halitosis. Other causes of transient halitosis include food (eg garlic, onion, spices), smoking and alcoholic beverages.

Intraoral causes account for 90% of **ongoing** halitosis; they include poor oral hygiene or underlying pathology, most commonly intraoral infections (eg periodontal infections, pericoronitis). Although halitosis is the result of a complex interaction between several bacterial species, the most active bacteria are gram-negative anaerobes that are associated with periodontal disease.

Poor oral hygiene results in accumulation of dental plaque and food debris, which can worsen halitosis.

Extraoral causes of ongoing halitosis include systemic conditions, such as respiratory infections, gastrointestinal disorders, advanced kidney disease and ketoacidosis.

Patients with **halitophobia** perceive that they have halitosis although oral malodour cannot be detected by the dental professional or others. Causes of altered perception of halitosis include psychological [\[Note 1\]](#) and neurological factors [\[Note 2\]](#). People who are anxious about having halitosis typically misinterpret other people's behaviour, or perceived behaviour, such as covering the nose or averting the face, as an indication that the patient's breath is offensive. Halitophobia can be a diagnostic and treatment challenge; the symptoms may require psychological or medical assessment.

Note 1: Halitophobia has similarities to body dysmorphic disorder and social anxiety disorder.

Note 2: Neurogenic factors can contribute to altered perception of smell and taste (eg in patients with Parkinson disease).

Diagnosis and management of halitosis

Diagnosis and management of halitosis

Halitosis is identified by noting the smell of the patient's breath. Devices that objectively measure volatile sulfur compounds give variable results, are costly and are not recommended. Definitive diagnosis can be difficult and requires a thorough dental and medical history. Examination of the nose, tonsils, mucosal surfaces of the pharynx and oral cavity, and teeth is required. Management depends on the cause as outlined in [Table 13.15](#). Promote [oral hygiene](#) for patients with transient halitosis or intraoral causes.

Promote oral hygiene for patients with transient or intraoral causes of halitosis.

Most halitosis that persists or recurs despite treatment has an intraoral cause; refer patients with either condition to a dental specialist (eg oral medicine specialist, periodontist); if no intraoral cause is identified by the dental specialist, referral to a medical practitioner is indicated to investigate extraoral causes.

Patients with halitophobia present a diagnostic and treatment challenge, and, despite reassurance, may require psychological and medical assessment.

Table 13.15 Management of halitosis according to type**Transient halitosis**Ongoing halitosis: intraoral causesOngoing halitosis: extraoral causes

transient halitosis [NB1]

cause of halitosis

management of halitosis

address the cause of mouth breathing

recommend:

- improving oral hygiene, including gentle tongue cleaning
- avoiding odour-causing foods, smoking and alcoholic beverages
- considering a trial of other nonspecific measures, such as
 - chewing sugar-free gum to stimulate saliva
 - ensuring adequate hydration
 - reducing caffeine intake

transient dry mouth from low saliva flow and lack of oral cleansing during sleep (especially when mouth breathing)

odour-causing foods (eg garlic, onions, spices)

smoking and alcoholic beverages

ongoing halitosis: intraoral causes

cause of halitosis

management of halitosis

poor oral hygiene (eg food particles between the teeth, promote oral hygiene on the tongue and around the gums)

treat the cause

poorly designed oral denture or bridge can promote plaque and accumulate debris

if halitosis persists or recurs, consider referral to a specialist (eg oral medicine specialist, periodontist), or to a medical practitioner to investigate extraoral causes

intraoral bacteria present in:

- tongue colonisation
- dental caries
- periodontitis

acute infections within the mouth including:

- dental abscess
- oral and oropharyngeal candidiasis
- necrotising gingivitis

salivary gland hypofunction

tonsillar pathology

- chronic tonsillitis
- peritonsillar abscess

oral cancer

ongoing halitosis: extraoral causes

cause of halitosis

management of halitosis

acute pharyngeal infections (eg streptococcal pharyngitis, glandular fever)

respiratory

- upper airway cough syndrome (formerly postnasal drip)

- sinusitis

- intranasal foreign bodies

- bronchitis

- bronchiectasis

- lung abscess

- respiratory tract cancer

medical assessment and management is required

gastrointestinal

- Zenker diverticulum [NB2]

- gastrocolic fistulae

- *Helicobacter pylori* infection [NB3]

- gastro-oesophageal reflux disease [NB3]

advanced kidney disease

advanced liver disease

trimethylaminuria [NB4]

ketoacidosis (eg starvation, protein-only diet, diabetes)

NB1: Transient halitosis can be rectified by eating, rinsing the mouth with water, or oral hygiene; ongoing halitosis remains despite these measures.

NB2: A Zenker diverticulum is a diverticulum of pharyngeal mucosa just above the upper oesophageal sphincter diagnosed on endoscopy or preferably barium studies.

NB3: This is not a well-established cause of halitosis.

NB4: Trimethylaminuria is a recessive enzyme deficiency resulting in a characteristic fishy body odour.

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Pathology and diagnosis of dental caries

Pathology and diagnosis of dental caries

Dental caries (tooth decay) is a pathological process resulting in localised destruction of tooth tissue.

Dental caries formation requires the presence of dental plaque (a complex biofilm of mixed bacteria and their by-products). Frequent exposure to dietary sugar and carbohydrates promotes proliferation of certain bacteria (cariogenic bacteria) that produce organic acids. By making the biofilm more acidic, the bacteria cause enamel demineralisation (loss of carbonated hydroxyapatite), resulting in caries.

The stages of dental caries are classified by the International Caries Detection and Assessment System (ICDAS), which is described in detail on the [Caries Care International website](#). For a diagram of the stages of dental caries, see [Figure 13.19](#). For photographs, see [Figure 13.20](#) (sound enamel), [Figure 13.21](#) (initial caries) and [Figure 13.22](#) (extensive root caries).

Figure 13.19 Stages of dental caries

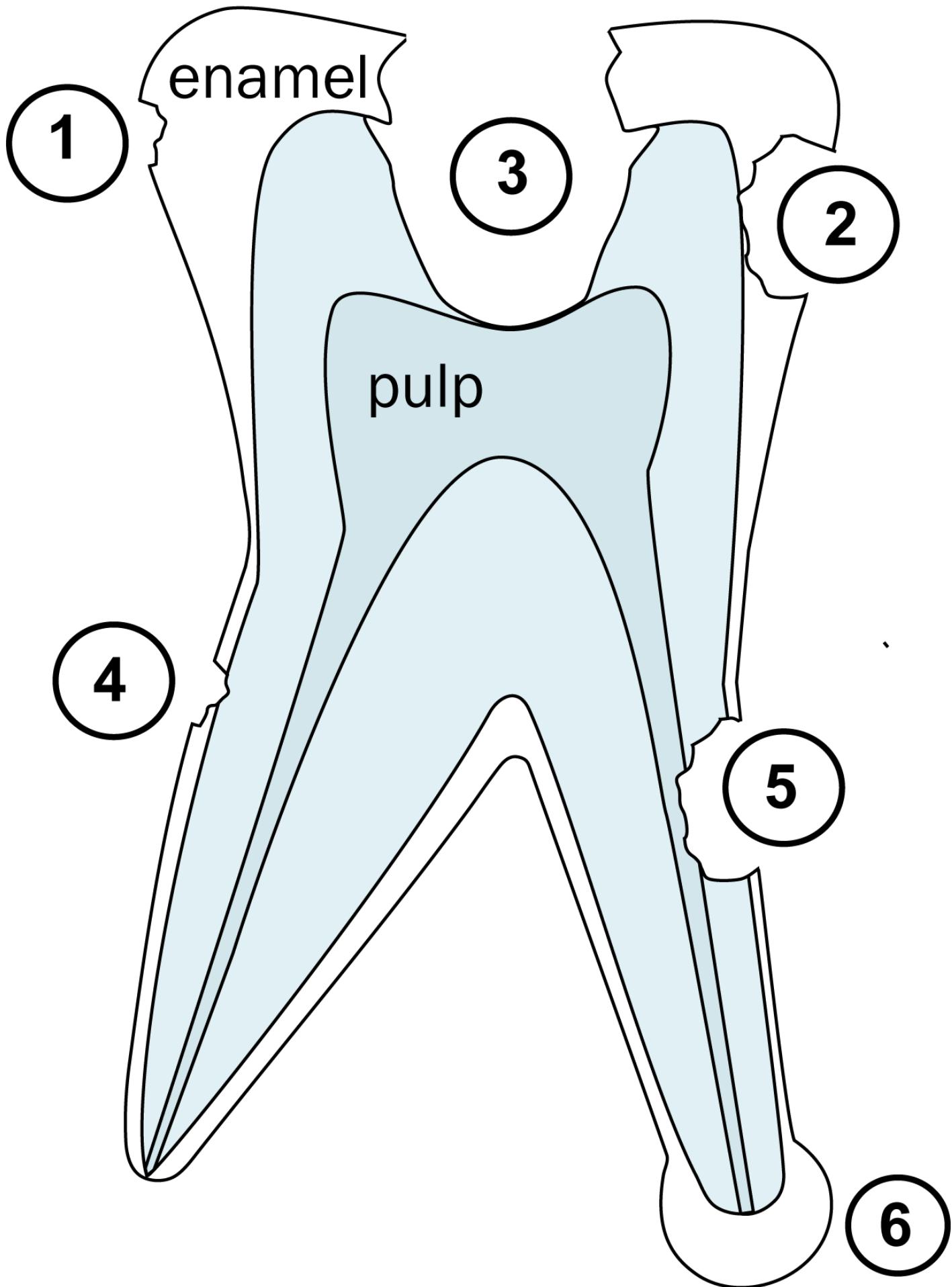


Diagram shows dental caries and its sequelae:

1. coronal initial caries lesion
2. coronal moderate caries lesion
3. coronal extensive caries lesion involving the pulp
4. root initial caries
5. root extensive caries involving the pulp
6. periapical abscess

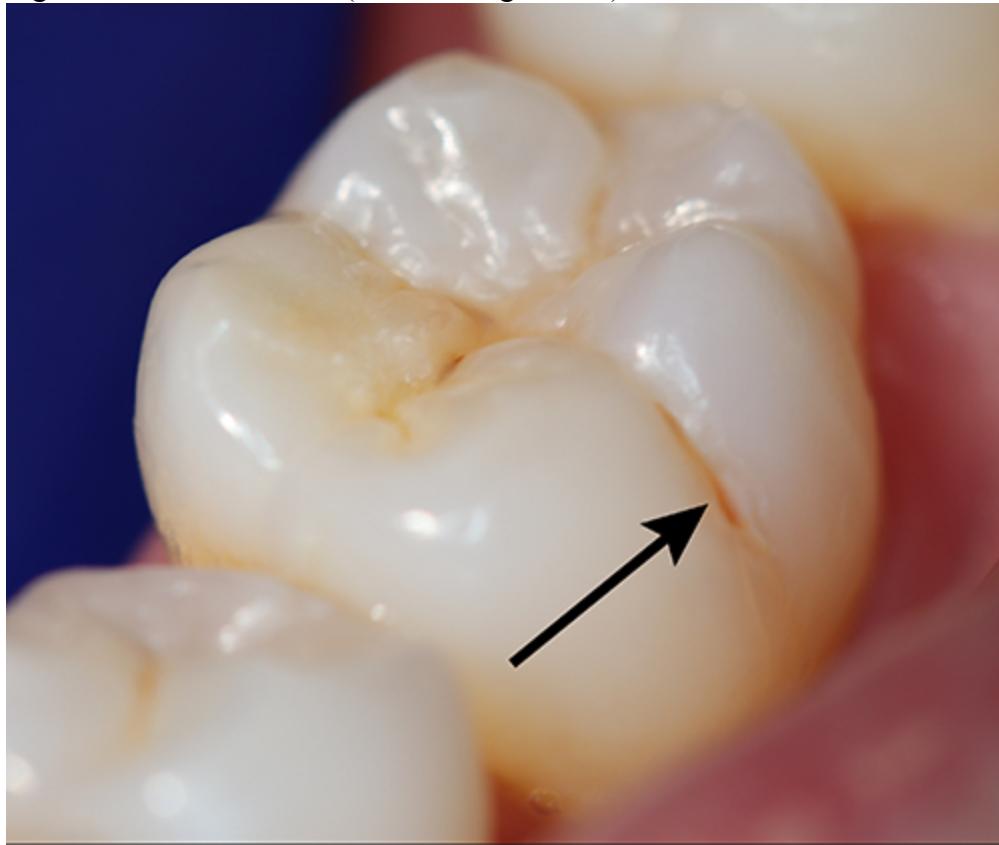
Figure 13.20 Sound enamel (ICDAS Stage 1)



A sound tooth surface has no evidence of change in enamel translucency due to caries (after plaque removal and drying).

ICDAS = International Caries Detection and Assessment System

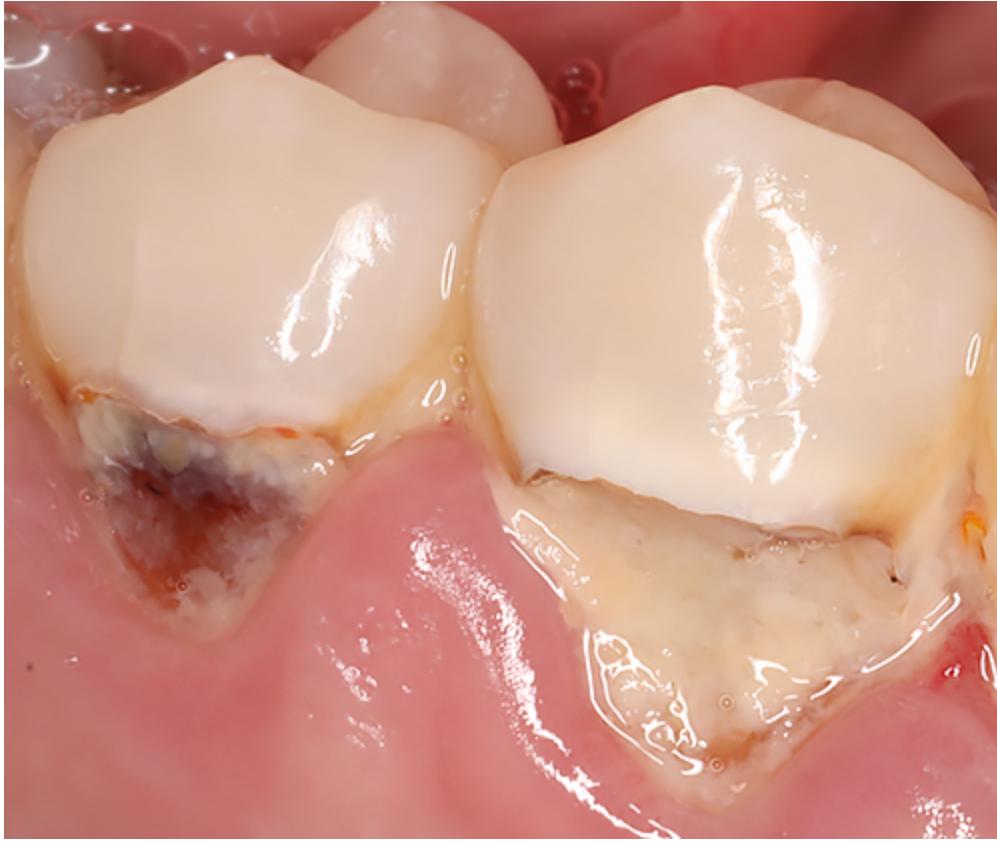
Photo sourced with permission from Ms Annie Luke

Figure 13.21 Initial caries (ICDAS Stage 1 to 2)

Change in enamel is seen as a carious opacity or white or brown discolouration, without evident surface breakdown, underlying dentine shadowing or cavitation.

ICDAS = International Caries Detection and Assessment System

Photo sourced with permission from Ms Annie Luke

Figure 13.22 Extensive caries (ICDAS Stage 5 to 6)

Dentine is clearly visible through the root cavity of the tooth on the left of the image; extensive plaque overlies the root caries on the right.

ICDAS = International Caries Detection and Assessment System

Photo sourced with permission from Ms Annie Luke

Initial carious lesions present as opacities or white or brown spots on the tooth; the lesions have relatively intact surfaces. Early diagnosis of carious lesions maximises the opportunities to arrest further decay and promote remineralisation. Carious lesions can be accurately assessed and monitored by either traditional methods (eg visual and radiographic techniques), or newer technologies involving laser and light-induced fluorescence. Sharp probing of carious lesions will not improve detection and may cause further damage.

Continued subsurface demineralisation leads to cavitation. If untreated, cavitation gradually progresses through the enamel and dentine towards the dental pulp, leading to:

- pulpititis
- pulp necrosis
- infection of the root canal system causing
 - apical periodontitis
 - periapical abscess (for a diagram showing location of these infections, see [Figure 13.23](#))
- spreading odontogenic infections causing swelling of the soft tissues of the face or neck.

Dental caries risk assessment

Dental caries risk assessment

Dental caries risk assessment involves quantification of patient factors such as:

- diet (amount and frequency of free sugar intake in drinks and food)
- oral hygiene habits
- fluoride exposure (eg community water fluoridation, use of topical fluoridated products)
- socioeconomic status, health literacy, health access barriers
- special needs (eg cognitive disability), physical disabilities
- history of head and neck radiotherapy
- recent caries experience
- saliva quality and quantity (see Dry mouth for causes of low saliva flow, including illicit drug use)
- plaque characteristics
- areas of plaque stagnation
- gingival recession and exposed root surfaces
- impacted teeth
- disorders of dental development such as amelogenesis imperfecta, dentinogenesis imperfecta and molar incisor hypoplasia.

Additional risk factors for caries in children include:

- active caries lesions in a caregiver
- sugary drinks such as milk, fruit juice or smoothies consumed frequently, or without (or after) oral hygiene has been performed
- erupting molar teeth and immature enamel.

Additional risk factors for caries in older patients include:

- exposed dentine
- difficulties with oral hygiene; see Oral and dental health in older people: advice for medical practitioners.

Early modification of these factors is part of the primary preventive strategy (see Dental caries management strategies). The Caries Care International website provides further information on individual dental caries risk assessment, detection of lesions and management protocols.

Dental caries management strategies

Dental caries management strategies

Minimal intervention for dental caries (before cavitation has occurred) involves several strategies that promote remineralisation and arrest further decay; these can be tailored to the patient's risk factors. Strategies include:

- dietary modification
 - avoiding sucrose in sticky forms
 - limiting other sugars (eg acidic drinks) and carbohydrates as snacks between meals
- plaque reduction by cleaning the teeth
 - brushing at least twice a day with a toothpaste containing fluoride
 - interdental cleaning (eg flossing), preferably immediately before brushing [[Note 1](#)]
- tooth surface modification ensuring all dental restorations are sound, well contoured and cleansable
 - using remineralising agents (eg fluoride)
 - placing fissure sealants and other adhesive materials that protect the tooth surface
- saliva modification
 - addressing causes of dry mouth
 - using low-acid, sugar-free chewing gum or lozenges, or nonacidic coarse foods (eg carrots) to increase salivary flow and buffering capacity of saliva.

Additional strategies for patients at elevated risk of dental caries include acidulated or higher concentration fluoride products, or nonfluoride remineralising agents. Perform a thorough assessment of the patient (eg of their age, medications, disease risk) and use clinical judgement to determine a management strategy. For further information on dental caries management protocols, see the International Caries Classification and Management System.

If cavitation has occurred, remove the infected tooth structure and restore the cavity using minimally destructive methods. Follow up includes advising the patient on preventive strategies as listed above.

Note 1: Although there is little evidence to suggest interdental cleaning (flossing or interdental brushing) reduces caries, it is an important part of oral hygiene that reduces interdental plaque.

Fluoride use in dental practice

Fluoride use in dental practice

Toothpastes containing fluoride are first-line treatments for caries prevention. Other topical fluoride products (eg mouthwash, gel, varnish) can be used in addition to toothpaste for patients at elevated risk of dental caries.

Water fluoridation is an effective, inexpensive and safe community health measure to prevent dental caries. Individuals without access to community water fluoridation are at elevated risk of dental caries.

Fluoride supplements in the form of drops or tablets are no longer recommended because of limited efficacy and the risk of dental fluorosis.

Fluoride supplements in the form of drops or tablets are no longer recommended.

Fluoride toothpastes for caries prevention

Fluoride toothpastes for caries prevention

Toothpastes containing fluoride are first-line treatments for caries prevention – they significantly reduce the incidence of dental caries. Fluoride promotes enamel remineralisation through the formation of fluoride-containing apatites (eg fluorhydroxyapatite, fluorapatite), which are more resistant to future acid challenge than the carbonated hydroxyapatites of normal tooth enamel. Common toothpaste formulations contain sodium fluoride. Stannous fluoride toothpaste formulations have the advantage of antimicrobial effects and reducing dental hypersensitivity but effects on other aspects of oral health (eg gingival health) have not been fully evaluated. Nonfluoridated toothpastes are the subject of research but are not recommended as sole first-line caries prevention because their efficacy is not adequately established; for more detail, see [Nonfluoride remineralising agents in dental practice](#).

Toothpastes that do not contain fluoride provide little protection against dental caries.

The recommended concentration of fluoride toothpaste varies according to age and risk of dental caries (see [Table 13.16](#)). Children up to 6 years of age who ingest excessive amounts of fluoride during the tooth-forming years are at risk of dental fluorosis. Dental fluorosis is a mineralisation disorder of the teeth in which porous subsurface enamel results in tooth discolouration (eg white spots, mottling).

To reduce ingestion of fluoride in any patient, after brushing the teeth, toothpaste should be spat out rather than swallowed. Young children are likely to swallow some toothpaste, but their fluoride ingestion may be reduced by parental supervision of brushing and by using a product with an appropriate fluoride concentration – see [Table 13.16](#). To promote increased uptake of residual fluoride from the saliva into the enamel, advise all patients using fluoride toothpaste not to rinse the mouth after brushing.

Do not rinse the mouth after brushing with fluoride toothpaste. Table 13.16 Recommended concentration of fluoride toothpaste according to age and risk of dental caries

[Printable table](#)

Toothpaste for people not at elevated risk of dental caries

Toothpaste for people at elevated risk of dental caries

To promote increased uptake of residual fluoride from the saliva into the enamel, advise all patients using fluoride toothpaste not to rinse the mouth after brushing.

Toothpaste for people not at elevated risk of dental caries

child younger than 18 months

twice-daily brushing without toothpaste

child 18 months to younger than 6 years

500 to 550 ppm (0.5 to 0.55 mg/g) fluoride twice daily, pea-sized amount [NB1]

child 6 years to adolescent

1000 to 1500 ppm (1 to 1.5 mg/g) fluoride twice daily

adolescent or adult

1000 to 1500 ppm (1 to 1.5 mg/g) fluoride twice daily

Toothpaste for people at elevated risk of dental caries [NB2]

child younger than 18 months

twice-daily brushing with toothpaste may be recommended [NB1]

1000 ppm (1 mg/g) fluoride twice daily [NB1]

child 18 months to younger than 6 years

OR

more frequent use of 500 to 550 ppm (0.5 to 0.55 mg/g) fluoride [NB1]

child 6 years to adolescent

more frequent use of 1000 to 1500 ppm (1 to 1.5 mg/g) fluoride [NB1]

5000 ppm (5 mg/g) neutral fluoride twice daily [NB4]

adolescent or adult (particularly older adults
[NB3])

OR

more frequent use of 1000 to 1500 ppm (1 to 1.5 mg/g) fluoride

ppm = parts per million

NB1: Advise parents of the need to supervise toothbrushing until the parent is confident the child can brush correctly on their own.

NB2: Toothpaste use may be varied as needed, based on the dentist's clinical judgement.

NB3: Caries risk is increased in older people; see [Oral and dental health in older people: advice for medical practitioners](#).

NB4: Although available over the counter from pharmacies, it must be recommended by a dental practitioner.

Other topical fluoride products for use in patients at elevated risk of dental caries

Other topical fluoride products for use in patients at elevated risk of dental caries

For patients at increased risk of dental caries, options for using topical fluoride products include use of:

- common toothpaste formulations applied more frequently than in standard recommendations or use of higher-fluoride concentration toothpaste; see the section on people at elevated risk of dental caries in [Table 13.16](#)
- other topical fluoride products to use at home – see [Table 13.17](#)
- topical fluoride products applied by a dental practitioner – see [Table 13.18](#).

Table 13.17 Examples of topical fluoride products for patients at elevated risk of dental caries to use at home [NB1]

Formulation	Usual directions for use
neutral fluoride mouthwash 220 ppm (0.22 mg/mL)	Use in adults and children 6 years or older daily. Patients should rinse the mouth for 1 minute, at a time of day when toothpaste is not used [NB2].
neutral fluoride mouthwash 900 ppm (0.9 mg/mL)	Use in adults and children 6 years or older weekly or more frequently if indicated. Patients should rinse the mouth for 1 minute, at a time of day when toothpaste is not used [NB2].
fluoride+CPP-ACP 900 ppm+10% cream	Use in adults and children for noncavitated initial lesions twice daily after brushing with usual fluoride toothpaste. Avoid use of fluoride+CPP-ACP in patients who are allergic to dairy products because it contains a milk protein (casein). Patients should apply the cream to the teeth, hold in the mouth for 3 to 5 minutes, spit out excess and avoid rinsing the mouth [NB2].

CPP-ACP = casein phosphopeptide–amorphous calcium phosphate

NB1: Treatment choice is based on clinical judgement and requires a complete assessment of the patient (eg age, other medications, disease risk). Products in this table are for use in addition to fluoride toothpaste described in Table 13.16.

NB2: Fluoride products should be spat out to minimise ingestion. To promote increased uptake of residual fluoride from the saliva into the enamel, advise the patient not to rinse the mouth with water after use of fluoride products.

Table 13.18 Examples of topical fluoride products for patients at elevated risk of dental caries to be applied by a dental practitioner

Formulation	Usual directions for use
fluoride varnish 22 600 ppm (22.6 mg/mL)	Use in adults and children usually twice a year depending on dental caries risk. Varnish is the first-line professional topical application. For patients with a high caries risk, varnish should be applied 3 to 4 times a year. Varnish is applied by a dental practitioner (or other appropriately trained health professional) to all at-risk dental surfaces. A guideline <i>Fluoride varnishes</i> is available from <u>Queensland Health</u> .
acidulated phosphate fluoride gel 12 300 ppm (12.3 mg/g) [NB3]	Use in adults and children 10 years or older usually twice a year depending on dental caries risk. Fluoride gels appear more effective in the permanent dentition than in primary teeth. Gel is applied by a dental practitioner using trays. Limit swallowing of product with upright positioning, continuous low-volume suction and monitoring; evacuate excess [NB2]. Acidulated phosphate fluoride gel is preferred to neutral fluoride gel because it has better enamel uptake; however, avoid acidulated gels in patients with ceramic crowns and bridgework, direct restorations containing glass ionomer particles, or poor salivary flow (eg patients undergoing head or neck irradiation).
neutral fluoride gel 5000 to 9000 ppm (5 to 9 mg/g) [NB3]	Use in adults and children aged 10 years or older. Can be used for patients with ceramic crowns and bridgework, direct restorations containing glass ionomer particles, or poor salivary flow (eg patients undergoing head or neck irradiation). Gel is applied by a dental practitioner using trays. Limit swallowing of product with upright positioning, continuous low-volume suction and monitoring; evacuate excess [NB2].
silver diamine fluoride formulations	Use silver diamine formulations (SDF) in adults and children. SDF is used to stabilise caries; it can be used for all teeth, although caution should be used on tooth surfaces where there may be a cosmetic concern because it stains caries black. SDF stabilisation of root caries is preferred to a restoration procedure because it avoids the risk of damaging the pulp or root canal. SDF is applied by the dental practitioner while the patient awaits permanent restoration or as part of a broader fluoride monitoring and treatment plan. Concentrations greater than 38% are usually used. SDF may be applied as a preventive treatment to high-risk surfaces annually in patients at risk of new caries.
fluoride+CPP-ACP 22 600 ppm (22.6 mg/mL)+2% varnish	Use in adults and children for noncavitated initial lesions usually twice a year depending on dental caries risk. Avoid use in patients who are allergic to dairy products because fluoride+CPP-ACP contains a milk protein (casein). Fluoride+CPP-ACP varnish is applied by a dental practitioner to all at-risk dental surfaces.

CPP-ACP = casein phosphopeptide–amorphous calcium phosphate

NB1: Treatment choice is based on clinical judgement and requires a complete assessment of the patient (eg age, other medications, disease risk).

NB2: Fluoride products should be spat out to minimise ingestion. To promote increased uptake of residual fluoride from the saliva into the enamel, advise the patient not to rinse the mouth with water after use of fluoride products.

NB3: Fluoride foam is no longer recommended in the Australian Research Centre for Population Oral Health 2020 guidelines as evidence for benefit is lacking.

Nonfluoride remineralising agents in dental practice

Nonfluoride remineralising agents in dental practice

There are a number of topical applications claiming to remineralise a decalcified tooth surface. However, most international guidelines acknowledge that further research is required before recommending widespread use of nonfluoride remineralising agents in dental caries management plans – fluoride remains first-line therapy for the primary prevention and treatment of dental caries.

Evidence suggests casein phosphopeptide–amorphous calcium phosphate (CPP-ACP) in combination with fluoride can reverse dental caries in the early stages of the disease (noncavitated lesions). CPP-ACP products should not replace fluoride interventions, but may be discussed as an additional treatment in motivated patients. Avoid CPP-ACP use in patients who are allergic to dairy products because the casein component is a milk protein. Use clinical judgement to determine if CPP-ACP is an appropriate option in patients at elevated risk of dental caries.

If a patient is unwilling to use fluoridated toothpaste despite discussion of the evidence of benefits and harms, toothpastes containing hydroxyapatite can be considered; these toothpastes have more evidence of efficacy than other nonfluoridated toothpastes. Trials in small numbers of patients support a role in caries reduction but more research is needed to establish efficacy, particularly in comparison to fluoride. Patients should be made aware that evidence is limited.

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Gingivitis

Gingivitis

Gingivitis (inflammation of the gingivae) is the most common and mildest form of periodontal disease. Assess and record the periodontal status of all patients because approximately 50% of the population have periodontal disease.

Gingivitis is associated with the accumulation of dental plaque (a complex biofilm of mixed bacteria and their by-products) and calculus (mineralised plaque) at the gingival margins. Bacterial by-products diffuse into the adjacent gingival tissue causing a nonspecific inflammatory response. Inflammation results in red swollen gingivae that bleed easily.

Gingivitis is not painful and does not destroy the periodontal ligament or alveolar bone. However, if it is not managed appropriately, gingivitis can progress to periodontitis. Figure 13.23 shows the location of gingivitis around the teeth.

With appropriate management, gingivitis is reversible; resolution of inflammation can be expected within 1 month. Strategies include:

- removing plaque and calculus with thorough debridement
- smoothing any irregularities on the teeth that allow plaque to accumulate (eg rough edges of fillings)
- improving oral hygiene through patient education.

Antibiotic therapy is not required for gingivitis.

Antibiotic therapy is not required for gingivitis.

If pain and inflammation associated with gingivitis restrict oral hygiene practices, consider short-term use of a mouthwash to reduce plaque formation; use:

1 chlorhexidine 0.2% mouthwash 10 mL rinsed in the mouth for 1 minute then spat out, 8- to 12-hourly for 5 to 10 days [\[Note 1\]](#)

OR

1 chlorhexidine 0.12% mouthwash 15 mL rinsed in the mouth for 1 minute then spat out, 8- to 12-hourly for 5 to 10 days [\[Note 1\]](#).

Note 1: When used for more than a few days, chlorhexidine may cause a superficial discolouration of the teeth and fillings (see Chlorhexidine for intraoral use for more information).

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Periodontitis

Periodontitis

Periodontitis is characterised by the loss of bone and tissues that support the teeth (eg periodontal pocket formation, gingival recession) – see [Figure 13.23](#). It is often associated with [halitosis](#) and an unpleasant taste in the mouth. In severe periodontitis, the teeth may become loose or drift, allowing spaces to develop between the teeth. Periodontitis may be associated with systemic diseases, especially diabetes. Pain is not usually a feature until the late stages of the disease. Assess and record the periodontal status of all patients because approximately 50% of the population have periodontal disease.

Gram-negative anaerobic bacteria are involved with the initiation and progression of periodontitis; *Porphyromonas gingivalis* is the key pathogen.

Risk factors for the development and progression of periodontitis include smoking, vaping and suboptimally managed diabetes.

Periodontitis is classified by its stage (determined by the severity of the disease and the complexity of its management) and grade (determined by biological features such as the rate of disease progression). For details of the classification, see the [2017 World Workshop consensus report on periodontal and peri-implant diseases](#). Periodontitis is usually chronic and slowly progressing, with brief acute episodes. The amount of plaque, calculus and bleeding usually corresponds with the disease severity.

Rarely, patients present with a rapidly progressing form of periodontitis, previously known as aggressive or early-onset periodontitis; it is characterised by rapid loss of attachment and alveolar bone destruction. A family history of the condition is a risk factor. The severity of periodontal destruction in rapidly progressive periodontitis does not correlate with the amount of plaque and calculus. Specialist management of this disease is required.

Periodontitis in children is rare and usually associated with systemic disease (eg leukaemia, type 1 diabetes, cyclic neutropenia) – refer for urgent specialist review.

Management of periodontitis is divided into the following 4 steps, which are presented in infographic form at the [European Federation of Periodontology website](#):

- Step 1 – motivation of patients to improve their control of supragingival plaque and periodontal risk factors
- Step 2 – management of the subgingival biofilm and calculus using hand or ultrasonic instruments
- Step 3 – further management of sites that have responded inadequately, such as pockets greater than 4 mm with bleeding on probing or pockets 6 mm and greater
- Step 4 – supportive periodontal care (SPC); this is provided after successful completion of active treatment and is undertaken in all patients with periodontitis.

Guide behavioural change by motivating all patients to:

- improve their plaque control – this requires effective [oral hygiene skills](#) and regular professional cleaning
- manage their risk factors for periodontal disease (eg smoking, diabetes) – this may include collaboration with their medical practitioner. For advice on helping patients to cut down or stop smoking, see advice for oral health professionals on the [Quit website](#).

Review motivation frequently and provide ongoing support to sustain behavioural change.

Manage the subgingival biofilm and calculus using hand or ultrasonic instruments in all patients with periodontitis and re-evaluate their periodontal disease after a suitable healing period. Defective fillings should be polished, reshaped or replaced.

Further management of sites that respond inadequately (such as pockets greater than 4 mm with bleeding on probing, or pockets 6 mm or greater) may involve repeated subgingival instrumentation, use of antibiotics, access flap surgery, resective procedures and regenerative surgery. Subgingival irrigation using chlorhexidine is not recommended, because of allergy concerns. Surgery should only be undertaken in patients with adequate oral hygiene; it is recommended that a periodontist provide surgical treatment. Re-evaluation is required after an appropriate healing period.

After successful treatment, provide all patients with supportive periodontal care (regular recall visits to maintain plaque control and periodontal health).

Antibiotic therapy is rarely required for periodontitis.

Antibiotic therapy is rarely required for periodontitis; only consider antibiotic therapy (preferably under the care of a periodontist) if periodontitis:

- is rapidly progressing
- has not responded to treatment
- affects patients with immune compromise, including patients with suboptimally managed diabetes.

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Overview of necrotising periodontal disease

Overview of necrotising periodontal disease

Necrotising periodontal disease is an acute painful condition characterised by gingival bleeding and necrosis or ulceration of the interdental papillae, which are often covered with a greyish pseudomembrane. Necrotising periodontal disease is usually associated with halitosis and sometimes with swollen glands (lymphadenopathy) and fever.

Necrotising periodontal disease is classified by the extent of inflammation or necrosis; the categories are:

- necrotising gingivitis
- necrotising periodontitis
- necrotising stomatitis.

Necrotising gingivitis (previously known as acute necrotising ulcerative gingivitis [ANUG]) affects the interdental papillae and gingivae; if not managed appropriately, it can spread to bone. Necrotising gingivitis most commonly occurs in young adult smokers and is rare in children. For management, see [Management of necrotising gingivitis](#). Children thought to have necrotising gingivitis should be assessed for acute herpetic gingivostomatitis (see [Initial episode of oral mucocutaneous herpes](#)).

Necrotising periodontitis affects the periodontium and causes bone loss. Promptly refer for specialist management.

Necrotising stomatitis affects the periodontium, bone and soft tissues of the oral cavity. Promptly refer for specialist management.

Management of necrotising gingivitis

Management of necrotising gingivitis

Thorough debridement of plaque and necrotic debris by a dental practitioner is necessary for successful management of necrotising gingivitis. However, pain may prevent complete debridement at the first presentation.

Begin management of necrotising gingivitis:

- Gently remove as much plaque and necrotic debris as possible, using local anaesthetics if necessary.
- Irrigate locally with chlorhexidine (0.2% mouthwash) or hydrogen peroxide (3% solution); chlorhexidine mouthwash or hydrogen peroxide solution may also be used if pain limits the patient's ability to mechanically clean their teeth.
- Prescribe antibiotic therapy.
- Offer analgesics (see [Choice of analgesic for acute and postprocedural dental pain](#)).
- Address risk factors (eg optimise [oral hygiene](#), consider smoking or vaping management – see [Overview of tobacco smoking and nicotine dependence](#)).

If a patient presents first to a medical practitioner, advise urgent dental review. Interim medical management can be started – offer analgesics, start antibiotics and recommend use of mouthwashes (as outlined below).

Profoundly immunocompromised patients or patients with severe necrotising gingivitis require prompt referral for specialist management, in addition to the management above.

Metronidazole is the drug of choice for necrotising gingivitis because it is effective against anaerobes, which are the main pathogens.

For antibiotic therapy of necrotising gingivitis, use:

metronidazole 400 mg orally, 12-hourly for 3 to 5 days.

If metronidazole is not suitable for treatment of necrotising gingivitis, use:

amoxicillin 500 mg orally, 8-hourly for 3 to 5 days.

If pain and inflammation restrict oral hygiene practices, recommend short-term use of a mouthwash to reduce plaque formation; use:

- 1 hydrogen peroxide 3% solution 5 mL, mixed with 5 mL of warm water, rinsed in the mouth for 1 minute then spat out, 12-hourly until pain has reduced

OR

- 1 hydrogen peroxide 1.5% solution 10 mL, rinsed in the mouth for 1 minute then spat out, 12-hourly until pain has reduced

OR

- 2 chlorhexidine 0.2% mouthwash 10 mL rinsed in the mouth for 1 minute then spat out, 8- to 12-hourly until pain has reduced [\[Note 1\]](#)

OR

- 2 chlorhexidine 0.12% mouthwash 15 mL rinsed in the mouth for 1 minute then spat out, 8- to 12-hourly until pain has reduced [\[Note 1\]](#).

Review the patient in 48 to 72 hours after the first dental appointment; perform a periodontal examination and provide the patient with advice on oral hygiene. Perform thorough debridement as soon as possible to prevent recurrence.

A poor response to treatment or recurrence of symptoms is usually due to inadequate debridement or a lack of improvement in oral hygiene, rather than an ineffective antibiotic regimen. If the infection has not responded to appropriate management (complete debridement, antibiotic therapy, improved oral hygiene) within 2 weeks, refer for specialist management.

Inadequate response to treatment for necrotising gingivitis is usually due to inadequate debridement or poor oral hygiene, rather than ineffective antibiotic therapy.

Note 1: When used for more than a few days, chlorhexidine may cause a superficial discolouration of the teeth and fillings (see Chlorhexidine for intraoral use for more information).

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Periodontal abscess

Periodontal abscess

A periodontal abscess most often occurs in patients with pre-existing periodontal disease or immune compromise (eg patients with suboptimally managed diabetes). Symptoms include swelling of the gums and discomfort. Pain is often difficult to localise, and is not generally severe enough to interfere with sleep.

It is important to differentiate a periodontal abscess from a periapical abscess, because a periodontal abscess requires local periodontal treatment. [Figure 13.23](#) shows the locations of periodontal and periapical abscesses. For the management of periapical abscess, see [Localised odontogenic infections](#).

Management of periodontal abscess includes:

- draining the abscess (with local anaesthetics) through the periodontal pocket beneath the swelling or, less commonly, through an incision in the external surface of the gingival swelling
- removing plaque and calculus deposits with thorough debridement
- irrigating the area with water, saline solution or local anaesthetic solution.

In severe cases, tooth extraction may be necessary to drain pus adequately, followed by thorough irrigation and curettage of the socket.

Specialist management is required if a periodontal abscess does not respond to local intervention.

In the rare event that a periodontal abscess has spread into surrounding tissues of the face or neck (or is causing systemic symptoms or signs of infection), treat as a spreading odontogenic infection; for an overview of management, see [Table 13.19](#).

If the patient has profound immune compromise, adjunct antibiotics are indicated for a periodontal abscess even without evidence of spread or systemic features. Discuss choice of treatment with the patient's specialist medical team if possible; for a localised periodontal abscess, consider a regimen as for spreading odontogenic infections without severe local or systemic features.

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Introduction to peri-implant diseases

Introduction to peri-implant diseases

Dental implants replace one or more teeth using metal screws to anchor crowns to the jaw. Information for patients on implants and how to maintain them to reduce risk of peri-implant diseases is available from the [Australian Dental Association](#) and the [Australian and New Zealand Academy of Periodontists](#).

The likelihood that an implant will survive 10 years is estimated to be 95 to 98% but is reduced if the:

- dental implant is not professionally maintained
- patient is unable to maintain good oral hygiene including the cleaning of the implant
- patient smokes
- patient has a history of periodontitis.

Implants are associated with the same range of soft- and hard-tissue complications as affect natural teeth. Peri-implant diseases are caused by plaque accumulation around an osseointegrated dental implant.

Peri-implant mucositis involves nondestructive reversible inflammation of the soft tissues, similar to gingivitis.

Peri-implantitis involves destruction of the bone supporting the implant, which can lead to loss of the implant. It is characterised by inflammation, bleeding on probing, increased probing depths and radiographic bone loss compared to previous assessment. Peri-implantitis can be associated with excess cement or poor fit of dental implant components.

Management of peri-implant mucositis

Management of peri-implant mucositis

Management of peri-implant mucositis includes:

- nonsurgical debridement of the implant
- providing advice on improving [oral hygiene](#) and [smoking management](#)
- encouraging regular dental review, including maintenance of the implant
- considering removal of the prosthesis for improved access.

Antibiotic therapy is not required for peri-implant mucositis treatment.

If there is no resolution after 3 months, repeat the nonsurgical debridement.

Antibiotic therapy is not required for peri-implant mucositis.

Management of peri-implantitis

Management of peri-implantitis

Management of peri-implantitis starts with nonsurgical therapy. This includes:

- oral hygiene instruction
- control of risk factors (eg help with smoking management)
- removal (and possible adjustment) of the prosthesis
- debridement with conventional instruments.

The endpoint of nonsurgical therapy is a reduction in probing depths (to 5 mm or less) and bleeding sites (to a single site of bleeding on probing). If this endpoint is not achieved, specialist referral is recommended and surgical therapy should be considered.

The aim of surgical therapy is to achieve the endpoints set for nonsurgical therapy and avoid further bone loss. No single surgical technique has been shown to be superior to another. Flap access and resective techniques are effective. Reconstruction procedures may be considered, especially with infrabony defects (contained areas of bone loss around a tooth or implant) of 3 mm or more. The role of surface decontamination is unclear.

A maintenance program tailored to the patient is necessary. In addition to the above strategies, the following interventions are often required:

- removal of crowns or bridges to facilitate access surgical intervention including:
 - surface decontamination
 - hard-tissue augmentation
 - implantoplasty (removal of the implant threads and smoothing of the implant surface)
 - soft-tissue grafting.

Limited evidence supports a role for antibiotics in peri-implantitis; consider specialist referral before prescribing. For antibiotic therapy of peri-implantitis, in conjunction with other interventions, consider using:

amoxicillin 500 mg orally, 8-hourly for 7 days

PLUS

metronidazole 400 mg orally, 12-hourly for 7 days.

In patients with hypersensitivity to penicillins, consider using metronidazole as a single drug (see above).

Despite appropriate treatment, some implants will show continued bone loss requiring further management (as outlined above) with possible removal.

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The spectrum of acute odontogenic infections

Acute odontogenic (tooth-related) infections are common and can affect:

- dental pulp – secondary to restoration breakdown, dental caries or loss of tooth structure from trauma
- periodontal tissues – most commonly due to advanced periodontitis
- pericoronal tissues – most commonly due to partially erupted mandibular third molars.

If an odontogenic infection is not appropriately treated, it can progress to a **localised abscess** (see [Figure 13.23](#) for locations) or **spreading infection** causing swelling of the soft tissues of the face or neck. Rare but serious complications of odontogenic infections include:

- Ludwig angina (a severe spreading infection involving the bilateral submandibular, sublingual and submental spaces, with cellulitis and risk of airway compromise)
- [necrotising infection of skin and soft tissues](#).

Distant spread from an odontogenic source can cause sepsis or involve the heart valves, bone, brain, neck or mediastinum. Patients with profound immune compromise are prone to rapidly spreading infection.

Differential diagnoses in acute odontogenic infections

Persistent dental pain and swelling after dentoalveolar surgery [\[Note 1\]](#) could be due to alveolar osteitis (following a tooth extraction) or a postoperative infection.

Osteomyelitis of the jaw is an important differential diagnosis in patients with an unresolved oral infection with systemic features and localised bone pain or tenderness. If osteomyelitis of the jaw is suspected, refer the patient to a specialist oral and maxillofacial surgeon or hospital; expert advice is needed. Other differential diagnoses of persistent oral infection include osteonecrosis (which can be medication-related osteonecrosis of the jaw) and osteoradionecrosis (which occurs in patients undergoing radiation therapy).

Other conditions can cause acute facial swelling, such as salivary gland infections of the submandibular or parotid gland. Imaging may help to differentiate these from acute odontogenic infections.

Management approach to acute odontogenic infections

An acute odontogenic infection requires prompt management with a dental procedure (eg extraction, root canal treatment, periodontal debridement, surgery) to address the source of the infection. Antibiotics are not routinely indicated – see [Indications for antibiotic therapy in dental practice](#) and [Rationale for choice of antibiotic therapy in dental practice](#).

Prompt dental procedures are key to managing acute odontogenic infections; antibiotics are not routinely indicated.

[Table 13.19](#) provides an overview of the classification of acute odontogenic infections based on severity, and their management. If unsure of the severity, seek expert advice.

Table 13.19 Acute odontogenic infections: features and overview of management

[Printable table](#)

localised odontogenic infections

spreading odontogenic infections without severe local or systemic features

spreading odontogenic infections with severe local or systemic features

Clinical features

Management overview

localised odontogenic infections [NB1]

dental pain, often with marked tenderness on tapping the tooth

abscess (localised swelling on the gum or fluctuant tissue) may be visible, depending on location [NB2]

pus may be visible

no facial swelling

no severe local or systemic features of infection (see features listed [below](#) for spreading odontogenic infections with severe local or systemic features)

a dental procedure in the community

if a dental procedure is not likely to be performed within 24 hours, antibiotic therapy can be started; however, dental treatment is required as soon as possible. Use a regimen for [spreading infection with delayed dental treatment](#). Advise the patient to seek review early if symptoms worsen

spreading odontogenic infections without severe local or systemic features [NB1]

facial swelling

dental or facial pain

abscess (localised swelling on the gum or fluctuant tissue) may be visible, depending on location [NB2]

pus may be visible

no severe local or systemic features of infection (see features listed [below](#) for spreading odontogenic infections with severe local or systemic features)

a dental procedure performed in the community, followed by [oral antibiotic therapy](#)

if a dental procedure is not likely to be performed within 24 hours, [antibiotic therapy](#) can be started; however, dental treatment is required as soon as possible. Advise the patient to seek review early if symptoms worsen

spreading odontogenic infections with severe local or systemic features [NB1]

severe **local features** that indicate risk of airway compromise include any of the following:

arrange urgent transfer to a hospital with an oral and maxillofacial surgeon (or anaesthetic or emergency facilities for airway management)

- difficulty breathing [NB3] give supplemental oxygen by mask if the patient has difficulty breathing or looks blue
- difficulty swallowing allow the patient to adopt a position of comfort
- swelling of floor of mouth contact the local service that will be managing the patient to alert them to the transfer and for advice on prehospital management
- trismus
- neck swelling urgent intravenous antibiotic therapy is required
- significant facial swelling and pain, especially if associated with any other local features listed above urgent surgical intervention is required

swelling of the upper third of the face, occluding the eye (a rare severe local feature) may indicate cavernous sinus thrombosis

systemic features include any of the following:

- pallor
- sweating
- tachycardia
- temperature above 38°C or below 36°C

signs of sepsis (life-threatening organ dysfunction) in adults include [NB4] [NB5]:

- impaired consciousness
- tachypnoea (respiratory rate 22 breaths/minute or more)
- hypotension (systolic blood pressure less than 90 mmHg)
- poor peripheral perfusion or mottled skin
- acute reduction in urine output.

NB1: Acute odontogenic infections exhibit a continuum of severity; if unsure of the severity, seek expert advice.

NB2: Periapical inflammation or abscess (at the root of the tooth) may not cause signs in the mouth other than dental pain with marked tenderness on tapping the tooth.

NB3: In partial airway obstruction, breathing is laboured and may be noisy; some air movement can be felt at the mouth. In complete obstruction, a patient may be attempting to breathe but no breath sounds are heard and no air movement is felt from the nose or mouth.

NB4: Laboratory indicators include hypoxaemia and elevated serum creatinine and lactate concentrations.

NB5: In children, standard observations (eg respiratory rate, blood pressure) and signs of life-threatening organ dysfunction vary according to the patient's age; age-appropriate standard observation charts are available in most jurisdictions. Clinical features can be nonspecific and include signs (eg gasping, grunting, increased irritability or lethargy, inability to feed or eat) that are not typical of sepsis in older patients. Consider sepsis in children when their clinical state is causing significant concern to family or clinical staff. Detailed information on recognising and managing sepsis in children is not covered in these guidelines. Age-appropriate sepsis management pathways are available in some jurisdictions.

Indications for antibiotic therapy in acute odontogenic infections

Antibiotic therapy is not a routine adjunct in managing acute odontogenic infections. Antibiotics are indicated:

- as an adjunct to a dental procedure in managing spreading odontogenic infections (for features of spreading infections, see [Table 13.19](#))
- if a dental procedure to drain the infection is not likely to take place within 24 hours
- if a fragment or root of an infected tooth is retained during extraction and complete extraction is delayed [\[Note 2\]](#).

Antibiotic therapy is not a substitute for dental treatment of acute odontogenic infections. The main indication for antibiotic therapy is as an adjunct to a dental procedure in spreading infections.

Spreading infection is the main indication for antibiotic therapy (as an adjunct to dental treatment) because of the risk of life-threatening complications, such as airway compromise or sepsis.

If a procedure is delayed or a fragment or root of an infected tooth is retained, antibiotic therapy aims to reduce the risk of progression from localised to spreading infection. Emphasise to the patient that dental treatment is essential as soon as possible, regardless of any improvement in symptoms after starting antibiotics.

To choose an appropriate antibiotic regimen, see [Table 13.19](#).

Patients with profound immune compromise are at increased risk of rapidly spreading infection (even from a localised odontogenic infection) and require urgent management. Consult with the patient's specialist or medical practitioner to create a treatment plan (including indications for antibiotics and timing of dental procedures) because the risk of complications from infection (eg sepsis) or a dental procedure (eg periprocedural bleeding) may be increased.

Seek expert advice for patients with recurrent infection who have received antibiotics but not dental treatment.

Rationale for choice of antibiotic in acute odontogenic infections

Odontogenic infections are usually polymicrobial. The spectrum of pathogens described includes anaerobes (eg *Prevotella*, *Fusobacterium*, *Porphyromonas*), viridans streptococci, *Haemophilus* species and staphylococci. The species identified in odontogenic infections vary according to the patient population selected, the timing of sample collection and techniques used to identify the organisms, but anaerobes are considered major pathogens in abscesses.

Rationale for oral antibiotic choice for acute odontogenic infections

When an oral antibiotic is indicated as an adjunct to a dental procedure for a spreading odontogenic infection, and the dental procedure can be performed promptly, an oral penicillin (phenoxyethylpenicillin or amoxicillin) has an adequate spectrum of activity against the major pathogens. Phenoxyethylpenicillin is preferred to amoxicillin because of its narrower spectrum of activity.

Resistance to penicillins has been reported in some anaerobes in odontogenic abscesses. Data are limited and sourced mainly from hospitalised patients in international studies; studies from Australian and outpatient settings are scarce. Because of these factors, the combination of a penicillin and metronidazole is recommended if:

- a definitive dental procedure for an acute odontogenic infection is unlikely to take place within 24 hours
- response to penicillin monotherapy following a dental procedure is inadequate at 48 hours.

Amoxicillin+clavulanate has activity against anaerobic and aerobic bacteria; it can be used as an alternative to the combination of penicillin and metronidazole (eg if adherence to the combination regimen is likely to be difficult). However, amoxicillin+clavulanate has a broader spectrum of activity, so is not preferred for reasons of antimicrobial stewardship.

Metronidazole monotherapy is not recommended for acute odontogenic infections because it does not have activity against aerobic bacteria.

Cefalexin and clindamycin are alternatives to penicillin-based regimens for patients with hypersensitivity to penicillins; however, they have a broader spectrum of activity than penicillins, so are not preferred for reasons of antimicrobial stewardship.

Rationale for intravenous antibiotic choice for odontogenic infections

Intravenous antibiotics are required for patients with a spreading odontogenic infection with severe local or systemic features. For patients **without evidence of sepsis**, the combination of a narrow-spectrum penicillin (benzylpenicillin) with metronidazole is preferred because it has an adequate spectrum of activity against the major pathogens (similar to the rationale for oral antibiotic choice). Amoxicillin+clavulanate can be used as an alternative but is not preferred for reasons of antimicrobial stewardship.

Cefazolin and clindamycin are alternatives to penicillin-based regimens for patients with hypersensitivity to penicillins; however, they have a broader spectrum of activity than penicillins, so are not preferred for reasons of antimicrobial stewardship.

In patients with **suspected sepsis from an odontogenic source**, a regimen with activity against a broader range of potential pathogens than oral anaerobes (eg some gram-negative bacteria, staphylococci) is warranted because of the life-threatening nature of the infection.

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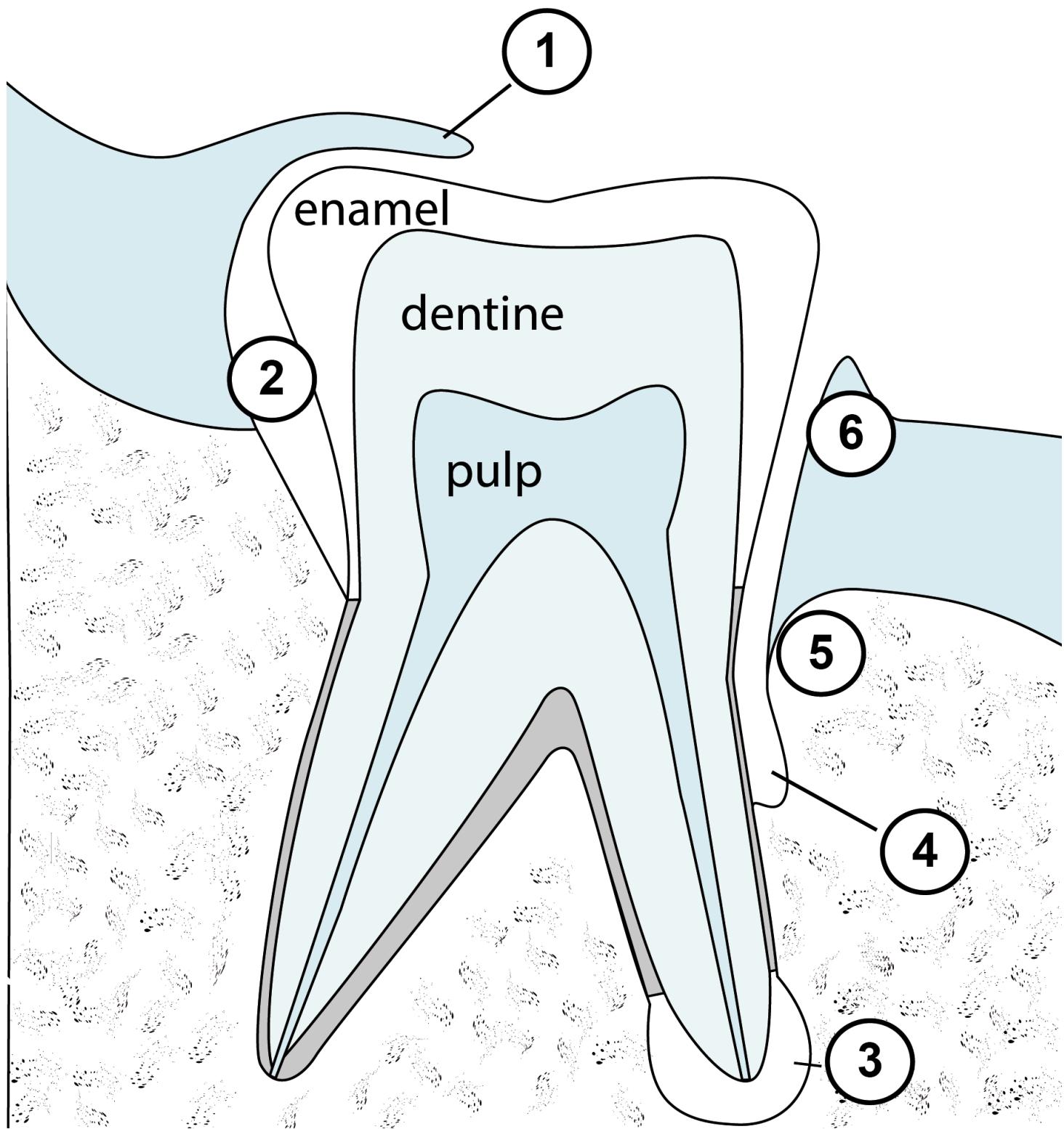


Localised odontogenic infections

Localised odontogenic infections

An odontogenic infection is localised if it causes dental pain without facial swelling or features of systemic infection (for details of features and a summary of the management approach, see [Table 13.19](#)). Localised odontogenic infections include periapical, pericoronal or periodontal abscesses – see [Figure 13.23](#) for their anatomical locations. A periapical and periodontal abscess can occur together and require a combination of root canal and periodontal treatment.

Figure 13.23 Anatomical location of localised odontogenic infections and associated conditions



1. pericoronal infection (infection around the crown of a partially erupted tooth, most commonly a third molar [wisdom tooth])
2. pericoronal abscess
3. periapical inflammation (apical periodontitis) or abscess (these result from infection of the tooth pulp)
4. periodontal abscess

5. periodontitis (bone loss)

6. gingivitis (inflammation of the gingiva)

Acute localised odontogenic infections are items 1 to 4 in the list above. Gingivitis and periodontitis (items 5 and 6) are usually generalised and chronic; they may be associated with an acute localised infection.

The key to successful management of localised odontogenic infections is a dental procedure to drain pus and address the source of infection – see Figure 13.24 for procedures.

Figure 13.24 Dental procedures for acute localised odontogenic infections

[NB1]

Periapical inflammation (apical periodontitis) or periapical abscess

- endodontic treatment (eg closed root canal treatment [NB2], surgical endodontic treatment)
- tooth extraction

Periodontal abscess

- periodontal treatment (debridement)
- tooth extraction

Pericoronal infection, including abscess

- tooth extraction (treatment of choice)
- remove or recontour the opposing tooth

NB1: Consider incision and drainage for any pointing abscess.

NB2: In closed (nonsurgical) root canal therapy, the root canal is accessed by drilling the tooth surface. In surgical endodontic treatment, the gingiva is incised to remove an infected root tip.

Patients with a localised odontogenic infection who present to a medical practitioner should be:

- promptly referred to a dentist for treatment
- advised to seek review if symptoms worsen in the interim
- offered systemic analgesics for the treatment of dental pain.

For pericoronal infections, the patient should, in addition, be advised to irrigate the area (using an irrigation syringe with sterile saline solution) and to rinse with warm saline or chlorhexidine mouthwash until dental review determines whether a procedure is needed (irrigation and rinsing may be sufficient to resolve mild pericoronal infections).

Antibiotic therapy is not required routinely for a localised infection if a dental procedure can be undertaken within 24 hours of presentation because prompt drainage removes the source of infection and bacteraemia resolves rapidly. However, antibiotic therapy is indicated if a procedure is not likely to be performed within 24 hours, or an infected tooth breaks during an extraction and there is a delay in removing residual root or bone fragments; use an antibiotic regimen for spreading odontogenic infections with delayed dental treatment. Antibiotic therapy is not required if a noninfected tooth root or fragment is retained during extraction.

Do not routinely give antibiotic therapy for a localised odontogenic infection.

Antibiotic therapy may be indicated for localised infection in patients with profound immune compromise but the decision should be made in consultation with the patient's specialist or medical practitioner.

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Overview of spreading odontogenic infections without severe local or systemic features

Overview of spreading odontogenic infections without severe local or systemic features

A spreading odontogenic infection that has caused facial swelling but has no features of severe local or systemic infection can be managed in a community dental setting. Management by a dental practitioner involves:

- drainage of pus, with culture and susceptibility testing of pus samples if feasible – sampling is ideally done (before any antibiotic is given) by aspiration of an abscess with a needle and syringe into a sterile jar, with immediate transport to a laboratory; swabs do not adequately preserve anaerobes and are easily contaminated with oral flora
- a dental procedure (surgical or nonsurgical endodontic or periodontal treatment, or tooth extraction) to address the source of infection
- oral antibiotic therapy, ideally started after samples are taken for culture.

It may not be possible to achieve adequate analgesia with local anaesthetics in patients with a spreading odontogenic infection; minimal sedation or referral for other techniques (moderate or deep sedation or general anaesthesia) may be required.

Once a procedure has been performed, start antibiotic therapy and arrange follow-up.

If a dental procedure is promptly performed, penicillin monotherapy is recommended – see empirical antibiotic regimens if dental treatment is prompt.

If a dental procedure cannot be performed within 24 hours or is incomplete, a combination of a penicillin and metronidazole is recommended to provide broader activity against anaerobic bacteria – see empirical antibiotic regimens if dental treatment is delayed.

Empirical antibiotic regimens for spreading odontogenic infections without severe local or systemic features if dental treatment is prompt

Empirical antibiotic regimens for spreading odontogenic infections without severe local or systemic features if dental treatment is prompt

For spreading odontogenic infections (without severe local or systemic features listed in Table 13.19) in patients undergoing a dental procedure within 24 hours of presentation, use:

1 phenoxymethylpenicillin 500 mg (child: 12.5 mg/kg up to 500 mg) orally, 6-hourly for 5 days

OR

2 amoxicillin 500 mg (child: 15 mg/kg up to 500 mg) orally, 8-hourly for 5 days. For dosage adjustment in adults with kidney impairment, see amoxicillin dosage adjustment.

See advice on follow-up.

Both phenoxycephalothin and amoxicillin can be taken with or without food.

For patients who have had a **nonsevere (immediate or delayed)** [\[Note 1\]](#) hypersensitivity reaction to a penicillin [\[Note 2\]](#), use:

- 1 cefalexin 500 mg (child: 12.5 mg/kg up to 500 mg) orally, 6-hourly for 5 days. For dosage adjustment in adults with kidney impairment, see [cefalexin dosage adjustment](#)

OR if adherence to a 6-hourly regimen is unlikely for a child

- 1 cefalexin 20 mg/kg up to 750 mg orally, 8-hourly [\[Note 3\]](#) for 5 days.

See advice on [follow-up](#).

For patients who have had a **severe (immediate or delayed)** [\[Note 4\]](#) hypersensitivity reaction to a penicillin, use:

clindamycin 300 mg (child 10 mg/kg up to 300 mg) orally, 8-hourly for 5 days [\[Note 5\]](#).

See advice on [follow-up](#).

Clindamycin use, even if short-term, is associated with increased risk of *Clostridioides difficile* (formerly known as *Clostridium difficile*) infectious diarrhoea. If diarrhoea occurs, advise patients to stop the clindamycin and alert their dentist and general medical practitioner for management advice.

Note 1: Nonsevere hypersensitivity reactions include urticaria (hives), mild immediate rash, benign childhood rash and maculopapular rash.

Note 2: Cefalexin may be used in patients who have had a nonsevere (immediate or delayed) reaction to any penicillin, including amoxicillin or ampicillin. However, because cross-reactivity between cefalexin and either amoxicillin or ampicillin is possible, consider the extent of the amoxicillin or ampicillin reaction, patient acceptability and the suitability of non-beta-lactam options (eg clindamycin).

Note 3: Unpublished pharmacokinetic and pharmacodynamic modelling data for cefalexin show similar levels of target attainment with the 6- and 8-hourly regimens above. It is the consensus view of the Antibiotic Expert Group that either regimen can be used for children.

Note 4: **Severe immediate** hypersensitivity reactions include anaphylaxis, compromised airway, airway angioedema, hypotension and collapse. **Severe delayed** hypersensitivity reactions include cutaneous adverse drug reactions (eg drug rash with eosinophilia and systemic symptoms [DRESS], Stevens–Johnson syndrome / toxic epidermal necrolysis [SJS/TEN], severe blistering or desquamative rash), and significant internal organ involvement (eg acute interstitial nephritis). For more information on severe cutaneous reactions (including images), see [Cutaneous drug reactions](#).

Note 5: An oral liquid formulation of clindamycin is not commercially available; for formulation options for children or people with swallowing difficulties, see *Don't Rush to Crush*, which is available for purchase from [the Advanced Pharmacy Australia website](#) or through a subscription to *eMIMSplus*.

Empirical antibiotic regimens for spreading odontogenic infections without severe local or systemic features if dental treatment is delayed

Empirical antibiotic regimens for spreading odontogenic infections without severe local or systemic features if dental treatment is delayed

Patients with a spreading odontogenic infection may present to a medical practitioner. If there are no features of severe local or systemic infection requiring urgent hospital transfer, refer the patient to a dentist for prompt treatment. Offer systemic analgesics for the treatment of dental pain (see advice on choice of analgesic). If a dental procedure is not likely to be performed within 24 hours, start antibiotic therapy (as below). However, antibiotic therapy is not a substitute for dental treatment, so it is essential that the patient sees a dentist as soon as possible.

For spreading odontogenic infections without severe local or systemic features, if a dental procedure is delayed, use:

1 metronidazole 400 mg (child: 10 mg/kg up to 400 mg) orally, 12-hourly for 5 days

PLUS EITHER

1 phenoxymethylpenicillin 500 mg (child: 12.5 mg/kg up to 500 mg) orally, 6-hourly for 5 days

OR

2 amoxicillin 500 mg (child: 15 mg/kg up to 500 mg) orally, 8-hourly for 5 days. For dosage adjustment in adults with kidney impairment, see amoxicillin dosage adjustment

OR as a single drug

2 amoxicillin+clavulanate 875+125 mg (child 2 months or older: 22.5+3.2 mg/kg up to 875+125 mg) orally, 8-hourly for 5 days. For dosage adjustment in adults with kidney impairment, see amoxicillin+clavulanate oral dosage adjustment.

See advice on follow-up.

For patients who have had a **nonsevere (immediate or delayed)** [\[Note 6\]](#) hypersensitivity reaction to a penicillin [\[Note 7\]](#); use:

metronidazole 400 mg (child: 10 mg/kg up to 400 mg) orally, 12-hourly for 5 days

PLUS EITHER

1 cefalexin 500 mg (child: 12.5 mg/kg up to 500 mg) orally, 6-hourly for 5 days. For dosage adjustment in adults with kidney impairment, see cefalexin dosage adjustment

OR if adherence to a 6-hourly regimen is unlikely for a child

1 cefalexin 20 mg/kg up to 750 mg orally, 8-hourly [\[Note 8\]](#) for 5 days.

See advice on follow-up.

For patients who have had a **severe (immediate or delayed)** [\[Note 9\]](#) hypersensitivity reaction to a penicillin, use:

clindamycin 300 mg (child: 10 mg/kg up to 300 mg) orally, 8-hourly for 5 days [\[Note 10\]](#).

See advice on follow-up.

Note 6: Nonsevere hypersensitivity reactions include urticaria (hives), mild immediate rash, benign childhood rash and maculopapular rash.

Note 7: Cefalexin may be used in patients who have had a nonsevere (immediate or delayed) reaction to any penicillin, including amoxicillin or ampicillin. However, because cross-reactivity between cefalexin and either amoxicillin or ampicillin is possible, consider the extent of the amoxicillin or ampicillin reaction, patient acceptability and the suitability of non-beta-lactam options (eg clindamycin).

Note 8: Unpublished pharmacokinetic and pharmacodynamic modelling data for cefalexin show similar levels of target attainment with the 6- and 8-hourly regimens above. It is the consensus view of the Antibiotic Expert Group that either regimen can be used for children.

Note 9: **Severe immediate** hypersensitivity reactions include anaphylaxis, compromised airway, airway angioedema, hypotension and collapse. **Severe delayed** hypersensitivity reactions include cutaneous adverse drug reactions (eg drug rash with eosinophilia and systemic symptoms [DRESS], Stevens–Johnson syndrome / toxic epidermal necrolysis [SJS/TEN], severe blistering or desquamative rash), and significant internal organ involvement (eg acute interstitial nephritis). For more information on severe cutaneous reactions (including images), see Cutaneous drug reactions.

Note 10: An oral liquid formulation of clindamycin is not commercially available; for formulation options for children or people with swallowing difficulties, see *Don't Rush to Crush*, which is available for purchase from the Advanced Pharmacy Australia website or through a subscription to *eMIMSpus*.

Follow-up of antibiotic therapy for spreading odontogenic infections without severe local or systemic features

Follow-up of antibiotic therapy for spreading odontogenic infections without severe local or systemic features
If a patient is started on antibiotics by a medical practitioner before seeing a dentist, dental review is needed as soon as possible because antibiotics are not a substitute for a dental procedure.

If adequate source control (with antibiotics as an adjunct to the dental procedure) has been achieved, further review should take place in 48 to 72 hours.

Review progress within 48 to 72 hours of achieving source control in spreading odontogenic infections.
If source control is achieved and the patient is improving at 48 to 72 hours, advise them to stop the antibiotics as it is not necessary to complete the prescribed course. Explain that they should seek prompt dental review if their condition deteriorates or if the infection has not resolved within 5 days from the start of treatment.

If a spreading infection has not responded adequately within 48 to 72 hours of postprocedural antibiotic treatment:

- assess whether severe local or systemic features as listed in Table 13.19 have developed; if any features are present, urgent hospital transfer is required
- determine whether source control has been achieved
- review the current antibiotic regimen; if empirical therapy was penicillin monotherapy, add oral metronidazole or switch to amoxicillin+clavulanate (using the regimen for delayed dental treatment)
- arrange further review in another 48 to 72 hours to re-evaluate the patient's progress.

If further measures have not achieved an adequate response or if the patient's condition has deteriorated, seek expert advice (eg from an oral and maxillofacial surgeon). Culture and antibiotic susceptibility testing may be undertaken on referral to guide further antibiotic choice. Transfer to a hospital may be required.

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Overview of spreading odontogenic infections with severe local or systemic features

Overview of spreading odontogenic infections with severe local or systemic features

Acute odontogenic infections can present as life-threatening emergencies with **features of severe local infection** (that indicate risk of airway obstruction or, rarely, spread to the cavernous sinus) or **systemic features** that indicate risk of sepsis (life-threatening organ dysfunction caused by an abnormal response to infection).

Features of a spreading odontogenic infection that indicate **risk of airway obstruction** include any of the following:

- difficulty swallowing
- difficulty breathing
 - in partial airway obstruction, breathing is laboured and may be noisy; some air movement can be felt at the mouth
 - in complete obstruction, a patient may be attempting to breathe but no breath sounds are heard and no air movement is felt from the nose or mouth
- swelling of floor of mouth
- trismus
- neck swelling
- significant facial swelling and pain, especially if associated with any other local features listed above.

A spreading odontogenic infection with swelling of the upper third of the face, occluding the eye, indicates a **risk of cavernous sinus thrombosis**.

Systemic features of a spreading odontogenic infection that indicate **risk of sepsis** include any of the following:

- pallor
- sweating
- tachycardia
- temperature above 38°C or below 36 C.

Early recognition of sepsis is critical; **signs of sepsis in adults** [\[Note 1\]](#) include:

- impaired consciousness
- tachypnoea (respiratory rate 22 breaths/minute or more)
- hypotension (systolic blood pressure less than 90 mmHg)
- poor peripheral perfusion or mottled skin

- acute reduction in urine output.

In **children**, standard observations (eg respiratory rate, blood pressure) and signs of life-threatening organ dysfunction vary according to the patient's age; age-appropriate standard observation charts are available in most jurisdictions. Clinical features can be nonspecific and include signs (eg gasping, grunting, increased irritability or lethargy, inability to feed or eat) that are not typical of sepsis in older patients. Meningitis must be considered in young children presenting with nonspecific signs of sepsis, because classical signs are often absent. Consider sepsis in children if their clinical state is causing significant concern to family or clinical staff. Detailed information on recognising sepsis in children is not covered in these guidelines.

Note 1: Laboratory indicators of sepsis in adults include hypoxaemia and elevated serum creatinine and lactate concentrations.

Management of spreading odontogenic infections with severe local or systemic features

Management of spreading odontogenic infections with severe local or systemic features

If a patient has features of severe local or systemic infection that indicate risk of airway obstruction or sepsis, management is outlined in Figure 13.79. The steps include:

- calling an ambulance
- giving 100% supplemental oxygen by mask if the patient has difficulty breathing or looks blue
- allowing the patient to adopt a position of comfort
- arranging urgent transfer to a hospital that has an oral and maxillofacial surgeon or another appropriate expert. If access to a service with appropriate surgical expertise is difficult, urgent transfer to a hospital with anaesthetic or emergency facilities is critical
- contacting the local service (eg emergency department or oral and maxillofacial surgeon) who will be managing the patient to alert them to the transfer and for advice on prehospital management.

Arrange urgent transfer of patients with a spreading infection with severe or systemic features to a hospital that has an oral and maxillofacial surgeon or another appropriate expert.

In a specialised unit, further management of a spreading odontogenic infection with severe or systemic features involves:

- support of airway, breathing and circulation
- obtaining blood and other samples for culture and susceptibility testing
- intravenous fluids and antibiotic therapy
- draining pus by incising affected spaces (intra-orally and extra-orally) and placing drains
- removing the tooth or otherwise addressing the source of infection.

For patients with suspected sepsis, if arrival at a hospital is likely to be **delayed by 1 hour or more** (such as in regional, rural or remote areas), consider the following measures, provided facilities and appropriate medical or nursing staff are available to undertake these steps:

- taking blood samples for culture if feasible, but do not delay antibiotic therapy for sample collection in critically ill patients
- starting resuscitation

- administering an immediate dose of antibiotic.

Prehospital antibiotic therapy should be based on local sepsis protocols if available; in the absence of local protocols, see advice on regimens for suspected sepsis. Urgent administration of empirical antibiotics is required once the patient is admitted to hospital, even if antibiotics were given before admission.

Empirical antibiotic regimens for spreading odontogenic infections with severe local or systemic features without evidence of sepsis

Empirical antibiotic regimens for spreading odontogenic infections with severe local or systemic features without evidence of sepsis

If signs of sepsis are not evident but a patient has features of a severe local or systemic infection, for empirical antibiotic therapy in a hospital setting, in conjunction with surgical intervention, use:

- 1 benzylpenicillin 1.8 g (child: 50 mg/kg up to 1.8 g) intravenously, 6-hourly. For dosage adjustment in adults with kidney impairment, see benzylpenicillin dosage adjustment

PLUS

metronidazole 500 mg (child: 12.5 mg/kg up to 500 mg) intravenously, 12-hourly. See advice on modification and duration of therapy

OR as a single drug

- 2 amoxicillin+clavulanate intravenously [[Note 2](#)]. See advice on modification and duration of therapy

2+0.2 g formulation

adult, or child 40 kg or more: 2+0.2 g 8-hourly. For dosage adjustment in adults with kidney impairment, see amoxicillin+clavulanate intravenous dosage adjustment

OR

1+0.2 g formulation

adult, or child 40 kg or more: 1+0.2 g 6-hourly. For dosage adjustment in adults with kidney impairment, see amoxicillin+clavulanate intravenous dosage adjustment

child 3 months or older and less than 40 kg: 25+5 mg/kg up to 1+0.2 g 6-hourly.

For patients who have had a **nonsevere (immediate or delayed)** [[Note 3](#)] hypersensitivity reaction, use:

cefazolin 2 g (child: 50 mg/kg up to 2 g) intravenously, 8-hourly. For dosage adjustment in adults with kidney impairment, see cefazolin dosage adjustment

PLUS

metronidazole 500 mg (child: 12.5 mg/kg up to 500 mg) intravenously, 12-hourly. See [advice on modification and duration of therapy](#).

For patients who have had a **severe immediate** [Note 4] hypersensitivity reaction to a penicillin, metronidazole plus cefazolin (at the dosages above) can be considered if a beta-lactam antibiotic is strongly preferred to a non-beta-lactam; for considerations, see [Severe immediate hypersensitivity: Implications of cross-reactivity between penicillins and cephalosporins](#)

For patients who have had a **severe immediate** [Note 4] hypersensitivity reaction to a penicillin in whom cefazolin plus metronidazole is not used, or for patients who have had a **severe delayed** [Note 5] hypersensitivity reaction to a penicillin, use:

clindamycin 600 mg (child: 15 mg/kg up to 600 mg) intravenously, 8-hourly [Note 6]. See [advice on modification and duration of therapy](#).

Note 2: Amoxicillin+clavulanate as a single drug regimen may be more practical than a two-drug regimen for some patients; however, it is recommended second line as this spectrum of activity is not usually required to treat these infections.

Note 3: Nonsevere hypersensitivity reactions include urticaria (hives), mild immediate rash, benign childhood rash and maculopapular rash.

Note 4: Severe immediate hypersensitivity reactions include anaphylaxis, compromised airway, airway angioedema, hypotension and collapse.

Note 5: Severe delayed hypersensitivity reactions include cutaneous adverse drug reactions (eg drug rash with eosinophilia and systemic symptoms [DRESS], Stevens-Johnson syndrome / toxic epidermal necrolysis [SJS/TEN], severe blistering or desquamative rash), and significant internal organ involvement (eg acute interstitial nephritis). For more information on severe cutaneous reactions (including images), see [Cutaneous drug reactions](#).

Note 6: There are more clinical and microbiological data to support the use of clindamycin than lincomycin. Intravenous lincomycin can be used at the same dosage if clindamycin is unavailable or if a local protocol recommends its use.

Empirical antibiotic regimens for suspected sepsis from an odontogenic source

Empirical antibiotic regimens for suspected sepsis from an odontogenic source

For empirical treatment of patients with suspected sepsis from an odontogenic source (see [Table 13.19](#) for signs of sepsis), seek expert advice. While awaiting expert advice, consider using the empirical regimens for [mediastinitis related to perioral or parapharyngeal infection in patients with sepsis or septic shock](#) because target pathogens and sources are similar to those in a life-threatening odontogenic infection.

Modification and duration of therapy for spreading odontogenic infections with severe local or systemic features

Modification and duration of therapy for spreading odontogenic infections with severe local or systemic features
Modify therapy for spreading odontogenic infections with severe local or systemic features based on the results of culture and susceptibility testing.

Switch to oral therapy once swelling and trismus subside (and the patient can swallow) and purulent discharge from the drains slows.

For intravenous to oral switch, if results of susceptibility testing are not available:

- for patients **without** penicillin hypersensitivity, use metronidazole plus amoxicillin, or amoxicillin+clavulanate
- for patients with a penicillin hypersensitivity who tolerated intravenous cephalosporin therapy, use metronidazole plus cefalexin [[Note 7](#)]; however, cefalexin must **not** be used if the patient has had a **severe (immediate or delayed)** [[Note 8](#)] hypersensitivity reaction to amoxicillin or ampicillin
- for patients with **severe immediate** [[Note 9](#)] hypersensitivity to amoxicillin or ampicillin or those in whom an intravenous cephalosporin was not used or not tolerated, or for patients with **severe delayed** [[Note 10](#)] penicillin hypersensitivity, use clindamycin.

Stop oral antibiotic therapy once purulent discharge from drains has stopped, signs and symptoms have resolved, the white blood cell count has returned to normal and the patient is afebrile. Prolonged oral therapy is indicated for patients with concurrent mandibular osteomyelitis; for durations, see Mandibular osteomyelitis.

Note 7: Cefalexin may be used in patients who have had a **nonsevere (immediate or delayed)** reaction to penicillins, including amoxicillin or ampicillin. However, cross-reactivity between cefalexin and either amoxicillin or ampicillin is possible; therefore, consider the extent of the amoxicillin or ampicillin reaction, patient acceptability and the suitability of non-beta-lactam options.

Note 8: **Severe immediate** hypersensitivity reactions include anaphylaxis, compromised airway, airway angioedema, hypotension and collapse. **Severe delayed** hypersensitivity reactions include cutaneous adverse drug reactions (eg drug rash with eosinophilia and systemic symptoms [DRESS], Stevens–Johnson syndrome / toxic epidermal necrolysis [SJS/TEN], severe blistering or desquamative rash), and significant internal organ involvement (eg acute interstitial nephritis). For more information on severe cutaneous reactions (including images), see Cutaneous drug reactions.

Note 9: Severe immediate hypersensitivity reactions include anaphylaxis, compromised airway, airway angioedema, hypotension and collapse.

Note 10: Severe delayed hypersensitivity reactions include cutaneous adverse drug reactions (eg drug rash with eosinophilia and systemic symptoms [DRESS], Stevens–Johnson syndrome / toxic epidermal necrolysis [SJS/TEN], severe blistering or desquamative rash), and significant internal organ involvement (eg acute interstitial nephritis). For more information on severe cutaneous reactions (including images), see Cutaneous drug reactions.

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Odontogenic infections following dentoalveolar surgery

Odontogenic infections following dentoalveolar surgery

Infections following dentoalveolar surgery (surgery involving teeth and their supporting gums or jaw bones, such as tooth extraction, implant placement, periodontal surgery and surgical endodontic treatment [Note 1]) are uncommon, and their incidence is not reduced by surgical antibiotic prophylaxis.

Signs and symptoms of postoperative odontogenic infections include:

- signs of cellulitis adjacent to the surgical site (swelling, tenderness, redness)
- fluctuant surgical site
- purulent discharge from the surgical site
- pain and swelling that is worsening or is not improving 4 days after surgery
- foul taste
- signs of severe local or systemic infection (eg trismus, swelling of floor of mouth or neck, difficulty swallowing, difficulty breathing, pallor, sweating, tachycardia, temperature above 38°C or below 36 C).

Before diagnosing a postoperative odontogenic infection, exclude postsurgical inflammation, and alveolar osteitis (dry socket) after a tooth extraction.

If a patient has profound immune compromise, consult with their specialist or medical practitioner to create a treatment plan because the risk of complications from infection (eg sepsis) or a further dental procedure (eg periprocedural bleeding) may be increased.

If a postoperative odontogenic infection is associated **with** severe local or systemic features, provide urgent management as outlined in Spreading odontogenic infections with severe local or systemic symptoms (including Ludwig angina).

Management of a postoperative odontogenic infection **not** associated with severe local or systemic features involves:

- regular use of antiseptic mouthwash
- washout and debridement of any debris in the socket
- drainage and culture [Note 2] of localised purulent collections, if feasible
- oral antibiotics – usually required because complete drainage is often not feasible; if antibiotic susceptibility results are not available to guide antibiotic choice, use an empirical antibiotic regimen for spreading odontogenic infections without severe local or systemic features if dental treatment is delayed
- addressing the source of infection, including removing residual root or tooth fragments if demonstrated on X-ray
- analgesia and rehydration therapy.

Note 1: An example of surgical endodontic treatment is removal of an infected root tip.

Note 2: Sampling is ideally done by aspiration of an abscess with a needle and syringe into a sterile jar; swabs do not adequately preserve anaerobes and are easily contaminated with oral flora.



Approach to assessment of oral mucosal disease

Approach to assessment of oral mucosal disease

Oral mucosal lesions are common. They may result from physiological changes, local disease, a skin condition with oral features, an adverse drug reaction or systemic disease (eg gastrointestinal disease). Successful management of an oral mucosal lesion requires an accurate diagnosis.

Assessing an oral mucosal lesion involves taking a full patient history (including a medication history), performing a thorough extraoral and intraoral examination and using diagnostic investigations if appropriate. Ask about:

- the duration of the lesion
- precipitating factors (eg trauma from chewing, burns from hot drinks)
- symptoms
- exacerbating and relieving factors
- any other changes that the patient associates with the lesion.

Always consider oral cancer as a possible diagnosis, particularly in patients with risk factors for oral cancer. See When to refer a patient with oral mucosal disease for symptoms and signs that warrant specialist referral for investigation.

The following conditions can be managed in general practice, provided there are no red flag features or features that may indicate a nonmalignant condition warranting referral:

- mild recurrent aphthous ulcerative disease
- traumatic oral ulcers
- oral candidiasis provided it is not recurrent or persistent
- angular cheilitis
- oral mucocutaneous viral infections in a patient without immune compromise (eg herpes simplex virus, herpangina, hand, foot and mouth disease, herpes zoster)
- mild dry mouth
- oral mucositis
- amalgam tattoo
- geographic tongue
- hairy tongue
- physiological oral pigmentation.

Some causes of oral mucosal discolourations are physiological (eg Fordyce spots [ectopic sebaceous glands as shown in [Figure 13.25](#)], leukoedema [[Note 1](#)]); these do not require active management.

Figure 13.25 Intraoral Fordyce spots

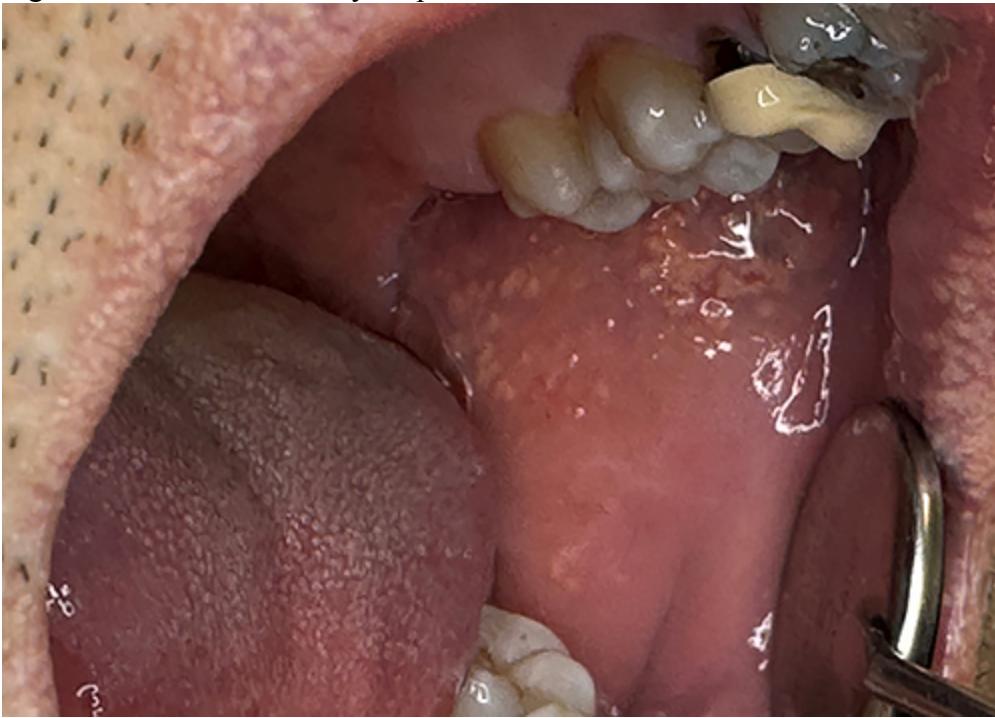


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Note 1: Leukoedema is a white opalescence of the buccal mucosa visible only when the mucosa is relaxed, not when stretched; it is seen more commonly in people with dark skin or people who smoke.

When to refer a patient with oral mucosal disease

When to refer a patient with oral mucosal disease

Referral criteria aim to promote early investigation of oral mucosal diseases associated with significant morbidity and mortality, particularly [oral cancer](#) and [oral potentially malignant disorders](#).

Early referral to an appropriate specialist [[Note 2](#)] is required if:

- the patient has any [red flag features that may indicate oral cancer](#)
- the diagnosis is not clear
- the patient has not responded to initial treatment.

Early referral is warranted if a patient has potential symptoms or signs of oral cancer, an unclear diagnosis or a condition that does not respond to treatment.

Some oral symptoms or signs are features that may indicate a [nonmalignant condition warranting referral](#) to an appropriate specialist [[Note 2](#)].

Figure 13.26 Red flag features that may indicate oral cancer
oral ulcers that have lasted for more than 2 weeks [NB1]

[pigmented lesions](#) on the oral mucosa with features that may be symptoms or signs of melanoma

red, white, or mixed red and white oral mucosal lesions of unknown origin or with high-risk features, such as:

- induration
- ulceration with rolled margins
- fixation to underlying tissues
- lesions in high-risk sites (eg lateral tongue, floor of mouth)

facial or oral paraesthesia

persistent oral mucosal discomfort with no obvious cause

lumps or swellings, including lymphadenopathy

swelling, pain or blockage of a salivary gland, suggestive of salivary gland disease (see [here](#) for common causes of salivary gland swelling)

NB1: Oral cancer must be excluded, but nonmalignant causes of persistent ulcers to consider include syphilitic chancre (see [Oral syphilis](#)).

Figure 13.27 Features that may indicate a nonmalignant condition warranting specialist referral suspected allergy or adverse reaction to dental materials (eg [oral lichenoid lesion](#))

oral ulcers that recur

nontraumatic oral ulcers in children

dry mouth that is not adequately relieved with over-the-counter products and [nonpharmacological methods](#)

suspected oral manifestations of undiagnosed systemic diseases such as:

- syphilis, usually appearing as ulcers (signs vary with stage of disease– see [Oral syphilis](#) for details)
- Behçet syndrome, appearing as tender ovoid oral mucosal ulcers with a red halo, and a history of eye inflammation and genital ulcers
- [HIV](#), manifesting as conditions such as oral hairy leukoplakia or chronic [oral or oropharyngeal candidiasis](#) [NB1]
- inflammatory bowel disease, usually appearing as linear oral ulcers, oral tissue tags or a cobblestone appearance of the buccal mucosa
- [lichen planus](#), usually appearing as white striations on the oral tissues
- [pemphigoid](#) and [pemphigus](#), usually appearing as ulcers and blisters, with peeling of the oral tissues

oral lesions in patients known to have immune compromise (see [Immune compromise: dental considerations](#) for causes of profound immune compromise)

HIV = human immunodeficiency virus

NB1: Oral hairy leukoplakia is associated with Epstein–Barr virus infection and is seen in patients who have immune compromise. It is distinct from oral leukoplakia, which is an oral potentially malignant disorder. For images of oral hairy leukoplakia, see the [DermNet website](#). Oral hairy leukoplakia and chronic [oral and oropharyngeal candidiasis](#) are [indicators for HIV testing](#). Indicator conditions for HIV testing are conditions that are seen in people with HIV infection (including

undiagnosed infection), conditions that share a transmission route with HIV (eg sexually transmissible infections), or conditions for which management is altered in people with HIV infection (eg tuberculosis). If oral hairy leukoplakia or chronic oral or oropharyngeal candidiasis is identified, HIV testing should be offered by the patient's medical practitioner, regardless of whether the patient has behavioural or epidemiological risk factors for HIV infection.

Note 2: An oral medicine specialist is the most appropriate specialist to diagnose and manage oral mucosal disease, but may not be accessible; an oral surgeon, dermatologist or otorhinolaryngologist are other options.

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Oral leukoplakia

Leukoplakia is a clinical term for a nonremovable white lesion that is not easily recognisable as a specific diagnosis and therefore requires further investigation. For an image of oral leukoplakia, see [Figure 13.31](#). Oral leukoplakia may be homogeneous (uniform lesion often with a fissured surface), or nonhomogeneous (with surface irregularity and textural or colour variation [eg speckled]). Oral leukoplakia is a form of [oral potentially malignant disorder](#) and is a distinct condition from oral hairy leukoplakia [\[Note 1\]](#). Evaluation follows the approach in [Assessment of oral mucosal disease](#).

Some oral leukoplakia lesions show histologic evidence of dysplasia, carcinoma *in situ* or invasive squamous cell carcinoma – see [Oral cancer](#). The malignant transformation rate for oral leukoplakia is variably reported, but ranges between 0.13 to 34%, with a mean annual transformation rate of 3.8% per year.

Refer patients with oral leukoplakia to an appropriate specialist for biopsy and monitoring [\[Note 2\]](#).

Biopsy of a persistent undiagnosed oral white patch is required to exclude epithelial dysplasia, carcinoma *in situ* and squamous cell carcinoma. [Figure 13.31 Leukoplakia of the ventral surface of the tongue and floor of mouth](#)



Photo sourced with permission from Associate Professor Sue-Ching Yeoh

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Oral erythroplakia

Oral erythroplakia

Erythroplakia is a clinical term for a potentially malignant fiery red lesion that cannot be attributed to a specific diagnosis (see [Figure 13.32](#)). Lesions are usually asymptomatic and isolated, and commonly appear on the floor of the mouth, tongue, soft palate and buccal mucosa. Lesions may appear as smooth, velvety, granular or nodular plaques, often with distinct margins. Oral erythroplakia most commonly affects middle-aged and older males. It is a form of [oral potentially malignant disorder](#).

Approximately 70 to 90% of oral erythroplakia lesions are carcinoma *in situ* or squamous cell carcinoma upon presentation.

Evaluation follows the approach in [Assessment of oral mucosal disease](#). Urgent referral to a specialist for biopsy of oral erythroplakia lesions is essential because approximately 70 to 90% are carcinoma *in situ* or squamous cell carcinoma at presentation [[Note 1](#)] – see [Oral cancer](#). Periodic review and repeated biopsy by the managing specialist is recommended for all patients with oral erythroplakia, because malignant transformation is common.

Figure 13.32 Erythroplakia of the right posterolateral surface of the tongue



Photo sourced with permission from Associate Professor Antonio Celentano

Note 1: The treating specialist should perform the biopsy of an oral mucosal lesion. If a delay in specialist review is expected, seek expert advice on biopsy technique – a punch biopsy is not appropriate.

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Oral syphilis

Oral syphilis

Syphilis is caused by *Treponema pallidum*. For information on the incidence, epidemiology and clinical stages of syphilis, see [Syphilis](#) in the Antibiotic Guidelines.

Oral lesions are features of early syphilis (primary and secondary subcategories) and tertiary syphilis.

Primary oral syphilis appears as a painless lesion (chancre) at the site of contact with the bacteria; see [Figure 13.49](#). Oral chancres are observed in 4 to 12% of patients, often on the tongue, gingivae, palate and lips. The incubation period is 10 to 90 days and the chancre resolves after 3 to 8 weeks.

Figure 13.49 Primary syphilitic chancre on the tongue



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Without treatment, 25% of patients develop secondary syphilis, which may present as a maculopapular cutaneous rash (on the palms and soles), uveitis and hepatitis. Oral lesions of secondary syphilis are most commonly painful ulcers and occur in at least 30% of individuals; these resolve in 3 to 12 weeks.

Tertiary syphilis affecting the oral mucosa appears as a nodular, ulcerative lesion (gumma) commonly on the tongue, tonsils, palate or lips, and less often, the jaw bone.

Evaluation follows the approach in [Assessment of oral mucosal disease](#). Suspected oral syphilis is an indication for specialist referral. The diagnosis usually requires a biopsy and serological investigations. For information on investigations and management, see [Syphilis](#) in the Antibiotic guidelines.



Human papillomavirus-related oral lesions

Human papillomavirus-related oral lesions

Human papillomaviruses (HPV) can cause a wide range of oral mucosal lesions. The virus is usually transmitted by direct contact with a lesion. Evaluation follows the approach in [Assessment of oral mucosal disease](#).

Squamous papilloma is the most common oral HPV lesion, appearing as a protruding growth with small finger-like projections (see [Figure 13.33](#)). Sexually transmitted HPV infections can cause oral HPV lesions called condyloma acuminata. Verruca vulgaris – the common wart – is also caused by HPV infection and may present in the oral cavity. Both condyloma acuminata and verruca vulgaris can be clinically similar to squamous papilloma.

Oncogenic types of HPV are now recognised as a cause of some [squamous cell carcinomas](#), particularly of the posterior tongue, tonsillar region and oropharynx. These HPV-related oral cancers appear to be a distinct entity, separate to the oral cancers associated with alcohol and tobacco use.

Refer patients with suspected HPV lesions to an appropriate specialist for biopsy and management [\[Note 1\]](#).

Figure 13.33 Papilloma of the tongue



Photo sourced with permission from Associate Professor Sue-Ching Yeoh

Note 1: The treating specialist should perform the biopsy of an oral mucosal lesion. If a delay in specialist review is expected, seek expert advice on biopsy technique – a punch biopsy is not appropriate.



Oral lichen planus

Oral lichen planus

Lichen planus is an uncommon idiopathic immune-mediated condition that can affect the skin, hair, nails, and oral and genital mucosae. It is a form of oral potentially malignant disorder. For management of nonoral lichen planus, see Lichen planus in the Dermatology guidelines.

Oral lichen planus typically occurs bilaterally on the buccal mucosa, tongue and gingivae. In the nonerosive form of the disease, the lesions consist of a characteristic reticular pattern of white striations or plaques (see Figure 13.34). Erosive oral lichen planus presents as erythematous, ulcerated or eroded areas of mucosa, which are often painful. Symptoms include stinging or burning, especially with spicy or acidic food. Oral lichen planus is associated with an increased risk of oral squamous cell carcinoma.

Oral lichen planus is associated with an increased risk of oral squamous cell carcinoma.

Evaluation follows the approach in Assessment of oral mucosal disease. Refer patients with suspected oral lichen planus to a specialist for biopsy, definitive diagnosis and management [Note 1]. Topical triamcinolone paste available over the counter may be used if the patient is in pain while awaiting specialist review. Differential diagnosis should exclude oral lichenoid lesions. If lichen planus occurs on the gingival tissues, management includes improving oral hygiene and periodontal health. Patients with oral lichen planus require ongoing review by an oral medicine specialist because of the chronic nature of the condition and the potential for malignant transformation.

If biopsy-confirmed oral lichen planus becomes symptomatic, treat with:

betamethasone dipropionate 0.05% cream or ointment topically to the lesions, twice daily after meals, until symptoms resolve [Note 2].

Advise patients to return to their treating specialist if symptoms have not improved after 3 weeks of topical corticosteroids, the symptoms change or the appearance or texture of the lesion changes.

A compounded topical steroid mouthwash (eg dexamethasone) should only be prescribed by specialists or other practitioners experienced in its use after a diagnosis has been confirmed.

Figure 13.34 Oral lichen planus of the left buccal mucosa showing characteristic white striations



Photo sourced with permission from Associate Professor Sue-Ching Yeoh

Note 1: The treating specialist should perform the biopsy of an oral mucosal lesion. If a delay in specialist review is expected, seek expert advice on biopsy technique – a punch biopsy is not appropriate.

Note 2: For instructions on applying a topical corticosteroid to the oral mucosa, see [Figure 13.14](#).

Oral lichenoid lesions

Oral lichenoid lesions

Oral lichenoid lesions (see [Figure 13.35](#)) are similar in appearance to idiopathic oral lichen planus but differ in that they are usually isolated lesions rather than bilateral. They are a form of oral potentially malignant disorder.

Lichenoid mucosal reactions can be caused by:

- contact hypersensitivity to dental restorations (mainly amalgam)
- hypersensitivity reactions to drugs, particularly
 - drugs that lower blood pressure (eg beta blockers, angiotensin converting enzyme inhibitors (ACEIs), diuretics [particularly hydrochlorothiazide])
 - nonsteroidal anti-inflammatory drugs (NSAIDs)
 - medical conditions eg chronic graft-versus-host disease.

Refer patients with a suspected oral lichenoid lesion to an appropriate specialist for definitive diagnosis and management.

If the lesion is caused by contact hypersensitivity to an amalgam filling, replacement of the implicated amalgam filling may result in partial or full resolution of the lesion. However, removal of all amalgam fillings is not recommended.

Figure 13.35 Oral lichenoid lesion due to contact hypersensitivity to an amalgam filling



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Geographic tongue

Geographic tongue (erythema migrans) is a benign condition affecting up to 5% of the population. It manifests as migratory red lesions and usually involves the dorsal surface of the tongue, but sometimes extends to the floor of the mouth and buccal mucosa. The red patches have a central atrophic and depapillated zone, which, in the most common presentation, is surrounded by elevated white or cream margins (see [Figure 13.36](#)). Occasionally the central red patch is sensitive, but not painful. If pain or burning is present, investigate for other causes or seek specialist advice.

The cause of geographic tongue is unknown, but there may be a family history of the condition. Atopy may also be associated. Some patients note sensitivity of the tongue to certain foods, particularly those that are spicy or acidic. Histologically, the lesions resemble psoriasis, but geographic tongue is not related to a specific condition.

Evaluation follows the approach in [Assessment of oral mucosal disease](#). Management of geographic tongue is not required beyond correct diagnosis and reassurance. If any [red flag features](#) of oral mucosal disease or features that may indicate a [nonmalignant condition warranting referral](#) are present, refer to an appropriate specialist.

Figure 13.36 Geographic tongue lesion of the right lateral border



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Hairy tongue

Hairy tongue

Hairy tongue occurs when excessively long and hyperkeratinised filiform papillae of the tongue become stained by an accumulation of epithelial cells, exogenous material or chromogenic microorganisms (see [Figure 13.37](#)). The staining is usually black, but may be other colours, and can occur with the use of chlorhexidine mouthwash, after a course of antibiotics or in patients who have limited oral intake (eg with percutaneous endoscopic gastrostomy [PEG] feeding).

Evaluation follows the approach in [Assessment of oral mucosal disease](#). If any [red flag features](#) of oral mucosal disease or features that may indicate a [nonmalignant condition warranting referral](#) are present, refer to an appropriate specialist.

Management of hairy tongue primarily involves identifying and addressing the cause. Other strategies include improving [oral hygiene](#), brushing the tongue gently with a toothbrush, and using sodium bicarbonate mouthwash [[Note 1](#)].

Figure 13.37 Hairy tongue

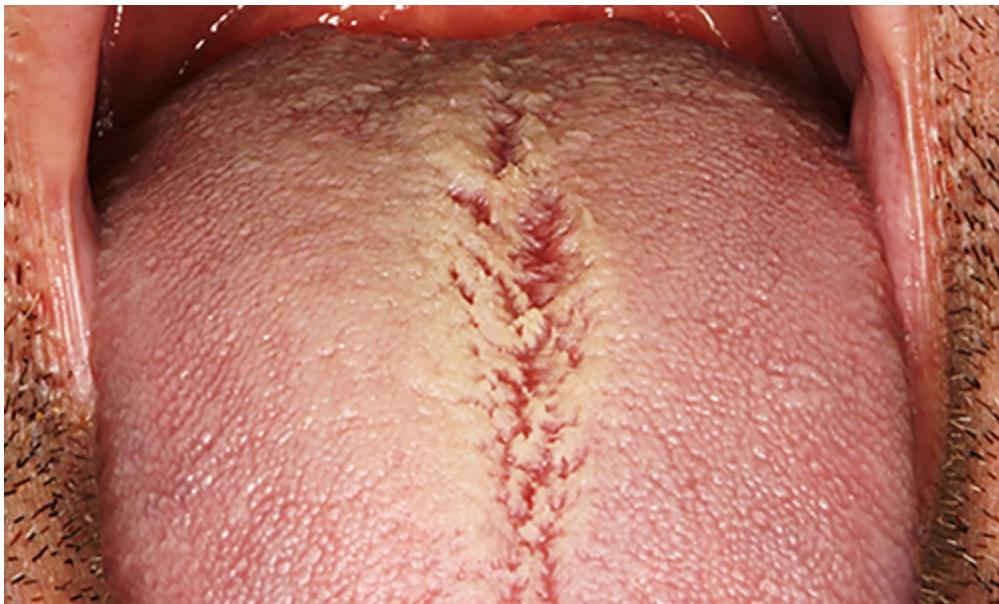


Photo sourced with permission from Associate Professor Sue-Ching Yeoh

Note 1: A sodium bicarbonate mouthwash can be made by adding half a teaspoon of sodium bicarbonate powder to a glass of warm water. The mouthwash can be rinsed in the mouth on waking and at any time during the day.



Assessment of oral pigmentation

Assessment of oral pigmentation

Oral pigmentation is common and usually benign (eg physiological oral pigmentation, amalgam tattoo), but it is important to take a history and examine for features of oral mucosal melanoma or systemic disorders associated with hyperpigmentation (eg adrenal insufficiency). Evaluation follows the approach in Assessment of oral mucosal disease. Ask about the time course of the pigmentation, particularly its relationship to medication use because some forms are drug-induced.

Urgent referral is required to exclude melanoma if a pigmented lesion:

- fits the ABCDEFG rule for melanoma diagnosis
- is associated with pain or loosening of adjacent teeth.

Multiple discrete pigmented areas in the mouth or on the lips require specialist referral because they may be a sign of systemic disease.

Pigmentation that does not require immediate referral should still be monitored for changes (including the use of clinical photographs); however, monitoring is not required if a diagnosis of physiological pigmentation or amalgam tattoo has been made.

Physiological oral pigmentation

Physiological oral pigmentation

Physiological oral pigmentation usually occurs in patients with dark skin and is a common incidental finding. The most common presentation is generalised brown-black pigmentation of the gingival tissues, but it can also occur on the buccal mucosa, palate, tongue and lips. It is asymptomatic, and no intervention is required.

Amalgam tattoo

Amalgam tattoo

Amalgam tattoos are a common cause of exogenous oral discolouration. They result from the iatrogenic mucosal implantation of amalgam particles during a dental procedure. They are usually small, macular and blue-grey to black in colour. Amalgam tattoos are usually found close to amalgam-restored teeth or where such teeth were previously present (see Figure 13.38).

Amalgam tattoos are benign and do not require management beyond correct diagnosis. To confirm the diagnosis, look for metallic amalgam particles on X-ray. Refer patients to an appropriate specialist if:

- the diagnosis is not confirmed on X-ray
- any red flag features of oral mucosal disease are present
- features that may indicate a nonmalignant condition warranting referral are present.

Figure 13.38 Amalgam tattoo

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Melanotic macule

Melanotic macule

Melanotic macules commonly occur on the vermillion border of the lips, and can also present intra-orally (see [Figure 13.39](#) for a lip macule and [Figure 13.40](#) for a macule on the palate). A macule presents as a discrete, well-circumscribed brown-black pigmented area, usually a few millimetres in diameter.

Lesions should be assessed by an appropriate specialist and monitored (including the use of clinical photographs) for changes in size, texture, colour and definition. If changes are noted, patients should be referred to an appropriate specialist for biopsy to exclude oral melanoma.

Patients with multiple melanotic macules may require referral for further assessment for associated systemic conditions (eg Peutz–Jeghers syndrome [\[Note 1\]](#), [adrenal insufficiency](#)).

Figure 13.39 Melanotic macule on the lower lip



Photo sourced with permission from Associate Professor Sue-Ching Yeoh

Figure 13.40 Melanotic macule on the palate



Photo sourced with permission from Associate Professor Sue-Ching Yeoh

Note 1: For information including photographs of the genetic condition Peutz–Jeghers syndrome, see [MedlinePlus](#).

Oral mucosal melanoma

Oral mucosal melanoma

Oral mucosal melanomas are rare. They tend to present on the hard palate or gingivae as irregular blue-black macules with ill-defined borders (see [Figure 13.41](#)). Commonly, colour varies within the lesion. In some lesions, raised nodular or plaque-like

areas and ulceration occur.

Oral melanomas behave aggressively, with regional lymph node involvement often noted at diagnosis.

Patients may present with symptoms of pain, or alteration in sensation, as well as loosening of adjacent teeth.

If a mucosal melanoma is suspected, as outlined in [Assessment of oral pigmentation](#), urgently refer the patient to an appropriate specialist for timely biopsy and diagnosis. Early diagnosis of oral mucosal melanoma is crucial because early treatment prolongs survival.

Figure 13.41 Melanoma on the hard palate



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Causes of oral ulcers

Causes of oral ulcers

The most common causes of oral ulcers are:

- trauma
- recurrent aphthous ulcer disease.

Other causes of ulcers include:

- common infections that occur mainly in children (eg herpangina, hand, foot and mouth disease)
- other viral infections
 - herpes simplex
 - herpes zoster
 - cytomegalovirus in HIV-infected patients
- bacterial infections (eg oral syphilis)
- dermatological conditions
 - oral lichen planus
 - mucous membrane pemphigoid
 - pemphigus vulgaris
 - erythema multiforme
- oral cancer
- systemic disease (eg Crohn disease)
- drug reactions.

Evaluation of oral ulcers, including indications for referral, follows the approach in Assessment of oral mucosal disease.

Symptom management for oral ulcers

Symptom management for oral ulcers

For assessment of oral ulcers, including indications for referral, see Assessment of oral mucosal disease.

For pain relief, a saltwater mouthwash may be effective; it is also antiseptic. If additional pain relief is required, use oral analgesia, a topical analgesic or anaesthetic, or a combination. Avoid topical preparations containing salicylates (eg teething gels) because they may exacerbate ulcer pain.

A suitable topical analgesic regimen is:

benzydamine 1% gel (adult and child 6 years or older) topically to the ulcer, 2- to 3-hourly as necessary.

The topical anaesthetic lidocaine viscous solution is an alternative, but it may be prohibitively expensive so is usually reserved for use in hospital settings when other therapies have been ineffective; use:

lidocaine 2% viscous solution

adult: use the lowest dose necessary up to 15 mL, rinsed in the mouth for 30 seconds then spat out, 3-hourly as necessary; maximum 8 doses in 24 hours

child 3 years or older: use the lowest dose necessary up to 0.2 mL/kg (maximum 5 mL), rinsed in the mouth for 30 seconds then spat out, 3-hourly as necessary; maximum 4 doses in 24 hours

child younger than 3 years: use the lowest dose necessary up to 0.2 mL/kg (maximum 1.25 mL), applied to the affected areas with a cotton swab, 3-hourly as necessary; maximum 4 doses in 24 hours.

Topical corticosteroids can be used in the short term to promote healing and relieve pain for most oral ulcers in adults (excluding major or herpetiform recurrent aphthous ulcers, which require specialist advice). For considerations on the use of topical corticosteroid in dentistry, including patient information on how to apply them, see Topical corticosteroids used in dentistry. Suitable regimens for over-the-counter topical corticosteroids to treat oral ulcers in **adults** include:

1 hydrocortisone 1% cream or ointment topically to the lesions, 2 to 3 times daily after meals

OR

1 triamcinolone acetonide 0.1% paste topically to the lesions, 2 to 3 times daily after meals.

Identifying a specific cause of the ulcer guides further management. Seek specialist review if ulcers persist for more than 14 days.

Ulcers not improving after 2 weeks should be assessed by an appropriate specialist.

Traumatic oral ulcers

Traumatic oral ulcers

Oral ulcers due to trauma are common and can be associated with:

- eating sharp, rough or hot foods
- sharp broken teeth or dental restorations
- toothbrushing
- oral prostheses or orthodontic appliances
- chemical burns (eg following incorrect use of tooth-bleaching products).

Address the cause of trauma by changing oral hygiene practices, smoothing sharp edges of teeth or restorations, adjusting prostheses or placing wax on orthodontic appliances.

Most traumatic ulcers resolve spontaneously if the cause of the trauma has been adequately addressed. However, if any red flag features are present that may be indicators of oral cancer or may be indicators of nonmalignant conditions warranting specialist referral, refer to an appropriate specialist. For an image of a persistent traumatic ulcer, see [Figure 13.42](#).

For advice on managing pain and promoting healing of traumatic ulcers, see [Symptom management for oral ulcers](#). Ulcers persisting more than 2 weeks despite addressing the cause of trauma require investigation; refer to an appropriate specialist. Differential diagnosis of a persistent ulcer includes oral syphilis.

Figure 13.42 Persistent traumatic ulcer of the right posterior lateral margin of the tongue



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Recurrent aphthous ulcerative disease

Recurrent aphthous ulcerative disease

Overview of recurrent aphthous ulcerative disease

Overview of recurrent aphthous ulcerative disease

Recurrent aphthous ulcerative disease is the most common cause of nontraumatic ulcers of the oral mucosa. It is immune-mediated and causes periodic eruption of painful oral ulcers. Triggers for recurrence include smoking cessation and trauma (eg toothbrushing, orthodontic appliances).

Recurrent aphthous ulcerative disease usually affect the mucosa of the cheek, lip and floor of the mouth, but can occasionally affect the mucosa of the gingivae and hard palate. Aphthous ulcers can be minor, major or herpetiform.

Minor aphthous ulcers (see [Figure 13.43](#)) are the most common form. They present as small lesions (usually 2 to 4 mm in diameter) occurring a few at a time. They usually heal within 7 to 10 days.

Major aphthous ulcers are less common. They present as larger lesions (10 mm or more in diameter) and can persist for up to 6 weeks (occasionally months). They heal with submucosal scarring.

Herpetiform aphthous ulcers are rare. They present as recurrent crops of nonvesicular small ulcers (1 to 2 mm in diameter) that coalesce to form larger ulcers; they resemble but are not caused by herpes virus infections. They heal within 1 to 2 weeks.

Assessment of recurrent aphthous ulcers involves taking a thorough history and examination; see also red flag features of oral mucosal disease. Patients who have recurrent aphthous ulcers and additional symptoms should be investigated (by a medical practitioner or oral medicine specialist) for differential diagnoses such as:

- iron, vitamin B₁₂, folate or zinc deficiency – deficiencies should only be treated if confirmed by laboratory testing (see Overview of vitamin, mineral and trace element deficiencies for management)
- coeliac disease
- ulcerative colitis
- Behcet syndrome
- PFAPA (periodic fever, aphthous stomatitis, pharyngitis, cervical adenitis) syndrome in children; for more information, see the DermNetwebsite
- cyclic neutropenia or neutropenia related to other causes of immune compromise.

Figure 13.43 Minor aphthous ulcer of the mandibular labial mucosa



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Management of recurrent aphthous ulcerative disease

Management of recurrent aphthous ulcerative disease

If recurrent aphthous ulcerative disease is suspected in a child, refer for further investigation because it could be a sign of systemic disease.

Seek specialist advice for patients with major or herpetiform aphthous ulceration, or patients with immune compromise and neutropenic ulceration.

For management of aphthous ulcers in patients receiving palliative care, see [Aphthous ulcers](#).

For advice on managing pain and promoting healing of traumatic ulcers, see [Symptom management of oral ulcers](#). Ulcers persisting more than 2 weeks despite addressing the cause of trauma require investigation; refer to an appropriate specialist. Differential diagnosis of a persistent ulcer includes [oral syphilis](#).

The aim of management is to treat the lesion rather than prevent further outbreaks. For advice on managing pain and promoting healing of minor recurrent aphthous ulcers, see [Symptom management of oral ulcers](#). Use of topical corticosteroids in the prodromal or pre-ulcerative stage can produce rapid healing.

A compounded topical steroid mouthwash (eg dexamethasone) may also be used for minor aphthous ulcers but should only be prescribed by specialists (or other practitioners experienced in its use) after the diagnosis has been confirmed.

Patients with ulcers that are not improving after 2 weeks should be referred to an appropriate specialist for biopsy [\[Note 1\]](#) and management.

Note 1: The treating specialist should perform the biopsy of an oral mucosal lesion. If a delay in specialist review is expected, seek expert advice on biopsy technique – a punch biopsy is not appropriate.

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Overview of oral presentations of shingles (herpes zoster) in dental practice

Overview of oral presentations of shingles (herpes zoster) in dental practice

Shingles (herpes zoster) is caused by reactivation of varicella zoster virus (VZV). It is uncommon in childhood and incidence increases with age. This topic is intended for use in dental practice; advice for medical practitioners is available in the [Antibiotic guidelines](#).

Shingles is usually a self-limiting infection lasting 10 to 15 days. It is characterised by a painful rash that presents with blisters in a dermatomal [[Note 1](#)] distribution on an erythematous base.

Shingles commonly occurs on the thorax, neck, lumbosacral region or face (involving any branch of the trigeminal nerve). Ophthalmic branch involvement may compromise vision, as well as causing eye pain and photophobia, amongst other symptoms. Shingles involving the maxillary and mandibular branches of the trigeminal nerve may result in cutaneous and intraoral mucosal lesions. Lesions typically extend to but not beyond the midline (see [Figure 13.44](#) and [Figure 13.45](#)). Prodromal symptoms last 3 to 5 days and are followed by blisters erupting over a week. These heal over 2 weeks. Reactivation of the virus may occur spontaneously, but is more frequent in patients with immune compromise, who are more likely to develop disseminated disease. Triggers may include physical trauma (including dental treatment), as well as physical and emotional stress.

Zoster sine herpete is an atypical presentation of shingles; the conventional presentation of a rash and vesicular lesions may be absent. Symptoms may be variable and include neuralgia.

Figure 13.44 Shingles affecting the mandibular skin



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Figure 13.45 Shingles affecting the left half of the tongue



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Patients with undiagnosed HIV infection may present initially with shingles. Shingles is an indicator condition for HIV testing [\[Note 2\]](#). If shingles is identified, refer patients to a medical practitioner to be offered HIV testing, regardless of whether the patient has behavioural or epidemiological risk factors for HIV infection.

For information on the use of zoster vaccine see the [Australian Immunisation Handbook](#).

Note 1: Dermatomes are segments of skin defined by their nerve supply, such as the arc of skin between 2 ribs if an intercostal nerve is affected.

Note 2: Indicator conditions for HIV testing are conditions that are seen in people with HIV infection (including undiagnosed infection), conditions that share a transmission route with HIV (eg sexually transmissible infections), or conditions for which management is altered in people with HIV infection (eg tuberculosis).

Approach to managing oral presentations of shingles (herpes zoster) in dental practice

Approach to managing oral presentations of shingles (herpes zoster) in dental practice

Antiviral therapy for shingles (herpes zoster) is indicated for:

- adults and adolescents who are immunocompetent and present within 72 hours of rash onset
- children who are immunocompetent and have severe or rapidly progressing infection, regardless of rash duration
- all patients with immune compromise (including those with HIV infection), regardless of rash duration.

Antiviral therapy for shingles reduces acute pain, duration of the rash, viral shedding and ocular complications. Whether antiviral therapy reduces the incidence of postherpetic neuralgia is contentious.

If indicated, antiviral therapy should be started as early as possible. Promptly refer patients to a medical practitioner or oral medicine specialist for oral antiviral therapy. However, inpatient treatment for intravenous antiviral therapy is required for patients with:

- disseminated disease (affecting 3 or more dermatomes or more than 20 vesicles outside the area of the primary and adjacent dermatomes)
- invasive disease (eg encephalitis)
- herpes zoster ophthalmicus or herpes zoster oticus (Ramsay-Hunt syndrome) in patients with immune compromise and in patients with nonresponsive or fulminant infection.

If there is ocular involvement, urgently refer the patient to an ophthalmologist.

Refer patients to a medical practitioner for management of acute pain or postherpetic neuralgia (pain persisting after shingles has resolved). In children, shingles is generally less painful and most children do not require treatment.

Secondary bacterial infection of shingles skin lesions with *Streptococcus pyogenes* (group A streptococcus [GAS]) or *Staphylococcus aureus* can occur and requires referral to a medical practitioner for antibiotic therapy.

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Hand, foot and mouth disease

Hand, foot and mouth disease

Hand, foot, and mouth disease is a highly contagious viral infection caused by various enteroviruses (usually coxsackievirus). It frequently occurs in young children but may present at any age. Childhood infection is often milder than in adulthood. The diagnosis is usually made clinically.

Systemic symptoms of hand, foot, and mouth disease are common, including fever, sore throat and malaise. Oral mucosal lesions present as pinpoint red spots on the oral mucosa, which become fluid-filled vesicles and eventually ulcerate. For images of hand, foot and mouth disease affecting perioral skin and the palatal mucosa, see [Figure 13.46](#) and [Figure 13.47](#). Patients also develop a cutaneous rash, often affecting the palms of the hands and soles of the feet.

Figure 13.46 Perioral skin lesions in hand, foot and mouth disease



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Figure 13.47 Palatal lesions in hand, foot and mouth disease

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Treatment of hand, foot and mouth disease is supportive; ensure the patient has adequate analgesia, nutrition and hydration. The infection is self-limiting, with full recovery expected within 3 weeks.

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Herpangina

Herpangina

Herpangina is a coxsackievirus infection that presents as erythema followed by vesicles and ulcers in the soft palate and tonsillar region; see [Figure 13.48](#). This is usually accompanied by fever, malaise, regional lymphadenopathy and dysphagia. The diagnosis is usually made clinically.

Treatment of herpangina is supportive; ensure the patient has adequate analgesia, nutrition and hydration. The infection is self-limiting with full recovery expected within 2 to 3 weeks.

Figure 13.48 Herpangina



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Mucocele

Mucocele

Mucoceles represent a collection of mucous, either within a salivary gland duct or the surrounding tissues. They usually result from local trauma such as biting the lip, leading to rupture of the salivary duct or ductal obstruction and accumulation of saliva in the tissue. The most common site for mucoceles is the lip although they can form in other oral mucosal sites. Many mucoceles appear as painless, bluish, soft, fluid-filled, fluctuant localised swelling.

The different types of mucoceles are mucous extravasation phenomenon, mucus retention cysts and ranulas.

Mucous extravasation phenomenon occurs when trauma to a minor salivary duct leads to mucus spilling into the surrounding connective tissue, forming a fluid-filled lump. This phenomenon often occurs on the lower lip (see [Figure 13.50](#)). Superficial mucocele presentations include mucous-filled blisters beneath the epithelium of the soft palate.

Figure 13.50 Mucocele on lower lip



Photo sourced with permission from Associate Professor Sue-Ching Yeoh

Mucous retention cysts are formed by accumulation of saliva within the salivary duct, often as a result of ductal obstruction. This is commonly associated with the sublingual or submandibular glands and presents in the floor of the mouth.

Ranulas (plunging or cervical) are herniations of mucous retention cysts through the mylohyoid muscle and along the fascial planes of the neck.

Evaluation follows the approach in [Assessment of oral mucosal disease](#).

Some mucocoeles may rupture and heal spontaneously, but many will recur. Larger and deeper mucocoeles require surgical excision; refer to an appropriate specialist for management.

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Mucous membrane pemphigoid

Mucous membrane pemphigoid

Mucous membrane pemphigoid is an uncommon autoimmune vesiculobullous disorder that affects stratified squamous epithelium, most frequently of the mouth and eyes. The oral features occur predominantly on the gingivae and palate (see [Figure 13.51](#)). Mucous membrane pemphigoid presents as areas of bulla or vesicle formation characterised by subepithelial splitting. These lesions develop into large, painful and persistent erosions that heal with variable amounts of scarring. Evaluation follows the approach in [Assessment of oral mucosal disease](#). Differential diagnoses include [pemphigus vulgaris](#).

Refer patients with suspected mucous membrane pemphigoid to an appropriate specialist for biopsy of oral lesions and definitive diagnosis [\[Note 1\]](#). Optimal oral hygiene and periodontal management are central to improving the condition. Long-term use of immunosuppressive therapy is usually required.

Ophthalmologist review is necessary because there is a risk of blindness with untreated mucous membrane pemphigoid.

Figure 13.51 Mucous membrane pemphigoid affecting the mandibular gingivae



Photo sourced with permission from Associate Professor Sue-Ching Yeoh

Note 1: The treating specialist should perform the biopsy of an oral mucosal lesion. If a delay in specialist review is expected, seek expert advice on biopsy technique – a punch biopsy is not appropriate.

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Pemphigus vulgaris: oral features

Pemphigus vulgaris: oral features

Pemphigus vulgaris is a rare chronic autoimmune disease characterised by intraepithelial blistering. This results in superficial fluid-filled bullae and vesicles that rupture quickly leaving areas of peeling tissue and irregular tender ulceration of the mucosa or skin.

Up to 70% of patients with pemphigus vulgaris present with oral lesions. These may be the initial and only sign of disease. The gingivae and the buccal and palatal mucosa are the most common oral sites, although the mucosa of the entire oral cavity, and the oropharynx, larynx, oesophagus, conjunctiva and genitalia may be affected. For nonoral features of pemphigus vulgaris, see [Pemphigus](#) in the Dermatology guidelines.

Evaluation follows the approach in [Assessment of oral mucosal disease](#). Refer patients with suspected pemphigus vulgaris to an appropriate specialist for biopsy and definitive diagnosis. Management usually requires long-term immunosuppressive therapy.

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Erythema multiforme: orofacial features

Erythema multiforme: orofacial features

Orofacial features of erythema multiforme are haemorrhagic crusting of the lips, blistering and extensive ulceration of the oral mucosa. Pain, difficulty eating, drinking and swallowing are common.

Erythema multiforme is a rare hypersensitivity reaction affecting the skin and/or mucous membranes. It is often triggered by reactivation of an infection with herpes simplex virus (HSV) or *Mycoplasma pneumoniae*, but other triggers include drugs (eg antibiotics, nonsteroidal anti-inflammatory drugs).

Two forms of erythema multiforme are recognised. The milder and more common form (**erythema multiforme minor**), has symmetrical targetoid lesions on the arms and legs, and may, uncommonly, involve a single mucosal site. The more severe form (**erythema multiforme major**) involves 2 or more mucous membranes (eg oral, ocular, genital, laryngeal, oesophageal membranes), variable cutaneous lesions and, sometimes, internal organs. For images of erythema multiforme presentations, see the [DermNet website](#).

Urgently refer patients with any systemic symptoms, severe symptoms, or extensive cutaneous or mucosal involvement to hospital because, of the possibility of potentially life-threatening severe cutaneous drug reactions such as Stevens–Johnson syndrome / toxic epidermal necrolysis (SJS/TEN). For more details of severe cutaneous drug reactions, see [Cutaneous drug reactions](#) in the Dermatology guidelines.

Supportive management of orofacial erythema multiforme includes wound care, fluid and nutritional support, and pain relief. Topical corticosteroids may be used for oral lesions as an adjunct to systemic therapy.

Identification of triggers is important to prevent recurrence, which occurs in up to 24% of patients. Antiviral prophylaxis may be appropriate for frequent severe recurrences associated with HSV infection.



Overview of oral mucositis

Overview of oral mucositis

Oral mucositis presents as painful inflammation, redness, swelling and ulceration of the oral mucosal surfaces caused by radiotherapy, chemotherapy or other drugs. Oral mucositis is a type of stomatitis (an inflammatory condition of the oral tissues). Other causes of stomatitis include salivary gland hypofunction (see [Dry mouth](#)) and nutritional deficiencies (iron, vitamin B₁₂, zinc). Evaluation follows the approach in [Assessment of oral mucosal disease](#).

Oral mucositis can lead to significant problems with eating, drinking and adherence to medication.

Patients undergoing treatment of cancer who develop mucositis have an increased risk of systemic infection and require longer hospital admissions. To minimise the risk of oral infection and associated complications during cancer treatment, patients should have a dental examination and any necessary dental treatment before starting therapy. For more information, see [Cancer: dental considerations](#).

Management of oral mucositis in dental practice

Management of oral mucositis in dental practice

For management of oral mucositis in patients receiving palliative care, see [Mucositis](#).

For management of oral mucositis in children, seek expert advice.

Manage oral mucositis in conjunction with a multidisciplinary team. Management includes addressing the cause, [symptomatic relief](#), [oral care regimens](#) and [nutritional advice](#).

Symptomatic relief for oral mucositis for adults in dental practice

Symptomatic relief for oral mucositis for adults in dental practice

Initial and regular ongoing assessment of oral pain is essential. Lubricants and mouthwashes may reduce pain and inflammation.

Over-the-counter dry mouth products can be applied as necessary for transient relief of oral dryness.

Examples of mouthwashes include sodium bicarbonate (a lubricant) and lidocaine (a topical anaesthetic). At the time of writing, alcohol-free benzylamine mouthwash is not available in Australia (alcohol-containing formulations can cause stinging). If a topical regimen is needed for oral mucositis, use:

- 1 sodium bicarbonate powder, half a teaspoon dissolved in a glass of warm water, rinsed in the mouth and spat out, as required

OR

- 2 lidocaine 2% viscous solution, use the lowest dose necessary up to 15 mL, rinsed in the mouth for 30 seconds then spat out, 3-hourly as necessary; maximum 8 doses in 24 hours.

If symptoms are not adequately managed with topical measures, seek advice from the patient's multidisciplinary team. Systemic analgesics may be required.

Oral care regimens for oral mucositis in dental practice

Oral care regimens for oral mucositis in dental practice

Establish preventive oral care regimens, and regularly assess the oral cavity. Patients with profound mucositis have difficulty performing recommended oral hygiene measures effectively; use of a soft toothbrush or swab to clean the mouth may be tolerable. For patient education resources on oral hygiene in mucositis, see the eviQ website.

If pain and discomfort restrict oral hygiene practices, use an antiseptic mouthwash; use:

chlorhexidine 0.2% mouthwash alcohol-free, 10 mL rinsed in the mouth for 1 minute then spat out, 8- to 12-hourly (use diluted with 10 mL of water if stinging occurs) [\[Note 1\]](#).

Chlorhexidine gel is an alternative to mouthwash, and may provide some lubrication and ease discomfort; use:

chlorhexidine 0.5% gel alcohol-free, apply 2 to 3 times daily to all mucosal surfaces and gingival margins [\[Note 1\]](#).

Note 1: When used for more than a few days, chlorhexidine may cause a superficial discolouration of the teeth and fillings. Chlorhexidine use is usually limited to short periods (up to 2 weeks) to minimise adverse effects (see Chlorhexidine for intraoral use for more information).

Nutritional support for oral mucositis in dental practice

Nutritional support for oral mucositis in dental practice

Nutritional support for patients with mucositis is important. Encourage patients to avoid irritant foods (eg acidic, spicy, salty, dry or abrasive foods). Specific nutritional deficiencies can be identified and addressed by the patient's medical practitioner, but referral for specialist nutritional advice may be indicated if mucositis is severe.

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Causes and complications of dry mouth

Causes and complications of dry mouth

The subjective feeling of dry mouth (xerostomia) is a relatively common condition and is often associated with burning mouth syndrome. Patients with dry mouth may have salivary gland hypofunction (an objective reduction in the quantity and the quality of saliva). Salivary gland function is best evaluated by clinical examination. An adequate amount of saliva is usually present if:

- saliva can be seen to pool in the floor of the mouth
- clear saliva can be expressed from the major salivary glands (Wharton and Stenson ducts)
- the oral membranes glisten with moisture.

Many physiological and pathological conditions and drugs can cause dry mouth. Common causes include:

- dehydration
- alcohol
- anxiety
- mouth breathing
- smoking or vaping
- drugs (see [Figure 13.52](#)).

Evaluation follows the approach in [Assessment of oral mucosal disease](#). If common causes have been excluded, investigate for less common medical conditions associated with dry mouth (eg Sjögren syndrome).

Dry mouth is a debilitating adverse effect of head and neck radiotherapy; the degree of salivary flow reduction depends on the dose and region of the radiation (see also [Head and neck radiotherapy: dental considerations](#)).

Figure 13.52 Drugs frequently associated with dry mouth

[NB1]

anticholinergic drugs:

- urinary antispasmodics (eg oxybutynin, solifenacina)
- inhaled antimuscarinic bronchodilators (eg tiotropium)

anticonvulsants

antidepressants

antihistamines (particularly sedating antihistamines)

antiretrovirals

antihypertensives:

- angiotensin converting enzyme inhibitors (ACEIs)
- angiotensin II receptor blockers (ARBs)
- alpha blockers (eg prazosin, terazosin)
- alpha-receptor agonists (eg clonidine, methyldopa)
- beta blockers
- calcium channel blockers
- diuretics and other drugs with diuretic effects (eg SGLT2 inhibitors)

drugs used to treat benign prostatic hypertrophy (eg tamsulosin, prazosin)

inhaled medications such as beta₂-agonist bronchodilators (eg salbutamol) or inhaled corticosteroids

muscle relaxants (eg baclofen, orphenadrine)

opioids

psychotropic drugs

- antidepressants
- antipsychotics
- hypnotics (for insomnia) (eg zolpidem, zopiclone)
- illicit drugs (eg cannabis, stimulants [eg metamfetamine, cocaine, ecstasy])
- lithium
- psychostimulants (eg amphetamines)
- guanfacine (for ADHD)
- varenicline (for smoking management).
 - retinoids (eg isotretinoin)

ADHD = attention deficit hyperactivity disorder

SGLT2 = sodium-glucose co-transporter 2

NB1: Dry mouth is likely to be more severe if these drugs are used in combination.

Chronic dry mouth can have a profound effect on the oral environment and can contribute to:

- dental caries (tooth decay) and erosion
- periodontal disease (eg gingivitis, periodontitis)

- halitosis
- oral mucosal disease
- oral and oropharyngeal candidiasis
- difficulty with the retention of dentures
- difficulty with chewing, swallowing and speech
- altered sense of taste.

Management of dry mouth

Management of dry mouth

Review the patient's medications and, in conjunction with the prescriber, stop any nonessential drugs that can cause a dry mouth. Encourage patients to have a dental review and any necessary dental treatment before starting a drug that can cause dry mouth.

For symptomatic and preventive strategies for dry mouth, see the patient information in [Figure 13.53](#). For examples of dry mouth products (eg additional mouthwashes, sprays), see [Dry mouth in palliative care](#). Other strategies to manage dry mouth include:

- discussing ways for the patient to optimise oral hygiene
- use of topical remineralising agents to prevent tooth decay (see [Dental caries management strategies](#)).

If symptomatic measures are inadequate, or if dry mouth is a symptom of systemic disease, refer patients to an appropriate specialist – specialist options include systemic pilocarpine (off-label use of eye drops or a compounded formulation).

Figure 13.53 Practical advice for managing dry mouth - patient information[Printable figure](#)

To manage your dry mouth:

- ensure you stay hydrated – drink at least 1.5 litres of tap water a day
- chew food thoroughly before swallowing because chewing stimulates saliva flow
- avoid licking your lips
- chew sugarless gum or suck sugarless sweets (avoid fruit flavours)
- use a lip balm such as lanolin or aloe vera but avoid those that contain additives other than sun protection (eg fragrance, preservatives, colouring, flavouring)
- avoid smoking cigarettes and vaping
- avoid foods that irritate the mouth (spicy, sharp or acidic foods)
- limit your caffeine and alcohol intake, especially in the evening
 - add milk to tea or coffee to reduce the drying effect
- avoid oral preparations (eg mouthwashes) that contain alcohol
- trial over-the-counter dry mouth products (gels, sprays) or bicarbonate mouthwash; talk to your healthcare professional if these do not offer enough relief

- a bicarbonate mouthwash can be made by adding half a teaspoon of bicarbonate powder to a glass of warm water.
Rinse with mouthwash on waking and at any time during the day.

To prevent oral and dental consequences of dry mouth:

- ensure you have good oral hygiene
- have regular dental examinations every 3 to 6 months
- avoid acidic beverages and foods (eg wine, fruit juices, soft drinks, sports drinks) or limit their consumption to meal times
- limit your sugar intake and avoid sugary snacks.

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Oral cancer

Oral cancer

Oral cancer is associated with significant morbidity and mortality. Early presentations of oral cancer are usually asymptomatic, whereas late presentations include pain, discomfort, reduced mobility of the tongue, increased mobility of the teeth or an inability to wear dentures. Oral cancer varies in appearance and can mimic many other oral mucosal diseases (see [Figure 13.28](#), [Figure 13.29](#) and [Figure 13.30](#)).

Oral cancer can mimic many other oral mucosal diseases, so early specialist referral is required for investigation and biopsy of any suspicious lesion.

Evaluation follows the approach in [Assessment of oral mucosal disease](#). Any suspicious lesion needs early specialist referral for investigation and biopsy [\[Note 1\]](#).

Oral squamous cell carcinoma is the most common oral malignancy. Oral squamous cell carcinoma can affect any part of the oral mucosa; however, it most commonly occurs on the lateral surfaces of the tongue, the floor of the mouth or the gingivae.

Risk factors for oral squamous cell carcinoma include:

- advanced age
- male gender
- smoking or tobacco use
- alcohol use
- known [oral potentially malignant disorders](#)
- infection by oncogenic viruses (eg human papillomavirus [HPV]); HPV-related head and neck cancer is an [indicator for human immunodeficiency virus \(HIV\) testing](#) [\[Note 2\]](#). If HPV-related head and neck cancer is identified, HIV testing should be offered by the treating medical practitioner, regardless of whether the patient has behavioural or epidemiological risk factors for HIV infection
- personal or family history of squamous cell carcinoma of the head and neck
- history of cancer therapy – refer patients with a suspicious oral lesion following head and neck cancer treatment for investigation to exclude cancer recurrence or assess for a new primary cancer
- prolonged immune suppression
- chewing areca nut (alone or in a betel quid mixture)
- sun (ultraviolet light) exposure (a risk factor for lip cancer).

The incidence of oral squamous cell carcinomas is rising in younger female patients without typical risk factors.

Genetic susceptibility, environment, occupation and diet may also contribute to the development of oral squamous cell carcinoma.

Figure 13.28 Squamous cell carcinoma of the left ventral surface of the tongue



Photo sourced with permission from Associate Professor Sue-Ching Yeoh

Figure 13.29 Squamous cell carcinoma of the right anterior ventral surface of the tongue



Photo sourced with permission from Associate Professor Sue-Ching Yeoh

Figure 13.30 Squamous cell carcinoma of the left mandibular alveolus

Photo sourced with permission from Associate Professor Sue-Ching Yeoh

Cancers originating from the salivary glands and supporting nonepithelial tissues are less common than oral squamous cell carcinoma. Metastatic cancers to the oral soft tissues and jawbones commonly present as lumps on the tongue and gingivae; they originate from primary malignancies in the breast, prostate, kidneys or lungs. Other malignancies that can present in the oral cavity include leukaemia, lymphoma and, rarely, oral mucosal melanoma.

Note 1: The treating specialist should perform the biopsy of an oral mucosal lesion. If a delay in specialist review is expected, seek expert advice on biopsy technique – a punch biopsy is not appropriate.

Note 2: Indicator conditions for HIV testing are conditions that are seen in people with HIV infection (including undiagnosed infection), conditions that share a transmission route with HIV (eg sexually transmissible infections), or conditions for which management is altered in people with HIV infection (eg tuberculosis).

Oral potentially malignant disorders

Oral potentially malignant disorders

Oral potentially malignant disorders are conditions in which a field change [Note 3] increases lifetime cancer risk in the tissues of the lip and mouth, although most lesions do not progress to cancer. These disorders include:

- oral leukoplakia
- proliferative verrucous leukoplakia (in which lesions have an irregular, rough appearance)
- oral erythroplakia
- actinic cheilitis (actinic [ultraviolet-induced] keratosis causing atrophy, erosion and white patches on the lips)

- oral lichen planus
- oral submucous fibrosis (progressive band-like scarring of the oral mucosa often leading to trismus)
- palatal lesions in reverse smokers [[Note 4](#)]
- oral lupus erythematosus (autoimmune lesions in the lip and inside the mouth, presenting as red areas with white surrounding striations)
- dyskeratosis congenita [[Note 5](#)]
- oral lichenoid lesions
- oral graft-versus-host disease (lesions similar to oral lichen planus after a bone marrow transplant from a donor).

Any suspicious lesion needs early specialist referral for investigation; see [Assessment of oral mucosal disease](#).

Note 3: A field change is a high prevalence of premalignant genetic changes in a tissue.

Note 4: Reverse smoking involves placing the lit end of the cigarette in the mouth before inhaling; it can cause red and white patches on the hard palate, often stained with nicotine.

Note 5: For information on the genetic disorder dyskeratosis congenita, see [Medline Plus](#).

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Overview of orofacial pain: information for dental practice

Overview of orofacial pain: information for dental practice

Pain is ‘an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage’. It is a subjective perception resulting from the brain’s interpretation of inputs and expectations influenced by experience. Understanding the different types of pain guides pain management; the crucial distinction for a general dental practitioner is between pain arising in the dentoalveolar structures (managed by dentists) and nonodontogenic pain (which requires referral).

Acute pain (less than 3 months duration) arising in the dentoalveolar structures is the most common cause of orofacial pain. It:

- is usually nociceptive; see [Table 13.20](#) for a description of nociceptive pain and comparison with other types of pain
- usually resolves rapidly with appropriate dental treatment, but may require short-term use of analgesics
- serves a protective biological function – it alerts the body to a potential threat, prevents the body from further harm, and can teach the body to avoid similar harm in the future.

Chronic pain (persistent pain) is generally regarded as lasting for 3 months or more and is either episodic or constant. Chronic pain is not usually odontogenic; pain often persists because of lasting changes within the nervous system (central sensitisation). Chronic pain:

- may be nociceptive, neuropathic, nociplastic or mixed (see [Table 13.20](#)) for a description of and comparison of these pain types
- can be difficult to diagnose because there may not be any obvious pathology
- may result in anxiety, fear, depression, loss of sleep and impaired social functioning; these factors may also affect a patient’s pain experience
- requires a sociopsychobiological (biopsychosocial) approach to [assessment](#) and [management](#).

For a comprehensive classification of orofacial pain, see the [International Classification of Orofacial Pain 1st edition](#).

Table 13.20 Features of nociceptive, neuropathic and nociplastic pain
[nociceptive pain](#)

[neuropathic pain](#)

[nociplastic pain](#)

nociceptive pain

acute dentoalveolar pain such as:

examples

- pulpitis
- acute odontogenic infections

a mechanical, chemical or thermal stimulus to receptors that are:

cause

- superficial (eg in skin, subcutaneous tissue or mucosa)
- deep (eg in bone or joints)

superficial: hot, sharp, stinging

description

deep: dull, aching, throbbing, cramping, pressure, tightness

perceived as:

localisation

- superficial (precisely localised)
- deep (poorly localised)

neuropathic pain

examples

trigeminal neuralgia, posttraumatic trigeminal neuropathic pain

cause

injury or disease of the peripheral nerves, spinal cord or brain pathways

altered sensation (eg pins and needles, tingling, burning, radiating, lancinating, electric-shock-like, shooting)

sensitisation:

description

- allodynia [NB1]
- hyperalgesia [NB2]

neuralgia [NB3]

localisation

perceived in region supplied by the damaged or diseased neural structure

nociplastic pain

burning mouth syndrome

examples

persistent idiopathic dentoalveolar pain

increased responsiveness of brain and spinal cord to normal input (central sensitisation)

cause

pain persists after a nociceptive or neuropathic stimulus has stopped

variable and nonspecific	
description	may be similar to nociceptive or neuropathic description depends on the affected pathways
localisation	perceived as localised or widespread depending on the affected pathways

NB1: Allodynia is a painful experience in response to normally nonpainful stimuli (eg light touch to skin).

NB2: Hyperalgesia is an increased pain response to normally painful stimuli (eg touching inflamed skin with a sharp needle may be perceived as more painful than the same sharp touch to adjacent normal skin).

NB3: Neuralgia is pain in the distribution of a nerve or nerves.

Assessment of orofacial pain in dental practice

Assessment of orofacial pain in dental practice

Obtaining an adequate pain history from the patient is key to establishing a diagnosis and determining a treatment plan. Figure 13.54 is a summary of red flag features in a pain history that warrant urgent referral for medical evaluation; differential diagnoses include severe infection, giant cell arteritis and head and neck tumours.

Figure 13.54 Red flag features in an orofacial pain history
severe or persistent or worsening pain

severe local or systemic features of infection, especially those that could compromise the patient's airway

trismus

features suggestive of giant cell arteritis in patients 50 years or older (eg jaw pain on eating [NB1], loss of vision or double vision, severe new-onset headache, scalp tenderness)

firm nonmobile enlarged lymph nodes

history of malignancy

tongue weakness or difficulty swallowing

a recent head or neck procedure

unilateral hearing loss, new-onset or unilateral tinnitus or vertigo [NB2]

NB1: Moderate jaw pain on persistent chewing, which settles immediately when chewing stops, is almost diagnostic of giant cell arteritis.

NB2: Reduced hearing and tinnitus are uncommon symptoms of temporomandibular disorders. Rare causes of orofacial pain and auditory or vestibular symptoms include cranial nerve and base of skull tumours. Refer patients with auditory or vestibular symptoms and orofacial pain to an ear, nose and throat specialist.

For a guide for medical practitioners on assessing presentations of **acute** dental pain, see Table 13.21.

For advice on assessing chronic orofacial pain, see the advice in the individual topics listed in Figure 13.56.

In some patients with chronic orofacial pain, acute pain could be a feature of their chronic pain condition. Dental procedures should not be undertaken in patients with chronic orofacial pain unless an acute dental pathology has been identified. If uncertain of the cause of pain, refer the patient to an oral medicine specialist or an oral and maxillofacial surgeon.

Do not undertake dental treatment in a patient with chronic orofacial pain unless a dental pathology is confirmed to be the cause of the acute pain.

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Overview of acute and postprocedural dental pain

Overview of acute and postprocedural dental pain

For a summary of the approach to assessing a patient with orofacial pain, see [Assessment of orofacial pain in dental practice](#). Acute dental pain is usually nociceptive and inflammatory (see [Table 13.20](#) for a description of types of pain).

[Table 13.21](#) outlines common causes of acute dental pain. Differential diagnoses include conditions that are less common, difficult to diagnose or not of dental origin (eg trigeminal neuralgia, which may be mistaken for pulpitis). Refer patients for medical assessment if:

- [red flags](#) are present
- the orofacial pain is not odontogenic (see [Figure 13.56](#) for examples)
- there is uncertainty about the cause of the pain.

Dental treatment is the most effective means of managing acute pain arising from the teeth or surrounding tissues. Drug therapy has a more limited role and should only be used if necessary.

A dental procedure should only be performed if pain is confirmed to be odontogenic; dental treatment is the most effective means of reducing odontogenic pain.

Patients with dental pain presenting to a medical practitioner

Patients with dental pain presenting to a medical practitioner

If a patient with dental pain presents to a medical practitioner and is unable to undergo a dental procedure promptly, interim treatment may be needed – see [Table 13.21](#) for initial management of common causes of dental pain. However, the medical practitioner should stress the importance of seeing a dentist, because dental treatment is often the definitive treatment for conditions causing dental pain.

If dental review is not immediately available, the medical practitioner may consider a panoramic X-ray (an orthopantomogram [OPG]) to exclude pathologies (eg gross dental caries, jaw fractures, jaw lesions such as cysts).

[Table 13.21 A guide for medical practitioners to differentiating and managing acute dental pain](#)
[Printable table](#)
[intermittent dental pain triggered by a stimulus](#)

[severe dental pain persisting after a stimulus is removed](#)

[throbbing dental pain not triggered by a stimulus](#)

[tenderness of the tooth to pressure and pain on biting](#)

[facial swelling and pain without features of severe local or systemic infection](#)

[facial swelling and pain with any features of severe local or systemic infection](#)

[dental pain that worsens when the head is tilted forward](#)

dental pain worsening 1 to 4 days after tooth extractionsevere pain in the whole mouth with gingival bleedingpre-auricular pain

Intermittent dental pain triggered by a stimulus

pain only present while a stimulus is applied to the tooth (eg hot, cold or sweet food or drinks)

likely cause

reversible pulpitis

advise the patient to avoid food or drink that provokes pain

initial management by medical practitioners
cover any obvious cavity with an inert material such as chewing gum or temporary dental cement (temporary filling repair material) available over the counter

advise the patient to see a dentist as soon as possible

analgesics and antibiotic therapy are **not** indicated

dental treatment

simple restoration or desensitisation treatment is required

Severe dental pain persisting after a stimulus is removed

induced by a stimulus (eg hot, cold or sweet food or drinks), persists as a dull throbbing ache on stimulus removal, and can become continuous

likely cause

irreversible pulpitis

advise the patient to avoid food or drink that provokes pain

offer analgesics – NSAIDs are preferred if the patient can use theminitial management by medical practitioners
cover any obvious cavity with an inert material such as chewing gum or temporary dental cement (temporary filling repair material) available over the counterif symptoms are severe, consider local anaesthesia of the affected tooth

advise the patient to see a dentist as soon as possible

antibiotic therapy is **not** indicated

dental treatment

endodontic treatment (root canal) or extraction is usually needed

Throbbing dental pain not triggered by a stimulus

a dull throbbing ache not triggered by a stimulus such as hot, cold or sweet food or drinks; tooth may be sore to bite on

likely cause

infected root canal system with acute periapical inflammation (apical periodontitis – a form of localised odontogenic infection)

offer analgesics – NSAIDs are preferred if the patient can use them

initial management by medical practitioners

advise the patient to see a dentist urgently and to seek review early if symptoms worsen

antibiotic therapy is **not** routinely indicated; however, if a dental procedure is unlikely to be performed within 24 hours, antibiotic therapy can be started (see Localised odontogenic infections)

dental treatment

endodontic treatment (root canal) or extraction is needed

Tenderness of the tooth to pressure and pain on biting

fractured or cracked tooth

likely cause

a localised odontogenic infection

bruxism or occlusal trauma (can damage periodontal ligaments)

initial management by medical practitioners

it is difficult for medical practitioners to differentiate a localised odontogenic infection from other causes (even with imaging) without a visible abscess or pus to indicate infection

manage as for a presumed localised odontogenic infection (see entry above)

dental treatment

restoration, endodontic treatment (root canal) or extraction is needed

Facial swelling and pain without features of severe local or systemic infection

facial swelling and pain following a toothache **without** any features of severe local or systemic infection (for features, see the next entry in this table)

likely cause

a spreading odontogenic infection without severe local or systemic features

offer analgesics – NSAIDs are preferred if the patient can use them

initial management by medical practitioners

advise the patient to see a dentist urgently and to seek review early if symptoms worsen

antibiotic therapy is only indicated in initial management if a dental procedure is unlikely to be performed within 24 hours; use a regimen for spreading odontogenic infections with delayed dental treatment

dental treatment

endodontic treatment (root canal) or extraction is needed

Facial swelling and pain with any features of severe local or systemic infection

features of severe local or systemic infection include:

- difficulty swallowing or breathing
- swelling of floor of mouth

- trismus
- neck swelling
- significant facial swelling and pain (especially if associated with any other features above)
- swelling of the upper third of the face occluding the eye [NB1]
- pallor, sweating or tachycardia
- temperature above 38°C or below 36°C

likely cause	<u>a spreading odontogenic infection with severe local or systemic features</u>
	arrange urgent transfer to a hospital with an oral and maxillofacial surgeon or anaesthetic or emergency facilities for airway management
	if the patient has difficulty breathing or is cyanosed, give supplemental oxygen by mask
initial management by medical practitioners	<p>allow the patient to adopt a position of comfort</p> <p>alert the hospital to the transfer</p> <p>if arrival at a hospital is likely to take more than 1 hour and signs of sepsis are present, consider following local sepsis protocols on prehospital management (see <u>Figure 13.79</u> for signs of sepsis)</p>
dental treatment in hospital	surgical intervention and intravenous antibiotic therapy are needed – see <u>Spreading odontogenic infections with severe local or systemic features (including Ludwig angina)</u>
Dental pain that worsens when the head is tilted forward	
likely cause	maxillary sinusitis
initial management by medical practitioners	symptomatic therapy is recommended and antibiotics are rarely needed – see <u>Acute rhinosinusitis</u>
dental treatment	dental treatment is not required
Dental pain worsening 1 to 4 days after tooth extraction	
likely cause	<u>alveolar osteitis (dry socket)</u>
	flush the socket with warm sterile saline until all debris is removed from the socket
	offer <u>analgesics</u> – NSAIDs are preferred if the patient can use them
initial management by medical practitioners	<p>an obtundent dressing may relieve pain [NB2]</p> <p>advise the patient to urgently see the practitioner who performed the extraction</p> <p>antibiotic therapy is not indicated</p>

further socket irrigation and analgesia may be needed
 dental treatment
 an obtundent dressing may be applied or replaced

Severe pain in the whole mouth with gingival bleeding

acute severe pain throughout the mouth with gingival bleeding and necrosis or ulcers of the interdental papillae; halitosis is usually present

likely cause necrotising gingivitis (previously known as acute necrotising ulcerative gingivitis)

offer analgesics

start antibiotics

initial management by medical practitioners
 chlorhexidine mouthwash or hydrogen peroxide solution may be used by the patient if pain limits their ability to mechanically clean their teeth

advise the patient to see a dentist urgently

dental treatment thorough local debridement of the gingiva, local irrigation and antibiotic therapy are needed

Pre-auricular pain

acute unilateral or bilateral pre-auricular pain (if mouth opening is restricted, see advice on trismus)

likely cause a temporomandibular disorder

consider less common differential diagnoses (see a guide to assessment of orofacial pain in dental practice)

initial management by medical practitioners

advise the patient to rest the jaw (eg eat only soft foods) and avoid extreme jaw movements (eg yawning)

advise the patient to apply cold or warm compresses, as indicated

offer analgesics – NSAIDs are preferred if the patient can use them

advise the patient to see a dentist as soon as possible

conservative measures (see Figure 13.58)

dental treatment

if conservative measures are not adequate, referral to an oral medicine specialist or oral and maxillofacial surgeon may be required

NSAIDs = nonsteroidal anti-inflammatory drugs

NB1: Rarely, an odontogenic infection spreads to the upper third of the face and poses a risk of cavernous sinus thrombosis.

NB2: An obtundent dressing is a pain-reducing dressing such as a dry socket paste. Advise patients that the dressing has a marked taste. Commercial products contain varying ingredients; review product information to assess risk of hypersensitivity reactions. Any residue remaining at review must be removed.

Indications for analgesics for acute and postprocedural dental pain

Indications for analgesics for acute and postprocedural dental pain

Analgesics modify the sensation of pain but do not address its cause. For acute dental pain, analgesics should only be used as an adjunct to dental treatment in the following circumstances:

- when the patient's pain cannot be eliminated or adequately controlled by a dental procedure and other drugs (eg antibiotic therapy for spreading infection)
- following surgical procedures that cause postoperative pain
- when a patient is unable to undergo prompt dental treatment (see [Table 13.21](#) for indications for interim analgesia)

Analgesics are not a substitute for appropriate dental treatment.

The analgesic regimens in this topic are only suitable for nociceptive pain (pain caused by noxious stimuli [eg inflammatory mediators] activating receptors in skin and deep tissues). For neuropathic or nociceptive pain, further investigations and other management approaches are required; see [Overview of orofacial pain: information for dental practice](#) for further information on types of pain.

Choice of analgesic for acute and postprocedural dental pain

Choice of analgesic for acute and postprocedural dental pain

When choosing an analgesic regimen for acute nociceptive or postprocedural dental pain, consider the severity of the patient's pain and [patient factors that may influence analgesic choice](#).

Figure 13.55 Factors that influence the choice of analgesics for acute and postprocedural dental pain

Pain severity

Consider both [patient-reported pain severity](#) and the expected pain severity based on the cause of pain.

Adverse effects, contraindications or precautions

For information on adverse effects, contraindications and precautions, see [Drugs used to treat acute pain in dentistry](#).

Route of administration

Oral administration is preferred. If this is not possible (if the patient has difficulty swallowing or gastrointestinal absorption is likely to be significantly reduced), consider suppositories or injections. Transdermal patches are not recommended because drug absorption is too slow to allow rapid dose adjustment.

Nonsteroidal anti-inflammatory drugs (NSAIDs) are preferred for acute nociceptive or postprocedural dental pain because the pain is inflammatory in nature; however, their adverse effect profile limits their use in some patients. Before prescribing, determine whether NSAID use is appropriate based on the patient's comorbidities and risk factors. See [Nonsteroidal anti-inflammatory drugs used in dentistry](#) for guidance on drug choice.

Paracetamol can be combined with an NSAID, or used alone in patients who cannot take NSAIDs.

Opioids can be added to NSAIDs and paracetamol for severe acute nociceptive or postprocedural dental pain in adults, when nonopioid analgesics and nonpharmacological measures (eg a dental procedure) have not provided adequate pain relief or are unlikely to do so (eg in severe pain). Oxycodone is preferred; do not use codeine. For a summary of opioids used in dentistry, see [Table 13.6](#).

Combining analgesics from different classes can result in enhanced pain management, or synergistic analgesia (eg combining ibuprofen and paracetamol provides greater pain relief than either drug alone).

Mild to moderate acute and postprocedural dental pain in adults

Mild to moderate acute and postprocedural dental pain in adults

For factors that affect the choice of analgesic regimen, see [Choice of analgesic for acute and postprocedural dental pain](#).

For mild to moderate acute dental or postprocedural pain in adults, a combination of nonopioid analgesics (an NSAID plus paracetamol) is recommended for optimal pain management, unless the patient cannot use NSAIDs. For discussion of risk factors for NSAID toxicity, see [Nonsteroidal anti-inflammatory drugs used in dentistry](#). In patients who are not at increased risk of NSAID toxicity, NSAIDs may be used for up to 5 days. Durations shorter than 5 days are preferred if NSAIDs are used in patients at increased risk of NSAID toxicity (provided [contraindications](#) have been excluded).

For mild to moderate acute nociceptive and postprocedural dental pain in adults who can use nonsteroidal anti-inflammatory drugs (NSAIDs), use as a 2-drug regimen:

- 1 celecoxib 100 mg orally, 12-hourly for the shortest duration possible and no more than 5 days without review
[\[Note 1\]](#)

OR

- 1 ibuprofen 400 mg orally, 6- to 8-hourly for the shortest duration possible and no more than 5 days without review
[\[Note 2\]](#)

PLUS

paracetamol 1000 mg orally, 4- to 6-hourly (to a maximum of 4 g in 24 hours) for the shortest duration possible.

The above regimen should be taken regularly initially, rather than as required, to achieve continuous pain relief. As the pain eases, switch to as-required nonsteroidal use and continue regular paracetamol use. Paracetamol and NSAIDs are ideally taken without food because food reduces their absorption and delays onset of action.

If NSAIDs are contraindicated (see [Figure 13.12](#)), use:

paracetamol 1000 mg orally, 4- to 6-hourly (to a maximum of 4 g in 24 hours) for the shortest duration possible.

If analgesics are used after a surgical procedure that causes postoperative pain, inform the patient of the usual course of pain (eg pain is most severe 48 to 72 hours after surgery, then improves). Advise the patient to return to the dentist for review if pain persists.

Note 1: Avoid celecoxib in people who are pregnant; for information on safety considerations of any NSAID use in pregnancy, see [Considerations regarding NSAIDs in dentistry for people who are pregnant or breastfeeding](#).

Note 2: Avoid nonselective NSAIDs (eg ibuprofen, diclofenac, naproxen) in patients at increased risk of gastrointestinal bleeding; see [Gastrointestinal toxicity and its impact on choice of NSAID](#).

Severe acute and postprocedural dental pain in adults

Severe acute and postprocedural dental pain in adults

Approach to managing severe acute and postprocedural dental pain in adults

Approach to managing severe acute and postprocedural dental pain in adults

For severe acute or postprocedural dental pain in adults, a combination of nonopioid analgesics (an NSAID plus paracetamol) and an opioid is recommended for optimal pain management, provided there are no contraindications or precautions for their use.

For advice on use of paracetamol, see [Paracetamol use in dentistry](#). For advice on prescribing NSAIDs, including discussion of risk factors for NSAID toxicity, see [Nonsteroidal anti-inflammatory drugs used in dentistry](#). In patients who are not at increased risk of NSAID toxicity, NSAIDs may be used for up to 5 days. Durations shorter than 5 days are preferred if NSAIDs are used in patients at increased risk of NSAID toxicity (provided [contraindications](#) have been excluded).

When prescribing an opioid, always consider the benefits, harms and regulatory requirements; for more information, see [Opioid use in dentistry](#). A thorough medical history must be taken to assess risk of opioid harms, including risks of oversedation caused by interactions with prescribed drugs (eg benzodiazepines, gabapentinoids), alcohol or illicit substances with sedative effects.

To optimise pain management and minimise harms of analgesia for severe acute or postprocedural dental pain:

- prescribe both the NSAID with paracetamol regularly initially, rather than as required
- prescribe the lowest effective dose of opioid for use only as required
- as the tissue heals, taper and stop analgesics; stop the opioid first, then switch the NSAID from regular to as-required use, then stop the NSAID, then stop paracetamol
- ensure the patient understands the intended duration of opioid use and when to stop taking the opioid; this is important because long-term opioid use often starts with the use of opioids to treat acute pain
- advise the patient to return for review (eg if pain persists for longer than expected).

Ensure patients understand the intended duration of opioid use.

For patients with severe acute or postprocedural dental pain who are currently taking opioids for another indication, consult their medical practitioner to determine an appropriate analgesic regimen.

For patients being discharged from hospital, do not prescribe opioids if they were not required during admission or if pain can be successfully managed with nonopioid analgesia on discharge. Do not use modified-release opioids for acute dental or postprocedural pain.

Do not use modified-release opioids for acute dental or postprocedural pain.

Administering local anaesthetics by infiltration or regional block is an alternative or additional strategy for the management of severe acute dental or postprocedural pain, provided the clinician is competent in these methods (see [General information about local anaesthetics in dentistry](#)).

If analgesics are used after a surgical procedure that causes postoperative pain, inform the patient of the usual course of pain (eg pain is worst 48 to 72 hours after surgery, then improves). Advise the patient to return to the dentist for review if pain persists.

If postoperative pain persists for longer than expected, advise patients to return to the dentist for review.

Analgesic regimens for severe acute and postprocedural dental pain in adults

Analgesic regimens for severe acute and postprocedural dental pain in adults

For severe acute nociceptive or postprocedural dental pain (eg after oral or dental surgery) in adults who can use nonsteroidal anti-inflammatory drugs (NSAIDs), as a 3-drug regimen, use:

- 1 celecoxib 100 mg orally, twice daily for the shortest duration possible and no more than 5 days without review [\[Note 3\]](#)

OR

- 1 ibuprofen 400 mg orally, 6- to 8-hourly for the shortest duration possible and no more than 5 days without review [\[Note 4\]](#)

PLUS with either of the above drugs

paracetamol 1000 mg orally, 4- to 6-hourly (to a maximum of 4 g in 24 hours) for the shortest duration possible

PLUS

oxycodone immediate-release 5 mg orally, 4- to 6-hourly if required, for the shortest duration possible and no more than 3 days. Use a lower dose of oxycodone in older or frail patients because they are particularly vulnerable to adverse effects. Prescribe small quantities (eg 10 tablets) to avoid inappropriate use in the community [\[Note 5\]](#).

If NSAIDs are contraindicated, use the regimen above but omit the NSAID.

For severe acute nociceptive or postprocedural dental pain in **adults who cannot tolerate oxycodone**, immediate-release tapentadol may be considered as an alternative opioid, although data are limited for this indication. Tapentadol should only be prescribed by clinicians (eg dental practitioners in a hospital setting, medical practitioners, oral medicine specialists) who are experienced in evaluating the risk of opioid-related harms and drug interactions with tapentadol. For a summary of the considerations and limitations of tapentadol use (including legal limitations on prescribing), see [Table 13.6](#). If tapentadol is appropriate and the prescriber is experienced in its use, consider replacing oxycodone in the above 3-drug regimen with tapentadol; use [\[Note 6\]](#):

tapentadol immediate-release 50 mg orally, 6-hourly if required, for the shortest duration possible and no more than 3 days. Prescribe small quantities (eg 10 tablets) to avoid inappropriate use in the community [\[Note 5\]](#).

Note 3: Avoid celecoxib in people who are pregnant; for information on safety considerations of any NSAID use in pregnancy, see [Considerations regarding NSAIDs in dentistry for people who are pregnant or breastfeeding](#).

Note 4: Avoid nonselective NSAIDs (eg ibuprofen, diclofenac, naproxen) in patients at increased risk of gastrointestinal bleeding; see [Gastrointestinal toxicity and its impact on choice of NSAID](#).

Note 5: Always consider the benefits, harms and regulatory requirements of prescribing an opioid; for more information, see [Opioid use in dentistry](#).

Note 6: At the time of writing, it is not legal for dentists practising outside of hospitals to prescribe tapentadol in New South Wales or for any dentists to prescribe tapentadol in Queensland.

Acute and postprocedural dental pain in children and adolescents

Acute and postprocedural dental pain in children and adolescents

Approach to managing acute and postprocedural dental pain in children and adolescents

Approach to managing acute and postprocedural dental pain in children and adolescents

For factors that affect the choice of analgesic regimen, see [Choice of analgesic for acute and postprocedural dental pain](#). Do not use aspirin in people younger than 16 years because of the risk of Reye syndrome.

For acute dental or postprocedural pain in children 3 months or older, use ibuprofen (a nonsteroidal anti-inflammatory drug [NSAID]) or paracetamol; ibuprofen and paracetamol can be combined for enhanced pain management. Give doses regularly, rather than as required, to achieve continuous pain relief.

For adolescents aged 16 years or older with severe acute or postprocedural dental pain (eg pain after surgical tooth extraction), oxycodone may be considered as an adjunct to ibuprofen plus paracetamol if the prescriber is experienced in its use in this patient group; the prescriber should consider factors such as the patient's size and physical maturity. For a suitable regimen, see [Analgesic regimens for severe acute and postprocedural dental pain in adults](#).

Analgesic regimens for acute and postprocedural dental pain in children and adolescents

Analgesic regimens for acute and postprocedural dental pain in children and adolescents

For acute or postprocedural dental pain in children, use:

- 1 ibuprofen 5 to 10 mg/kg up to 400 mg orally, 6- to 8-hourly (to a maximum of 3 doses in 24 hours). See [Table 13.22](#) for calculated doses. Use the lowest effective dose for the shortest duration possible and no more than 3 days without review

OR

- 2 paracetamol 15 mg/kg up to 1000 mg orally, 4- to 6-hourly (to a maximum of 4 doses in 24 hours). See [Table 13.23](#) for calculated doses. Continue treatment for the shortest duration possible.

Particular care is required for dose selection in children at extremes of weight or height.

For **children without obesity**, calculate the dose of analgesic using the child's actual body weight, even if they are significantly underweight. If the child's weight cannot be determined, use the dose for the average body weight of a child of that age; see [Table 13.22](#) for ibuprofen or [Table 13.23](#) for paracetamol. However, age-based dosing is imprecise for children at extremes of weight or height.

For **children with obesity**, calculate the dose using ideal body weight; because of changes in drug pharmacokinetics in obesity, using the child's actual body weight will result in an excessive dose. If the child's height is known, estimate their ideal body weight using the corresponding weight for the height percentile on the growth chart (eg the [Centers for Disease Control and Prevention \(CDC\) growth charts](#)). If the child's height cannot be determined, use the dose for the average body weight of a child of that age; see [Table 13.22](#) for ibuprofen or [Table 13.23](#) for paracetamol. However, age-based dosing is imprecise for children with obesity at extremes of height.

Table 13.22 Weight-based dose and approximate volumes of ibuprofen liquid for children
[NB1]

[1 year or 9 kg](#)

2 years or 12 kg3 years or 14 kg4 years or 16 kg5 years or 18 kg6 years or 21 kg7 years or 23 kg8 years or 25 kg9 years or 29 kg10 years or 33 kg11 years or 36.5 kg12 years or 41 kg

age: 1 year

weight: 9 kg [NB2]

ibuprofen dose 45 to 90 mg

volume of 100 mg/5 mL liquid [NB3] 2.5 to 4.5 mL

volume of 200 mg/5 mL liquid [NB3] 1.5 to 2 mL

age: 2 years

weight: 12 kg [NB2]

ibuprofen dose 60 to 120 mg

volume of 100 mg/5 mL liquid [NB3] 3 to 6 mL

volume of 200 mg/5 mL liquid [NB3] 1.5 to 3 mL

age: 3 years

weight: 14 kg [NB2]

ibuprofen dose 70 to 140 mg

volume of 100 mg/5 mL liquid [NB3] 3.5 to 7 mL

volume of 200 mg/5 mL liquid [NB3]

2 to 3.5 mL

age: 4 years

weight: 16 kg [NB2]

ibuprofen dose

80 to 160 mg

volume of 100 mg/5 mL liquid [NB3]

4 to 8 mL

volume of 200 mg/5 mL liquid [NB3]

2 to 4 mL

age: 5 years

weight: 18 kg [NB2]

ibuprofen dose

90 to 180 mg

volume of 100 mg/5 mL liquid [NB3]

4.5 to 9 mL

volume of 200 mg/5 mL liquid [NB3]

2.5 to 4.5 mL

age: 6 years

weight: 21 kg [NB2]

ibuprofen dose

105 to 210 mg

volume of 100 mg/5 mL liquid [NB3]

5.5 to 10.5 mL

volume of 200 mg/5 mL liquid [NB3]

3 to 5 mL

age: 7 years

weight: 23 kg [NB2]

ibuprofen dose

115 to 230 mg

volume of 100 mg/5 mL liquid [NB3]

6 to 11.5 mL

volume of 200 mg/5 mL liquid [NB3]

3 to 5.5 mL

age: 8 years

weight: 25 kg [NB2]

ibuprofen dose

125 to 250 mg

volume of 100 mg/5 mL liquid [NB3]

6.5 to 12.5 mL

volume of 200 mg/5 mL liquid [NB3]

3.5 to 6 mL

age: 9 years

weight: 29 kg [NB2]

ibuprofen dose

145 to 290 mg

volume of 100 mg/5 mL liquid [NB3]

7.5 to 14.5 mL

volume of 200 mg/5 mL liquid [NB3]

4 to 7 mL

age: 10 years

weight: 33 kg [NB2]

ibuprofen dose

165 to 330 mg

volume of 100 mg/5 mL liquid [NB3]

8.5 to 16.5 mL

volume of 200 mg/5 mL liquid [NB3]

4.5 to 8 mL

age: 11 years

weight: 36.5 kg [NB2]

ibuprofen dose

182.5 to 365 mg

volume of 100 mg/5 mL liquid [NB3]

9.5 to 18 mL

volume of 200 mg/5 mL liquid [NB3]

5 to 9 mL

age: 12 years

weight: 41 kg [NB2]

ibuprofen dose

205 to 400 mg

volume of 100 mg/5 mL liquid [NB3]

10.5 to 20.0 mL

volume of 200 mg/5 mL liquid [NB3]

5.5 to 10 mL

NB1: Particular care is required for dose selection in children at extremes of weight or height. To determine whether to use the child's age or weight to select an appropriate dose, see the discussion in [Analgesic regimens for acute and postprocedural dental pain in children and adolescents](#) (above).

NB2: The average body weight-for-age values were derived from the [World Health Organization \(WHO\) growth charts for children 5 years or younger](#) and the [Centers for Disease Control and Prevention \(CDC\) growth charts for children older than 5 years](#).

NB3: For practicality, volumes have been specified to the nearest 0.5 mL that achieves a dose no less than 5 mg/kg and no more than 10 mg/kg.

Table 13.23 Weight-based dose and approximate volumes of paracetamol liquid for children[NB1]
1 year or 9 kg

2 years or 12 kg

3 years or 14 kg

4 years or 16 kg

5 years or 18 kg

6 years or 21 kg

7 years or 23 kg

8 years or 25 kg

9 years or 29 kg

10 years or 33 kg

11 years or 36.5 kg

12 years or 41 kg

age: 1 year

weight: 9 kg [NB2]

paracetamol dose	135 mg
------------------	--------

volume of 120 mg/5 mL liquid [NB3]	5.5 mL
------------------------------------	--------

volume of 240 mg/5 mL liquid [NB3]	3 mL
------------------------------------	------

age: 2 years

weight: 12 kg [NB2]

paracetamol dose	180 mg
------------------	--------

volume of 120 mg/5 mL liquid [NB3]	7.5 mL
------------------------------------	--------

volume of 240 mg/5 mL liquid [NB3]	4 mL
------------------------------------	------

age: 3 years

weight: 14 kg [NB2]

paracetamol dose

210 mg

volume of 120 mg/5 mL liquid [NB3]

9 mL

volume of 240 mg/5 mL liquid [NB3]

4.5 mL

age: 4 years

weight: 16 kg [NB2]

paracetamol dose

240 mg

volume of 120 mg/5 mL liquid [NB3]

10 mL

volume of 240 mg/5 mL liquid [NB3]

5 mL

age: 5 years

weight: 18 kg [NB2]

paracetamol dose

270 mg

volume of 120 mg/5 mL liquid [NB3]

11.5 mL

volume of 240 mg/5 mL liquid [NB3]

5.5 mL

age: 6 years

weight: 21 kg [NB2]

paracetamol dose

315 mg

volume of 120 mg/5 mL liquid [NB3]

13 mL

volume of 240 mg/5 mL liquid [NB3]

6.5 mL

age: 7 years

weight: 23 kg [NB2]

paracetamol dose

345 mg

volume of 120 mg/5 mL liquid [NB3]

14.5 mL

volume of 240 mg/5 mL liquid [NB3]

7 mL

age: 8 years

weight: 25 kg [NB2]

paracetamol dose	375 mg
volume of 120 mg/5 mL liquid [NB3]	15.5 mL
volume of 240 mg/5 mL liquid [NB3]	8 mL
age: 9 years	
weight: 29 kg [NB2]	
paracetamol dose	435 mg
volume of 120 mg/5 mL liquid [NB3]	18 mL
volume of 240 mg/5 mL liquid [NB3]	9 mL
age: 10 years	
weight: 33 kg [NB2]	
Paracetamol dose	495 mg
volume of 120 mg/5 mL liquid [NB3]	20.5 mL
volume of 240 mg/5 mL liquid [NB3]	10.5 mL
age: 11 years	
weight: 36.5 kg [NB2]	
paracetamol dose	547.5 mg
volume of 120 mg/5 mL liquid [NB3]	23 mL
volume of 240 mg/5 mL liquid [NB3]	11.5 mL
age: 12 years	
weight: 41 kg [NB2]	
paracetamol dose	615 mg
volume of 120 mg/5 mL liquid [NB3]	25.5 mL
volume of 240 mg/5 mL liquid [NB3]	13 mL

NB1: Particular care is required for dose selection in children at extremes of weight or height. To determine whether to use the child's age or weight to select an appropriate dose, see the discussion in [Analgesic regimens for acute and postprocedural dental pain in children and adolescents](#) (above).

NB2: The average body weight-for-age values were derived from the World Health Organization (WHO) growth charts for children 5 years or younger and the Centers for Disease Control and Prevention (CDC) growth charts for children older than 5 years.

NB3: For practicality, volumes have been specified to the nearest 0.5 mL.

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Overview of chronic orofacial pain in dental practice

Overview of chronic orofacial pain in dental practice

Causes of chronic orofacial pain discussed in these guidelines are listed in [Figure 13.56](#).

Figure 13.56 Examples of causes of chronic orofacial pain

[NB1]

temporomandibular disorders

idiopathic orofacial pain such as:

- [burning mouth syndrome](#)
- [persistent idiopathic facial pain](#)
- [persistent idiopathic dentoalveolar pain](#)

orofacial neuropathic pain (attributed to lesions or disease in cranial nerves), such as:

- trigeminal neuralgia (see [medical management](#) or [information for dental practice](#))
- postherpetic neuralgia affecting the trigeminal nerve (see [medical management](#) or [information for dental practice](#))
- [posttraumatic trigeminal neuropathic pain](#)
- [glossopharyngeal neuralgia](#) (see [medical management](#) or [information for dental practice](#))

orofacial pain resembling primary headache, such as:

- [trigeminal autonomic cephalgias](#)
- [migraine](#)

NB1: For a comprehensive classification of orofacial pain, see the [International Classification of Orofacial Pain 1st edition](#).

Management of chronic orofacial pain requires referral (by an oral medicine specialist, oral and maxillofacial surgeon or general medical practitioner) to a pain medicine specialist. A [multidimensional approach](#) is required. Active self-management strategies for a patient include increasing social connections, addressing thoughts and emotions, and improving physical activity, nutrition and sleep.

Analgesics are unlikely to eliminate chronic pain; adverse effects often outweigh benefit, especially in the long term.

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Overview of temporomandibular disorders

Overview of temporomandibular disorders

Temporomandibular disorders (TMDs) is a collective term defined by the American Association of Orofacial Pain as embracing a number of clinical problems that involve the masticatory musculature, the temporomandibular joint (TMJ) and associated structures, or both.

Factors predisposing to TMDs can affect the masticatory muscles (contributing to a myogenous TMD) or the TMJ (contributing to an arthrogenous [intra-articular] TMD); for examples of predisposing factors, see [Figure 13.57](#). Malocclusion has not been shown to be a risk factor for TMDs.

Figure 13.57 Examples of predisposing factors for temporomandibular disorders
trauma – direct, or indirect (eg acceleration-deceleration injury)

systemic diseases that can affect the temporomandibular joint (TMJ):

- rheumatoid arthritis
- juvenile idiopathic arthritis
- psoriatic arthritis
- systemic lupus erythematosus (SLE)
- osteoarthritis
- malignancy

parafunctional activities (eg tooth grinding or clenching teeth or jaw bracing; see [Bruxism](#))

other chronic pain conditions (eg fibromyalgia)

psychosocial factors, including:

- stress
- anxiety
- depression
- previous traumatic life events
- lack of psychosocial supports

Habits such as lip and cheek biting, biting fingernails, chewing gum and smoking can perpetuate an existing TMD. Accurate diagnosis of a TMD requires appropriate history, examination and imaging. For red flags in the history requiring evaluation of differential diagnoses, see [Assessment of orofacial pain in dental practice](#). [Table 13.24](#) outlines symptoms and signs of temporomandibular disorders. The identification of an acute TMD is crucial because TMDs become more complex if not managed appropriately initially.

Table 13.24 Symptoms and signs of temporomandibular disorders

common symptoms of temporomandibular disorders

jaw pain

pain with mandibular function, including difficulty opening the jaw wide or chewing

pain in and around the ears and masticatory muscles

headache

neck pain

joint sounds (clicking, popping, crepitus)

uncommon symptoms of temporomandibular disorders

reduced hearing or tinnitus

a feeling of changes in occlusion (bite)

toothache, tooth sensitivity or tooth mobility

altered sensation in the face (eg paraesthesia, a feeling of swelling)

signs of temporomandibular disorders

tenderness of the TMJ and masticatory muscles during jaw movement

TMJ sounds (clicking, clunking or crepitus) during repetitive opening and closing of the mouth, as well as lateral and protrusive movements [NB1]

deviation or limitation on opening of the jaw

TMJ = temporomandibular joint

NB1: TMJ sounds are not an indication for treatment, unless associated with pain or dysfunction.

Management of temporomandibular disorders

Management of temporomandibular disorders

The aim of temporomandibular disorder (TMD) management is to manage the patient's symptoms rather than achieve a cure. Treatment goals may include reducing pain and adverse loading (abnormal forces on the joint), restoring mandibular function and resuming normal daily activities.

Early referral to a specialist is not often required but **immediate referral to an oral and maxillofacial surgeon** is warranted if the patient has clinical or radiographic features of a structural abnormality of the temporomandibular joint (TMJ), such as:

- pre-auricular swelling

- severe trismus – including acute closed lock (sudden-onset trismus and acute TMJ pain)
- TMJ luxation (open lock)
- radiographic evidence of a tumour affecting the joint.

Acute closed lock is an example of an internal derangement of the TMJ (displacement of the disc from its normal position between the mandible and the temporal bone). Other presentations of internal derangement include clicking of the joints, intermittent locking and recurrent dislocation; these do not require urgent surgical referral.

Early referral to an oral medicine specialist is indicated for patients with:

- chronic pain
- comorbid systemic diseases or psychosocial factors (see [Figure 13.57](#))
- litigation claims related to their symptoms
- previous temporomandibular joint surgery.

For most patients, management should start with conservative strategies; see [Figure 13.58](#). If conservative measures are inadequate after a 6-to 12-week trial, referral to an oral medicine specialist is indicated.

Figure 13.58 Conservative management strategies for temporomandibular disorders

patient education and reassurance

jaw rest, using strategies such as dietary modification to minimise chewing

avoidance of excessive jaw movements (eg yawning, chewing gum, singing)

massage and application of warm packs to the temporomandibular joints and cheeks several times per day. Cold packs can be useful if the patient has redness and swelling

short-term use of a nonsteroidal anti-inflammatory drug (NSAID) or paracetamol for acute symptoms (using regimens for mild to moderate pain); discourage patients from relying on drugs alone (particularly drugs of dependence)

referral for psychological therapies (eg cognitive behavioural therapy [CBT], behavioural modification); managing sources of stress may be facilitated by individual or group counselling

regular treatment (gentle muscle stretching and massaging [including manual trigger point therapy]) by a physiotherapist familiar with the management of TMD

use of custom-made full-coverage occlusal splints, generally at night, in combination with other conservative strategies

The aim of **occlusal splint** (dental guard) use for TMD is to reduce joint loading, muscle activity and pain, and to protect teeth from wear caused by sleep bruxism. Evidence for the effectiveness of occlusal splints is limited. There is moderate-certainty evidence that TMD pain is reduced by a combination of counselling, physical therapy and occlusal splint use. Evidence that occlusal splints reduce masticatory muscle activity is lacking. To avoid any permanent effect of splints on the position of the teeth, it is essential that occlusal splints are custom-made and full-coverage. There are many different occlusal splint designs, including the hard stabilisation splint, soft stabilisation splint, hard posterior plane splint, anterior repositioning splint and anterior partial-coverage splint. Anterior partial-coverage splints should be avoided because of the potential for significant occlusal changes, mobility of the anterior teeth caused by excessive loading, and the risk of swallowing or aspirating the splint.

There is some evidence for the use of **botulinum toxin** to manage myogenous TMD if conservative measures are inadequate (but little support for an effect in arthrogenous TMD). Botulinum toxin reduces masseter hypertrophy, but the evidence for benefit in masticatory muscle pain is equivocal. Ensure patients understand that botulinum toxin is not a cure for TMD and that use is off-label. Specific training is required to administer botulinum toxin [[Note 1](#)]. Local complications include stinging during injections, bruising at the site of injection and excessive muscle weakness. Rarely, inadvertent injection of botulinum toxin into

nontarget tissues causes adverse effects, such as alteration in smile and dry mouth. Systemic adverse effects include a transient influenza-like syndrome and hypersensitivity reactions. There is no universally accepted protocol for the use of botulinum toxin in the management of TMD.

Management by an oral medicine specialist or pain medicine specialist may involve the use of muscle relaxants, anxiolytics, antidepressants or anticonvulsants.

Surgery for TMD is rarely required because patients often respond well to conservative treatment. For patients who have not responded to conservative management, consider referring for surgical assessment if there is definitive evidence of internal joint derangement (displacement of the disc in relation to the mandibular condyle) or other joint pathology on imaging.

Note 1: For more information on the training required for botulinum toxin administration, see the Australian Dental Association [Policy Statement 6.30: Neurotoxins and dermal fillers in dentistry](#) and the Dental Board of Australia fact sheet: [The Use of Botulinum Toxin and Dermal Fillers by Dentists](#).

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Burning mouth syndrome

Burning mouth syndrome

Overview of burning mouth syndrome

Overview of burning mouth syndrome

Burning mouth syndrome is an oral sensory disorder (oral dysaesthesia) that is diagnosed after exclusion of causes of symptoms. Burning mouth syndrome is more common in females, with the highest prevalence reported in people aged between 50 and 70 years. The onset of symptoms may be sudden, following a specific event (eg dental treatment, a significant increase in personal stressors), or gradual and unrelated to any obvious event.

Although symptoms of burning mouth syndrome vary, the characteristic feature is a burning sensation of the tongue (starting in the anterior third) and, less frequently, the hard palate and mucosal aspect of the lips. Symptoms can cause minor inconvenience or, if severe, prevent patients from conducting normal daily activities. Patients with severe symptoms may have suicidal thoughts. Most commonly, however, the burning sensation is mild in the morning and increases in intensity as the day progresses; this presentation has the best prognosis.

Other signs and symptoms associated with burning mouth syndrome include:

- parafunctional habits (eg unconsciously rubbing the tongue against the adjacent teeth and the hard palate, which can cause traumatic abrasion of the filiform papillae on its dorsal surface)
- dry mouth
- halitosis
- dysgeusia (most commonly a metallic taste).

Burning mouth syndrome is often poorly diagnosed and managed.

Diagnosis and management of burning mouth syndrome

Diagnosis and management of burning mouth syndrome

If burning mouth syndrome is suspected, consultation with an oral medicine specialist is recommended to plan the initial work-up, which is extensive and requires a detailed clinical history, including a dental, medical and medication history. Assessment follows the approach in Assessment of orofacial pain in dental practice. Because burning mouth syndrome is a diagnosis of exclusion, differential diagnoses must be ruled out, such as:

- local causes (eg oral lichen planus, oral or oropharyngeal candidiasis, rough dental surfaces)
- systemic causes, including hypothyroidism, and deficiencies of iron, vitamin B₁₂ or folate
- prosthesis-related hypersensitivity (which can be identified with skin patch testing, but is rarely required)
- drugs (eg drugs that cause sensory neuropathy, taste aberrations or dry mouth).

For general principles of managing chronic orofacial pain, see Management of chronic orofacial pain. The management of burning mouth syndrome is complex and warrants referral to an oral medicine specialist. The most important component of management is helping the patient to understand that burning mouth syndrome is a chronic nociceptive pain syndrome,

irrespective of the likely initial triggers. For a description of nociceptive pain, see [Table 13.20](#). Some patients find that their symptoms improve with discussion and counselling alone.

The most important component of managing burning mouth syndrome is helping the patient to understand the condition.

Other strategies for managing burning mouth syndrome include:

- strategies to modify the patient's response to external stressors (eg cognitive behavioural therapy [CBT], relaxation therapy, time management, exercise, community group participation); see [Multidimensional approach to chronic pain management](#)
- pharmacological management by an oral medicine specialist – use of topical or systemic drugs (eg tricyclic antidepressants, antiepileptic drugs, clonazepam, topical capsaicin).

Most patients choose pharmacological management; this requires specialist referral.

Persistent idiopathic orofacial pain

Persistent idiopathic orofacial pain

Persistent idiopathic facial pain has variable features. The pain is usually not well-localised but tends to involve the maxilla and extend to the eyes, nose, cheeks and temples. It is considered [nociceptive pain](#) (see [Table 13.20](#) for features of pain types).

Sensation is usually normal on testing. To meet diagnostic criteria, the pain must recur daily for more than 2 hours per day for more than 3 months without clinical neurological deficit or a known cause.

Refer patients with suspected persistent idiopathic facial pain to an oral medicine specialist or neurologist for assessment and management. Misdiagnosis puts the patient at risk of unnecessary dental treatment.

Persistent idiopathic dentoalveolar pain

Persistent idiopathic dentoalveolar pain

Persistent idiopathic dentoalveolar pain is unilateral intraoral pain, localised to a dentoalveolar site, with variable features. The pain is ‘dragging’, ‘throbbing’, ‘pressing’ or ‘burning’; it can be challenging to distinguish from odontogenic pain but differs in that it rarely causes waking at night. It is considered [nociceptive pain](#) (see [Table 13.20](#) for features of pain types). To meet diagnostic criteria, the pain must recur for more than 2 hours per day over more than 3 months without a known cause.

Refer patients with suspected persistent idiopathic dentoalveolar pain to an oral medicine specialist or neurologist for assessment and management. Misdiagnosis puts the patient at risk of unnecessary dental treatment.

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Introduction to orofacial neuropathic pain in dental practice

Introduction to orofacial neuropathic pain in dental practice

Types of orofacial neuropathic pain include trigeminal neuralgia, postherpetic neuralgia affecting the trigeminal nerve, posttraumatic trigeminal neuropathic pain and glossopharyngeal neuralgia. For features of neuropathic pain and other pain types, see [Table 13.20](#).

Trigeminal neuralgia: information for dental practice

Trigeminal neuralgia: information for dental practice

Trigeminal neuralgia is a recurrent, unilateral, shock-like pain in one or more divisions of the trigeminal nerve (especially the second and third). It can be triggered by touch (eating, brushing teeth, shaving) speaking or exposure to cold winds. Attacks last seconds to minutes. Moderate persistent background pain may be present. Trigeminal neuralgia affects females mainly, particularly in the age range of 40 to 70 years.

Assessment of trigeminal neuralgia requires referral to a general medical practitioner, neurologist or oral medicine specialist; investigations include imaging for evidence of multiple sclerosis or compression from adjacent blood vessels. Drugs are first-line therapy for trigeminal neuralgia; there is stronger evidence for carbamazepine, but oxcarbazepine may be better tolerated. For medical management of trigeminal neuralgia, see [Trigeminal neuralgia and other cranial neuralgias](#) in the Neurology guidelines.

Postherpetic neuralgia involving the trigeminal nerve: information for dental practice

Postherpetic neuralgia involving the trigeminal nerve: information for dental practice

Postherpetic neuralgia is pain persisting for at least 3 months after shingles (herpes zoster) infection. It occurs in about 10% of patients with shingles, and in over 70% of patients older than 50 years. Postherpetic neuralgia affecting the trigeminal nerve is usually severe neuropathic pain. It may present as burning, paroxysmal electric shock-like, stabbing or lancinating pain. Ninety percent of patients have allodynia [\[Note 1\]](#) despite sensory loss on routine examination. The skin of the affected area may be depigmented and scarred.

Refer patients with suspected postherpetic neuralgia affecting the trigeminal nerve early to a general medical practitioner; successful management is more likely if started early; see [Postherpetic neuralgia](#) in the Pain and Analgesia guidelines.

Note 1: Allodynia is a painful experience in response to normally nonpainful stimuli (eg light breeze or cotton wool touching the skin).

Posttraumatic trigeminal neuropathic pain: information for dental practice

Posttraumatic trigeminal neuropathic pain: information for dental practice

Posttraumatic trigeminal neuropathic pain is a neuropathic pain presenting within 6 months of an identifiable traumatic event (which can range from a minor dental procedure to major surgery); it affects one or more of the divisions of the trigeminal nerve and is almost always unilateral. The pain can be paroxysmal, constant or a combination.

Refer patients with suspected posttraumatic trigeminal neuropathic pain to an oral medicine specialist or neurologist for assessment and management. For medical management of posttraumatic trigeminal neuropathic pain, see [Trigeminal neuralgia and other cranial neuralgias](#) in the Neurology guidelines.

Glossopharyngeal neuralgia: information for dental practice

Glossopharyngeal neuralgia: information for dental practice

Glossopharyngeal neuralgia is a rare facial pain syndrome characterised by severe, transient, unilateral stabbing pain in the distribution of the ninth cranial nerve (eg paroxysmal pain in the throat, tonsillar fossa, base of tongue, or ear). It is provoked by swallowing (particularly cold liquids), talking, coughing, chewing or yawning. The onset is usually after 60 years of age.

Refer patients with suspected glossopharyngeal neuralgia for assessment and management by a neurologist or neurosurgeon. Assessment involves excluding a structural cause (eg oropharyngeal malignancy, peritonsillar infection, vascular compression). Treatment involves drugs used for trigeminal neuralgia. For medical management of glossopharyngeal neuralgia, see [Trigeminal neuralgia and other cranial neuralgias](#) in the Neurology guidelines.

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Trigeminal autonomic cephalgias: information for dental practice

Trigeminal autonomic cephalgias are a group of unilateral and side-locked [Note 1] headaches that usually follow distribution of the first division of trigeminal nerve (ie pain is felt around the eyes, forehead and top of the head). They are typically associated with unilateral autonomic features (eg tearing, conjunctival injection or irritation, ptosis, nasal stuffiness or rhinorrhoea, fullness of the ear, tinnitus, facial flushing or sweating). They may be associated with photophobia or phonophobia (usually unilateral). The patient will often be agitated and restless during an attack.

The above characteristics are common to all trigeminal autonomic cephalgias; types of trigeminal autonomic cephalgias can be differentiated based on frequency, duration of attacks or commonality, as follows:

- cluster headache – most common of the trigeminal autonomic cephalgias (but is still rare); individual headaches last less than 2 hours, episodes last weeks to months, followed by a period of remission; pain is extremely severe
- paroxysmal hemicrania and hemicrania continua – less severe than cluster headache; they differ from each other in duration of headache (paroxysmal hemicrania headaches last 2 to 30 minutes, while hemicrania continua can persist for months); they are notably characterised by an absolute response to indometacin
- short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) – characterised by brief headaches lasting 5 to 240 seconds and cutaneous trigger.

Refer patients with a suspected trigeminal autonomic cephalgia to a general medical practitioner or neurologist for assessment and management.

For more details on the features of trigeminal autonomic cephalgias and their medical management, see [here](#) in the Neurology Guidelines.



Overview of bruxism

Overview of bruxism

Bruxism is defined as repetitive jaw-muscle activity characterised by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible. Bruxism can occur during sleep (sleep bruxism) or during wakefulness (awake bruxism).

Bruxism is common. The prevalence of awake bruxism is 22 to 30% in adults. Sleep bruxism is particularly common in children (the prevalence reported by parents is up to 50%); in adults, the prevalence is 8 to 16%.

Awake bruxism is primarily related to psychosocial factors such as stress, anxiety or illicit drug use. Rare causes include head injury, and orofacial (tardive) dyskinesia [Note 1] following use of dopamine antagonist antiemetic drugs (eg metoclopramide, prochlorperazine) and antipsychotic drugs. Tardive dyskinesia is more likely to be a differential diagnosis rather than a cause of bruxism; acute oromandibular dystonia [Note 2] is another differential diagnosis for bruxism but is rare.

Sleep bruxism is a behaviour distinct from awake bruxism; it may be a sign of other health conditions. For example, sleep bruxism is associated with other sleep disorders, including obstructive sleep apnoea, but it is not clear whether the associations are causal or reflect shared contributing factors. Figure 13.59 lists common factors associated with sleep bruxism.

There is no evidence that occlusal factors (that alter contact between teeth on jaw closure [Note 3]) cause awake or sleep bruxism; irreversible occlusal adjustments should not be made.

Figure 13.59 Common factors associated with sleep bruxism

caffeine use

alcohol use

smoking

snoring

obstructive sleep apnoea

stress

anxiety

antidepressant use:

- selective serotonin reuptake inhibitors (SSRIs)
- serotonin noradrenaline reuptake inhibitors (SNRIs)

antipsychotic use

amfetamine use:

- dexamfetamine
- lisdexamfetamine

- metamfetamine
- MDMA (ecstasy)

cocaine use

Note 1: Tardive dyskinesia is a chronic movement disorder characterised by repetitive involuntary choreiform (writhing) movements, particularly of the tongue, lips and mouth, but may involve any part of the body. For more information, see [Antipsychotic adverse effects](#) in the Psychotropic guidelines.

Note 2: Oromandibular dystonia is a rare focal neurological disorder; prolonged spastic movements affect the tongue, face and masticatory muscles. Causes include genetic factors, head trauma and antipsychotic drugs.

Note 3: Examples of occlusal factors include malocclusion, restorative treatment and missing teeth.

Assessment of bruxism

Assessment of bruxism

To identify bruxism, ask about symptoms and look for signs. Symptoms of bruxism include generalised tooth sensitivity, toothache and headache. Signs that may indicate bruxism include masseter hypertrophy, buccal mucosal ridging, scalloping of the lateral border of the tongue, tooth mobility, chipping or wear [Note 4] of incisal edges, prominent wear facets on canines and molars, prominent exostosis [Note 5] (see [Figure 13.60](#) for an example of buccal mandibular exostosis) and multiple cracked teeth or failed restorations.

If evidence of bruxism is found, assess the patient for a [temporomandibular disorder](#), which can be a complication of bruxism.

Figure 13.60 Mandibular exostosis



The arrow indicates a benign bony outgrowth on the mandible (exostosis).

Photo sourced with permission from Associate Professor Nicole Heaphy

Note 4: Tooth surface loss can be a sign of bruxism but does not necessarily represent current bruxing activity as it may be historical wear and possibly compounded by other forms of wear such as abrasion or erosion.

Note 5: Evidence of an association between exostoses and bruxism is equivocal.

Management of bruxism

Management of bruxism

Bruxism does not require treatment unless enamel or restorations are being damaged, but associated factors (some of which may contribute to the development of bruxism) should be explored and addressed. If a patient's medication is implicated in their bruxism, they should not reduce the dose or stop the medication without medical advice. Management of bruxism may require a multidisciplinary approach.

Botulinum toxin is not recommended in the management of awake or sleep bruxism because it produces only short-term reduction in muscle activity (lasting 3 to 4 months) and may be associated with long-term adverse effects as outlined in Management of temporomandibular disorders.

Management of awake bruxism

Management of awake bruxism

Management of awake bruxism requires habit recognition and reversal, and stress management. There is weak evidence for hypnotherapy, biofeedback or cognitive behavioural therapy (CBT) for awake bruxism. Smartphone applications are available to monitor awake bruxism but evidence of efficacy is limited.

Management of sleep bruxism in adults

Management of sleep bruxism in adults

Management strategies for sleep bruxism in adults include:

- using an occlusal splint to protect teeth from wear
- addressing associated factors (see Figure 13.59 for factors to consider) by
 - reviewing medications and substance use (including alcohol, smoking, stimulant use)
 - addressing obstructive sleep apnoea
 - referring for psychosocial therapies (eg relaxation techniques, hypnotherapy, cognitive behavioural therapy [CBT] and advice on sleep hygiene).

Full-coverage occlusal splints (dental guards) can be used to protect the teeth from attrition during sleep bruxism, although evidence that these appliances reduce muscle activity is lacking. In addition to preventing tooth damage, occlusal splints are used in the management of temporomandibular disorders (for which sleep bruxism is a risk factor). Occlusal splints should be custom-made by a dentist with appropriate expertise or by an oral medicine specialist; regular review and adjustment should be undertaken as required. Partial-coverage splints should be avoided in the management of bruxism because of the potential for significant occlusal changes and the risks of ingestion and aspiration.

Evidence is inconclusive on whether occlusal splints aggravate snoring and obstructive sleep apnoea. Mandibular advancement appliances may be considered as an alternative to an occlusal splint in patients with snoring or obstructive sleep apnoea because they improve airway patency, protect teeth from wear and reduce the frequency of sleep bruxism episodes in the short term. However, mandibular advancement appliances are not recommended to treat sleep bruxism without obstructive sleep apnoea. Consultation with a sleep physician should be considered for patients with concurrent obstructive sleep apnoea and bruxism if

either an occlusal splint or a mandibular advancement appliance is considered. Informed consent before provision of either type of appliance requires discussion of the balance of benefits and harms, as detailed in [Dental management of obstructive sleep apnoea in adults](#).

Management of sleep bruxism in children

Management of sleep bruxism in children

The natural course of sleep bruxism in children is progressive reduction after the age of 9 to 10 years. Nevertheless, it is prudent to consider comorbid conditions such as respiratory conditions (eg obstructive sleep apnoea), neurological disorders (eg seizures) and psychosocial factors (eg anxiety). Consider specialist referral (eg to an ear, nose and throat specialist if obstructive sleep apnoea is suspected, or a paediatrician if a seizure disorder is suspected).

There is no evidence to support the dental treatment of sleep bruxism in children. If the enamel of permanent teeth is substantially worn, soft occlusal splints may be considered by a dentist with expertise in their use; monitoring is required to ensure that splints do not alter growth and development.

Evidence for long-term outcomes of orthodontic intervention (eg rapid maxillary expansion) for sleep bruxism in children is lacking.

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Overview of trismus

Overview of trismus

Trismus is the reduced ability to open the jaws; inability to close the mouth is a different phenomenon caused by an open dislocation of the jaw.

Ability to open the mouth is measured between the upper and lower incisors; it is difficult to assess in a child without permanent incisors. In adults, definitions of a reduced opening measurement range from less than 20 mm to less than 40 mm. A measurement less than 20 mm (generally 2 finger breadths) indicates a significantly reduced opening span that requires further evaluation. A measurement more than 20 mm may be clinically relevant depending on its impact on oral function, whether the patient has an associated condition, and whether the opening span is progressively reducing.

Trismus can arise inside or outside the temporomandibular joint (TMJ). Trismus is usually acquired and some causes of acquired trismus are potentially life-threatening, such as severe odontogenic infections and tetanus. Congenital causes of trismus include congenital ankylosis of the TMJ, congenital hypomobility of the mandible, and coronoid hyperplasia.

Table 13.25 lists causes of trismus according to their duration.

Table 13.25 Causes of trismus

Causes of acute trismus

Causes of chronic trismus

Causes of acute trismus (duration 6 weeks or less)

acute oral infections, including:

- pericoronitis (associated with partially erupted wisdom teeth)
- spreading odontogenic infections
- peritonsillar abscess (a potential complication of tonsillitis)

surgery (eg wisdom teeth removal)

haematoma following dental injection

acute temporomandibular disorders (eg acute closed lock [NB1])

stroke

tetanus

Causes of chronic trismus (duration longer than 6 weeks)

chronic temporomandibular disorders (eg chronic closed lock [NB1], temporomandibular joint osteoarthritis)

congenital causes, such as:

- ankylosis of the temporomandibular joint
- coronoid hyperplasia
- congenital hypomobility of the mandible

oral submucous fibrosis (associated with areca nut use [eg betel quid chewing])

tumours of the head and neck or their treatment with radiotherapy [NB2]

connective tissue diseases (eg scleroderma, rheumatoid arthritis)

NB1: Closed locks are internal derangements of the temporomandibular joint (TMJ) in which the disc within the joint is displaced from its normal position between the condyle and the glenoid fossa. Acute closed lock is sudden-onset trismus and acute TMJ pain. Chronic closed lock is chronic trismus caused by chronic nonreducing disc displacement within the TMJ.

NB2: Head and neck tumours may invade the masticatory muscles (or their nerve supply) or the temporomandibular joint. Trismus is more severe if the tumour is large or late-stage, close to the masticatory muscles or TMJ (eg tumour in parotid or nasopharyngeal sites) and requires extensive treatment. Cancer treatment (surgery, radiotherapy) can cause injury such as fibrosis of the joint and surrounding tissues; the incidence of postradiotherapy trismus is estimated at up to 40% and the condition does not generally improve with time.

Assessment of trismus

Assessment of trismus

Accurately determining the cause of trismus and its impact on the patient requires a thorough history, examination and, sometimes, imaging. Ask about pain, which is often present, together with other features that reduce quality of life, including difficulty speaking, eating and maintaining oral hygiene. Pain also makes dental treatment difficult and increases the risk of aspiration.

Some causes of trismus require urgent management (eg trismus associated with a spreading oral infection posing an airway risk or trismus with features that suggest malignancy); for red flags, see [Figure 13.61](#).

It is critical to establish in patients with previously treated head and neck cancer whether the trismus results from cancer recurrence or radiation treatment so that options for managing recurrence can be explored, if appropriate. Trismus in patients with cancer can inhibit tumour surveillance.

Figure 13.61 Red flags in patients with trismus severe or persistent or worsening pain

progressively worsening trismus

severe local or systemic features of infection especially those that could compromise the patient's airway

tongue weakness or difficulty swallowing

firm nonmobile enlarged lymph nodes

past history of malignancy

recent weight loss

features suggestive of giant cell arteritis in patients 50 years or older (eg jaw pain on chewing that settles immediately when chewing stops, loss of vision or double vision, severe new-onset headache, scalp tenderness)

a recent head or neck procedure

unilateral hearing loss, new-onset or unilateral tinnitus or vertigo [NB1]

NB1: Reduced hearing and tinnitus are uncommon symptoms of temporomandibular disorders. Rare causes of trismus and auditory or vestibular symptoms include cranial nerve and base of skull tumours. Refer patients with auditory or vestibular symptoms and trismus to an ear, nose and throat specialist.

Management of trismus

Management of trismus

The approach to management of trismus depends on the cause.

For urgent management of an odontogenic infection associated with trismus, see Spreading odontogenic infections with severe local or systemic features (including Ludwig angina).

For management of peritonsillar abscess, see Peritonsillar abscess.

For advice on management of acute temporomandibular disorders, see Temporomandibular disorders.

Even if a presentation is not an emergency, prompt management of the cause of trismus may improve outcomes.

Physiotherapy can be helpful to manage chronic closed lock [Note 1] or as an adjunct for patients with a rheumatological disorder. Physiotherapy aims to reduce oedema, relax tension or spasm within the surrounding tissues, increase range of motion of the temporomandibular joint (TMJ), and strengthen the muscles of mastication. This can be achieved with heat packs, massaging, and active and passive stretching exercises. Evidence suggests that this produces significant reduction in pain and an increase in mouth opening, although further research is needed. Trismus devices can also be used, but should be recommended by experienced clinicians (general dentists, oral medicine specialists and oral and maxillofacial surgeons), physiotherapists or speech pathologists to ensure safe and effective use.

Surgical procedures can be considered for some causes of trismus on an individual basis if conservative therapies are not suitable or have not been effective.

First-line surgical management for an internal derangement (a displacement of the disc within the TMJ) that has not responded to conservative treatment is either arthroscopy or arthrocentesis. These procedures are minimally invasive and more effective than conservative management for improving mouth opening, especially in acute closed lock. Arthroscopy is preferred to arthrocentesis, if possible, because it facilitates diagnosis through visualisation of the internal joint space. Both procedures allow for lysis and lavage of the joint space.

Open surgery on the TMJ can be considered by an experienced oral and maxillofacial surgeon to manage some causes of trismus, provided an accurate diagnosis has been made. Ankylosis of the TMJ often requires resection of the condyle, and, ultimately, TMJ prosthetic replacement. Nonmalignant extra-articular mechanical obstructions to mouth opening may be surgically removed (eg coronoideectomy to manage coronoid hyperplasia).

There is no evidence for the use of muscle relaxants, such as baclofen and pregabalin, in managing trismus.

No data support the use of therapies to prevent trismus (prehabilitation) in patients undergoing head or neck cancer treatment. The mainstay of treatment for trismus after radiotherapy or surgery is physiotherapy with devices to increase range of motion.

Progressive trismus caused by conditions such as scleroderma or oral submucous fibrosis require monitoring by a specialist. An oral medicine specialist is the most appropriate specialist but may not be accessible; an oral and maxillofacial surgeon, dermatologist, or ear, nose and throat specialist are other options. Liaison with the patient's general medical practitioner is important to ensure coordinated care.

Note 1: Chronic closed lock is chronic trismus caused by chronic nonreducing disc displacement within the temporomandibular joint.

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Overview of oral and maxillofacial trauma

Overview of oral and maxillofacial trauma

Oral trauma includes traumatic fractures, displacement or avulsion of teeth; it may cause permanent disfigurement and functional impairment. Oral injuries are common, particularly in children. In children 6 years and younger, oral injuries account for 18% of all physical injuries. For a detailed classification of oral trauma, see the [International Association of Dental Traumatology Guidelines](#).

Maxillofacial trauma describes trauma to the:

- facial soft tissues
- facial skeleton (which includes the frontal, nasal, lacrimal, ethmoid, palatal, maxilla, mandible and vomer bones); this chapter discusses mandibular and midfacial fractures.

Oral and maxillofacial injuries are most often the result of falls, collisions, interpersonal violence and leisure activities (eg contact sports). Consider the possibility of intentional (nonaccidental) injuries in all patients, particularly in children; see [Assessment of oral and maxillofacial trauma](#).

Patients with oral trauma may present to a variety of healthcare services while most with maxillofacial trauma will present to the emergency department of a hospital; a good understanding of management strategies is required by medical and dental practitioners including general dentists, general medical practitioners, emergency physicians and other primary care providers.

Injuries to the primary dentition present a different management challenge to those of the permanent dentition. Special considerations in treating children include:

- considering techniques for regional and local anaesthesia
- judicious use of radiographs to minimise radiation exposure
- prioritising protection of the developing permanent dentition.



Assessment of oral and maxillofacial trauma

Assessment of oral and maxillofacial trauma

When evaluating a person who has sustained an oral or maxillofacial injury, record a thorough history of the circumstances surrounding the injury. If there are inconsistencies between the nature of the injuries and the history, consider the possibility of abuse. Prompt referral to local authorities should be made if abuse is suspected.

Understanding the mechanism of the injury can help assess the likelihood of serious concurrent injuries. To further evaluate this risk; look for the following features, any of which point to concurrent serious injury:

- features of possible head injury
 - an unconscious episode
 - amnesia – does the patient remember the accident?
 - a worsening headache, nausea, vomiting or drowsiness
 - neck pain (a possible indicator of cervical spine injury)
- orbital swelling, proptosis [[Note 1](#)] or changes in vision
- features that indicate risk of airway compromise (eg difficulty breathing, difficulty swallowing, trismus, swelling [eg haematoma] of the floor of the mouth)
- uncontrolled bleeding.

For an algorithm on basic life support, see [Figure 13.76](#).

Patients with risk to the airway require urgent transfer to a facility with an oral and maxillofacial or emergency trauma service. Patients with a suspected head or cervical spine injury should be transferred to a facility where examination and investigations can assess the injury further. Transfer should be undertaken as soon as any active bleeding is controlled and the patient is stabilised. Any significant maxillofacial trauma requires a patient to undergo a formal primary and secondary trauma survey in hospital.

If a permanent tooth was avulsed and is available, replant the tooth as soon as possible (before performing a detailed clinical examination) to maximise its viability; see [Tooth avulsion \(knocked-out tooth\)](#) for more detail on the handling and management of an avulsed tooth.

Clinical examination of an oral or maxillofacial injury involves visual inspection for:

- active bleeding
- bruising
- obviously missing teeth
- chipped teeth
- deviation of bite or inability to close jaw completely (indicators of lateral tooth displacement lateral luxation)
- soft-tissue lacerations or abrasions

- foreign bodies or contamination (eg with gravel or dirt).

Palpate the facial skeleton to assess for a facial fracture. Start around the orbits, then palpate along the nose and the lower border of the mandible.

Examine the oral cavity, carefully recording all visible injuries; include clinical photographs. For a classification of dental trauma, see the [International Association of Dental Traumatology website](#). Record which teeth are involved (see the [Dental numbering system](#)), and type of injury of each tooth independently, and any soft-tissue injuries seen. Assess whether any mobile teeth move independently or as part of a larger segment of bone. If there are fractured teeth and lip lacerations, X-rays of the lips are indicated to determine whether the tooth fragments are within the soft tissues. Record whether the wounds are contaminated and document the patient's tetanus status [\[Note 2\]](#).

Baseline dental radiographs are required, such as an orthopantomogram (OPG) and periapical radiographs (if available), to assess oral injuries more accurately, and to provide a baseline for future comparisons. If there is suspicion of a facial fracture, baseline computed tomography (CT) may be warranted. Plain X-rays of the facial skeleton (eg OPG, posteroanterior [PA] skull or occipitomental views) are usually sufficient to assess uncomplicated maxillofacial trauma (eg isolated mandibular fractures). CT scanning is required for significant injuries (eg multiple facial injuries, middle-third facial injuries, associated head injury).

If tooth fragments or whole teeth are missing and unaccounted for, consider a chest X-ray in patients with symptoms or signs of aspiration (eg coughing).

For advice on managing specific oral injuries, see:

- [tooth fractures](#)
- [displacement injuries](#) (luxations)
- [tooth avulsion \(knocked-out tooth\)](#).

For advice on the management of maxillofacial injuries, see [Initial management of maxillofacial trauma](#).

Note 1: Proptosis is forward displacement of the eye.

Note 2: Tetanus prophylaxis is indicated in patients whose immunisations are not current if oral lacerations or tooth avulsions are present but are not routinely required for luxations or tooth fractures; see [here](#) in the Antibiotic guidelines for the requirements for tetanus immunisation).

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Tooth fractures

Tooth fractures

Traumatic fractures can occur in the primary or permanent teeth. The need for active intervention (rather than observation) depends on the extent of the fracture. An important principle is that missing tooth fragments should be accounted for; consider whether they could be in surrounding soft tissues or have been inhaled. If soft-tissue injuries, such as lip lacerations, are present, a radiograph of the lip should be performed. If fragments are unaccounted for and there are symptoms or signs of aspiration (eg coughing), a chest-X-ray should be considered. See [Assessment of oral and maxillofacial trauma](#) for the approach to evaluating the injuries.

Enamel fractures alone (without dentine or pulp exposure) are often painless; they generally only require observation after alleviation of the sharp edges. If the patient presents to a medical practitioner, advise the patient to see a dentist as soon as possible – analgesics and antibiotics are not indicated in the interim.

Enamel-dentine fractures can be symptomatic because of dentine exposure. Patients may have sensitivity to hot, cold and sweet foods (reversible pulpitis). The goal of treatment is to cover the exposed dentine to manage sensitivity (see [Figure 13.62](#)) and to restore the tooth.

Figure 13.62 How to cover exposed dentine or dental pulp in an emergency

Cover exposed dentine or dental pulp with calcium hydroxide (found in some emergency department dental kits) or glass ionomer cement, if available.

Advise the patient to take care when eating to avoid further trauma to the injured tooth.

Dental review is indicated as soon as practical.

Exposed dental pulp can be temporarily covered with calcium hydroxide (or glass ionomer cement) to manage sensitivity while awaiting dental review.

In a complicated crown fracture with **exposure of the pulp**, red soft tissue is seen at the fracture site (see [Figure 13.63](#)). The exposed pulp may bleed or have a blood clot over it. The pulp is very sensitive, so the patient may be avoiding any contact of this tooth with stimuli, such as the tongue, food, drink or cold air. Pain is typically more severe than occurs with an enamel or enamel-dentine fracture and persists as a dull throbbing ache (even after removal of the stimulus). In an emergency, a temporary covering can be applied (see [Figure 13.62](#)). Tooth damage with pulp exposure requires urgent dental treatment (preferably within 24 hours) to prevent further damage or infection of the tooth. If a delay in dental treatment is expected, pain relief with [oral analgesics](#) or infiltration of the tissues with [local anaesthetics](#) is indicated in the interim.

Tooth damage with pulp exposure requires urgent dental treatment to prevent further damage or infection of the

tooth. Prognosis may be worse the longer the delay in treatment. Figure 13.63 Fractured tooth with exposed pulp



Exposed pulp is visible as red tissue at the fracture site.

Photo sourced with permission from Professor Bill Kahler

Antibiotic therapy is only indicated for a broken tooth if there is an associated spreading infection (see [advice on management of acute odontogenic infections](#)).

Antibiotic therapy is not required for pulpitis associated with a broken tooth.

Clinical follow-up of a complicated crown fracture with pulp exposure is indicated at 1 week after treatment, then at 6 to 8 weeks; this is to ensure that there are no clinical signs of pulpal necrosis (eg pain, sinus tract development, discolouration).

Crown-root or root fractures require careful decision-making regarding treatment. Often, no treatment is required in the emergency situation, unless the fractured coronal fragment is highly mobile and could be aspirated, or pulpal exposure is present. In this situation, removal of the highly mobile fragment, and pulpal coverage would be prudent (see [Figure 13.62](#)). Urgent referral to a dentist for ongoing management is required. Treatment by the dentist depends on the degree of displacement of the coronal fragment, pulpal exposure, and stage of root development at the time of injury.

For more information on the classification and management of tooth fractures, see the [International Association of Dental Traumatology guidelines on fractures and luxations](#).



Overview of managing luxation injuries of the teeth

Overview of managing luxation injuries of the teeth

Luxation injuries are defined as trauma to the teeth that disrupts supporting structures (soft tissues, periodontal ligaments and bone) but does not cause avulsion. Five types of luxation injury are outlined in [Table 13.26](#) that cover a spectrum from tenderness of the tooth to partial displacement. Each type requires specific management but general principles of care are shared:

- Assess all patients with trauma to their teeth for other injuries, especially head and neck injuries; see [Assessment of oral and maxillofacial trauma](#).
- Systemic antibiotics are not recommended in the emergency management of luxation injuries because evidence for their use is limited.
- Tetanus prophylaxis is indicated if oral lacerations are present in patients who are not immune, but is not routinely required for luxation injuries; (see [here](#) in the Antibiotic guidelines for the requirements for tetanus immunisation).
- Emergency management of a dental luxation injury often requires repositioning and stabilisation of the affected tooth (eg splinting).
- If emergency management occurs outside of a dental clinical setting, early dental review is required.
- Regular dental follow-up is required for most injuries to evaluate whether pulpal necrosis occurs.

Stabilisation can be performed by **splinting** the injured tooth to adjacent stable teeth. Outside the dental clinical setting, a temporary splint that can be readily removed at dental review can be made with a light stainless steel wire or nylon filament [\[Note 1\]](#) bound to the labial surface of the teeth using tissue glue; see [Figure 13.64](#) for a photo of a splint using nylon wire and [Figure 13.65](#) for a photo of a splint using nylon filament. If these materials are unavailable, the tooth may be stabilised by:

- moulding a strip of stoma adhesive wafer onto the labial surface of the tooth and adjacent teeth
- applying a band of tissue glue across the labial surface of the tooth and adjacent teeth
- moulding aluminium foil or other malleable material (eg sugar-free gum) around the teeth and asking the patient to bite down
- replacing the patient's mouthguard.

Critical management factors that affect tooth survival are early treatment, accurate repositioning and prompt dental review with regular follow-up.

In children, luxation injuries in the primary dentition are managed in a similar manner to those in the permanent dentition. However, close dental follow-up by an experienced clinician is warranted as any clinical evidence of pulpal necrosis (such as discolouration, sinus tract formation, swelling or progressive symptoms) may warrant extraction to avoid damage to the developing permanent teeth.

Luxation injuries (of adult or primary teeth) require urgent dental review. [Figure 13.64](#) Emergency dental splint

with stainless steel wire



A flexible dental splint that bonds a tooth to adjacent teeth can be created with a light stainless steel wire or nylon filament (as shown below); these can be attached to the teeth using tissue glue.

Photo sourced with permission from Professor Bill Kahler

Figure 13.65 Emergency dental splint using nylon filament



Photo sourced with permission from Professor Bill Kahler

Note 1: Ideally clinical-grade materials should be used but if these are not available, a straightened paper clip or a piece of fishing line can be used to make a splint.

Managing luxation injuries of the teeth by luxation type

Managing luxation injuries of the teeth by luxation type

In managing luxation injuries, consider the principles of care outlined in [Overview of managing luxation injuries of the teeth](#). For a summary of how management varies with type of luxation, see [Table 13.26](#). If emergency management occurs outside of a dental setting, early dental review with regular pulpal monitoring is required for all luxation injuries.

Table 13.26 Managing luxation injuries of the teeth by luxation type

concussion

subluxation

lateral luxation

extrusive luxation

intrusive luxation

Type of luxation	Management [NB1]
concussion	
no significant damage to periodontal structures	
tooth is tender but not significantly mobile	dental follow-up and pulpal monitoring is generally the only treatment required
radiographic abnormalities not usually present	
subluxation	
tooth is tender and mobile	if the tooth is only slightly mobile, no treatment is required
bleeding from gingival crevice	excessive mobility or tenderness on biting requires a flexible splint for 2 weeks
radiographic abnormalities not usually present	
lateral luxation	
tooth is partially displaced towards palate (in maxilla), tongue (in mandible) or the lips (buccal displacement)	
may be associated with alveolar bone fracture	urgent digital repositioning of the tooth is required followed by a flexible splint for 4 weeks
periodontal ligament space is often increased on imaging	
extrusive luxation	
tooth is partially displaced out of its socket, appearing elongated and mobile	urgent repositioning is required
periodontal ligament space is often increased on imaging (at the root and laterally)	tooth is gently pushed back into the socket followed by a flexible splint for 2 weeks
intrusive luxation	
tooth is vertically displaced into the alveolar bone, treatment depends on extent of root formation and of intrusion appearing shorter and often immobile	

periodontal ligament space may not be visible for all or part of the root if **root formation is incomplete** on X-ray, monitor progress (vitality, colour change, abscess formation) and allow re-eruption

if root formation is complete:

- if intrusion is less than 3 mm, monitor progress as above and allow re-eruption
- if intrusion is 3 mm or more, surgical repositioning is required followed by a flexible splint for 4 weeks
- because pulpal necrosis is expected, root canal treatment is required within 2 weeks of the injury to reduce the risk of ankylosis [NB2] and resorption of the tooth

NB1: For more information on the approach to luxations, see the [International Association of Dental Traumatology guidelines on fractures and luxations](#).

NB2: Ankylosis is fusion between the dentine or cementum of the tooth root and the alveolar bone.

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Overview of assessing and managing tooth avulsion

Overview of assessing and managing tooth avulsion

Figure 13.66 summarises the initial assessment and management of an avulsed tooth.

Figure 13.66 Initial assessment and management of an avulsed tooth

Check for other injuries, especially head and neck injuries; see Assessment of oral and maxillofacial trauma.

Do not replant primary (baby) teeth; see Assessing tooth avulsion for advice on distinguishing primary and permanent (adult) teeth.

Do not scrape or handle the root of the tooth.

Rinse the tooth with dairy milk or saline if it is dirty. The tooth can be briefly rinsed in water (if milk or saline are not available), provided it is immediately replanted. Do not use water to store a tooth (see below for advice on storage).

Replant permanent (adult) teeth as soon as possible.

Use a temporary splint to hold the replanted tooth in place until the patient can see a dentist (see Figure 13.64 for a photo of splint using wire and Figure 13.65 for a photo of a splint using nylon filament).

Ensure that tetanus immunisation is up-to-date (see here in the Antibiotic guidelines for the requirements for tetanus immunisation).

Consider antibiotic therapy.

Refer to a dentist urgently.

If the tooth cannot be replanted immediately:

- Do not let the tooth dry out.
- Store the tooth in dairy milk; if milk is not available, store the tooth in saline, saliva or plastic wrap – do not use water because osmotic pressure will damage the periodontal ligament cells.

Assessing tooth avulsion

Assessing tooth avulsion

Avulsion of a tooth is the complete disarticulation of the tooth from its bone socket. In most cases, the tooth is knocked out of the mouth completely, but occasionally it may remain.

Assess all patients with trauma to their teeth for other injuries, especially head and neck injuries; see Assessment of oral and maxillofacial trauma.

Assess whether the tooth has been avulsed; if it is not readily seen, it may have been intruded (pushed into the alveolar bone) or the tooth root may have fractured so that only the crown has been lost. An orthopantomogram (OPG) will differentiate between these presentations. For advice on intrusions, see the overview of managing luxation injuries of the teeth. For advice on tooth fractures, see Tooth fractures. Both these differential diagnoses of avulsions, require urgent referral to a dentist.

If a tooth appears to be avulsed and is not found at the site of the accident, consider whether the patient has inhaled or swallowed the tooth. Consider a chest-X-ray if the patient has indicators of aspiration (eg coughing).

If the avulsed tooth has been retrieved, determine whether it is a primary (baby) or permanent (adult) tooth. In general, primary teeth are lighter in colour and smaller in all dimensions than permanent teeth. Children older than 5 years may have a mixture of primary and permanent teeth. In children aged 5 to 8 years, it can be challenging to determine whether a tooth is primary or permanent; crown size and tooth colour are the most reliable indicators (because root size varies in exfoliating primary teeth and developing permanent teeth). If in doubt, treat the tooth as a permanent tooth and replant it [Note 1]. See [Figure 13.67](#) for an image of avulsed upper incisors and [Figure 13.68](#) for an image of avulsed lower incisors. [Figure 13.102](#) and [Figure 13.103](#) give an indication of the average ages at which primary tooth exfoliation and permanent tooth eruption occur.

Check the patient's tetanus immunisation status (see [here](#) in the Antibiotic guidelines for the requirements for tetanus immunisation).

Figure 13.67 Avulsed upper central incisor teeth



Avulsed upper central incisor teeth; the permanent tooth is shown on the left and the primary tooth on the right.

Photo sourced with permission from Associate Professor Rita Hardiman

Figure 13.68 Avulsed lower central incisor teeth

Avulsed lower central incisor teeth; the permanent tooth is shown on the left and the primary tooth on the right.

Photo sourced with permission from Associate Professor Rita Hardiman

Note 1: Replanting a primary tooth could cause trauma to the crown of a permanent tooth already formed beneath it, but this risk is outweighed by the risk of losing a permanent tooth that is not replanted promptly.

Replanting and splinting an avulsed tooth

Replanting and splinting an avulsed tooth

Do not replant or reposition a primary (baby) tooth because this can damage the permanent (adult) tooth that is developing in the bone. For advice on evaluating whether a tooth is primary or permanent (including images), see [Assessing tooth avulsion](#).

Primary (baby) teeth should not be replanted or repositioned.

Hold an avulsed permanent tooth carefully by the crown so the root is not damaged – do not hold the root. Survival of the cells of the periodontal ligament, which is attached to the root, is essential for healing of the ligament following replantation. If the ligament heals, the tooth has a reduced risk of replacement root resorption and can remain in the mouth for many years.

If the tooth is dirty, rinse it briefly with milk or saline – do not scrub or rub the tooth. Replant an avulsed permanent tooth into its socket as soon as possible. Teeth replanted within 15 minutes are more likely to heal without complications.

If the tooth cannot be replanted immediately, arrange urgent transfer to a dentist or emergency department. The longer the delay in treatment, the worse the prognosis.

If the tooth cannot be replanted immediately, arrange urgent transfer to a dentist or emergency department. **Submerge the tooth** in cool or room temperature dairy milk until it can be replanted. The cells of the periodontal ligament can survive in milk for up to 6 hours. All first-aid kits, especially those for sporting clubs and schools, should stock a small container of long-life dairy milk. Data on the use of nondairy milk are lacking.

If dairy milk is not available, Hank's balanced salt solution (HBSS), saliva, saline or plastic wrap can be used, but the periodontal ligament cells will survive for up to 1 hour at most under these conditions. If plastic wrap is used, ask the patient to spit some saliva into the plastic before wrapping the tooth. Avoid using water for storing an avulsed tooth because the osmotic effect of water causes cell death in the periodontal ligament.

Do not use water to store an avulsed tooth.

Remove blood clot from the socket with suction if replanting the tooth in a clinical setting. To accurately **replant** a tooth, local anaesthetic infiltration may be required. Ideally, this would be a medium-acting local anaesthetic with a vasoconstrictor to provide adequate anaesthesia. There is no evidence that infiltrating with a vasoconstrictor impacts the blood supply or the long-term prognosis of the replanted tooth.

After replanting the tooth, place a temporary **flexible splint** to hold the tooth in position in a similar way to that described for a luxation injury.

Refer the patient to a dentist urgently for further treatment. A dentist will stabilise the tooth for 2 weeks with a flexible splint bonded to the tooth and adjacent teeth. Further endodontic treatment depends on whether the apex (base of the tooth root) is open at the time of injury, and how rapidly the tooth was replanted. Generally, closed apex avulsions require endodontic therapy to start within 2 weeks of replantation (because pulpal necrosis is expected no matter how soon the tooth was replanted). Open apex avulsions have a high likelihood of pulpal revascularisation, but regular clinical and radiographic monitoring (including pulp testing) is required to assess for pulpal necrosis; pulpal necrosis will require endodontic treatment.

Managing an avulsed tooth after replanting and splinting

Managing an avulsed tooth after replanting and splinting

For all patients with tooth avulsion, ensure that tetanus immunisation is up-to-date (see [here](#) in the Antibiotic guidelines for the requirements for tetanus immunisation).

Although limited evidence suggests that antibiotic therapy reduces complications of healing (such as inflammatory root resorption), antibiotics should be considered after replanting the tooth [\[Note 2\]](#). Amoxicillin is preferred because of widespread clinical experience with its use.

For antibiotic therapy after replanting an avulsed tooth in a patient who can swallow tablets; consider:

amoxicillin 500 mg (child: 15 mg/kg up to 500 mg) orally, 8-hourly for 7 days.

In patients with a penicillin hypersensitivity reaction, doxycycline can be used. In children who have difficulty swallowing tablets (generally younger than 7 years), liquid doxycycline is preferable. For antibiotic therapy after replanting an avulsed tooth in a patient with penicillin hypersensitivity, consider:

doxycycline orally, once daily for 7 days [\[Note 3\]](#) [\[Note 4\]](#)

child less than 21 kg: 2.2 mg/kg

child 21 kg to less than 26 kg: 50 mg

child 26 to 35 kg: 75 mg

child more than 35 kg or adult: 100 mg.

Recommend the use of chlorhexidine mouthwash after replantation while the tooth is splinted; use:

chlorhexidine 0.12 to 0.2% mouthwash 10 mL rinsed in the mouth for 1 minute then spat out, 8- to 12-hourly

[Note 5].

For more information on the approach to tooth avulsions, see the [International Association of Dental Traumatology guidelines on avulsions](#).

Note 2: Animal models include studies of amoxicillin and doxycycline. Very low certainty data in human studies show nonsignificant associations between systemic antibiotic use and tooth survival, periodontal healing or pulpal revascularisation.

Note 3: When used short term (eg less than 21 days), doxycycline has not been associated with tooth discolouration, enamel hypoplasia or bone deposition so can be used in children of all ages.

Note 4: An oral liquid formulation of doxycycline is not marketed in Australia but is available via the [Special Access Scheme](#). For formulation options for children or people with swallowing difficulties, see *Don't Rush to Crush*, which is available for purchase from the [Advanced Pharmacy Australia website](#) or through a subscription to *eMIMSplus*.

Note 5: When used for more than a few days, chlorhexidine may cause a superficial discolouration of the teeth and fillings (see [Chlorhexidine for intraoral use](#) for more information).

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Initial management of maxillofacial trauma

Most patients with maxillofacial trauma will present to the emergency department of a hospital, although they can present to a general medical or general dental practice.

Although some patients with minor injuries to the mandible (lower jaw), zygomatic complex (cheekbone) and nose may look reasonably well at presentation, all patients require thorough assessment including evaluation for serious concurrent injuries that can be life threatening. Patients presenting with significant maxillofacial trauma should undergo a formal primary and secondary trauma survey in hospital.

Mandibular fractures often present with a deranged occlusion (misalignment), a gap between teeth at the site of the fracture, and pain and swelling along the lower border of the mandible. Generally, mandibular fractures require surgical management within 24 to 48 hours of the injury, to reduce the risk of infection; prompt referral to a tertiary hospital with an oral and maxillofacial surgery unit is required.

Midfacial fractures include a wide range of potential fracture patterns, and may present as facial asymmetry, a deranged occlusion, facial swelling and, potentially, a mobile midface. Occasionally, if the orbital floor or orbital walls are involved, significant periorbital bruising and swelling results, and eye movement may be impaired if the extraocular muscles are entrapped.

Minimally displaced or nondisplaced midface fractures may not require surgery. However, surgery is required for displaced fractures that would cause facial deformity, or fractures involving the dental alveolus and orbital floors, which could impair function. Surgery is usually required once the facial swelling subsides 7 to 10 days after the injury. Patients with fractures involving the orbital floor or orbital walls require review within 24 hours of the injury in an oral and maxillofacial surgery or hospital emergency unit, because of the risk of extraocular muscle entrapment. Early assessment is crucial for optimal management of midfacial fractures.

For all patients with maxillofacial trauma, ensure that tetanus immunisation is up-to-date (see [here](#) in the Antibiotic guidelines for the requirements for tetanus immunisation).

Debride any soft-tissue injuries. Soft-tissue injuries that require operative care by an appropriate specialist include:

- significant lacerations of the gums
- significant lacerations of the lip or vermillion border
- degloving injuries (where the bone has been exposed)
- external facial lacerations.

For advice on radiological investigations, see [Assessment of oral and maxillofacial trauma](#).

Mandibular fractures that involve the tooth-bearing segments, and most midfacial fractures (fractures that involve the maxillary sinus) are considered open fractures [\[Note 1\]](#), but antibiotic prophylaxis is generally only indicated if surgery is required or the wound is significantly contaminated.

If surgery for a mandibular or midfacial fracture is required, see [Surgical prophylaxis for oral maxillofacial surgery](#) for antibiotic regimens to be given at the time of surgery. Antibiotic therapy between the injury and the perioperative period is generally only indicated if the wound is significantly contaminated; see [Antibiotic prophylaxis for traumatic wounds requiring surgery](#).

If surgery is not required for a maxillofacial injury but the wound is significantly contaminated, see [Antibiotic prophylaxis regimens for significantly contaminated wounds not requiring surgery](#).

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If surgery is not required for a maxillofacial injury but the wound is significantly contaminated, see [Antibiotic prophylaxis regimens for significantly contaminated wounds not requiring surgery](#).

Note 1: Open fractures are those where the bone has broken the skin or mucous membrane and the fracture is exposed to the environment.

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Overview of oral and dental health in people with cognitive disability: information for dental practice

Overview of oral and dental health in people with cognitive disability: information for dental practice

Introduction to oral and dental health in people with cognitive disability: information for dental practice

Introduction to oral and dental health in people with cognitive disability: information for dental practice

Cognitive disabilities or impairments include developmental disabilities (eg intellectual disabilities, autism) and acquired conditions (eg brain injuries, dementia). Compared to the general population, people with cognitive disability have a higher prevalence of periodontal disease and untreated dental caries and more risk factors for oral and dental disease. Poor oral health can result in pain, poor self-esteem and restriction in oral function. It can increase the risk of local and systemic spread of infection, and contribute to aspiration pneumonia and acute airway compromise. Oral disease is also linked to chronic health conditions, including diabetes and cardiovascular disease.

In people with cognitive disability who have difficulty communicating, poor oral health can also contribute to altered or challenging behaviour.

Complicating medical and social factors that impact on safety of dental treatment for people with cognitive disability require careful evaluation.

Access to specialists in special needs dentistry care is very limited; general dental and medical professionals have important roles in improving access to dental care for people with cognitive disability.

The role of health professionals in dental care for people with cognitive disability: information for dental practice

The role of health professionals in dental care for people with cognitive disability: information for dental practice
All health professionals, including general medical practitioners, have a role in promoting access to dental care by:

- providing oral assessment (as part of the patient's overall annual health assessment and opportunistically), depending on the patient's ability to co-operate and the clinician's skills in undertaking them
- promoting preventive oral care practices
- encouraging regular dental reviews.

Although the focus of this guideline is the oral and dental health of people with cognitive disability, many of the adjustments to care can be helpful for other patient populations.

People with cognitive disability report that finding dental professionals willing to treat them is the greatest barrier to regular dental care. Specialists in special needs dentistry [[Note 1](#)] are few, so access to care relies on all dental professionals considering how they can contribute to advising on oral care or completing simple preventive interventions to slow the progression of oral diseases in people with cognitive disability. Sometimes, this will involve managing challenging treatment needs and behaviours; dentists can be supported to do this through discussion with other health professionals in a person's care team (eg speech or behavioural therapists, members of specialist dental services).

As in the general population, people with cognitive disability require comprehensive oral assessment and management by a dentist. These guidelines outline an approach in patients with cognitive disability to:

- diagnosing oral and dental pain
- treatment planning
- assessing capacity to consent for health care
- dental caries
- dental erosion
- periodontal disease
- dental malocclusion
- management of dental anxiety
- sedation for dental procedures.

If acute care for dental problems is needed in an area without ready access to a dentist (eg in rural or remote settings), triage by medical practitioners may be necessary; see Table 13.41 for advice on triage.

For information on the role of medical practitioners in oral health promotion, see Preventive interventions by medical practitioners for oral and dental health, which includes advice for medical practitioners on oral and dental health care for people with special needs.

Note 1: Special needs dentistry is defined by the Royal Australian College of Dental Surgeons as supporting the oral healthcare needs of people with an intellectual disability, medical, physical or psychiatric conditions that require special methods or techniques to prevent or treat oral health problems; or where such conditions necessitate special dental treatment plans.

Risk factors for oral and dental disease in people with cognitive disability: information for dental practice

Risk factors for oral and dental disease in people with cognitive disability: information for dental practice
Factors that increase the occurrence of oral and dental disease in people with cognitive disability are outlined in Figure 13.69. Wherever possible, these factors should be addressed as part of a comprehensive preventive oral healthcare approach; for more detail, see Preventing oral and dental disease in people with cognitive disability: information for dental practice.

Figure 13.69 Factors increasing the occurrence of oral and dental disease in people with cognitive disability
personal factors affecting tooth number, structure or occlusion:

- aberration in tooth formation (eg missing, hypomineralised or hypocalcified teeth, microdontia)
- craniofacial abnormality
- delayed or ectopic eruption of teeth
- delayed exfoliation of primary teeth
- oromotor difficulties

personal factors limiting ability to undertake or receive oral healthcare:

- altered muscle tone and dexterity, kyphosis, compromised vision
- a strong gag reflex
- difficulty with memory (eg in performing oral hygiene, finding dentures)
- challenging behaviour limiting caregivers from assessing oral health and providing care
- anxiety associated with previously traumatic dental experiences inhibiting regular dental clinic attendance

personal factors increasing the risk of trauma (eg through bruxism, other mandibular movements, falls):

- movement disorders
- habitual movements
- some antipsychotic medications
- epilepsy

personal factors increasing the risk of caries, oral mucosal or periodontal disease:

- swallowing disorders causing food retention in the mouth, and affecting oral hygiene
- dry mouth
- gingival enlargement as an adverse effect of some medications (eg calcium channel blockers, phenytoin)
- consumption of food or sugary or acidic drinks increasing the risk of dental caries
- substance use (eg smoking) increasing the risk of oral diseases including oral cancer
- genetic factors in syndromes (eg Down syndrome) that may increase risk of periodontal disease

caregiver factors:

- inadequate education about oral risk factors and training in oral care provision (eg in strategies for addressing swallowing difficulties, a hyperactive gag or bite reflex [[Note 2](#)], oral hypersensitivity, challenging behaviour)
- provision of food and drinks with high sugar and acid content, including use of these as rewards
- lack of awareness of dental services and how to access these

service provision factors:

- lack of time allocated by professionals to providing oral care
- lack of access to regular professional dental care (eg dentist, hygienist); causes include inadequate wheelchair access, limited finances and long waiting times for public dental clinics
- lack of training and expertise of general dentists in special needs dental care and lack of access to paediatric and specialists in special needs dentistry

Note 2: The bite reflex is involuntary biting of an object placed in the mouth. It normally disappears after the first year of life but can reappear in people with cognitive disability (eg as a result of brain injury or dementia).

Preventing oral and dental disease in people with cognitive disability: information for dental practice

Preventing oral and dental disease in people with cognitive disability: information for dental practice

Challenges to oral hygiene practices for people with cognitive disability: information for dental practitioners

Challenges to oral hygiene practices for people with cognitive disability: information for dental practitioners

Many people with cognitive disability need assistance to clean their teeth. Toothbrushing is a complex process that requires fine motor skills, planning, memory and coordination. Some people with disability and swallowing disorders also struggle to manage the fluids and pastes used during toothbrushing, and some have oral hypersensitivity or reflexes that impede oral care.

Many people with cognitive disability need some assistance to clean their teeth.

If a toothbrush is used incorrectly, it can cause trauma to the soft tissues of the mouth. It is natural for a person with cognitive disability to resist toothbrushing if it has caused pain or if there is a history of orofacial abuse or trauma. People with cognitive disability may have retained reflexes (eg bite reflex), have a sensitive gag reflex, or aversion to tastes or touch that makes regular oral care difficult to perform.

Consider referring the person with cognitive disability and their family or carers to a behaviour support practitioner for advice about addressing barriers to oral care, see [Behaviour support for a person with developmental disability](#) in the Developmental Disability guidelines. Speech therapists may also be able to provide advice to assist with oral care.

Strategies for health professionals to assist people with cognitive disability in achieving good oral hygiene: information for dental practice

Strategies for health professionals to assist people with cognitive disability in achieving good oral hygiene: information for dental practice

Create an oral healthcare plan according to a person's individual needs; this is ideally undertaken by dental professionals together with other healthcare team members (eg speech therapists, behavioural support therapists), family members and/or carers. Appropriate recommendations should be documented on this plan and updated regularly to communicate changes in oral hygiene routines to family members, carers and support workers.

Train people with cognitive disability (and their support persons) on optimal toothbrushing techniques. Electric or battery-operated toothbrushes, wider handles and modified toothbrush heads (eg 3-sided toothbrushes) can assist. Dental professionals are encouraged to involve other appropriately skilled members of the person's healthcare team in delivering or supporting this training. Referral to behavioural support practitioners and speech therapists may also be helpful.

Encourage interdental cleaning (using interdental brushes or dental floss) where possible, to assist in removal of oral biofilm; water jets remove food particles and interdental plaque but further research is needed to assess their efficacy in comparison to other methods. Water jets may pose a risk to people with swallowing difficulties because of the heightened aspiration risk.

Promote drinking of water between (and with) meals, in place of sugary or acidic drinks; for people with swallowing difficulties, consider using thickened fluid. However, be aware of the high-carbohydrate content of many thickeners and the associated increased caries risk. To avoid excess carbohydrate content in other intake, recommend:

- healthy savoury snacks that are in the correct food texture for the person to eat safely
- sugar substitutes (eg xylitol) in sweet foods (although intake should be moderate to avoid osmotic diarrhoea)

- reducing use of high-carbohydrate snacks and sugary drinks as a reward.

For people with swallowing difficulties, consider low-foaming toothpastes (without agents such as sodium lauryl sulfate). Dental professionals are encouraged to work with the person's speech therapist to ensure consistency and safety of any recommendations.

Advise people taking multiple medications who have a dry mouth or history of previous or current dental caries to use high-concentration fluoride-containing toothpaste (5000 ppm; see [Table 13.16](#)).

Provide over-the-counter dry mouth products for people with dry mouth; these include saliva substitutes to replace missing enzymes (eg lactoperoxidase, lactoferrin and lysozyme), and oral lubricants.

Visual aids, including reminders (about undertaking oral hygiene practices) and labelling dentures, can be helpful if a person has memory difficulties.

[Table 13.27](#) lists oral hygiene education resources (including videos on how family and carers can supervise and assist with oral hygiene).

Table 13.27 Oral health resources for people with cognitive disability and their families and caregivers [NB1]

Organisation	Resource
Council for Intellectual Disability	Dental care (a factsheet for family and carers)
New South Wales Health	Oral health advice for carers of people with a disability
Dental Health Services Victoria	Oral health advice for people with disabilities
Inclusion Melbourne	Your Dental Health: A Guide for People with a Disability, Their Family Carers, Friends and Advocates
The National Disability Insurance Scheme (NDIS) Quality and Safeguards Commission	Practice alert – oral health (for NDIS providers)

NB1: This list is not exhaustive.

For general advice on oral hygiene measures to discuss with patients, see [Oral hygiene information for patient education in medical practice](#). Considerations that apply to older people, including denture hygiene, are discussed in [Oral and dental health in older people: advice for medical practitioners](#).

Diagnosing oral and dental pain in people with cognitive disability: information for dental practice

Diagnosing oral and dental pain in people with cognitive disability: information for dental practice

Orofacial pain is complex and has many causes, only some of which are dental. For advice on diagnosis and management of acute orofacial pain, see [Acute and postprocedural dental pain](#). In people with cognitive disability, diagnosis can be compromised due to challenges in communicating the location and nature of pain (eg triggering, exacerbating and relieving factors, impact on quality of life).

In people with communication difficulties, orofacial pain can manifest in altered behaviour, sleep and diet patterns. Behavioural change may include hyperactive delirium (for more information on delirium, see the [Psychotropic guidelines](#)), reduced tolerance of tooth brushing, reluctance to eat or have hot or cold foods, new mouthing behaviours, pica or new or increased bruxism (teeth grinding). For tools and strategies to facilitate pain assessment in people with a communication disability, see [Pain assessment](#)

tools and Establishing successful communication with people with developmental disability in the Developmental Disability guidelines.

A person with cognitive disability may require urgent referral to a specialist if diagnosis of the cause of the pain is difficult, or if it is suspected that pain has significantly affected general health (eg by causing unexpected significant weight loss). Assessment may require positive behaviour support planning, moderate sedation or general anaesthesia. Consider whether these are appropriate options during treatment planning. The referring practitioner has a key role in facilitating and expediting specialist assessment by collecting information and providing an initial assessment in their referral letter.

Pain assessment tools for use in dental practice

Pain assessment tools for use in dental practice

Several tools are available to assess pain and distress in people with moderate to severe communication difficulties, for example:

- Wong Baker FACES pain rating scale – requires the person to choose an option
- Abbey pain scale – requires observation of the person.

Observable features (eg as outlined in the Abbey pain scale) may not capture atypical responses to pain (eg laughing) that can occur in some people with cognitive disability. In people with cognitive disability who have difficulty expressing themselves, pain may manifest as behavioural change.

Ask the family members and carers how they usually assess pain in the person with cognitive disability. It may be useful to give them pain assessment tools, to help them identify distress or pain in a person with communication difficulties.

Planning oral and dental treatment in people with cognitive disability: information for dental practice

Planning oral and dental treatment in people with cognitive disability: information for dental practice

All dental practitioners should be able to complete an oral assessment for a person with cognitive disability with support from other members of a person's healthcare team. For more details on practitioner roles, see health professional roles in dental care for people with cognitive disability. If a person has more complex treatment needs, oral assessment may be required by a specialist paediatric dentist or a specialist in special needs dentistry.

Some service strategies to improve a dental consultation experience for a person with cognitive disability are included in Figure 13.70; many of these strategies can be implemented by practice staff before the person's appointment. Efforts to minimise stress before and during the dental consultation can improve communication with the person with cognitive disability.

Figure 13.70 Adjustments to dental service provision to improve the consultation experience for a person with cognitive disability

Reception staff

Arrange for the person to see the same clinician at each visit (this may not always be possible, particularly in an emergency).

Book:

- a longer consultation and anticipate multiple visits
- an appointment at an appropriate time, taking into consideration what may accommodate the person's needs and minimise waiting
- a larger consulting room, if available.

Ask the person or their support people to bring to each appointment:

- any communication aids (or person to assist with communication) if needed
- their personal health record and other relevant health information, including a list of medications and a behaviour support plan, if applicable.

Ask who will accompany the person and establish their relationship to the patient (eg parent, support worker).

Provide a quiet waiting area or allow the person to wait outside.

Check whether the person has any other requirements such as mobility aids or equipment, assistive technology requirements (eg hearing loop) or environmental access needs (eg light or noise preferences).

Check with the patient, carers and/or family members whether they would like a discussion with the treating clinician before the first appointment to help the person and the clinician prepare for the appointment.

General dental practitioner

Clearly record the cognitive disability diagnosis in the dental record.

Nominate a contact person who will help the person navigate the booking and consultation process; this may be a receptionist, administrator or nurse, and not necessarily the dentist.

Review the person's history and, if appropriate, have an initial discussion with the patient, family and/or carers before the appointment to identify:

- who can make decisions
- what adjustments to care might be needed during an appointment
- opportunities for preventive health care
- whether any further information (eg pictures to support a social story) may assist the person in preparing for the visit.

Seek information from family, carers or other health professionals about existing behaviour support plans for people with cognitive disability, which may provide strategies to assist with their dental care.

Consider physical access barriers for people with limited mobility (eg many dental surgeries do not have wheelchair access or a hoist to transfer people on to the dental chair).

Consider how to make the environment welcoming and use calming communication strategies to reduce dental anxiety. Procedural sedation may be an option to support a person to undergo treatment.

Assess factors that impact on safety of dental treatment (especially if considering sedation) and seek medical advice on addressing them.

Consider other ways to reduce risk of complications, such as:

- use of short-acting local anaesthetic – this may reduce the risk of a person inadvertently biting their numb lip after a procedure
- limiting the risk of aspiration (eg by positioning a patient in a more upright position with good suctioning or reduced water spray, and frequent breaks to allow for swallowing).

Explain at the beginning of the consultation what will happen and how long it should take.

Recap and write down the key points at the end of the consultation for the person to take home.

Complete any relevant documentation about the visit to facilitate communication with staff, family and carers.

Encourage regular attendance to enable building of rapport and increase familiarity with the environment; consider addressing medication reviews, health checks and care planning at these visits.

The booklet [Your Dental Health](#) for people with disability and their family or carers, includes advice on oral and dental health, where to go for dental care, what to expect at an appointment and information needed by the dentist.

Dentistry is not usually covered under the [National Disability Insurance Scheme \(NDIS\)](#) or Medicare in Australia except under specific schemes such as the [Child Dental Benefits Schedule](#). However, if a person with cognitive disability requires additional supports for their oral health, dental professionals should discuss this with other members of the person's health team (eg speech therapist, occupational therapist) because provisions for additional supports may be funded or included as part of their National Disability Insurance Scheme (NDIS) plan.

In planning any significant dental treatment for a person with cognitive disability, the wishes of (and benefit to) the person should be considered. Health professionals should make a concerted effort to understand the wishes and priorities of a person with cognitive disability, even if the person cannot articulate these independently. Liaising with other members of the person's care team and their support networks may provide insights to guide their care. If the person's wishes are difficult to ascertain, it may be helpful to use a treatment planning approach (such as a rational dental framework [\[Note 3\]](#)) that has been designed for population groups with complex needs.

Note 3: An example of a rational dental framework for an older patient is described in this [Australian Dental Journal article](#).

Consent for health care in adults with cognitive disability: information for dental practice

Consent for health care in adults with cognitive disability: information for dental practice

Overview of consent required for health care for adults with cognitive disability: information for dental practice

Overview of consent required for health care for adults with cognitive disability: information for dental practice
Australian legislation generally presumes that an adult has the capacity to make decisions about themselves (including consenting to or refusing treatment), unless proven otherwise. Even when a person is considered to lack capacity for a particular decision, their views and wishes must still be obtained to inform any treatment, intervention or testing. For a comprehensive discussion of considerations regarding consent for people with developmental disability, see [Consent, capacity and decision making for people with developmental disability](#) in the Developmental Disability guidelines.

Information about legal requirements for decision-making in adults with cognitive disability is available from state and territory guardianship authorities; for website details, see [Table 13.28](#).

Table 13.28 Guardianship authorities in each state and territory

State	Organisation website
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Australian Capital Territory [Public Advocate](#)

New South Wales [Public Guardian](#)

Northern Territory [Public Guardian and Trustee](#)

Queensland

Public Guardian

South Australia

Office of the Public Advocate

Tasmania

Office of the Public Guardian Tasmania

Victoria

Office of the Public Advocate

Western Australia

Office of the Public Advocate

Informed consent is not required when health care is minor and uncontroversial (eg physical examination, blood tests, noninvasive investigations such as X-rays and ultrasound), and **the person is not objecting** to the treatment by word or action. Any implied consent and the nature of the procedure performed should be clearly documented in the person's medical record.

Informed consent is needed for most procedures; it should come from (in order of preference) the:

- person (if they have capacity or if they can be supported to make an informed decision)
- substitute decision-maker if the person lacks capacity
- appointed guardian.

Providing **financial** consent for a procedure may be the responsibility of a different individual or authority to the one providing **informed** consent for treatment.

Assessing the capacity of an adult with cognitive disability to make decisions: information for dental practice

Assessing the capacity of an adult with cognitive disability to make decisions: information for dental practice
 Whether or not a person with cognitive disability is considered to have capacity will depend on the nature and timing of the consent required. A person's capacity to make specific decisions can fluctuate and may improve with appropriate information and support.

Capacity should be re-assessed before any procedure because it can change over time.

No universally accepted standard or tool exists for assessing capacity to make decisions about health care. Health practitioners need to assess each person's situation individually. Considerations when assessing capacity for decision-making in a person with cognitive disability are outlined in Figure 13.71.

Health practitioners need to assess each person's situation individually. Figure 13.71 Considerations when assessing capacity for decision-making in a person with cognitive disability: information for dental practice
 A person's capacity can be expressed in terms of their ability to:

- receive, comprehend, retain and recall relevant information
- integrate the information received and relate it to their situation
- evaluate benefits and harms in terms of personal values
- select an option and give convincing reasons for the choice
- communicate their choice to others
- persevere with that choice, at least until the decision is acted upon.

Capacity assessment should consider advice from multiple sources (eg carers, support people, other healthcare providers). Assessment of capacity by a practitioner who has not had a longitudinal relationship with a person can be unreliable.

Record key issues considered, others consulted, and any assessments undertaken, in the person's medical and dental history.

It is important to be aware of interpersonal dynamics (including the possibility of coercion) when a person with cognitive disability presents as lacking either decision-making capacity or the ability to provide their views and wishes when accompanied by another. For example, the power imbalance between a family member or carer and the person with cognitive disability may be a factor.

If there is uncertainty about a person's capacity, discussion with other health professionals providing care for and interaction with the person is recommended. Advice is available from guardianship authorities in each state and territory; see Table 13.28.

If there is uncertainty about a person's capacity, discussion with their wider healthcare team is recommended.

Supported decision-making for an adult with cognitive disability: information for dental practice

Supported decision-making for an adult with cognitive disability: information for dental practice

A support person may be a health professional, support worker, family member, carer or other person. Support can include communication modifications, additional information resources and time to consider options. The support person's role is to help the person make, communicate and act on their medical (including dental) treatment decisions or to represent the person's interests in relation to their medical treatment. Support people do not have the power to independently make a person's medical treatment decisions, unless they are also appointed to be a 'medical treatment decision-maker'. In some states, disability advocacy agencies can provide support to an adult to understand and make their own decisions.

Substitute decision-making or guardianship for an adult with cognitive disability: information for dental practice

Substitute decision-making or guardianship for an adult with cognitive disability: information for dental practice

When an adult is unable to make decisions about their health care, a **substitute decision-maker** (family member, close friend or unpaid support person in hierarchies defined by state and territory legislation) may be able to make decisions about significant medical (including dental) treatment on their behalf, without a formal guardianship appointment. A formal appointment of a substitute decision maker may have been made by the person with cognitive disability at a point when they had capacity, through an enduring power of attorney or enduring guardianship.

Medical information (including dental information) provided to a substitute decision-maker should be limited only to that needed to make an informed decision about the treatment proposed.

A paid support person (eg a disability support worker) cannot consent to medical treatment, intervention or testing for an adult with impaired capacity to make decisions.

A paid support person (eg a disability support worker) cannot consent to medical treatment for an adult with impaired capacity to make decisions.

Discussions with a substitute decision-maker about the treatment proposed should consider the best interests of the person and any preferences that may have been documented if an advance care directive has been created; this is a document that outlines the circumstances in which a person wants certain forms of treatment to be provided or withheld.

If there is no appropriate person to be a substitute decision-maker, a **guardian** may need to be appointed to make healthcare decisions for the person with cognitive disability.

Procedures for obtaining consent for a person who already has an appointed guardian (or a substitute decision-maker) may vary between individual states and territories. If in doubt about how to obtain consent, contact the local guardianship authority as listed in Table 13.28.

Procedures for obtaining consent may vary in different states and territories. If in doubt, contact the local guardianship authority.

Dental caries in people with cognitive disability: information for dental practice

Dental caries in people with cognitive disability: information for dental practice

Dental caries is more common in people with cognitive disability than in the general population. All people with cognitive disability should see a dental professional regularly to help prevent and manage dental caries. For strategies to help people with cognitive disability prepare for a dental appointment, see [an approach to planning treatment](#). For a detailed discussion of dental caries, including pathology and diagnosis, see [Dental caries](#). If dental caries results in pain, see [advice on choice of analgesic](#) as an adjunct to a dental procedure. If the caries has resulted in an acute odontogenic infection, antibiotics may be indicated as an adjunct to a dental procedure for a subset of infections; see [Management approach to acute odontogenic infections](#) for advice on management.

Given the limited number of specialists in special needs dentistry, general dental professionals and general medical practitioners play critical roles in the prevention of dental caries for people with cognitive disability. Support from other members of the healthcare team is central. For more details on practitioner roles, see [The role of health professionals in dental care in people with cognitive disability](#).

Dental erosion in people with cognitive disability: information for dental practice

Dental erosion in people with cognitive disability: information for dental practice

Gastro-oesophageal reflux disease (GORD) is common in people with cognitive disability and can contribute to dental erosion if unmanaged. GORD introduces stomach acid into the mouth, which can erode the teeth, leaving them hypersensitive. Dental erosion and halitosis may be early indicators of an underlying diagnosis of GORD.

Early diagnosis and appropriate treatment of GORD is essential to avoid dental erosion. If erosion has occurred, dental restoration cannot be undertaken until GORD is managed appropriately; see [Gastro-oesophageal reflux disease in people with developmental disability](#). Dental erosion may also exacerbate other causes of tooth wear in a person with cognitive disability.

Any individual with tooth wear should see a dental professional for assessment and advice on management. For strategies to help people with cognitive disability prepare for a dental appointment, see [an approach to planning treatment](#).

Periodontal diseases in people with cognitive disability: information for dental practice

Periodontal diseases in people with cognitive disability: information for dental practice

Some syndromes, such as Down syndrome, are associated with additional risk factors (eg T-cell dysfunction, neutropenia, microdontia) that can result in rapid advancement of periodontal disease. Anticonvulsant-related gingival enlargement is common in people with cognitive disability because of the prevalence of epilepsy. People with cognitive disability at increased risk of periodontal disease should be seen by a dental professional regularly. Periodontal disease is discussed in detail in management advice on [gingivitis](#), [periodontitis](#), [necrotising periodontal disease](#), [periodontal abscess](#) and [peri-implantitis](#).

Given the limited number of specialists in special needs dentistry, general dental professionals and general medical practitioners play critical roles in the prevention of periodontal disease for people with cognitive disability. Support from other members of the healthcare team is central. For more details on practitioner roles, see [health practitioner roles in dental care for people with cognitive disability](#).

For strategies to help people with cognitive disability prepare for a dental appointment, see [an approach to planning treatment](#).

Dental malocclusion in people with cognitive disability: information for dental practice

Dental malocclusion in people with cognitive disability: information for dental practice

People with cognitive disability have an increased incidence of oromotor dysfunction, which contributes to dental malocclusion. Orthodontic treatment may be appropriate to align the teeth; for the best result, this should start when permanent (adult) teeth are developing (between 6 to 12 years). During this time, children with cognitive disability require more frequent examination by an oral health professional.

Indications for orthodontic intervention are the same as in the general population (eg to improve function and appearance). Improving malocclusions may also assist with improving oral hygiene. Cognitive disability is not a contraindication to orthodontic treatment, but conventional orthodontics may not be possible for all patients. The indications for any orthodontic intervention need to be considered based on individual patient factors.

For strategies to help people with cognitive disability prepare for a dental appointment, see [an approach to planning treatment](#).

Dental anxiety in people with cognitive disability: information for dental practice

Dental anxiety in people with cognitive disability: information for dental practice

Many people experience anxiety when attending a dental clinic or hospital environment; these fears can be exacerbated in people with cognitive disability, who may have difficulty understanding the process or communicating their distress. A traumatic experience at the dentist can have significant and lasting psychological impact for people with cognitive disability. Individuals who have suffered previous head and neck trauma, or those who have been the victim of sexual assault, can have significant dental anxiety and posttraumatic stress disorder (PTSD). For advice on trauma-informed care for people with cognitive disability, see [Trauma-informed care](#) in the Developmental Disability guidelines.

All dental practitioners should be aware of dental anxiety in people with cognitive disability, and simple environmental and communication strategies that may assist with managing it; see [Anxiety management in dentistry](#). Specialist paediatric dentists and specialists in special needs dentistry undertake additional training in managing such anxiety. Planning for appointments often requires collaboration between the person with cognitive disability and their family or carers, behaviour support planners and medical and dental professionals. Liaise with other members of the person's healthcare team to determine whether existing behaviour support strategies are transferable to support dental treatment.

Resources to help people with cognitive disability prepare for a visit to the dentist include:

- [Your Dental Health](#) booklet from the Inclusion group in Melbourne
- [I am going to the dentist](#) – a ‘Say less, show more’ resource for children produced by the Agency for Clinical Innovation.

If nonpharmacological strategies are neither possible nor sufficient to manage dental anxiety in people with cognitive disability, [sedation for dental procedures](#) may be considered.

Sedation for dental procedures for people with cognitive disability: information for dental practice

Sedation for dental procedures for people with cognitive disability: information for dental practice

First-line approaches to supporting a person with cognitive disability to tolerate a dental procedure are [nonpharmacological strategies](#). Sedation is only considered for procedures if first-line measures have been evaluated as impossible or unsuccessful;

procedural sedation should only be used to support a person with cognitive disability to tolerate a procedure; it should not be used solely to make provision of dental care easier for the professional.

Minimal sedation (anxiolysis) can be provided in a dental practice but moderate sedation must be undertaken by a dentist endorsed by the Dental Board or a registered medical practitioner, with access to appropriate facilities. For general advice on minimal sedation, see Anxiety management in dentistry. People with cognitive disability may have conditions that are too medically complex to be treated in a community clinic; they may require day surgery or hospital admission.

Complicating medical and social factors that affect the safety of dental treatment for people with cognitive disability include:

- complex congenital defects and ongoing concerns with cardiovascular health
- respiratory dysfunction, especially risk of aspiration and obstructive sleep apnoea
- altered airway anatomy, kyphoscoliosis or atlantoaxial instability making airway access difficult
- the high incidence of undiagnosed underlying systemic disease
- difficulties adhering to fasting times and inability to take recommended premedication without food
- obesity, liver or kidney dysfunction, any of which may lead to unpredictable drug uptake and clearance
- tolerance to sedative medication (eg with long-term use), synergistic drug effects or other interactions with current medications
- challenging behaviour on emergence from sedation or general anaesthesia.

People with cognitive disability may have support plans that outline measures of pharmacological support for medical interventions. These plans should be discussed with the person, their carers, family and the healthcare teams to determine whether similar approaches may be applicable for dental care.

If multiple interventions are required for a person with cognitive disability, it may be prudent to advocate for these to be undertaken with a single anaesthetic procedure, if possible. A planned general anaesthetic for dental treatment may present a good opportunity for undertaking screening blood tests (eg in people with a needle phobia). Hospital admission can be planned using this Admission to Discharge template developed in New South Wales for people with cognitive disability.

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Overview of sleep-disordered breathing in dental practice

Overview of sleep-disordered breathing in dental practice

Sleep-disordered breathing refers to a spectrum of breathing disorders in adults and children, ranging from snoring [Note 1] to sleep apnoea (interruptions to breathing). The disordered breathing may be accompanied by other disturbances of sleep (eg insomnia, restless legs or sleep bruxism). For an overview of sleep disorders managed within the field of sleep medicine, see the [Sleep Health Foundation website](#).

This topic discusses the role of the dentist in identifying and treating obstructive sleep apnoea, the most common form of sleep-disordered breathing. For advice on the medical diagnosis and management of obstructive sleep apnoea, see [Obstructive sleep apnoea in adults](#) and [Sleep-disordered breathing in children](#) in the Respiratory Guidelines. Other types of sleep apnoea include [central sleep apnoea](#) (periodic loss of respiratory drive), and complex sleep apnoea (in which central and obstructive apnoea co-exist). Central and complex sleep apnoea are outside the scope of dental practice.

The main functional abnormality during obstructive sleep apnoea is pharyngeal collapse, causing episodes of hypopnoea (reduction in airflow) and apnoea (complete cessation of airflow). This reduction in airflow causes oxygen desaturation. Mild obstructive sleep apnoea [Note 2] is common and causes few symptoms, although some patients experience daytime sleepiness. Moderate or severe obstructive sleep apnoea is associated with increased risks of hypertension, cardiac diseases (atrial fibrillation, heart failure), and premature death. Obstructive sleep apnoea is also associated with snoring, sleep bruxism, mood disorder, cognitive delay or impairment and reduced quality of life.

The role of the dentist in obstructive sleep apnoea is to:

- identify patients at increased risk of the condition and refer them for medical diagnosis
- assess the suitability of adult patients for a customised mandibular advancement oral appliance, and prescribe and monitor its use.

Note 1: Snoring results from vibrations in the pharynx during breathing while asleep. It is common and can affect people of all ages but is particularly prevalent in middle age. The risk of snoring is increased by factors that narrow the pharyngeal space or relax the pharyngeal muscles. Over 10% of regular snorers have sleep apnoea (interruptions to breathing).

Note 2: The severity of obstructive sleep apnoea is measured by the apnoea hypopnoea index (AHI). The AHI is an average of the number of apnoea events (cessation of breathing) and hypopnoea events (reduction in airflow) experienced per hour. In adults, 5 to 14 events per hour is considered mild obstructive sleep apnoea, 15 to 29 events is moderate and 30 or more events is severe.

Assessment for obstructive sleep apnoea in dental practice

Assessment for obstructive sleep apnoea in dental practice

Evidence is insufficient to recommend routine screening for obstructive sleep apnoea in the general population because there are no randomised trials demonstrating cost-effectiveness. However, dentists are encouraged to ask about symptoms of sleep apnoea in patients who have risk factors such as:

- age over 50 years (particularly in males with obesity [a body mass index greater than 30 kg/m^2], hypertension or diabetes)
- excessive alcohol use

- enlarged tonsils
- craniofacial abnormalities.

For symptoms and signs of obstructive sleep apnoea and questionnaires to help guide referral decisions, see [Clinical assessment of obstructive sleep apnoea in adults](#) or [Clinical assessment of obstructive sleep apnoea in children](#).

Examination for risk factors for obstructive sleep apnoea in dental practice

Examination for risk factors for obstructive sleep apnoea in dental practice

Examination may identify risk factors for obstructive sleep apnoea that warrant administering a sleep apnoea questionnaire.

Craniofacial abnormalities that reduce the size of the pharyngeal airway are risk factors for obstructive sleep apnoea; these include a high-arched or narrow hard palate, micrognathia, retrognathia, macroglossia [Note 3], adenotonsillar hypertrophy and nasal septum deviation.

Although obesity is a risk factor for obstructive sleep apnoea in adults and children, some children have poor weight gain, thought to result from the increased work of breathing during sleep. A neck circumference of more than 42 cm in adult males or more than 39 cm in females is a risk factor for obstructive sleep apnoea.

Functional abnormalities that alter muscle tone (eg hypotonia in Down syndrome causing airway collapse, hypertonia in cerebral palsy causing airway narrowing) are also risk factors for obstructive sleep apnoea.

Radiographic examinations to evaluate the upper airway may be considered by specialists.

Note 3: Macroglossia is common in people with Down syndrome. People with Down syndrome are at increased risk of obstructive sleep apnoea, with the prevalence estimated at close to 100% by adulthood. All people with Down syndrome, including those without symptoms, should be referred for medical evaluation for obstructive sleep apnoea.

Medical referral of patients in dental practice for diagnosis of obstructive sleep apnoea

Medical referral of patients in dental practice for diagnosis of obstructive sleep apnoea

Refer patients in dental practice to a medical practitioner for diagnosis of obstructive sleep apnoea if they have a questionnaire score [Note 4] (or additional features) suggestive of obstructive sleep apnoea.

General medical practitioners can request a diagnostic sleep study for patients with scores that reach thresholds on a combination of questionnaires, as outlined on the [Australian Sleep Association website](#).

Referral to a sleep physician is indicated if:

- questionnaire scores do not meet the thresholds but a sleep study is considered to be warranted based on the patient's additional features
- the patient has a complex presentation (eg comorbid significant respiratory disease or heart failure).

Refer children with suspected obstructive sleep apnoea to a paediatric respiratory or sleep physician, or to an ear, nose and throat specialist. Multidisciplinary assessment is often required and other specialists (eg paediatric dentists, orthodontists, oral and maxillofacial surgeons) may be involved in care. For detail on treatment of obstructive sleep apnoea in children, see [Treatment of obstructive sleep apnoea in children](#) in the Respiratory guidelines.

Note 4: Questionnaires are useful screening tools that are straightforward to administer, but their scores do not diagnose or exclude obstructive sleep apnoea. A score above a specified threshold is an indication to refer a patient for medical diagnostic assessment. A score below a threshold supports a decision not to refer, unless a patient has other factors that raise concerns (eg additional symptoms or signs of obstructive sleep apnoea); see [Assessment for obstructive sleep apnoea in dental practice](#).

Dental management of obstructive sleep apnoea in adults

Dental management of obstructive sleep apnoea in adults

The role of the dentist in treating obstructive sleep apnoea is to manage the use of oral appliances as outlined in the position statement, *The use of oral appliances in the treatment of snoring and obstructive sleep apnoea*, from the [Australasian Sleep Association](#). A recommendation from a sleep physician who has interpreted the patient's sleep study is required before an oral appliance can be considered; these appliances are used in adults only. Use of oral appliances to treat suspected obstructive sleep apnoea without a recommendation from a sleep physician is not appropriate.

Use of oral appliances to treat obstructive sleep apnoea without medical examination and investigation is not appropriate.

Oral appliance therapy is one of a range of treatments for obstructive sleep apnoea. Choice of treatment(s) depends on various factors (including patient preferences), which are assessed initially by a medical practitioner. For an overview of treatments for obstructive sleep apnoea, see [Figure 13.72](#).

Figure 13.72 Examples of treatments for obstructive sleep apnoea

Medical treatments for obstructive sleep apnoea include:

- general measures
 - to assist with weight loss if obesity is a factor (eg dietary advice, bariatric surgery)
 - to reduce or stop smoking (this can reduce nasal resistance)
 - to promote nasal airflow (eg prescribing intranasal corticosteroids, recommending nasal strips to dilate nostrils)
 - to improve sleep quality (eg help in reducing alcohol and other drug intake, reviewing use of medications, advising on sleep hygiene)
- positional therapy (use of devices to limit supine sleep)
- continuous positive airway pressure (CPAP)
- protocol-based surgical procedures – adenotonsillar, palatal or skeletal surgery; these are not generally first-line treatments.

Dental treatment for obstructive sleep apnoea is use of an oral appliance (provided after a sleep study report and a recommendation from a medical practitioner).

For detail on the medical treatment of obstructive sleep apnoea in adults, see [Treatment of obstructive sleep apnoea in adults](#) in the Respiratory guidelines.

Following a sleep study, a medical practitioner discusses suitable options from [Figure 13.72](#) with the patient. If the patient wishes to consider an oral appliance, referral to a dentist is required to:

- assess the patient's suitability for an appliance from a dental perspective and obtain informed consent (see below)
- prescribe an appropriate customised appliance

- oversee use of the appliance, in collaboration with the patient's medical practitioner(s).

The types of oral appliances for obstructive sleep apnoea are:

- mandibular advancement appliances, which aim to protrude the mandible and stabilise associated soft tissues to open the airway and reduce the apnoea hypopnoea index (AHI [\[Note 5\]](#)); these are different to occlusal splints (used for bruxism or temporomandibular disorders), which protect the mandibular and maxillary teeth to reduce wear from grinding but do not protrude the mandible
- tongue-retaining appliances, which aim to maintain the tongue in a forward position, to avoid obstruction of the airway. They are less frequently used and are neither well-tolerated nor widely available. They may be considered in edentulous patients.

Informed consent for a mandibular advancement appliance requires discussion of the benefits and harms. A 2022 review by the United States Preventive Services Task Force [\[Note 6\]](#) found that mandibular advancement appliances are associated with a small reduction in daytime sleepiness, but data on other outcomes (eg quality of life, mortality, cardiovascular outcomes) are inconclusive. Appliances are mainly considered in mild or moderate obstructive sleep apnoea but may also be used for severe obstruction after specialist consultation (eg if CPAP has not been tolerated or is not acceptable to the patient). Complications from use of a mandibular advancement appliance include:

- potential occlusal changes
- mouth breathing, which can cause a dry mouth
- hypersalivation
- initiating or exacerbating a temporomandibular disorder [\[Note 7\]](#)
- fractured teeth
- fractured restorations.

Patient information on oral appliances is available from the [Sleep Health Foundation](#).

Note 5: The severity of obstructive sleep apnoea is measured by the apnoea hypopnoea index (AHI). It is an average of the number of apnoea events (cessation of breathing) and hypopnoea events (reduction in airflow) experienced per hour. In adults, 5 to 14 events per hour is considered mild obstructive sleep apnoea, 15 to 29 events is moderate and 30 or more events is severe.

Note 6: Feltner C, Wallace IF, Aymes S, Cook Middleton J, Hicks KL, Schwimmer M, Baker C, Balio CP, Moore D, Voisin CE, Jonas DE. Screening for Obstructive Sleep Apnea in Adults: Updated Evidence Report and Systematic Review for the US Preventive Services Task Force. JAMA. 2022 Nov 15;328(19):1951-1971. doi: 10.1001/jama.2022.18357. PMID: 36378203

Note 7: Temporomandibular symptoms are not contraindications to the use of an oral appliance, but advice from (or referral to) a dental specialist should be considered.

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Overview of dental considerations for patients with a medical condition

Overview of dental considerations for patients with a medical condition

Patients attending a general dental practice may have a medical condition (or be taking medications) that affect their dental management. It is important to obtain a complete medical and medication history, including a history of allergy (see [Dental practice: taking a history](#)).

Consider the potential effect of dental treatment on a patient's medical condition. If the patient can only tolerate short periods of dental treatment or their condition is easily destabilised, modify dental treatment accordingly. Schedule appointments in the morning for patients with complex medical conditions so that any sequelae can be resolved during the day.

If the patient's life expectancy is short or they have severe disease, consider whether dental treatment will improve their quality of life and level of pain, or impact on their function; see [Dental practice: the process of rational treatment](#) for an approach.

The advice in these guidelines on dental considerations for patients with a medical condition is not a substitute for formal training or detailed texts. It outlines common medical conditions and medications, and the associated dental implications, including periprocedural risks. Periprocedural risks vary with the invasiveness of the procedure, which affects the risk of bleeding, infection and (in some patients) corticosteroid replacement requirements; see [Table 13.29](#).

If a medical emergency arises during dental treatment, see [Introduction to medical emergencies in dental practice](#) for an overview of first-aid advice.

Table 13.29 Classification of dental procedures by invasiveness and considerations for risk management[Printable table](#)

noninvasive procedures

minimally invasive procedures

- gingival retraction cord, subgingival matrix band placement, stainless steel crowns, rubber dam clamps
- supragingival debridement
- dental restorations requiring local anaesthetic or closed root canal procedure

invasive procedures

noninvasive procedures

oral examinations (including periodontal probing in most patients [NB3]), X-rays, dental impressions, small supragingival restorations not requiring local anaesthetic, fluoride treatment, placing and tightening orthodontic brackets

bleeding risk considerations

antibiotic prophylaxis

other considerations

full assessment of patient factors affecting bleeding risk is generally not required because the procedure is unlikely to cause bleeding	surgical antibiotic prophylaxis is not indicated [NB3]	an increase in glucocorticoid replacement is not indicated for patients at risk of adrenal crisis.
consider limiting periodontal probing for patients with gingivitis and a <u>congenital or inherited bleeding disorder</u>	infective endocarditis prophylaxis is not indicated [NB3]	
minimally invasive procedures: gingival retraction cord, subgingival matrix band placement, stainless steel crowns, rubber dam clamps		
bleeding risk considerations	antibiotic prophylaxis	other considerations
full assessment of patient factors affecting bleeding risk is generally not required because the procedure is unlikely to cause bleeding	surgical antibiotic prophylaxis	an increase in glucocorticoid replacement is not indicated for patients at risk of adrenal crisis
minimise gingival trauma as much as possible during these procedures for patients with <u>congenital or inherited bleeding disorders</u>	infective endocarditis prophylaxis is not indicated	
minimally invasive procedures: supragingival debridement		
bleeding risk considerations	antibiotic prophylaxis	other considerations
unlikely to cause prolonged bleeding, but see <u>Table 13.30</u> for considerations to minimise risk	surgical antibiotic prophylaxis is not required for most patients; consider (with the patient's medical team) whether it is appropriate for patients with gingivitis and <u>profound immune compromise</u>	an increase in glucocorticoid replacement is not indicated for patients at risk of adrenal crisis
	infective endocarditis prophylaxis is indicated in patients with <u>specific cardiac conditions</u>	
minimally invasive procedures: dental restorations requiring local anaesthetic or closed (nonsurgical) root canal procedure		
bleeding risk considerations	antibiotic prophylaxis	other considerations
unlikely to cause prolonged bleeding if local infiltration alone is used; if an inferior alveolar nerve block is required, see <u>Table 13.30</u> for considerations to minimise risk	<u>surgical antibiotic prophylaxis</u> is not indicated	an increase in glucocorticoid dose is recommended for patients at risk of adrenal crisis (including patients on chronic glucocorticoids [eg prednisolone 5 mg or more daily for more than 3 weeks]); seek advice from the patient's medical practitioner [NB4]
invasive procedures		

tooth extraction, periodontal surgery, biopsies, implant placement, subgingival debridement

bleeding risk considerations	antibiotic prophylaxis	other considerations
prolonged bleeding is likely with invasive procedures; see Table 13.30 for considerations to minimise risk	for patients <u>without profound immune compromise</u> , surgical antibiotic prophylaxis is not indicated for most dental procedures; see Table 13.12 for patients <u>with profound immune compromise</u> , consider (with the patient's medical team) whether surgical antibiotic prophylaxis is appropriate infective endocarditis prophylaxis is recommended only for specific oral and dental procedures in patients with <u>specific cardiac conditions</u>	an increase in glucocorticoid dose is recommended in patients at risk of adrenal crisis (including patients on chronic glucocorticoids [eg prednisolone 5 mg or more daily for more than 3 weeks]); seek advice from the patient's medical practitioner risk of triggering <u>medication-related osteonecrosis of the jaw</u> (MRONJ) may be increased for patients taking certain medications

NB1: This table lists examples of dental procedures for each category of risk but excludes oral and maxillofacial surgical procedures. Risks of bleeding, infection and other events (eg adrenal crisis) vary with procedural and patient factors.

NB2: If a procedure is being performed to treat an established infection, indications for antibiotic treatment are considered separately to indications for surgical antibiotic prophylaxis or infective endocarditis prophylaxis. For advice on the role of antibiotics in treating infections, see [Indications for antibiotic therapy in acute odontogenic infections](#), [Necrotising gingivitis](#) and [Peri-implant diseases](#).

NB3: Periodontal probing is unlikely to cause prolonged bleeding or systemic infection if there are no visible or radiological signs of periodontal disease. If a patient has evidence of periodontal disease and requires another procedure warranting antibiotic prophylaxis (eg debridement in patients with a cardiac condition warranting infective endocarditis prophylaxis or debridement in patients with profound immune compromise, which may warrant surgical antibiotic prophylaxis), consider performing probing together with the other procedure at a single appointment.

NB4: Patients at risk of adrenal crisis may have a sick day management plan (for an example, see the [Endocrine Society of Australia website](#)). For medical practitioners, advice on glucocorticoid dose adjustment for patients at risk of adrenal crisis is available in [Adrenocortical suppression](#) and in [Adrenal insufficiency](#).

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Hypertension: dental considerations

Hypertension: dental considerations

For the medical management of hypertension, see [Hypertension and blood pressure reduction](#) in the Cardiovascular guidelines.

Patients treated for hypertension can undergo general dental treatment if their blood pressure is controlled. Manage [dental anxiety](#) because this can exacerbate hypertension during a procedure. Consider hypertension as a risk factor when evaluating periprocedural bleeding risk; see [Figure 13.73](#).

When treating acute dental or postprocedural pain, avoid nonsteroidal anti-inflammatory drugs (NSAIDs) in patients taking a diuretic plus any of the following medications for hypertension (which are also used to treat heart failure) because of the risk of acute kidney injury:

- an angiotensin converting enzyme inhibitor (eg perindopril)
- an angiotensin II receptor blocker (eg candesartan).

For more information on the impact of NSAIDs on the kidney, see [Renal toxicity of NSAIDs and its impact on choice of NSAID](#). For advice on alternative analgesics (eg paracetamol), see [Choice of analgesic for acute and postprocedural dental pain](#).

Although local anaesthetics containing adrenaline (epinephrine) have a limited effect on elevation of blood pressure, it is recommended to avoid using them in patients with uncontrolled hypertension (see [Adding vasoconstrictors to local anaesthetics](#)).

Calcium channel blockers used to treat hypertension (eg amlodipine) can cause gingival enlargement. Gingival enlargement may be minimised with good oral hygiene and periodontal debridement; however, extensive enlargement requires specialist periodontal and medical management.

Angina and myocardial infarction: dental considerations

Angina and myocardial infarction: dental considerations

For the medical management of angina and myocardial infarction (heart attack), see [Classification of coronary ischaemic syndromes](#) in the Cardiovascular guidelines.

In dental practice, first-aid management of angina or a suspected myocardial infarction is outlined in [Clinical features and management of chest pain in dental practice](#).

In the 12 months after myocardial infarction, stent placement, coronary artery bypass surgery, or valve procedures (including transcatheter aortic valve implantation [TAVI]), patients are at increased risk of a major adverse cardiac event (eg sudden death). Defer elective dental treatment for 6 months after myocardial infarction, stent placement, coronary artery bypass surgery or valve procedures. If dental pain or infection occurs within 6 months following the event, provide adequate emergency treatment but avoid the use of adrenaline-containing local anaesthetics. Consider seeking specialist advice about appropriate treatment and timing of procedures.

Defer elective dental treatment for 6 months after myocardial infarction, stent placement, coronary artery bypass surgery or a heart valve procedure.

Patients with a history of angina (or myocardial infarction more than 6 months earlier) can undergo dental treatment provided their medical practitioner advises that their condition is stable.

The presence of a pre-existing coronary stent is not an indication for surgical antibiotic prophylaxis for dental procedures (see [Antibiotic prophylaxis for dental procedures](#)).

If the patient requires a dental procedure likely to cause prolonged bleeding assess patient factors that impair haemostasis, such as use of antithrombotic drugs; see [Figure 13.73](#).

Instruct patients with angina to bring their medication (eg glyceryl trinitrate spray or tablets) when attending for dental treatment, and have it readily accessible. Limit the duration of dental procedures. Use relaxation techniques and consider other measures for anxiety management. Ensure effective analgesia during dental procedures using a local anaesthetic – the use of a vasoconstrictor with local anaesthetic is not contraindicated in patients with angina (see [Local anaesthetics in dentistry](#)).

Heart failure: dental considerations

Heart failure: dental considerations

For the medical management of heart failure, see [Heart failure in the Cardiovascular guidelines](#).

Do not undertake dental treatment unless the patient's medical practitioner advises that their heart failure is stable. Limit the duration of dental procedures. Patients with heart failure may not tolerate being placed in a horizontal position – position the dental chair so the head is higher than the heart, at a similar angle to that at which the patient can comfortably sleep.

Patients with severe heart failure are at increased risk of adverse outcomes from sedation and general anaesthesia. Dental procedures requiring sedation or general anaesthesia should be undertaken in a hospital with an anaesthetist present.

Avoid nonsteroidal anti-inflammatory drugs (NSAIDs), if possible, in patients with heart failure, particularly those taking a diuretic plus an angiotensin converting enzyme inhibitor (eg perindopril) or an angiotensin II receptor blocker (eg candesartan), because of the risk of acute kidney injury. Patients with **severe** heart failure should not be prescribed NSAIDs by a dentist. For further considerations regarding NSAID prescribing, see [Nonsteroidal anti-inflammatory drug use in dentistry](#). For advice on alternative analgesics, see [Choice of analgesic for acute and postprocedural dental pain](#).

Diuretics and other drugs with diuretic effects (eg dapagliflozin, empagliflozin) used in managing heart failure can contribute to dry mouth.

Some patients with heart failure may be candidates for a heart transplant. They will require a dental assessment before being added to the heart transplant waiting list. All patients with heart failure should have their oral health optimised through regular recall and preventive management to avoid delays if they should need to be listed for transplant. Dentists may wish to seek advice from dental specialists who work in a hospital for advice on pretransplant dental treatment plans.

Cardiac implanted electronic devices: dental considerations

Cardiac implanted electronic devices: dental considerations

Cardiac implanted electronic devices (CIEDs) include implantable cardioverter defibrillators, permanent pacemakers and ventricular assistive devices. Patients with a CIED can undergo most general dental treatment.

Surgical diathermy can interfere with some CIEDs. With modern CIEDs, interference from most other dental electronic and ultrasonic devices is usually not clinically significant. However, if in doubt, consult the cardiologist responsible for the management of the CIED or seek expert advice before a dental procedure [\[Note 1\]](#).

The presence of a CIED is not a specific indication for surgical antibiotic prophylaxis (see [an overview of antibiotic prophylaxis for dental procedures](#)).

CIEDs should not be confused with prosthetic cardiac valves. The presence of a cardiac implanted electronic device is not a specific indication for infective endocarditis prophylaxis (see [Indications for endocarditis prophylaxis](#)).

Patients with left ventricular assistive devices (LVADs) are at increased risk of thrombotic events. Antithrombotics may be used to manage this risk; see [Management of patients taking antithrombotic drugs undergoing a dental procedure](#) for information on

these drugs. Patients with LVADs may be at increased risk of postoperative bleeding following dental procedures because of the combined effects of antithrombotics and LVAD-induced blood pressure changes.

Note 1: For further information on interference, see the [American Dental Association website](#).

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Assessing periprocedural bleeding risk in dental practice

Assessing periprocedural bleeding risk in dental practice

Periprocedural bleeding risk should be assessed before a dental procedure to plan the appropriate treatment setting and haemostatic measures required. When assessing periprocedural bleeding risk in dental practice, consider:

- the practitioner's ability to achieve haemostasis (control of bleeding)
- the likelihood of the procedure causing prolonged bleeding – this is the result of complex interactions between procedural factors and patient factors (medical conditions and medications that impair haemostasis)
- the clinical consequence of bleeding, should it occur.

If bleeding occurs during or after dental procedures, see advice on immediate management in [Bleeding during or after oral surgery](#).

Assessing dental procedural factors for impact on risk of periprocedural bleeding

Assessing dental procedural factors for impact on risk of periprocedural bleeding

Most dental procedures pose a relatively minor risk of bleeding (in comparison to more extensive surgical procedures performed at other body sites). [Table 13.30](#) classifies dental procedures by their likelihood of inducing prolonged bleeding, and outlines management considerations, including the need to assess patient risk factors for bleeding and the need for consultation or referral. The goals of consultation are to determine appropriate investigations, additional haemostasis measures required and the most appropriate setting for treatment.

Although most dental procedures can be undertaken in general dental practice with careful planning, referral to a dental specialist should be considered for patients with impaired haemostasis, particularly if a higher-risk procedure is planned or if a clinician does not feel comfortable administering the haemostatic measures required. For patients in remote and rural locations, consider access to after-hours services capable of managing bleeding complications when deciding on the most appropriate setting.

Many patients can receive most of their dental treatment in a general dental practice after careful assessment of periprocedural bleeding risk, and planning.

If possible, any patient risk factors for bleeding should be addressed before elective dental procedures.

A patient's bleeding risk is dynamic, so should be reassessed before each procedure likely to cause bleeding.

Table 13.30 Risk of and implications for managing prolonged periprocedural bleeding in dental practice[NB1]
unlikely to cause prolonged bleeding:

- [noninvasive procedures](#)
- [minimally invasive procedures](#)

likely to cause prolonged bleeding:

- [lower-risk invasive procedures](#)
- [higher-risk invasive procedures](#)

unlikely to cause prolonged bleeding: noninvasive procedures

oral examinations (including periodontal probing)

examples of procedures

X-rays, dental impressions, small supragingival restorations not requiring local anaesthetic, fluoride treatment, placing and tightening orthodontic brackets

implications for management of bleeding risk

the procedure can be managed by a general dentist

before periodontal probing in a patient with gingivitis, assess whether the patient has a congenital or inherited bleeding disorder; if present, consider limiting probing

unlikely to cause prolonged bleeding: minimally invasive procedures

restorations requiring local anaesthetic or closed root canal therapy (excluding procedures requiring an inferior alveolar nerve block in specific patient groups [NB2])

gingival retraction cord

examples of procedures

placement of matrix band (below gum margins)

rubber dam clamps

stainless steel crowns

supragingival debridement

the procedure can be managed by a general dentist

minimise gingival trauma as much as possible

before supragingival debridement:

implications for management of bleeding risk

- assess for medical conditions and medications affecting bleeding risk and manage as in Figure 13.73; if gingivitis is present, consider whether the extent influences bleeding risk
- in a patient with a congenital or inherited bleeding disorder, consult with a haematologist or haemophilia treatment centre before debridement
- in patients with severe thrombocytopenia, involve a medical practitioner and/or a dental specialist in formulating a management plan

likely to cause prolonged bleeding: lower-risk invasive procedures

nonsurgical periodontal procedures (eg subgingival debridement)

examples of procedures

incision and drainage of swellings

limited or small soft-tissue biopsies

most procedures can be managed by general dentists, but specialist advice may be required to create a management plan, including choice of treatment setting

assess for medical conditions and medications affecting bleeding risk and manage as in Figure 13.73; in patients undergoing subgingival debridement, consider whether the extent of gingivitis influences bleeding risk

implications for management of bleeding risk

for patients with congenital or inherited bleeding disorders contact a haemophilia treatment centre or the patient's haematologist for advice

for patients with severe thrombocytopenia or acquired medical conditions impairing haemostasis, involve a medical practitioner and/or a dental specialist in formulating a management plan

for patients taking one or more antithrombotic drugs, see Table 13.34 for advice on consultation and referral

likely to cause prolonged bleeding: higher-risk invasive procedures

dental extractions (regardless of number of teeth) [NB3]

any procedure where a mucoperiosteal flap is used (eg surgical extractions, implant placement, periapical surgery, periodontal surgery)

extensive soft-tissue biopsies

examples of procedures

hard-tissue biopsies

inferior alveolar nerve blocks for patients with:

- clotting factor deficiencies (eg haemophilia)
- a recent platelet count (in the last 24 hours) less than $30 \times 10^9/L$

assess for medical conditions and medications affecting bleeding risk and manage as in Figure 13.73

for patients with a congenital or inherited bleeding disorder or thrombocytopenia, referral to a hospital-based specialist dental team is recommended

implications for management of bleeding risk

for patients with acquired medical conditions impairing haemostasis, consider referral to a hospital-based specialist dental team

consider referral to either a community-based dental specialist or a hospital-based specialist dental team for:

- patients taking a combination of an anticoagulant and an antiplatelet drug (as outlined in Table 13.34)
- situations in which a practitioner is not comfortable to undertake the haemostatic procedures required

NB1: The bleeding risk associated with these procedures is based on the consensus opinion of the Oral and Dental Expert Group. Risk assessment requires clinical judgement, taking into consideration the procedural risks, the patient's medical conditions and medications that impair haemostasis, and the practitioner's ability to manage prolonged bleeding, should it occur. The list in this table is not comprehensive.

NB2: If the procedure requires an inferior alveolar nerve block in a patient with a clotting factor disorder (eg haemophilia, von Willebrand disease) or a platelet count below $30 \times 10^9/\text{L}$, the procedure is considered ‘higher-risk’.

NB3: Risk assessment for dental extractions is challenging and requires considerations of local factors (eg number and type of teeth removed, technique applied, ability to support postoperative haemostasis with local measures).

Assessing a patient’s history to evaluate haemostasis before a dental procedure

Assessing a patient’s history to evaluate haemostasis before a dental procedure

Assess the patient’s capacity to provide an accurate medical history, understand and consent to the procedure, and adhere to postprocedural care requirements. For more information on obtaining informed consent, see [Dental practice: the process of rational treatment](#).

For a general approach to history-taking, see [Dental practice: taking a history](#). Specific points to ask about regarding haemostasis include:

- conditions and medications (including herbal and over-the-counter preparations) that may impair haemostasis
- previous bleeding episodes following dental procedures (and the management required)
- any family history of prolonged bleeding (especially after a procedure) or bleeding disorders, particularly if a patient has not had an invasive dental procedure to provide their own periprocedural bleeding history
- the extent of any recent excessive bleeding (eg prolonged bleeding from cuts, nosebleeds, menstrual periods), particularly in patients with jaundice or purpura [[Note 1](#)].

Confirm the history with the patient’s medical practitioner; ask them to interpret any recent blood tests results and advise on whether there is evidence of medical conditions listed in [Table 13.31](#).

Table 13.31 Examples of medical conditions that impair haemostasis and require further evaluation before a dental procedure

Congenital or inherited medical conditions [NB1]

clotting factor deficiencies (eg haemophilia, von Willebrand disease) [NB2]

connective tissue disorders causing blood vessel fragility (eg Ehlers-Danlos syndrome, Marfan syndrome)

platelet function disorders (eg Bernard-Soulier syndrome, Glanzmann thrombasthenia)

Acquired medical conditions

liver disease (cirrhosis or evidence of liver disease on blood tests) [NB3]

kidney disease requiring dialysis or transplant, or a serum creatinine more than 200 micromol/L

low platelet count [NB4] caused by:

- bone marrow failure (eg aplastic anaemia, myelodysplasias)
- haematological malignancy (leukaemias, lymphomas, myelomas)

- solid tumour infiltrating bone marrow
- total body irradiation
- chemotherapy
- excessive chronic alcohol use
- immune thrombocytopenia (ITP) [NB5]
- hypersplenism [NB6]

NB1: These medical conditions should prompt further consultation with medical professionals or dental specialists, as outlined in Figure 13.73; they are not necessarily contraindications to dental procedures in general practice. This list is not exhaustive.

NB2: Patients with a clotting predisposition (a thrombophilia) may have increased periprocedural bleeding risk if taking antithrombotic medications; see Table 13.32.

NB3: Examples of blood test abnormalities include serum bilirubin concentration elevated more than 2 times the upper limit of normal together with serum liver enzyme concentrations (alanine transaminase [ALT], alkaline phosphatase [AP], aspartate aminotransferase [AST]) elevated more than 3 times the upper limit of normal. Not all liver disease is evident on blood tests.

NB4: Platelet counts less than $50 \times 10^9/\text{L}$ represent marked reductions; for treatment implications, see Considerations for dental procedures in thrombocytopenia.

NB5: In acquired immune thrombocytopenia, platelets are destroyed by antiplatelet antibodies associated with a broad range of causes (including autoimmune syndromes, immune deficiency syndromes, viral infections, malignancies, medications and vaccines).

NB6: Hypersplenism causes circulating blood cells to be trapped by the spleen resulting in a low platelet count; causes of hypersplenism include liver cirrhosis, lymphoma, infections and connective tissue diseases.

**Table 13.32 Medications that impair coagulation or platelet function
antithrombotics**

anticoagulants such as direct-acting anticoagulants (DOACs) (eg apixaban, rivaroxaban, dabigatran), heparin, enoxaparin, warfarin

antiplatelets such as aspirin, clopidogrel, prasugrel and ticagrelor

other medications that may impair platelet function

nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen and naproxen

serotonin noradrenaline reuptake inhibitors (SNRIs) such as venlafaxine

selective serotonin reuptake inhibitors (SSRIs) such as fluoxetine, paroxetine or sertraline

Bruton tyrosine kinase inhibitors (BTKis) such as acalabrutinib, ibrutinib and zanubrutinib (used to treat lymphomas and chronic lymphocytic leukaemia)

supplements or complementary medicines such as gingko biloba, garlic and curcumin

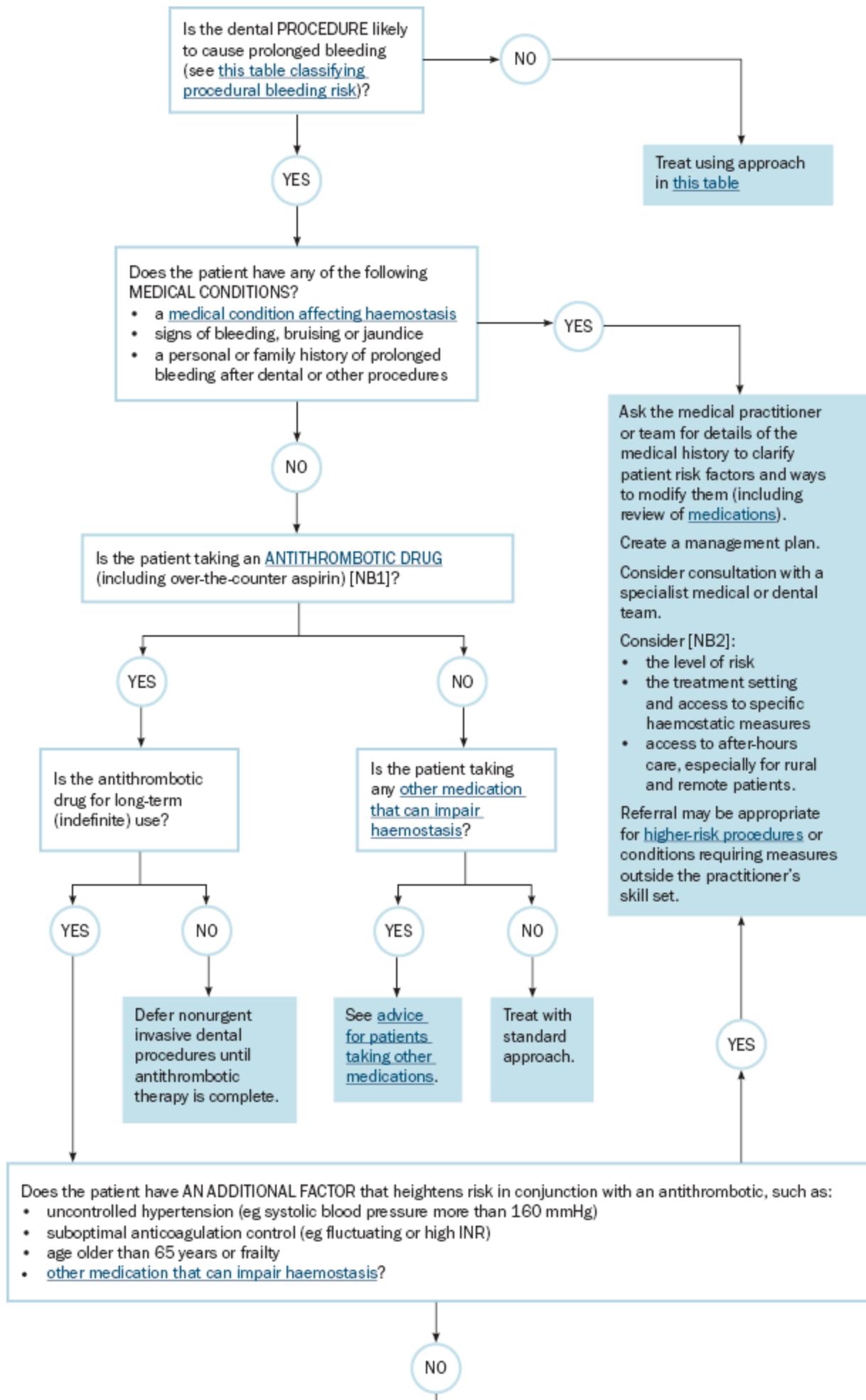
Note 1: Purpura is the discolouration of the skin or mucous membranes caused by bleeding from small blood vessels; the size of lesions ranges from pinprick lesions (petechiae) to larger bruises (ecchymoses). For images, see the [DermNet website](#).

Approach to managing bleeding risk in dental procedures

Approach to managing bleeding risk in dental procedures

Figure 13.73 gives an overview of the approach to assessing and managing bleeding risk in dental procedures.

Figure 13.73 Approach to assessment and management of periprocedural bleeding risk in dental procedures



↓

Manage according to the type of antithrombotic drug being used (see [advice on management of antithrombotics](#)).

Seek advice from a medical practitioner or a specialist dental team if uncertain about assessing or managing bleeding risk.

INR = international normalised ratio

NB1: Antithrombotic drugs include anticoagulants (eg heparin, enoxaparin, warfarin, direct-acting oral anticoagulants [such as apixaban, rivaroxaban, dabigatran]) and antiplatelets (eg aspirin, clopidogrel, prasugrel, ticagrelor).

NB2: Specific considerations apply for patients with congenital or inherited bleeding disorders, thrombocytopenia or acquired medical conditions impairing haemostasis.

For more extensive procedures or procedures expected to be of a longer duration (eg subgingival debridement across multiple sextants), consider limiting the extent of surgery performed in one sitting (**staging treatment**) or **referring to or consulting** with a hospital-based specialist dental team. For a summary of other higher-risk procedures and implications for referral, see [Table 13.30](#).

Ideally, procedures with a higher risk of bleeding should be planned for early in the day and week to avoid the need to manage complications after hours with potentially fewer resources.

Plan procedures with a higher risk of bleeding for early in the day and week.

Local haemostatic measures should be considered for all patients at increased bleeding risk. Applying prolonged pressure to the wound is the most important local measure.

It is essential to provide the patient with **written information** on postprocedural care, including contact information in an emergency. Advise patients to seek urgent medical attention if there is persistent ooze or bleeding, bleeding that restarts, or any bleeding of concern. Explain that extensive bruising may occur.

Advise patients to seek urgent medical attention if there is persistent ooze or bleeding, bleeding that restarts, or any bleeding of concern.

Explain how to **manage postprocedural pain**. Paracetamol is the preferred analgesic for postoperative pain in patients taking an antithrombotic drug [\[Note 2\]](#) – concomitant use of nonsteroidal anti-inflammatory drugs (NSAIDs) and antithrombotics increases the risk of postoperative bleeding (see [Choice of analgesic for acute and postprocedural dental pain](#)).

NSAIDs increase the risk of bleeding in patients taking an antithrombotic drug.

Arrange a **follow-up** phone call or dental appointment within 2 days after the procedure to assess for bleeding, pain, delayed healing and infection, and treat as necessary.

Note 2: Antithrombotics include anticoagulants such as direct-acting oral anticoagulants (DOACs) (eg apixaban, rivaroxaban, dabigatran), heparin, enoxaparin, warfarin, and antiplatelets (eg aspirin, clopidogrel, ticagrelor).

Considerations for dental procedures in patients with congenital or inherited bleeding disorders

Considerations for dental procedures in patients with congenital or inherited bleeding disorders

Patients with congenital or inherited bleeding disorders are generally under the management of a haematologist or a haemophilia treatment centre. Patients with haemophilia, von Willebrand disease or other clotting factor deficiencies are registered on the [Australian Bleeding Disorders Registry](#) (ABDR) and often carry an ABDR wallet card (or a letter from their haematologist) that contains information for other clinicians on their bleeding disorder.

A list of haemophilia treatment centres in Australia is available from the [Haemophilia Foundation website](#). Most have specialist dental teams who provide advice to clinicians on dental management of bleeding disorders and perform dental treatments

associated with a higher risk of bleeding. Through consultation with these centres, general dental practitioners can be supported to provide timely dental care to patients with a congenital or inherited bleeding disorder.

Many dental procedures for patients with haemophilia or von Willebrand disease can be performed safely in general dental practice because they are unlikely to cause prolonged bleeding. Some procedures require advice from specialists. For a guide to stratifying the risk of prolonged bleeding associated with procedures, see Table 13.30.

Inferior alveolar nerve blocks require particular consideration because there is a risk of haematoma in the pharyngeal spaces. Consider whether alternative methods of local anaesthesia would be adequate. If an inferior alveolar nerve block is likely to be required, consult with a patient's haematologist or a haemophilia treatment centre to formulate a treatment plan and decide the treatment setting. If an inferior alveolar nerve block is known to be required (eg because local infiltration has previously been inadequate) refer to a hospital-based specialist dental team.

Many dental procedures for patients with a congenital or inherited bleeding disorder can be done safely in general practice.

Guidelines are available from the World Federation of Hemophilia website to assist dental practitioners providing ongoing care to patients with bleeding disorders.

Considerations for dental procedures in patients with thrombocytopenia

Considerations for dental procedures in patients with thrombocytopenia

Decisions on dental management of patients with low platelet counts, including the setting for the procedures, should be made in conjunction with medical and/or specialist dental advice. Routine fillings with local anaesthetic infiltration are generally considered safe for patients with thrombocytopenia. Debridement is also generally considered safe, but the platelet count should exceed the recommended threshold for the procedure. For threshold platelet counts for common dental procedures, see Table 13.33.

Table 13.33 Threshold platelet counts for common dental procedures in patients with thrombocytopenia

Dental procedure	Threshold platelet count [NB1]
------------------	--------------------------------

debridement	more than $20 \times 10^9/L$
-------------	------------------------------

regional nerve block (eg inferior alveolar nerve block)	more than $30 \times 10^9/L$
---	------------------------------

tooth extraction: simple	more than $30 \times 10^9/L$
--------------------------	------------------------------

tooth extraction: complex, surgical, molar	more than $50 \times 10^9/L$
--	------------------------------

NB1: Thresholds are sourced from the consensus guidelines for the management of immune thrombocytopenia from the Thrombosis and Haemostasis Society of Australia and New Zealand; they are considered applicable to thrombocytopenia arising from other causes.

Considerations for dental procedures in patients with acquired medical conditions impairing haemostasis

Considerations for dental procedures in patients with acquired medical conditions impairing haemostasis

Many acquired medical conditions impair haemostasis; these include kidney, liver and bone marrow disorders. Multiple factors (effects on coagulation, platelet count and/or platelet function) may act synergistically to increase bleeding risk. Risk is difficult to quantify through investigations; consultation with the patient's medical practitioners is recommended.

Although most dental procedures can be completed safely in general dental practice for patients with one or more of these medical conditions, if the procedure is likely to cause prolonged bleeding (see [Table 13.30](#), consult with the patient's medical practitioners to evaluate risk of bleeding. Consider consulting a hospital-based specialist dental team in formulating a management plan. Consider referring to a hospital-based specialist dental team for procedures with a higher bleeding risk.

Managing patients taking antithrombotic drugs undergoing a dental procedure

Managing patients taking antithrombotic drugs undergoing a dental procedure

Antithrombotic drugs reduce the risk of thromboembolic events in predisposed patients [\[Note 3\]](#) by reducing the formation of blood clots. These drugs include:

- antiplatelet drugs
- oral anticoagulants
 - direct-acting oral anticoagulants (DOACs)
 - warfarin
- injectable anticoagulants.

Antiplatelet drugs include P2Y12 inhibitors (eg clopidogrel, prasugrel, ticagrelor) and aspirin. Some patients take nonprescribed aspirin. Dual antiplatelet therapy (aspirin plus a P2Y12 inhibitor) is usually prescribed for a specific duration.

The **direct-acting oral anticoagulants (DOACs)** include direct thrombin inhibitors (eg dabigatran) and factor Xa inhibitors (eg apixaban, rivaroxaban). There is no single test to indicate the extent of anticoagulation in patients taking DOACs. If there are concerns about overanticoagulation with a DOAC, medical input is required, including local haematology laboratory advice, on appropriate investigations and management.

Warfarin is an oral anticoagulant used for specific indications, such as prevention of thromboembolism in patients with mechanical heart valves. Warfarin inhibits the production of vitamin K–dependent coagulation factors. The international normalised ratio (INR) indicates the extent of anticoagulation in patients taking warfarin; the target INR depends on the indication for therapy. The INR should not be relied on solely to determine the bleeding risk in patients taking warfarin; other determinants of bleeding include concurrent drug therapy and other patient factors.

Injectable anticoagulants include heparin and low molecular weight heparins (eg enoxaparin). They are usually prescribed for a short duration. Anti–factor Xa assays to assess the extent of anticoagulation are rarely indicated but may be considered with advice from the prescribing medical practitioner or haematologist if there are concerns about overanticoagulation.

When planning a dental procedure likely to cause prolonged bleeding (see [Table 13.30](#)) in a patient taking an antithrombotic drug, weigh the potential benefits and harm of interrupting the antithrombotic therapy. Continuing the drug may increase the risk of prolonged bleeding; stopping the drug could cause a thromboembolic event.

Many common dental procedures have a low risk of bleeding, and the consequences of a thromboembolic event are usually more significant than the consequences of bleeding. However, bleeding can be unexpected and potentially life threatening.

In dental practice, the consequences of a thromboembolic event are usually more significant than the consequences of bleeding.

The management of a patient taking antithrombotic therapy depends on the type or combination of antithrombotic therapy. Clinical judgement is required from both the dentist and the clinician managing the antithrombotic therapy to assess the risks associated with interrupting or continuing antithrombotic therapy. Involve the patient and the medical practitioner in the decision. For further guidance on the risks associated with interrupting or continuing antithrombotic therapy, see [Periprocedural management of patients with cardiovascular disease](#) in the Cardiovascular guidelines.

For patients taking an antithrombotic drug who have additional risk factors for bleeding (see [Figure 13.73](#)) and require a procedure with a higher risk of prolonged bleeding consider referral to a community- or hospital-based specialist (eg oral and maxillofacial surgeon, special needs dentist).

If antithrombotic therapy has been prescribed for a specific period (eg dual antiplatelet therapy for 12 months following an acute coronary syndrome or implantation of a drug-eluting stent), delay elective dental procedures until after this period.

[Table 13.34](#) summarises the approach to timing of dental procedures, interruption to antithrombotic therapy and the choice between referring the patient or performing the procedure with local haemostatic measures. Advice in the table does not consider other patient-related risk factors (eg other medical conditions or other medications) that affect haemostasis; if other factors described in [Figure 13.73](#) are present, consult a medical practitioner to help assess bleeding risk or a dental specialist to help determine a management plan.

Table 13.34 Approach to managing patients taking antithrombotic drugs undergoing a dental procedure [Printable table](#)

This table only considers the impact of antithrombotic medications on bleeding risk. To assess the impact of medical conditions or other medications that impair haemostasis, see [Figure 13.73](#).

single antiplatelet therapy

dual antiplatelet therapy

direct-acting oral anticoagulant (DOAC)

injectable anticoagulant

warfarin

combination of anticoagulant + single or dual antiplatelet therapy

single antiplatelet therapy

(eg aspirin, clopidogrel)

assessment consider consulting a medical practitioner if further advice is required (eg to exclude contraindications to elective dental treatment) [NB1]

interruption of
antithrombotic therapy interruption not required

management local haemostatic measures

consider performing extensive procedures in stages

dual antiplatelet therapy

(eg aspirin plus one of the following: clopidogrel, prasugrel or ticagrelor)

assessment consider consulting a medical practitioner if further advice is required (eg to exclude contraindications to elective dental treatment) [NB1]

interruption of
antithrombotic therapy

interruption not required

if dual antiplatelet therapy is for a limited duration, delay elective procedures

management

local haemostatic measures

consider performing extensive procedures in stages

direct-acting oral anticoagulant (DOAC)

(eg apixaban, dabigatran, rivaroxaban)

for lower-risk procedures, interruption is not required

for higher-risk procedures, consult a medical practitioner:

interruption of
antithrombotic therapy

- if needed to establish the planned duration of DOAC therapy (to decide whether to delay an elective procedure)
- to assess safety and timing if considering any interruption to DOAC therapy (risks vary according to the indication for DOAC therapy) [NB2] [NB3]

local haemostatic measures

management

consider performing extensive procedures in stages

injectable anticoagulant

(eg heparin, enoxaparin)

for lower-risk procedures, interruption of anticoagulation is not required

for higher-risk procedures, consult a medical practitioner:

interruption of
antithrombotic therapy

- if needed to establish the planned duration of injectable anticoagulant therapy (to decide whether to delay an elective procedure)
- to assess safety and timing if considering any interruption to anticoagulant therapy (risks vary according to the indication for anticoagulant therapy)

local haemostatic measures

management

consider performing extensive procedures in stages

warfarin

assessment

check INR within 24 hours before the procedure

interruption of
antithrombotic therapy

if warfarin therapy is for a limited duration, delay elective procedures

if INR is less than 4, provide dental treatment without interrupting warfarin

if INR is 4 or more, urgently refer to the patient's medical practitioner to manage the INR. Do not proceed with the dental treatment; refer to a hospital-based specialist for emergency dental care

local haemostatic measures

management

consider performing extensive procedures in stages

combination of anticoagulant + single or dual antiplatelet therapy

if therapy is for a limited duration, delay elective procedures

interruption of
antithrombotic therapy

consult the patient's medical practitioner to evaluate impact of medical condition and medications on bleeding risk

consider specialist dental referral or management by experienced clinicians

management

local haemostatic measures

consider performing extensive procedures in stages

INR = international normalised ratio

NB1: Contraindications to elective dental procedures include these events in the previous 6 months: a myocardial infarction (heart attack), stent placement, coronary artery bypass surgery or valve procedure.

NB2: There is no single test to indicate the extent of anticoagulation in patients taking DOACs. If there are concerns about overanticoagulation with a DOAC, medical input is required, including local haematology laboratory advice, on appropriate investigations and management.

NB3: Evidence on the benefits of stopping DOAC therapy before dental procedures is of low certainty. This recommendation is the consensus view of the Oral and Dental Expert Group. Seek medical advice on the safety and timing of any interruption to DOAC therapy; [here](#) provides guidance for medical practitioners on the timing of interruption and recommencement. In that figure, dental procedures would generally be considered 'low to moderate risk'.

Note 3: Risk factors for thromboembolic events include a mechanical heart valve, a stroke or transient ischaemic attack (mini-stroke) in the previous 3 months, atrial fibrillation or a previous deep vein thrombosis or pulmonary embolus.

Managing patients taking drugs (other than antithrombotics) that can impair haemostasis in dental practice

Managing patients taking drugs (other than antithrombotics) that can impair haemostasis in dental practice
Drugs other than antithrombotics that can impair haemostasis by affecting platelet function include:

- nonselective nonsteroidal anti-inflammatory drugs (NSAIDs) (eg ibuprofen, naproxen)
- some antidepressants
 - serotonin noradrenaline reuptake inhibitors (SNRIs) (eg venlafaxine)
 - selective serotonin reuptake inhibitors (SSRIs) (eg fluoxetine, paroxetine, sertraline)

- Bruton tyrosine kinase inhibitors (BTKis) (eg acalabrutinib, ibrutinib, zanubrutinib) used to treat lymphomas and chronic lymphocytic leukaemia
- supplements or complementary medicines (eg gingko biloba, garlic, curcumin).

If a patient taking any of the above drugs or supplements has a concurrent medical condition listed in Table 13.31 or is concurrently taking an antithrombotic drug, discuss the bleeding risk (and any relevant medical options to reduce it) with their medical practitioner. Create a management plan as outlined in Figure 13.73.

If a patient without concurrent medical conditions or antithrombotic use is taking a nonselective NSAID, local haemostatic measures can be expected to control periprocedural bleeding; prolonged local pressure at the site is most important.

If a patient without concurrent medical conditions or antithrombotic use is taking an antidepressant medication, the antidepressant should be continued because the benefits outweigh the bleeding risk; there is also a risk of discontinuation syndrome with abrupt stopping of an SSRI or SNRI. Symptoms of discontinuation syndrome include insomnia, nausea, postural imbalance, and, rarely, delirium.

Many supplements and complementary medicines can affect haemostasis, either directly or through drug interactions. Depending on the indication for its use, consider stopping the complementary medicine before the procedure, generally at least 1 week ahead; seek medical advice if unsure of the balance of benefits and harms of stopping.

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Chronic musculoskeletal disorders: dental considerations

Chronic musculoskeletal disorders: dental considerations

For the medical management of chronic musculoskeletal disorders, see the [Rheumatology guidelines](#).

Pain and restricted mobility are common symptoms of musculoskeletal disorders. Chronic musculoskeletal disorders encompass a range of conditions affecting:

- muscles (eg sarcopenia [loss of muscle mass and strength])
- joints (eg osteoarthritis, rheumatoid arthritis)
- bones (eg osteoporosis, osteonecrosis, traumatic fractures)
- spine (eg back and neck pain)
- multiple body systems and locations (eg widespread and regional pain disorders, inflammatory or connective tissue diseases, systemic vasculitides, fibromyalgia).

Patients with pain and restricted mobility due to a musculoskeletal disorder may find extended dental treatment uncomfortable. Modify treatment to minimise the time spent in the dental chair, and consider changing the chair configuration or using filler pillows to support the neck, hips or knees.

Patients with chronic musculoskeletal disorders may be prescribed immunomodulatory drugs, which can cause immunosuppression (see [Immune compromise: dental considerations](#)). If corticosteroids are used, see also [Adrenal crisis: dental considerations](#).

Some patients with chronic musculoskeletal disorders take large doses of over-the-counter or prescription analgesics, including opioids. Opioids can cause [dry mouth](#), which leads to dental decay and periodontal disease, particularly if opioids are taken with other drugs that can cause dry mouth. Consult the patient's medical practitioner if pain management is required for a dental indication in a patient taking opioids for advice on other options.

Patients with chronic musculoskeletal disorders may have prosthetic joints; this is not an indication for surgical antibiotic prophylaxis before dental procedures (see [Surgical antibiotic prophylaxis for patients with a pre-existing joint prosthesis](#)).

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Osteoporosis: dental considerations

Osteoporosis: dental considerations

For the medical management of osteoporosis, see Osteoporosis and minimal-trauma fracture in the Bone and Metabolism guidelines.

For the dental management of patients taking antiresorptive drugs (bisphosphonates or denosumab) or romosozumab for osteoporosis, see advice on medication-related risk of osteonecrosis of the jaw (MRONJ). Osteoporosis and osteopenia are not recognised as risk factors for osteonecrosis of the jaw in the absence of antiresorptive drug or romosozumab use.

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Definition of MRONJ

Definition of MRONJ

Medication-related osteonecrosis of the jaw (MRONJ) is an area of exposed bone in the jaw persisting for more than 8 weeks in a patient currently or previously treated with a drug that increases risk of MRONJ, **who has not received radiation therapy** to the craniofacial region. For information on osteonecrosis occurring in a patient **who has received radiation therapy** (osteoradiation necrosis), see [Head and neck radiotherapy: dental considerations](#).

[Table 13.35](#) outlines the stages of MRONJ.

Table 13.35 Stages of MRONJ

Stage of MRONJ	Features
Patient at risk	no apparent necrotic bone
Stage 0 [NB1]	<p>asymptomatic patient treated with intravenous or oral antiresorptive therapy (bisphosphonates or denosumab), romosozumab or antiangiogenic drugs</p> <p>no apparent necrotic bone but nonspecific symptoms or clinical and radiographic findings are present</p> <p>nonspecific symptoms include toothache not explained by an odontogenic cause, dull aching bone pain, sinus pain and altered neurosensory function</p>
Stage 1 [NB1]	<p>radiographic changes include changes to trabecular pattern, regions of osteosclerosis and thickened periodontal ligament</p> <p>clinical findings include a lack of exposed bone, and possible loosening of teeth not explained by chronic periodontal disease</p> <p>asymptomatic</p> <p>exposed bone or fistula that probes to bone</p> <p>no inflammation or infection</p> <p>may have radiographic changes described in Stage 0</p> <p>symptomatic (eg pain)</p> <p>exposed bone or fistula that probes to bone</p>
Stage 2	<p>adjacent soft-tissue inflammation or secondary infection</p> <p>may have radiographic changes described in Stage 0</p> <p>symptomatic (eg pain)</p> <p>exposed and necrotic bone or fistulae that probe to bone, with evidence of infection and one or more of the following:</p> <ul style="list-style-type: none"> • exposed necrotic bone extending beyond the alveolar bone
Stage 3	<ul style="list-style-type: none"> • pathological fracture • extraoral fistula • oroantral and oral–nasal communication • osteolysis extending to the inferior border of the mandible or sinus floor

MRONJ = medication-related osteonecrosis of the jaw

NB1: Stage 0 and Stage 1 require follow-up and monitoring, but no treatment.

Drugs that increase risk of MRONJ

Drugs that increase risk of MRONJ

The main drug classes that increase the risk of medication-related osteonecrosis of the jaw (MRONJ) are antiresorptive drugs, antiangiogenic drugs and romosozumab. Other medications associated with MRONJ include immune-modulating drugs (eg adalimumab, etanercept, methotrexate, rituximab, everolimus) and raloxifene (a selective estrogen receptor modulator used mainly in postmenopausal osteoporosis prevention and treatment); however, evidence is limited.

Antiresorptive drugs inhibit bone resorption; they are used to treat osteoporosis, cancers that have metastasised to bone, and other bone disorders (multiple myeloma and Paget disease of the bone). Examples include:

- bisphosphonates
 - alendronate and risedronate (given orally)
 - ibandronate, pamidronate and zoledronic acid (given intravenously)
- denosumab (given subcutaneously).

Antiangiogenic drugs interfere with the formation of new blood vessels; they are used to treat some cancers (eg breast, prostate, liver, lung, kidney). Examples include oral drugs, such as tyrosine kinase inhibitors (eg cabozantinib, lenvatinib, sunitinib), and intravenous drugs, such as bevacizumab (a vascular endothelial growth factor [VEGF] monoclonal antibody).

Romosozumab, a sclerostin antibody inhibitor, increases bone formation, increases bone mineral density and decreases bone resorption. It is given subcutaneously and is used in osteoporosis management, usually in patients who have already had at least 12 months treatment with an antiresorptive drug.

Antiresorptive drugs are the most widely used drug class that increases MRONJ risk. Although MRONJ has significant consequences for the patient and can be difficult to treat, the benefits of antiresorptive therapy outweigh the risk of MRONJ in most patients. MRONJ occurs rarely at the doses of antiresorptives used to treat osteoporosis. Severe MRONJ associated with bisphosphonates has occurred mainly in patients with cancer who have had dental surgery while undergoing high-dose intravenous bisphosphonate therapy (to reduce the risk of skeletal-related events [metastasis or hypercalcaemia]). Risk of MRONJ in patients with cancer may also be increased by combination or sequential use of drugs (eg antiresorptive and antiangiogenic drugs in patients with multiple myeloma).

Invasive dental procedures (eg tooth extractions, surgical extractions, implant placement, periapical or radicular surgery, periodontal flap surgery) can trigger MRONJ. However, MRONJ can occur in patients who have not had an invasive dental procedure, for example, in patients with poorly fitting dentures or exostoses (eg tori [mandibular exostoses], mylohyoid ridges). Osteonecrosis unrelated to medication use can also occur spontaneously at these sites.

For estimates of the incidence of MRONJ in patients treated with bisphosphonates, denosumab or romosozumab (including the incidence after tooth extraction), see Table 13.36.

Table 13.36 Incidence of MRONJ according to drug indication, drug class and intervention

Drug	Incidence of MRONJ [NB1]	Incidence of MRONJ after tooth extraction [NB1]
therapy for osteoporosis		
bisphosphonates (oral)		
examples include:	estimate for oral bisphosphonates as a class: 0.02 to 0.05%	
• alendronate		
• risedronate		
bisphosphonates (intravenous)		estimate for bisphosphonates as a class: 0 to 0.15%
examples include:		
• ibandronic acid	estimate for zoledronic acid: less than 0.02%	
• pamidronate		
• zoledronic acid		
denosumab	0.04 to 0.3%	1%

romosozumab

0.03 to 0.05% [NB2]

[NB3]

therapy for multiple myeloma or metastatic cancer in bone

bisphosphonates (intravenous)

examples include:

estimate for zoledronic acid:

- ibandronic acid less than 5%
- pamidronate range: 0 to 18%
- zoledronic acid

estimates for bisphosphonates as a class:

most values are between 1 to 5%

range: 1.6 to 14.8%

denosumab

less than 5%

[NB3]

range: 0 to 6.9%

antiangiogenic drugs [NB4]

data insufficient to quantify but risk estimated to be less than is associated with bisphosphonates or denosumab

[NB3]

MRONJ = medication-related osteonecrosis of the jaw; VEGF = vascular endothelial growth factor

NB1: Risk estimates are not from head-to-head trials; they are sourced from limited data collated in Ruggiero SL, Dodson TB, Aghaloo T, Carlson ER, Ward BB, Kademani D. American Association of Oral and Maxillofacial Surgeons' Position Paper on Medication-Related Osteonecrosis of the Jaws-2022 Update. *J Oral Maxillofac Surg.* 2022;80(5):920-43. [URL](#)

NB2: Data on the risk of MRONJ with romosozumab use are more limited than for bisphosphonates or denosumab. Most patients receiving romosozumab would have had at least 12 months of therapy with an antiresorptive drug, which may have contributed to their developing MRONJ.

NB3: Figures are not available for this category.

NB4: Antiangiogenic drugs include a broad range of drug used to treat cancers such as breast, prostate, liver, lung and kidney cancer. Classes of antiangiogenic drugs include tyrosine kinase inhibitors (eg cabozantinib, lenvatinib, sunitinib) and anti-VEGF monoclonal antibodies (eg bevacizumab).

Approach to assessing risk of MRONJ before an invasive dental procedure

Approach to assessing risk of MRONJ before an invasive dental procedure

A thorough medical, medication and dental history (see [Dental practice: taking a history](#)) informs risk assessment for MRONJ and the discussion to obtain informed consent (including the consideration of timing) before an [invasive dental procedure](#).

Ask if a patient has ever had [drug treatment](#) for:

- osteoporosis (the condition itself has not been shown to increase risk of MRONJ)
- solid tumours that have spread to bone [\[Note 1\]](#)
- other bone disorders (eg multiple myeloma, Paget disease).

If a patient has had head and neck cancer treatment, ask if they have had radiation to the jaw because they may also be at risk of poor postoperative healing from osteoradionecrosis as well as MRONJ.

Consider consulting the patient's medical practitioner and electronic medical records as part of the history-taking.

[Figure 13.74](#) highlights key risk factors to assess in history-taking:

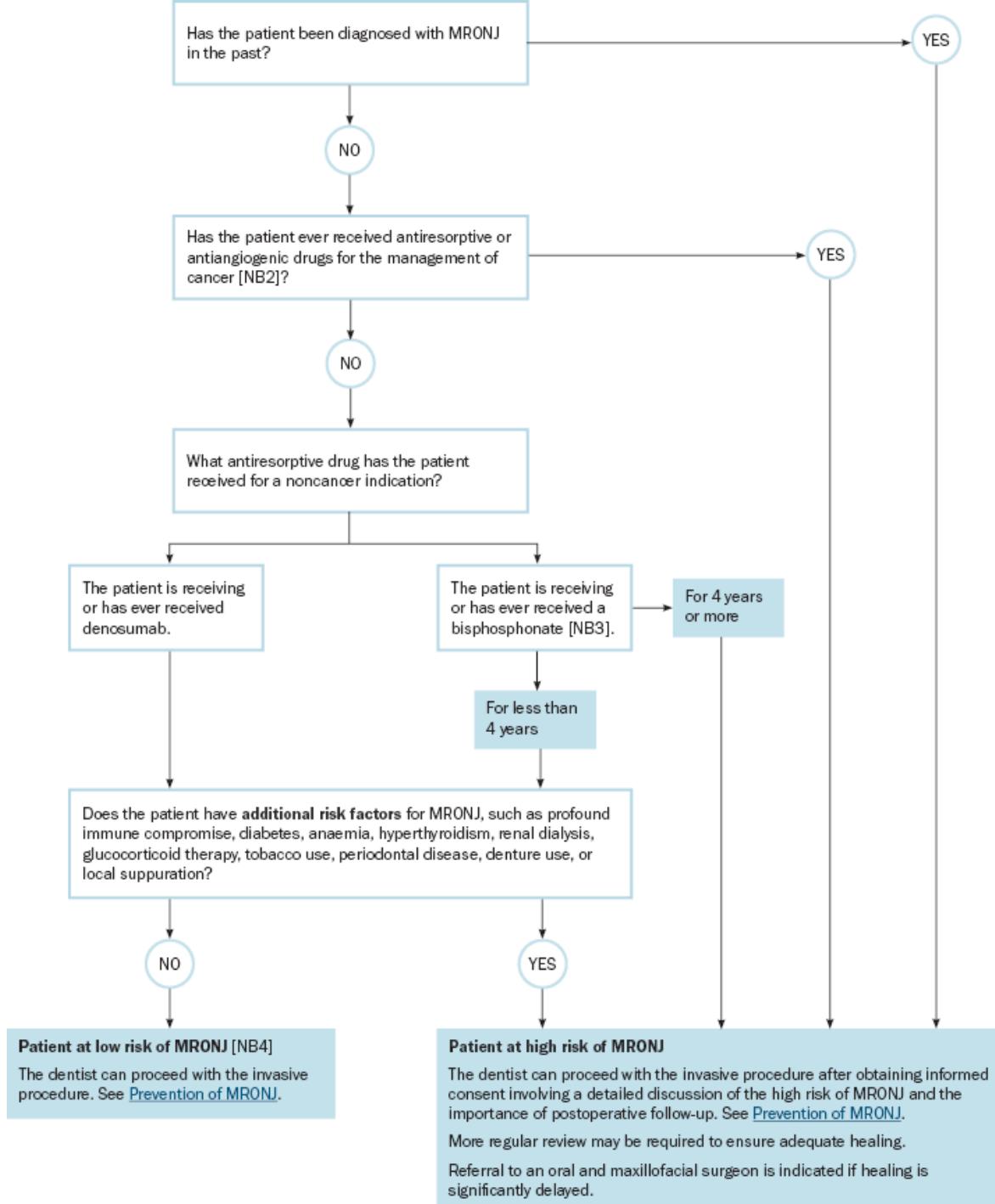
- a history of MRONJ
- use of cancer regimens containing drugs that increase MRONJ risk
- longer durations of bisphosphonate therapy (longer than 4 years).

Table 13.36 illustrates the impact of drug indication, drug class and dental procedures on MRONJ risk.

Additional risk factors for MRONJ are inconsistently reported in international guidelines. These factors include smoking, periodontal disease, alcohol, glucocorticoid therapy, profound immune compromise, diabetes, anaemia, hyperthyroidism and dialysis. Female sex and age older than 65 years have been associated with MRONJ, but data may be confounded because these are the characteristics of the population likely to be taking medications for osteoporosis.

C-terminal telopeptide (CTX) is a breakdown product of bone resorption and a validated marker of bone turnover. The serum CTX concentration has been proposed as a way of estimating a patient's risk of MRONJ; however, it is no longer recommended for use in MRONJ risk assessment.

Figure 13.74 Assessing the risk of MRONJ before an invasive dental procedure in a patient treated with an antiresorptive drug or antiangiogenic drug[NB1]



MRONJ = medication-related osteonecrosis of the jaw

NB1: This risk assessment tool is based on limited data and cannot definitively classify a patient's risk of MRONJ. Other medications (with fewer data on the risk of MRONJ) that are not considered in this chart include romosozumab (an osteoporosis therapy that follows treatment with antiresorptives), immune-modulating drugs (such as adalimumab, etanercept, methotrexate, rituximab and everolimus) and raloxifene (a selective estrogen receptor modulator used mainly in postmenopausal osteoporosis prevention and treatment).

NB2: Some patients with cancer may also have undergone head and neck radiotherapy. This can increase the risk of delayed healing as a result of osteoradiation necrosis (a condition separate to MRONJ).

NB3: Patients who have taken bisphosphonates in the past may still have an increased risk of MRONJ because the half-life of bisphosphonates in the bone is long; it is not known how fast and to what extent the risk diminishes after stopping bisphosphonates.

NB4: Patients classified as ‘low risk’ still have a risk of MRONJ that is higher than the general population.

Note 1: Examples of solid tumour types that spread to bone include breast, prostate, liver, lung and kidney.

Prevention of MRONJ

Prevention of MRONJ

Maintaining optimal oral health to prevent MRONJ

Maintaining optimal oral health to prevent MRONJ

Early dental assessment and dental care to optimise oral health reduce the incidence of medication-related osteonecrosis of the jaw (MRONJ). If a medical practitioner refers a patient for dental assessment (ideally before starting a drug that increases risk of MRONJ) the dentist should:

- undertake a comprehensive oral examination, including pulp tests and radiographs
- eliminate dental caries (eg through extractions, restorations)
- establish periodontal health (eg through debridement, extractions), and encourage good oral hygiene.

If possible, any necessary [invasive dental procedure](#) should be completed before starting treatment with drugs that increase the risk of MRONJ, particularly if the drug is part of cancer treatment (because risk of MRONJ is generally higher with these regimens than with osteoporosis regimens). The risk of MRONJ in patients starting bisphosphonates for osteoporosis remains low in the early stages of treatment; dental treatment should be completed within 6 months of the first dose. For further advice on timing of procedures during treatment with drugs that increase the risk of MRONJ, see [Drug holidays and scheduling of procedures in patients at risk of MRONJ](#).

If possible, complete invasive dental procedures before starting or within 6 months of starting bisphosphonates or denosumab.

To avoid unnecessary delays to starting medications in patients who require dental treatment, prioritise invasive dental procedures and notify the patient and their medical practitioner of dental fitness as early as possible (even if other less invasive dental treatments may be required after the medication has been started).

Regular dental review is essential to monitor oral health (eg clinical oral examinations, radiographs), particularly if the patient has a history of periodontal disease. Advise patients to maintain good oral hygiene, have regular dental reviews, seek early management of oral or dental symptoms, and ensure optimal fit if dentures are worn.

Effective communication between treating dentists and medical practitioners is essential. Inform and involve the patient in treatment decisions.

Precautions to minimise risk of MRONJ for patients before undergoing invasive dental procedures

Precautions to minimise risk of MRONJ for patients before undergoing invasive dental procedures

Patients can undergo invasive dental procedures in a general dental practice, whatever their risk of MRONJ, after a discussion of the [risk assessment](#) and precautions that will be taken; see [Figure 13.75](#) for precautions. Antibiotic prophylaxis is not recommended to reduce the risk of MRONJ.

Patients at increased risk of MRONJ can undergo invasive procedures in a general dental practice. [Figure 13.75 Precautions for managing patients at increased risk of MRONJ undergoing an invasive dental procedure](#)

Inform the patient of the risk of medication-related osteonecrosis of the jaw and obtain informed consent for the procedure.

See advice on [Drug holidays and scheduling of procedures in patients at risk of MRONJ](#).

Do not use antibiotic prophylaxis to reduce the risk of medication-related osteonecrosis of the jaw – there is insufficient evidence to support this practice. However, an active infection should be treated.

Ensure optimal oral hygiene before and after the procedure.

Reduce the plaque load with mechanical debridement and pre- and postprocedural chlorhexidine mouthwash.

Consider root retention techniques to avoid extractions.

Minimise trauma and periosteum stripping, and use sutures to close any mucosal flaps that are raised.

Monitor the oral wound until it heals – healing may be slow.

Do not debride nonhealing wounds.

Refer to an oral and maxillofacial surgeon if bone is still visible 8 weeks after the invasive dental procedure.

Drug holidays and scheduling of procedures in patients at risk of MRONJ

Drug holidays and scheduling of procedures in patients at risk of MRONJ

Recommendations in international guidelines to minimise MRONJ risk are inconsistent. Advice on ‘drug holidays’ (temporary discontinuation of drugs that increase the risk of MRONJ) and optimal timing of dental procedures varies depending on the indication for antiresorptive drugs, the duration of therapy and the presence of additional risk factors [Note 2] [Note 3] [Note 4].

There is no evidence that drug holidays reduce the risk of MRONJ.

Clinical judgement of treating doctors and dentists is required to determine the appropriate management of each patient. The decision to alter therapy with a drug that increases the risk of MRONJ should be made by the prescribing practitioner.

Clinical judgement of treating doctors and dentists is required to determine the appropriate management of each patient.

For most patients with **osteoporosis**, the benefits of continued drug therapy outweigh the risk of MRONJ. In determining a dental treatment plan, consider the lack of evidence that drug holidays reduce MRONJ risk, and the potential risk of fracture if the drug is stopped. Although stopping **bisphosphonates** for a short period is unlikely to cause harm in a patient at low risk of fracture, there is no evidence that this approach reduces the risk of MRONJ. Stopping romosozumab or denosumab results in marked loss of bone mineral density. It is never appropriate to interrupt **denosumab** treatment because its effects are rapidly reversible and any dosing delay increases the risk of spontaneous vertebral fractures. Evidence to guide optimal timing of dental procedures between 6-monthly denosumab doses is lacking; however, current practice is to schedule the procedure, if possible, for approximately 6 to 8 weeks before the next denosumab dose, when the denosumab concentration is (in theory) lowest. Performing a procedure at this time also allows 6 to 8 weeks for healing before the next denosumab dose. Healing should be assessed by the surgeon before the next dose; if there are any concerns about delayed healing or osteonecrosis occurring, consult a multidisciplinary osteoporosis clinic about timing of the next dose.

For patients with **cancer** who are taking drugs that increase the risk of MRONJ, the decision to alter therapy with a drug that increases risk of MRONJ lies with the specialist managing the cancer.

Note 2: Ruggiero SL, Dodson TB, Fantasia J, Gooday R, Aghaloo T, Mehrotra B, et al. American Association of Oral and Maxillofacial Surgeons position paper on medication-related osteonecrosis of the jaw--2014 update. *J Oral Maxillofac Surg* 2014;72(10):1938-56. [URL](#)

Note 3: Hellstein JW, Adler RA, Edwards B, Jacobsen PL, Kalmar JR, Koka S, et al. Managing the care of patients receiving antiresorptive therapy for prevention and treatment of osteoporosis: executive summary of recommendations from the American Dental Association Council on Scientific Affairs. *J Am Dent Assoc* 2011;142(11):1243-51. [URL](#)

Note 4: Khan AA, Morrison A, Hanley DA, Felsenberg D, McCauley LK, O’Ryan F, et al. Diagnosis and management of osteonecrosis of the jaw: a systematic review and international consensus. *J Bone Miner Res* 2015;30(1):3-23. [URL](#)

Management of MRONJ

Management of MRONJ

The goal of all management strategies for medication-related osteonecrosis of the jaw (MRONJ) is improved quality of life and control of disease, including prevention of secondary infection. Cure is feasible for some patients. Traditionally, the management of MRONJ has focused on surgery. International guidelines now recognise the importance of nonoperative therapies in addition to surgical management for all stages of MRONJ.

Patients should be referred for specialist assessment (by an oral and maxillofacial surgeon or special needs dentist) and interim nonoperative measures started with specialist advice as soon as MRONJ is suspected or identified.

Nonoperative management of MRONJ

Nonoperative management of MRONJ

Nonoperative management strategies are useful at all stages of MRONJ. These may stabilise disease, and lead to potential cure in the early stages, particularly in Stage 1. For Stage 2 and Stage 3 disease, nonoperative management is crucial for patients in whom surgery poses high risk (such as frail patients). Nonoperative measures can be started by the general dental practitioner with advice from a specialist on an appropriate protocol.

Key components for general dental practitioners to undertake include:

- improving the patient’s oral hygiene for biofilm control, including chlorhexidine wound care; instruct patients on how to dip a cotton swab or small toothbrush in chlorhexidine (0.12% solution) and gently mechanically scrub the exposed bone or fistula to remove plaque and debris. Inform patients that discomfort and bleeding are expected when performing wound care but will reduce with continued treatment
- monitoring wound healing

- management of generalised periodontal disease
- adjusting dentures to alleviate pressure on the nonhealing area.

Nonoperative measures undertaken by a specialist may be required if MRONJ is not responding to measures undertaken in general dental practice. Specialist measures may include removal of loose bone sequestra, and adjunctive medications (generally in a hospital environment). Teriparatide (recombinant human parathyroid hormone used to treat osteoporosis) has demonstrated promising results as a potential adjunctive therapy. The use of vitamin E and pentoxyphilline is limited to case reports. Although hyperbaric oxygen therapy and ozone therapy have been proposed, there is little evidence from clinical trials to support their use.

Surgical management of MRONJ

Surgical management of MRONJ

Although surgical management has focused on the more severe presentations of MRONJ, international guidelines now recognise that marginal or segmental resection (including sequestrectomy) may have an important role in the management of MRONJ, regardless of severity. Refer all patients with established MRONJ to a surgical dental specialist (oral and maxillofacial surgeon or special needs dentist) for assessment.

Despite the reported success rates of surgical interventions, progression of MRONJ can be unpredictable. MRONJ that has not responded to nonoperative measures is likely to improve following surgery, but patient factors may be limiting. Surgical procedures should be patient-specific, taking into account the balance of benefits and harms, analysing all factors (eg quality of life, symptoms, ability to clean wound to prevent infection and disease spread, morbidity of procedure, oral function [Note 5], rehabilitation required after procedure).

Note 5: Some procedures require long rehabilitation periods or cause sensory loss that affects the ability to eat; for these reasons, surgery may be deferred until a patient has loss of jaw function (eg from a fracture).

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Definition of and risk factors for adrenal crisis in dental practice

Definition of and risk factors for adrenal crisis in dental practice

Adrenal crisis (also known as acute adrenal insufficiency or Addisonian crisis) is a life-threatening condition in which the adrenal cortex does not produce sufficient cortisol to meet the increased requirements during periods of physiological stress (eg significant systemic illness or surgery). Physiological stress may be exacerbated by psychological stress and anxiety (eg anxiety associated with a dental procedure). The primary symptoms of adrenal crisis are gastrointestinal (abdominal or flank pain, vomiting, diarrhoea) and symptoms of acute circulatory failure (eg hypotension, confusion).

Patients at risk of adrenal crisis during periods of physiological stress are those with:

- an adrenal insufficiency disorder, such as Addison disease, in which the adrenal cortex does not produce sufficient cortisol (a glucocorticoid) and aldosterone (a mineralocorticoid); patients require permanent replacement of both hormones
- patients with adrenal suppression resulting from long-term use of glucocorticoids (eg prednisolone) to manage inflammatory or immune conditions (eg rheumatoid arthritis, severe dermatological conditions, asthma).

For patients using long-term glucocorticoids, the risk of adrenal suppression depends on the dose, duration, potency and route of administration of the glucocorticoid, and individual susceptibility. Oral prednisolone at a dose of 5 mg or more daily (or the equivalent dose of another glucocorticoid) for more than 3 weeks could be expected to cause adrenal suppression. A high dose of an inhaled, topical or intra-articular corticosteroid can also cause adrenal suppression; for high doses of inhaled corticosteroids, see Inhaled corticosteroid-based inhalers available in Australia for asthma in adults and adolescents. Other risk factors include use of multiple corticosteroid formulations concurrently (eg inhaled and oral formulations), repeated intra-articular injections in the previous 2 months, and use of inhaled or topical corticosteroids for more than 1 year.

Managing patients at increased risk of adrenal crisis in dental practice

Managing patients at increased risk of adrenal crisis in dental practice

Although there are few reported cases of adrenal crisis associated with dental procedures, an increase in glucocorticoid dose is recommended for patients at risk, regardless of whether they have an adrenal insufficiency disorder or glucocorticoid-induced adrenal suppression. Determining an individual's risk of adrenal crisis is challenging because it is influenced by patient and procedural factors. The recommendations on managing glucocorticoid dose requirements for dental procedures in Table 13.29 are based on expert consensus and take into account the invasiveness of the procedure.

For **dental procedures that do not warrant an increase in glucocorticoid dosing** (see Table 13.29), patients must take their usual glucocorticoid dose on the day of the dental procedure.

For **dental restorations requiring local anaesthetic, closed (nonsurgical) root canal procedures, or any invasive procedures**, an increase in glucocorticoid dose is recommended to minimise the risk of precipitating adrenal crisis. Patients may have a written action plan addressing the need for periprocedural dose increases; if not, seek advice from the patient's medical practitioner on glucocorticoid dosing adjustment. Advice for medical practitioners is available in Adrenal insufficiency and Adrenocortical suppression. Usually, the patient's regular glucocorticoid dose is doubled on the morning of the dental procedure (and in some situations, for up to 48 hours postoperatively). Dental practitioners should consult the patient's medical practitioner when a dose increase is required, to ensure all clinicians involved in the patient's care can consider the impact of any proposed short-term changes to their glucocorticoid regimen. Seek endocrinologist advice for patients at risk of adrenal crisis who are undergoing general anaesthetic, sedation or fasting.

Perform dental treatment in the morning so that if an adrenal crisis occurs, symptoms present while the patient is awake. After dental treatment, ensure the patient remains in the care of a responsible adult for the rest of the day, and the carer remains in contact with the patient for the following 2 to 3 days. Advise the patient and the carer to seek urgent medical attention if the patient experiences symptoms of adrenal crisis.

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Thyroid disorders: dental considerations

Thyroid disorders: dental considerations

For the medical management of hypothyroidism and hyperthyroidism, see the [Bone and Metabolism guidelines](#).

Stable medication-controlled thyroid disorders do not require specific consideration when planning a dental procedure. Although local anaesthetic preparations containing adrenaline (epinephrine) are contraindicated in patients with unstable hyperthyroidism, they can be safely used in patients with stable thyroid disorders.

Defer dental treatment in patients known to have an unstable thyroid disorder because unstable thyroid disease can result in severe acute illness (thyroid storm). Thyroid storm is due to severe excess of thyroid hormone and is an emergency requiring immediate hospitalisation. Features of thyroid storm can include fever, tachycardia, vomiting, dehydration, delirium, coma, and organ system dysfunction (especially of the liver). It can also be complicated by stroke, including cerebral venous thrombosis. For more detail, see [Thyroid storm](#) in the Bone and Metabolism guidelines.

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Overview of dental management of patients with diabetes

Overview of dental management of patients with diabetes

For the medical management of diabetes, see the [Diabetes guidelines](#).

In dental practice, first-aid management of hypoglycaemia is outlined in [Clinical features and management of hypoglycaemia in dental practice](#).

For patients with diabetes, take a thorough medical history (including medications) and determine whether their diabetes is stable and glycaemic targets (measures of glycated haemoglobin [HbA1c] and blood glucose concentration) are achieved. This information guides assessment of the likelihood of oral complications of diabetes and of periprocedural risks. Consult the patient's medical practitioner if needed to gather details of the history. A HbA1c above the patient's target is an indicator of persistently elevated blood glucose concentrations. Glycaemic targets are individualised; a common glycated haemoglobin target is 53 mmol/mol (7%) or less.

Emphasise the importance of regular dental review and provide instruction on [oral hygiene](#) and [denture maintenance](#). Diabetes may be associated with sialadenosis, which can cause impaired salivary gland function. Patients with suboptimally managed diabetes are at increased risk of periodontal disease.

To optimise the safety of a dental procedure in patients with diabetes, see [Dental procedures in patients with diabetes](#) and [Dental procedures in patients taking a sodium-glucose co-transporter 2 \(SGLT2\) inhibitor](#).

Suboptimally managed diabetes is associated with postprocedural complications, such as infection and poor wound healing. Although the risk of postoperative surgical site infection can be higher in patients with diabetes in whom glycaemic targets are not achieved, antibiotic prophylaxis should not be used unless the patient has an indication for [surgical antibiotic prophylaxis](#); also consider the need for [infective endocarditis prophylaxis](#).

Consider the possibility of undiagnosed diabetes in patients with sudden onset or progression of periodontal disease, poor response to periodontal treatment, poor wound healing, or recurrent or persistent bacterial or fungal oral infections – refer the patient to a medical practitioner.

Dental procedures in patients with diabetes

Dental procedures in patients with diabetes

Patients with diabetes can be safely treated in the outpatient dental setting. Most patients with diabetes have a routine of medications, diet, activity and blood glucose monitoring that maintains blood glucose concentration within safe limits. Provided this routine is not interrupted, most dental treatments can proceed in an outpatient setting. [Table 13.37](#) outlines the approach to outpatient dental treatment for patients with stable diabetes, with practical advice to avoid causing hypoglycaemia.

Optimal glycaemic management periprocedurally improves outcomes in patients with diabetes. If possible, postpone elective dental procedures until glycaemic management is optimised; however, do not delay treatment of acute dental conditions. If unsure whether dental treatment can safely proceed, consult the patient's medical practitioner.

Sodium-glucose co-transporter 2 (SGLT2) inhibitors (eg dapagliflozin, empagliflozin) may need to be stopped temporarily before some dental procedures to reduce the risk of potentially life-threatening metabolic abnormalities – see [Dental procedures in patients taking a sodium-glucose co-transporter 2 \(SGLT2\) inhibitor](#) for more information.

Glucagon-like peptide 1 (GLP-1) agonists can cause protracted gastric stasis leading to increased risk of intraoperative vomiting and aspiration pneumonitis. This usually relates to procedures completed under general anaesthesia or intravenous sedation.

Timing of stopping and restarting these medications needs to be discussed with the sedationist or anaesthetist. Alterations are not usually required for GLP-1 agonists in a general dental practice setting.

If preprocedural fasting is required (eg for general anaesthesia or intravenous sedation) for a patient with diabetes, an anaesthetist or sedationist must supervise the dental procedure – see [Periprocedural management of adults with diabetes](#) in the Diabetes guidelines for more information.

Table 13.37 Management of a patient with stable diabetes undergoing a dental procedure in an outpatient setting

Before the procedure

Scheduling the procedure

Day of the procedure

After the procedure

Before the procedure

Determine the patient's usual routine (eg medications, diet, activity, blood glucose monitoring).

Determine whether interruptions to routine have precipitated hypoglycaemia (eg longer than usual intervals between meals).

For patients taking a sodium-glucose co-transporter 2 (SGLT2) inhibitor, see the advice in [Dental procedures in patients taking sodium-glucose co-transporter 2 \(SGLT2\) inhibitors](#).

Determine the extent and type of dental treatment required.

Ask patients to bring their glucose monitor on the day of the procedure if they use one.

Ask the patient to bring a carer or support person if possible.

Scheduling the procedure

Schedule the procedure for the morning, so that any potential complications can be resolved during the day.

Consider the patient's usual meal times and medication regimen; aim to minimise interruption to their routine.

Avoid extensive treatments and long appointments.

Day of the procedure

Check that the patient has followed their usual meal times and medication regimen and is feeling well.

Keep glucose or a sweetened drink available in case the patient develops symptoms or signs of hypoglycaemia.

If a patient feels ill before or during the procedure, do not proceed with dental treatment. Assess their blood glucose concentration if a blood glucose monitor is available. If unsure of the cause of their symptoms, call 000. For the first-aid management of hypoglycaemia occurring in a dental practice, see [Figure 13.89](#).

If the patient has missed a meal but does not have symptoms of hypoglycaemia, if possible, ask them to eat a long-acting complex carbohydrate (eg sandwich, yoghurt, dried fruit) to maintain their blood glucose concentration, monitor their blood glucose concentration if possible and start treatment 30 minutes later; otherwise reschedule the appointment.

Do not give patients who have missed a meal but do not have symptoms or signs of hypoglycaemia a fast-acting source of glucose (glucose or a sweetened drink) 'just in case'; this is ineffective and can destabilise their diabetes management.

Do not allow the patient to leave your care or drive if they are unwell or confused.

After the procedure

Advise patients to maintain their usual activity level, medications and dietary intake, and to eat soft foods if their mouth is sore.

Dental procedures in patients taking a sodium-glucose co-transporter 2 (SGLT2) inhibitor

Dental procedures in patients taking a sodium-glucose co-transporter 2 (SGLT2) inhibitor

Sodium-glucose co-transporter 2 (SGLT2) inhibitors (eg dapagliflozin, empagliflozin) have been associated with the development of euglycaemic diabetic ketoacidosis (DKA) in patients with type 1 or type 2 diabetes. This is a life-threatening syndrome in which the blood glucose concentration is not elevated but severe metabolic acidosis occurs. Symptoms include nausea, vomiting, shortness of breath, malaise, lethargy, abdominal pain, a fruity odour of acetone on the breath, dehydration and altered conscious state.

The risk of diabetic ketoacidosis is increased in patients taking an SGLT2 inhibitor who:

- have been fasting or have a very restricted dietary intake
- have undergone a surgical procedure
- are dehydrated
- have an active infection.

SGLT2 inhibitors may need to be stopped before a dental procedure – consult the medical practitioner about timing of stopping and restarting.

Consider stopping SGLT2 inhibitors before a prolonged dental procedure (usually a procedure performed under general anaesthesia or with intravenous sedation) because fasting or dehydration are likely. This must only be done in consultation with the patient's medical practitioner (see Preprocedural management of noninsulin antihyperglycaemic drugs for adults with type 2 diabetes in the Diabetes guidelines). An alert highlighting the periprocedural risk of diabetic ketoacidosis in patients taking an SGLT2 inhibitor has been issued by the Australian Diabetes Society. SGLT2 inhibitors should not be resumed until oral food and fluid intake returns to normal after the procedure.

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Dental assessment before chemotherapy, head and neck radiotherapy, or stem cell or bone marrow transplants

Dental assessment before chemotherapy, head and neck radiotherapy, or stem cell or bone marrow transplants
Ideally, patients should have a comprehensive dental assessment before starting chemotherapy, head and neck radiotherapy or a stem cell or bone marrow transplant; the goal is to identify indications for dental treatment (eg infection, teeth with a poor prognosis, potential causes of mucosal trauma, such as sharp teeth) before the cancer therapy starts. The assessment should include a comprehensive oral examination and X-rays.

A key part of any dental assessment and treatment plan before cancer therapy starts is a discussion about an appropriate oral care program. Consider the patient's risk of dental disease and develop an individualised oral hygiene regimen tailored to the anticipated adverse effects of the proposed cancer therapy. Strategies include use of high-concentration fluoridated toothpaste, mouthwashes, casein phosphopeptides-amorphous calcium phosphate [CPP-ACP] products and interdental cleaning devices. Patient information on self-help for managing the adverse oral effects of cancer therapy is available from the [eviQ website](#).

Discuss the timing of minimally invasive and invasive dental procedures with the managing medical specialist or team. Although it would be ideal for these dental interventions to be completed before the cancer therapy starts, this may not be feasible. Minimally invasive and invasive dental procedures should occur as early as possible before starting cancer therapy, ideally allowing 10 to 21 days for healing; however, cancer therapy should not generally be delayed even if healing is incomplete.

Before undertaking an invasive dental procedure, consider whether there may be factors (eg thrombocytopenia) that impact on periprocedural bleeding risk or factors (eg profound immune compromise) that increase infection risk. Assessment and management of these factors should be discussed with the managing medical specialist or team before starting dental treatment.

Once the dental assessment and dental procedures are completed, inform the managing specialist or team of the patient's dental fitness for cancer therapy.

Chemotherapy: dental considerations

Chemotherapy: dental considerations

For the medical management of patients receiving palliative care, see the [Palliative Care guidelines](#).

Ideally, patients should have a dental assessment before starting chemotherapy.

Each chemotherapy agent has different adverse effects. Common examples are severe mucositis, reduced salivary flow and immune suppression. These effects may increase the risk of oral infections, such as oral or oropharyngeal candidiasis, herpes simplex virus infection and postoperative infection. Patients should be counselled on optimising oral hygiene; see Dental assessment before chemotherapy, radiotherapy or stem cell transplants. Unusual and rare oral adverse reactions can occur with chemotherapy trial drugs; if these occur, patients should be referred to a specialist for further investigation.

Some types of chemotherapy cause significant neutropenia and thrombocytopenia, particularly treatments for leukaemia and lymphoma. Chemotherapy is often completed in cycles; the optimal time for dental treatment is often a few days before a cycle starts (when the neutrophil and platelet counts are adequate and the patient has recovered). Dental treatment plans, including the timing of emergency or elective minimally invasive or invasive dental procedures should be discussed with the patient's specialist. Patients with neutropenia or thrombocytopenia may require referral to a community or hospital-based dental specialist to manage periprocedural risks of infection and/or bleeding.

Develop dental treatment plans in consultation with the patient's treating specialist or multidisciplinary team. Tooth extraction sockets heal well in most patients undergoing chemotherapy. However, additional precautions may be required for extractions for patients with profound immune compromise resulting from oral cancer or its treatment; consult with the patient's medical team on whether surgical antibiotic prophylaxis is appropriate. For advice on intraoperative haemostatic measures, see Table 13.13. Patients taking antiresorptive or antiangiogenic drugs are at risk of medication-related osteonecrosis of the jaw (MRONJ) after a tooth extraction – seek specialist advice.

Head and neck radiotherapy: dental considerations

Head and neck radiotherapy: dental considerations

Patients who require head and neck radiotherapy should have a dental assessment before radiotherapy starts. While this should ideally occur with a dentist experienced in cancer management, as part of a multidisciplinary team, hospital-based dental teams are limited. If possible, any dental treatment should be completed before starting radiotherapy, although this may be challenging as time is often limited. If time is short, dental treatment within the primary radiation field (eg areas exposed to 50 Gy or above) should be prioritised. Seek advice from the patient's multidisciplinary team before performing tooth extractions within the field of radiotherapy. If extractions are performed, allow adequate time for wound healing (usually 10 to 21 days) before starting radiotherapy, if possible.

The effects of radiotherapy to the head and neck region can be acute or chronic. Oral pain and mucositis are acute effects. Reduced salivary flow, oral infection, trismus and altered taste can be acute or chronic. Risk of osteoradionecrosis is a chronic effect.

Reduced salivary flow increases the risk of periodontal disease and dental caries. Good oral hygiene and high-concentration fluoride products can reduce the incidence, severity and duration of adverse effects associated with radiotherapy.

To manage the risk of osteoradionecrosis, regular dental review and an oral care program (as outlined in Dental assessment before chemotherapy, head and neck radiotherapy or stem cell or bone marrow transplants) are recommended. If possible, choose conservative dental treatment options (eg periodontal treatment, restorations, endodontic treatment [root canal], fluoride application). Neutral fluoride products are better tolerated than acidulated products. There is limited evidence to support protocols to prevent the development of osteoradionecrosis, such as hyperbaric oxygen therapy. Management of osteoradionecrosis is difficult and requires specialist management.

Do not extract teeth from a patient before or after head and neck radiotherapy without consulting the patient's multidisciplinary team.

For more information on the dental management of patients undergoing head and neck radiotherapy, see the eviQ website.

Stem cell and bone marrow transplants: dental considerations

Stem cell and bone marrow transplants: dental considerations

Patients with haematological disorders, such as leukaemia, aplastic anaemia and multiple myeloma, may require a haematopoietic stem cell or bone marrow transplant. Immunotherapy using chimeric antigen receptor T-cell therapy (CAR T-cell therapy) is another form of treatment for some haematological malignancies (leukaemias, lymphomas and multiple myeloma). Stem cell and bone marrow transplants and CAR T-cell therapy are associated with profound immunosuppression.

Haematopoietic stem cell transplants (HSCTs) may also be used to treat nonmalignant conditions, such as multiple sclerosis and immune deficiencies. The procedure involves the transplantation of stem cells to replace the host bone marrow. The stem cells may originate from the host patient (in an autologous transplant) or from a donor (allogeneic transplant).

Before receiving stem cells, patients often undergo a conditioning treatment (total body irradiation or chemotherapy) to deplete the dysfunctional bone marrow. This can cause mucositis, severe neutropenia (which increases the risk of infection) and severe thrombocytopenia (which increases the risk of bleeding). Risks of bleeding and infection may remain elevated for several weeks after the conditioning treatment until the blood counts recover. The effects of conditioning treatments are often greater for patients receiving allogeneic donor cells (compared to patients who have their own stem cells harvested).

Ideally, patients who require an HSCT have a dental assessment and any necessary dental treatment performed before the transplant, if time permits. Some patients may need prophylaxis against posttransplant osteoporosis [Note 1] with drugs that increase the risk of medication-related osteonecrosis of the jaw (MRONJ). Ask the treating team to clarify whether and when such drugs are likely to be started and take this into account in the treatment planning. Often, the assessment of dental fitness is undertaken by a specialised hospital dental team because of time limitations before HSCT therapy starts. Some dental procedures may require specialist dental care.

Chronic oral adverse effects of HSCT include reduced salivary flow, oral infections, including oral or oropharyngeal candidiasis, and trismus. Recipients of allogeneic stem cell transplants may be at risk of developing oral graft-versus-host disease (GVHD). Patients with symptomatic oral GVHD may benefit from management by an oral medicine specialist. Ongoing immune suppression increases the risk of secondary malignancy in the oral cavity. If a patient who has had an HSCT has an oral lesion with features that may indicate oral cancer, refer for investigation to exclude a new primary cancer.

Regular dental review with a preventive focus is recommended; see advice on an oral care program outlined in Dental assessment before chemotherapy, radiotherapy or stem cell transplants.

Note 1: Multiple factors, including long-term use of corticosteroids for immunosuppression, contribute to risk of osteoporosis after transplant.

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Effects of obesity on oral health

Effects of obesity on oral health

Excess body weight can be measured by waist circumference or body mass index (BMI) and classified as overweight (a BMI of 25 to 29.9 kg/m²) or obesity (a BMI of 30 kg/m² or more); see [Excess body weight, obesity and atherosclerotic cardiovascular disease risk](#) for assessment of body weight.

Obesity is a risk factor for periodontal disease, reflux and dental erosion; evidence for an increased risk of dental caries is inconclusive.

Treatments to reduce weight may increase the risk of dental disease. Weight loss medications are associated with dry mouth, and some (eg glucagon-like peptide 1 [GLP-1] agonists) require specific perioperative management – see [Dental procedures in patients with diabetes](#). Bariatric surgery is reported to increase reflux and dental erosion.

Dental procedures in patients with obesity

Dental procedures in patients with obesity

Enquire sensitively about a patient's weight when assessing and planning for a dental procedure. Take a thorough medical history to assess the stability and severity of any medical comorbidities (eg diabetes, cardiovascular disease, obstructive sleep apnoea, reduced blood clotting resulting from metabolic-associated fatty liver disease [MAFLD]). Assess and manage the patient's dental anxiety because high rates are reported in people with obesity.

Most dental procedures can be performed safely in general dental practice for patients with obesity by making reasonable adjustments to care. Additional time at appointments may be beneficial to accommodate adjustments for mobility and dental care. Consider seeking advice from medical practitioners before performing [invasive dental procedures](#) in patients with obesity; risks include impaired wound healing and postoperative bleeding.

Barriers to accessing dental care (including weight stigma) contribute to poor oral health in patients with obesity. Consider potential barriers in the dental practice (eg inappropriate waiting room chairs and toilets, poor access to the building, narrow door widths) for patients with obesity, particularly those who use mobility aides. Consider domiciliary dental care for patients with significantly reduced mobility.

Most dental chairs have a weight limit of 140 to 220 kg. Bariatric dental chairs (with safe working limits of up to 450 kg) may be available at selected public dental hospital facilities in most states and territories. Patients with a BMI more than 40 kg/m² should be treated in a more upright position when in the dental chair to prevent breathing difficulties in a supine position. Sedation and general anaesthesia should generally be avoided, if possible, or should be undertaken in a major hospital facility because intubation and cannulation may be difficult, lung capacity may be reduced, and risks of aspiration and apnoea may be increased. Appropriate medical emergency equipment should be available.

Explanations regarding the need for referral should be undertaken respectfully.

Increased soft-tissue thickness in the orofacial region may pose challenges to taking intraoral radiographs, soft-tissue retraction, administration of local anaesthesia, and dental procedures. Oral landmarks may be obscured during administration of local anaesthetic. Additional time may be required for local anaesthesia to take effect.

Also consider how to reduce occupational health risks for the clinician (eg planning ways to avoid physical strain resulting from difficulty accessing the patient and making positioning adjustments).

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Immune compromise: dental considerations

Immune compromise: dental considerations

A patient's degree of immune compromise affects treatment decisions, including decisions on indications for antibiotic treatment of established infection or prophylaxis for a dental procedure.

Patients with profound immune compromise are at increased risk of infection which can spread rapidly. Their dental management requires a multidisciplinary approach that considers how invasive a procedure is and the associated risk of infection.

Risk of bleeding also requires evaluation because patients may have impaired haemostasis.

Causes of profound immune compromise include:

- kidney failure (end-stage kidney disease)
- liver failure (end-stage liver disease)
- active haematological malignancies (leukaemias, lymphomas, myelomas)
- some chemotherapies and immunotherapies (eg Chimeric Antigen Receptor T-Cell therapy [CAR T-cell therapy]) for malignancies, particularly for leukaemia and lymphoma
- immune suppressive drugs for peripheral blood stem cell and bone marrow transplants
- immune suppressive drugs for solid organ transplantation or autoimmune and inflammatory conditions (eg rheumatoid arthritis, psoriasis, inflammatory bowel disease, systemic lupus erythematosus, vasculitides)
- untreated or end-stage human immunodeficiency virus (HIV) infection
- primary immunodeficiency syndromes; see this guideline from the Royal Children's Hospital for features of these syndromes.

Not all immune compromise is profound. For example, suboptimally managed diabetes can compromise the immune system but is not a cause of profound immune compromise that may warrant broader indications for antibiotic use (than apply to patients who are immunocompetent). Parameters that can guide medical practitioners in assessing the severity of immune suppression include:

- a low neutrophil count – severe neutropenia is a manifestation of profound immunosuppression in many of the conditions listed above
- reduced antibody production (hypogammaglobulinaemia) (eg in patients with myeloma or lymphoma)
- other immune parameters (eg CD4 cell counts).

If a patient has a condition that may cause profound immune compromise, consult the patient's medical practitioner, specialist or multidisciplinary team to assess the severity of the immune compromise, and to determine an appropriate treatment plan (eg treatment for established infection, decisions on surgical antibiotic prophylaxis, assessment and management of bleeding risk). For classification of dental procedures by invasiveness and implications for risk management, see Table 13.29.



HIV infection: dental considerations

HIV infection: dental considerations

For the medical management of human immunodeficiency virus (HIV) infection, see [Human immunodeficiency virus infection](#) in the Antibiotic guidelines.

Antiretroviral drugs interact with many commonly prescribed drugs – consult an HIV specialist before prescribing any drug in a patient taking antiretroviral drugs for HIV infection. Unusual and rare adverse reactions (eg perioral paraesthesia) can occur with antiretroviral drugs.

With currently available antiretroviral therapy, many patients with HIV are well-managed and stable. However, patients with HIV infection are at increased risk of oral diseases, such as opportunistic infections, periodontal disease (eg [gingivitis](#), [periodontitis](#)), [necrotising periodontitis](#), oral hairy leukoplakia [\[Note 1\]](#) and [oral squamous cell carcinoma](#). HIV-related salivary gland hypofunction can occur, and increases the risk of [oral or oropharyngeal candidiasis](#). Other oral manifestations of HIV include [recurrent aphthous stomatitis](#), intramucosal haemorrhages and hyperpigmentation of the oral mucosa. Some conditions are particularly related to late-stage HIV, such as Kaposi sarcoma and oral hairy leukoplakia. Patients with late-stage or suboptimally managed HIV may have profound immune compromise.

Before performing an [invasive procedure](#) for a patient with HIV, consider the severity of the immune compromise, liaising with the patient's medical practitioner; for further advice on management of profound immune compromise in dentistry, see [Immune compromise: dental considerations](#). For advice on infection control measures, see the [Australian Dental Association website](#).

Oral diseases and opportunistic infections in patients with HIV infection should be managed in conjunction with an HIV specialist. Referral to an oral medicine specialist may also be appropriate.

For patients with HIV, manage oral diseases and opportunistic infections in conjunction with an HIV specialist.

Note 1: Oral hairy leukoplakia is associated with Epstein–Barr virus infection and is seen in patients who have immune compromise. It is distinct from [oral leukoplakia](#), which is an oral potentially malignant disorder. For images of oral hairy leukoplakia, see the [DermNet website](#).

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Stroke: dental considerations

Stroke: dental considerations

For the medical management of stroke, see [Stroke and transient ischaemic attack](#) in the Neurology guidelines.

Patients who have had a stroke may have residual physical and cognitive deficit depending on the location and severity of the stroke. Cognitive deficits may impact on understanding and memory. [Capacity to consent](#) should be assessed.

Involve the patient's carers and family members, if appropriate, in treatment planning.

Physical deficits may reduce patient mobility and ability to perform usual oral hygiene. Additional time may be required at dental appointments to allow for transfers (eg to the dental chair) or for treatment to be provided in the patient's wheelchair. Large-handled or powered toothbrushes can improve the effectiveness of oral hygiene in patients with neurological deficits affecting the arm.

Patients with seventh cranial (facial) nerve weakness accumulate food debris on the affected side and can have difficulty with denture fitting. Modifications to denture design include a thickened flange. Consider an implant-borne prosthesis – the patient must be sufficiently healthy to undergo the surgical procedure and be able to maintain good oral hygiene.

Weakness of the orofacial muscles and tongue may also indicate the presence of a swallowing deficit (dysphagia). This may contribute to poor food clearance from the mouth or the need for modified diet textures and fluid thickening. Poor food clearance may increase the risk of caries and periodontal disease. Adaptations to oral hygiene routines may be required. Consider liaising with the patient's speech therapist to develop a tailored oral hygiene routine.

Ask about swallowing difficulties and consider adaptations to reduce the risk of aspiration during dental procedures. Patients may benefit from being treated in a more upright position with good suctioning or reduced water spray, and frequent breaks to allow for swallowing.

Patients who have had a stroke may be taking antithrombotic therapy – see [Periprocedural bleeding risk: dental considerations](#).

In dental practice, first-aid management of stroke is outlined in [Clinical features and management of stroke in dental practice](#).

Epilepsy: dental considerations

Epilepsy: dental considerations

For the medical management of epilepsy, see [Epilepsy and seizures](#) in the Neurology guidelines.

For patients with epilepsy, assess the stability of their condition, including how frequently seizures occur and what triggers them. At each appointment, check that the patient has taken their usual medication because omission of doses can cause seizures.

Avoid stressful extended procedures. Consider pre-emptive use of a mouth prop to avoid the patient biting the operator's fingers or instruments if a generalised seizure were to occur during treatment.

Some antiepileptic drugs (phenytoin, sodium valproate, carbamazepine and barbiturates) can cause gingival enlargement. Gingival enlargement can be minimised with good oral hygiene; however, extensive gingival enlargement requires specialist periodontal and medical management.

In dental practice, first-aid management of a seizure is outlined in [Clinical features and management of seizures in dental practice](#).

Dementia: dental considerations

Dementia: dental considerations

Introduction to dementia in dental practice

Introduction to dementia in dental practice

Dementia is a life-limiting, progressive syndrome characterised by cognitive and functional decline. People with dementia experience behavioural change and other symptoms that can significantly affect them and their significant other(s) and carers.

Although dementia can occur in people younger than 65 years, increasing age is the most significant risk factor for the most common forms of dementia.

The common subtypes of dementia include:

- Alzheimer disease (50 to 75% of cases)
- vascular dementia (20 to 30%)
- frontotemporal dementias (up to 10%)
- other types – dementia with Lewy bodies, Parkinson disease dementia (up to 10%).

Many patients have more than one subtype of dementia (mixed dementia).

Less common causes include infections (eg human immunodeficiency virus [HIV]), excessive alcohol consumption (a significant cause of dementia arising before the age of 65 years), Huntington disease, Creutzfeldt–Jakob disease and traumatic brain injury.

For more information on features of subtypes of dementia, see [Dementia in the Psychotropic guidelines](#).

Regardless of the type or severity of dementia, its management involves supporting and collaborating with the patient, and their significant others or carers, to meet their needs and goals of care. For more advice, see [Adjustments to dental care for patients with dementia](#).

Adjustments to dental care for patients with dementia

Adjustments to dental care for patients with dementia

All forms of dementia are progressive. Definitive dental interventions while the patients is in the early stages of dementia can assist in stabilising oral health and avoid the need for significant treatments in the later stages of the condition.

Common features of dementia are decline in memory and executive function (eg problem-solving, planning, managing emotions). These can reduce the ability of patients to complete their own oral hygiene, increasing the risk of caries and periodontal disease. Independence in oral hygiene should be encouraged in early dementia (eg use of visual aids and reminders). [Strategies for health professionals](#) can also support oral hygiene practices in patients with dementia.

Lost and broken dentures are common for patients with dementia in residential aged-care facilities. Consider labelling dentures with the patient's name. If dentures are broken, consider whether repairing the dentures (to minimise the changes for the patient) is preferable to making a copy.

Cognitive deficits, particularly associated with memory, may impact on the patient's ability to provide informed consent for dental procedures. For advice on consent, see [Consent for health care in people with cognitive disability: information for dental practice](#).

Dental treatment for patients with dementia is ideally scheduled for mid-to-late morning with a carer or family member present. Dentists should adjust their approach to dental treatment to accommodate the patient's needs and neurological deficits (eg ataxia limiting mobility, dysphagia increasing risk of aspiration); for a summary of adjustments to dental care, see [Figure 13.70](#).

Behavioural changes and avoidance of eating or oral hygiene in a patient in the later stages of dementia may be an indication of untreated dental pain. Behavioural changes can also complicate provision of dental care. Alternative approaches, such as domiciliary dental care (care in the patient's place of residence), can be considered to overcome challenges associated with attending the dental clinic.

Sedation or general anaesthesia should only be considered after careful evaluation of benefits and the harms, including potential detrimental effects on cognition.

Dental treatments that significantly change the oral status (eg multiple dental extractions, new dentures) in the later stages of dementia may be challenging for the patient to adjust to and accept. Consider a palliative approach using a rational dental framework [\[Note 1\]](#).

Note 1: An example of a rational dental framework for an older patient is described in this [Australian Dental Journal article](#).

Progressive neurological conditions: dental considerations

Progressive neurological conditions: dental considerations

Introduction to progressive neurological conditions in dental practice

Introduction to progressive neurological conditions in dental practice

Progressive neurological conditions (eg [multiple sclerosis](#), [Parkinson disease](#), [motor neurone disease](#)) are a heterogeneous group of diseases that impact on neuromuscular function and movement, resulting in gradual loss of independence. Most are incurable and many will have other neurological features that affect behaviour, memory and cognition.

Multiple sclerosis (MS) is an inflammatory and degenerative disease of the central nervous system (CNS). It is characterised by recurring inflammatory lesions that affect multiple areas of the CNS. Symptoms commonly associated with MS include acute painful vision loss (optic neuritis), limb weakness, sensory disturbance, ataxia [\[Note 2\]](#), bladder or bowel dysfunction. Over time, neurodegeneration worsens, causing progressive disability.

Idiopathic Parkinson disease is the most common form of parkinsonism - a syndrome commonly characterised by bradykinesia (slowness of movement), tremor, and muscular rigidity and postural instability. Nonmotor complications of Parkinson disease are a major cause of disability, even in the early stages of the disease. These complications include dysphagia, fatigue, neuropsychiatric symptoms (eg depression, anxiety, psychosis), sleep disturbance, autonomic symptoms (eg orthostatic hypotension, bladder dysfunction, constipation, sexual dysfunction), pain and other sensory symptoms. Dementia is common in late disease.

Motor neurone disease (the most common form of which is amyotrophic lateral sclerosis) is a progressive neurodegenerative disorder of the upper and lower motor neurones. It presents with weakness of the limbs, bulbar muscles (affecting speaking and swallowing) and/or respiratory muscles. The disease is fatal, usually within 3 to 4 years of onset. A small percentage of patients survive much longer.

Multidisciplinary care improves quality of life and survival in patients with progressive neurological conditions. Treatment is mostly targeted towards effective management of symptoms.

Note 2: Ataxia is loss of co-ordination, which can affect limb movement, gait, eye movement or speech.

Adjustments to dental care for patients with progressive neurological conditions

Adjustments to dental care for patients with progressive neurological conditions

Patients with progressive neurological conditions may have cognitive and communication difficulties, changes in executive functioning and behaviour. Consider the patient's ability to provide informed consent for dental procedures; see [Consent for health care in people with cognitive disability: information for dental practice](#).

Motor deficits will vary depending on the condition and its severity. Consider how this may affect the patient's access to the dental surgery (eg wheelchair access). Schedule appointments at times to best suit the patient's needs (mid-morning to early afternoon may be preferred). Appointments scheduled for soon after the patient's regular medications have been taken may reduce symptoms during the dental appointment.

Muscular weakness and orthostatic hypotension may result in falls. Consider falls risk and the need for equipment and extra time to perform transfers. Providing dental treatment to the patient in their wheelchair may be more comfortable and preferable (depending on the dental procedure and the posture required). For patients in the advanced stages of disease, consider domiciliary dental care to provide simple and basic aspects of dental care with the focus on maintaining the patient's quality of life.

Bladder dysfunction is common in many neurological conditions, leading to urinary frequency and urgency, and sometimes, urge incontinence. Measures to ensure patient comfort (eg frequent toilet breaks) may need to be considered for longer dental appointments.

Many patients with progressive neurological conditions will experience dysphagia and sialorrhea (poor saliva control). Sialorrhea may be an adverse effect of certain medications, but is often the result of changes in the swallowing reflex that cause saliva to pool. First-line treatment for sialorrhea is often botulinum toxin type A injections into the salivary glands. Botulinum injections can exacerbate dry mouth and the associated risk of dental disease. For advice on saliva control, see [Sialorrhoea](#) in the Developmental Disability guidelines.

Dietary modifications used to manage dysphagia and the risk of aspiration may contribute to the development of caries and periodontal disease. Dietary modifications that can have adverse oral health effects include:

- alterations to dietary texture (these can result in stagnation of food debris within the mouth in patients with orofacial muscular changes)
- use of fluid thickeners with a high-carbohydrate content
- mixing of sweet substances into crushed medicines to improve palatability and encourage swallowing.

Consider oral hygiene measures for patients with swallowing dysfunction and progressive physical impairment, ideally discussing these with the patient's speech therapist. Oral hygiene is equally important for patients without oral intake (who require enteral feeding because of severe dysphagia) because they are at risk of dry mouth and its consequences.

Adjustments to dental treatment should be considered to reduce the risk of aspiration during the procedure. Patients may benefit from being treated in a more upright position with good suctioning or reduced water spray, with frequent breaks to allow for swallowing.

Many patients with progressive neurological conditions will live independently in the early course of their disease and transition to supported residential facilities. Dentists play an important role in advocating for the importance of good oral health, given its impact on quality of life. Education for carers about how to optimise oral hygiene practices is important, taking into consideration the needs of the patient. Early interventions from the dentist and other healthcare team members may reduce the need for more significant treatment later. Consider providing written documentation of dental appointments and any relevant instructions for oral hygiene for carers to include in the patient's care plan. When formulating treatment options, discuss the feasibility, benefits and harms with other members of the patient's health care team, if appropriate, and explore with them how dental treatment or home oral care routines may be best provided. In the later stages of the condition, consider a palliative approach, using a rational decision framework [\[Note 3\]](#).

Note 3: An example of a rational dental framework for an older patient is described in this [Australian Dental Journal article](#).

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Asthma: dental considerations

Asthma: dental considerations

For the medical management of asthma, see the [Respiratory guidelines](#).

In dental practice, first-aid management of acute asthma is outlined in [Clinical features and management of acute asthma in dental practice](#).

Advise patients with asthma to bring their reliever inhaler and spacer to all dental appointments.

Patients with severe asthma are at increased risk of adverse outcomes from sedation and general anaesthesia. Dental procedures requiring sedation or general anaesthesia in a patient with severe asthma should be undertaken in a hospital with an anaesthetist present.

Nonselective nonsteroidal anti-inflammatory drugs (NSAIDs) (eg aspirin, ibuprofen, naproxen) can cause bronchoconstriction in patients with [NSAID-exacerbated respiratory disease](#). Cyclo-oxygenase-2 (COX-2)-selective NSAIDs (eg celecoxib) do not cause bronchospasm in patients with NSAID-exacerbated respiratory disease. If analgesia is required in patients with asthma and known NSAID-exacerbated respiratory disease, use a COX-2-selective NSAID or paracetamol (see [Choice of analgesic for acute and postprocedural dental pain](#)).

Patients with asthma can develop oral or oropharyngeal candidiasis secondary to the use of inhaled corticosteroids. For treatment of oral or oropharyngeal candidiasis, see [Oral and oropharyngeal infection caused by Candida and related species](#); to prevent recurrence, advise patients to rinse their mouth and throat with water and spit it out after using their inhaler. Asthma inhalers are also a cause of [dry mouth](#). Recommend that the patient has their inhalation technique checked (eg at their general medical practitioner's practice) to minimise deposition of the inhaled product in the mouth.

Patients are sometimes prescribed a short course of systemic corticosteroids following an asthma exacerbation – consider delaying elective dental treatment until the course is complete; this allows time for their asthma condition to stabilise, reducing the likelihood of procedural factors (eg anxiety, exposure to allergens) contributing to an acute asthma attack.

Chronic obstructive pulmonary disease: dental considerations

Chronic obstructive pulmonary disease: dental considerations

For the medical management of chronic obstructive pulmonary disease (COPD), see the [Respiratory guidelines](#).

Dental treatment for patients with COPD may need to be modified according to the patient's condition. Patients with severe COPD do not tolerate being placed in a horizontal position.

Patients with severe COPD are at increased risk of adverse outcomes from sedation and general anaesthesia. Dental procedures requiring sedation or general anaesthesia in a patient with severe COPD should be undertaken in a hospital with an anaesthetist present.

Patients with COPD are sometimes prescribed a short course of systemic corticosteroids following an exacerbation of COPD. Consider delaying elective dental treatment until the course is complete; this allows time for the patient's condition to stabilise and treatment to be more readily tolerated.

Patients with COPD can develop oral or oropharyngeal candidiasis secondary to the use of inhaled corticosteroids. For treatment of oral or oropharyngeal candidiasis, see [Oral and oropharyngeal infections caused by Candida and related species](#); to prevent recurrence, advise patients to rinse their mouth and throat with water and spit it out after using their inhaler.

In some patients with COPD (eg patients who retain carbon dioxide), supplemental oxygen is contraindicated – consult the patient's COPD action plan or alert card or alert bracelet if considering oxygen supplementation.

Obstructive sleep apnoea: dental considerations

Obstructive sleep apnoea: dental considerations

For the medical management of obstructive sleep apnoea, see the [Respiratory guidelines](#).

Dentists have an important role in the multidisciplinary management of obstructive sleep apnoea; see [Obstructive sleep apnoea: the role of dentistry](#) for advice on the dentist's role in identifying patients at risk, and their management.

Patients with obstructive sleep apnoea are at increased risk of respiratory arrest from benzodiazepines. Nitrous oxide is recommended for minimal sedation in patients with obstructive sleep apnoea because it is safer and shorter-acting than oral benzodiazepines. Dental procedures requiring moderate sedation or general anaesthesia in a patient with obstructive sleep apnoea should be undertaken in a hospital with an anaesthetist present.

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Overview of psychiatric disorders and disorders of substance use in dental practice

Overview of psychiatric disorders and disorders of substance use in dental practice

Psychiatric disorders and disorders of substance use (eg excessive use of alcohol, benzodiazepines or opioids) may affect dental plans and outcomes. Patients with either type of disorder often face difficulties in accessing and adhering to dental treatment, maintaining daily oral hygiene and attending regular dental reviews; examples of barriers include stigma, socioeconomic disadvantage and fear of health care. Establishing a therapeutic relationship is important to support patients to engage with treatment. Psychotropic medications (eg antidepressants, antipsychotics and stimulants) and other psychotropic substances (eg cocaine, amphetamines) can have marked oral and dental adverse effects. Some medications (eg benzodiazepines, opioids, gabapentinoids) and other substances with sedative effects (eg alcohol) need to be considered if planning minimal sedation (anxiolysis) in dental practice. Chronic excessive alcohol consumption increases risk of bleeding with some dental procedures; see Liver disorders: dental considerations.

A thorough medical and medication history should include the use of (and indication for) psychotropic medications, and other psychotropic substances, including tobacco (smoked, vaped or chewed), alcohol and illicit drugs (eg cocaine, amphetamines, cannabis).

Adverse oral and dental effects of psychotropic substances

Adverse oral and dental effects of psychotropic substances

Psychotropic medications, such as antidepressants, antipsychotics and psychostimulants, can cause a range of adverse effects (eg dry mouth, bruxism). When combined with a cariogenic diet and a lack of oral hygiene, a dry mouth can result in dental caries, oral or oropharyngeal candidiasis and other oral infections. Consult the patient's medical practitioner if a psychotropic medication is suspected to be causing an oral adverse effect.

Tobacco use (smoking and vaping) and use of illicit drugs (eg cocaine, amphetamines, cannabis) also increase the risk of dry mouth (and its consequences) and bruxism. Smoking tobacco is a major risk factor for periodontal disease (eg periodontitis), tooth loss, impaired postoperative healing (including dry socket) and oral cancer. The risks of oral cancer conferred by tobacco use are increased by alcohol consumption.

Assessing and managing disorders of substance use in dental practice

Assessing and managing disorders of substance use in dental practice

In people with a disorder of substance use, excessive use of more than one substance is common. Consider the possibility of excessive use of opioid analgesics if a patient requests these, particularly if they exhibit a good level of knowledge about (or a specific preference for) a particular drug. Advice on assessing the extent of substance use is available in the Addiction guidelines. Checking real-time prescription monitoring systems can flag concerns regarding drugs of dependence dispensed to a patient, but the list of monitored drugs differs from one state or territory to another. Consult the patient's medical practitioner if concerns about substance use arise; other sources of advice include the phone-based clinical advisory services of the drug and alcohol services in each state and territory; for contact details, see the Addiction guidelines. A factsheet on responding to inappropriate requests for drugs of dependence is available from the Royal Australian College of General Practitioners. Before prescribing drugs of dependence, check real-time prescription monitoring services. Be familiar with state or territory legislation on prescribing drugs of dependence to a patient with substance dependence; for more detail on regulations, see Legislative Acts and Regulations relevant to prescriptions and prescribing.

Patients with a history of excessive sedative drug use (eg analgesics, anxiolytics, some illicit drugs, excessive alcohol consumption) may risk oversedation or inadequate effect from benzodiazepines used for minimal sedation; nitrous oxide is the preferred agent for sedation.

For advice on helping patients to cut down or stop smoking or vaping, see advice for oral health professionals on the [Quit website](#). For medical management of nicotine dependence, see [Overview of tobacco smoking and nicotine dependence](#) in the Addiction guidelines. Guidance and resources for prescribers of therapeutic nicotine vaping devices and pharmacists supplying them are available at the [Therapeutic Goods Administration \(TGA\) website](#).

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Viral hepatitis: dental considerations

Viral hepatitis: dental considerations

For the medical management of viral hepatitis, see [Hepatitis A](#), [Hepatitis B](#), [Hepatitis C](#), [Hepatitis D](#), or [Hepatitis E](#).

The most relevant hepatitis viruses to dental practice are hepatitis B and C, which are bloodborne viruses causing chronic liver disease and cirrhosis. For advice on infection control measures, see the [Australian Dental Association website](#).

Most hepatitis C infections can now be cured with antiviral therapy. Patients with chronic or untreated hepatitis C have a higher incidence of [oral lichen planus](#), [dental caries](#) and periodontal disease (eg [gingivitis](#), [periodontitis](#)). Periodontal health is markedly poorer and salivary flow is reduced in patients with hepatitis C – whether this is a direct viral effect or due to other causes is unknown. Preventive dental care and management is particularly important for patients with hepatitis C because the outcomes of major restorative treatment may be poor.

Before proceeding with an invasive dental procedure (see [Table 13.29](#) for classification of procedures) in a patient with chronic viral hepatitis, consider the risk of [profound immune compromise](#) associated with [end-stage cirrhosis](#), which increases risk of infection. [Bleeding risk](#) should also be assessed for invasive procedures. Consult the patient's treating specialist or multidisciplinary team to determine an appropriate treatment plan.

Avoid sedatives and nonsteroidal anti-inflammatory drugs (NSAIDs) in patients with viral hepatitis, because they can cause liver toxicity. Paracetamol can be used at normal therapeutic doses. However, it is important to ensure that the maximum dose of paracetamol is not exceeded because patients with viral hepatitis are at increased risk of liver damage at supratherapeutic doses (see [Paracetamol use in dentistry](#)).

Liver cirrhosis: dental considerations

Liver cirrhosis: dental considerations

Liver cirrhosis (also known as advanced chronic liver disease) is extensive liver scarring (fibrosis) and nodule formation. It can be diagnosed using noninvasive blood tests and imaging of the liver. Chronic liver disease arising from any cause can progress to liver cirrhosis. Patients with liver cirrhosis are at higher risk of liver-related complications, including hepatocellular carcinoma (HCC) and death. Treatment of the cause of liver cirrhosis [\[Note 1\]](#) is a medical priority – this may significantly improve liver function and portal hypertension, and reduce the risk of developing HCC.

Compensated liver cirrhosis is a stable phase of the disease, with good long-term prognosis if the cause of cirrhosis is treated. Decompensated liver cirrhosis is associated with high mortality and defined clinically by the presence of complications: ascites [\[Note 2\]](#), hepatic encephalopathy [\[Note 3\]](#), variceal haemorrhage [\[Note 4\]](#) or nonobstructive jaundice. Patients may move between decompensated and compensated disease states, depending on response to treatments, acute events and disease progression.

Liver failure refers to impairment of the synthetic or metabolic functions of the liver. Chronic liver failure is end-stage cirrhosis [\[Note 5\]](#).

Note 1: Examples of treatment include facilitating abstinence from alcohol, antiviral treatment for hepatitis B or C, weight loss for metabolic-associated fatty liver disease and immune suppressive treatment for autoimmune hepatitis.

Note 2: Ascites is an accumulation of fluid within the peritoneal cavity.

Note 3: Features of hepatic encephalopathy include changes in cognition, personality and emotions, sleep disturbances, and disorientation.

Note 4: Gastro-oesophageal varices are dilated veins in the lining of the oesophagus and stomach, which are at risk of rupture, causing gastrointestinal bleeding.

Note 5: For more information on liver failure, see the [Liver Foundation website](#).

Adjustments to dental care for patients with liver cirrhosis

Adjustments to dental care for patients with liver cirrhosis

Dentists play an important role in maintaining the oral health of patients with liver cirrhosis. In the early stages of liver cirrhosis, most dental treatments can be completed safely. Establishing good oral health will help prevent the need for more invasive procedures should liver cirrhosis progress. Complications of cirrhosis that affect dental care include:

- altered bleeding and clotting tendencies
- altered drug metabolism and excretion by the liver; in some patients, excretion by the kidney is also impaired
- risk of hepatocellular cancer (HCC)
- risk of progression to liver failure with complications such as
 - hepatic encephalopathy
 - profound immune compromise
- in some patients, a need for assessment of dental fitness for liver transplant.

Although most dental procedures can be completed safely for patients with liver cirrhosis, evaluating **the risks of bleeding and clotting** is complex. Traditional markers of coagulation (international normalised ratio [INR], prothrombin time [PT]) do not accurately predict bleeding in patients with cirrhosis, and patients may have an increased risk of thrombosis despite an elevated INR or PT.

For invasive dental procedures that are likely to cause prolonged bleeding or for patients with active bleeding, discuss the proposed dental procedure with the patient's medical specialist. In addition to the use of local haemostatic measures correction of thrombocytopenia, may be required. Assessment is required on a case-by-case basis; see Considerations for dental procedures in patients with thrombocytopenia. Bleeding risk is unpredictable; consider referring to a hospital-based dental specialist for invasive dental procedures.

In patients with cirrhosis undergoing routine dental procedures that are unlikely to cause prolonged bleeding (for a guide to bleeding risk, see Table 13.30), correction of laboratory markers of coagulation (INR, PT) with blood products is generally not recommended.

Metabolism and clearance of drugs by the liver (and sometimes the kidney) is impaired in patients with liver cirrhosis. Hepatorenal syndrome (HRS) is functional kidney failure in patients with advanced liver cirrhosis, and can be precipitated by infection and nephrotoxic drugs. Dentists should ensure dental infections are managed efficiently to minimise the impact of infection on kidney function.

Prescribing of any drugs for a patient with cirrhosis should be guided by a discussion with the patient's medical team (general practitioner or liver specialist). Most common local anaesthetic agents are at least partially metabolised by the liver. Articaine is partly metabolised in the plasma (as well as in the liver) but evidence is lacking to demonstrate a lower risk of toxicity than other local anaesthetics in patients with liver disorders. Given the low volume and doses of local anaesthetics used in dentistry, dose reductions for local anaesthetics are not usually required.

HCC is a common complication of cirrhosis. Patients with HCC are often under the multidisciplinary management of a specialised unit. Therapy may include drug therapy (eg oral multikinase inhibitors, immunotherapy, antiangiogenic therapy), nonsurgical therapies (eg ablation, transarterial chemoembolisation, transarterial radioembolisation, stereotactic radiotherapy), surgical resection and liver transplantation. The antiangiogenic drug bevacizumab is a risk factor for medication-related osteonecrosis of the jaw (MRONJ). For advice on other dental considerations for patients with cancer, see Cancer: dental considerations.

Patients with cirrhosis may present with neuropsychiatric symptoms and signs associated with **hepatic encephalopathy**. Features of hepatic encephalopathy include changes in cognition, personality and emotions, sleep disturbances and disorientation. Patients with signs of hepatic encephalopathy should be assessed for their capacity to consent for dental procedures.

End-stage cirrhosis is a cause of profound immune compromise; before an invasive dental procedure, discuss the patient's immune status with their medical specialist for advice on whether surgical antibiotic prophylaxis may be indicated.

Patients requiring a **liver transplant** should have a pretransplant dental assessment. Some transplant teams have a dedicated hospital dental team. The dental assessment should include a comprehensive examination and X-rays. Identify sources of infection and teeth with a poor prognosis that may pose a risk of infection during the transplant period. The pretransplant assessment is an opportunity to establish an oral hygiene regimen and a recall program to suit the patient's individual needs; the plans should recognise the impact of long-term immunosuppression and polypharmacy on risks of caries, periodontal disease and malignancy. Some patients may need prophylaxis against posttransplant osteoporosis [Note 6] with drugs that increase the risk of medication-related osteonecrosis of the jaw (MRONJ). Ask the treating team to clarify whether and when such drugs are likely to be started and take this into account in the treatment planning. Once all relevant dental treatment is completed, dentists should communicate their assessment of the patient's dental fitness for the transplant in writing to the transplant team.

Note 6: Multiple factors, including long-term use of corticosteroids for immunosuppression, contribute to risk of osteoporosis after transplant.

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Introduction to kidney failure (end-stage kidney disease) in dental practice

Introduction to kidney failure (end-stage kidney disease) in dental practice

Chronic kidney diseases have a range of causes. Disease progression eventually results in end-stage kidney disease, also referred to as kidney failure. Kidney failure has a range of oral manifestations and is associated with poor oral hygiene and significant periodontal disease.

Commonly reported oral manifestations of kidney failure are halitosis, dry mouth, metallic taste, retrograde parotitis, mucosal pallor, uraemic stomatitis, oral hairy leukoplakia, macroglossia, and gingival bleeding (petechiae and ecchymosis). Medications used in management of kidney failure, such as calcium channel blockers, may cause gingival enlargement.

Commonly identified risk factors for poor oral health in patients with kidney failure include:

- salivary gland hypofunction (causing dry mouth)
- impaired immunity (profound immune compromise) and wound healing
- alveolar bone destruction due to renal osteodystrophy
- comorbid diabetes mellitus and malnutrition.

Increased urea in the saliva is also thought to promote calculus formation. Patients with kidney failure may also have a higher risk of caries if they have risk factors such as reduced saliva.

Common complications of kidney failure include:

- anaemia caused by decreased erythropoietin production
- mineral and bone disorders from inadequate production of 1,25-dihydroxyvitamin D (renal osteodystrophy)
- cardiovascular disease
- fluid overload
- electrolyte disturbances
- nutritional deficiencies.

The primary treatment options for kidney failure are kidney replacement therapy through dialysis (haemodialysis or peritoneal dialysis) and kidney transplant.

Haemodialysis uses a vascular access point to access and pump heparinised blood through a dialyser. Vascular access is through an arteriovenous fistula or central venous catheter. **Peritoneal dialysis** can be completed at home and uses the peritoneal membrane and abdominal cavity for solute exchange. All patients who use dialysis are required to restrict their fluid intake to manage risk of fluid overload.

Adjustments to dental care for patients with kidney failure

Adjustments to dental care for patients with kidney failure

Most patients with kidney failure require minimal adjustments to their dental treatment; however, complications of kidney failure that affect dental care include:

- increased bleeding risk
- profound immune compromise
- altered drug excretion by the kidney
- in some patients, a need for assessment of dental fitness for kidney transplant.

The primary concern is the **risk of bleeding** because of anticoagulant therapy for haemodialysis. Haemodialysis is usually performed at a dialysis centre 3 times a week for 3 to 5 hours. Dental treatment should be planned for the days in between dialysis sessions (or the day after dialysis). If dental treatment must occur on a dialysis day, consider bleeding risk for any dental procedures that are likely to cause prolonged bleeding (see [Table 13.30](#) for classification of procedures). Bleeding risk can be challenging to assess for patients with kidney failure. Liaise with the patient's medical team to determine whether any additional measures to manage bleeding risk may be required, such as withholding anticoagulation for a dialysis session. Although perioperative bleeding can usually be managed using [local haemostatic measures](#), dentists may consider referral to a community or hospital-based dental specialist for management of invasive dental procedures.

Patients with kidney failure may have profound **immune compromise** because of uraemia and nutritional deficiencies. Discuss with the patient's medical specialist whether antibiotic prophylaxis (to reduce dental surgical site infection) may be warranted for invasive dental procedures. If infections of the venous access point occur, the source is often the skin (rather than an oral source); antibiotic prophylaxis for dental procedures is not generally indicated for the protection of the venous access point from oral bacteria. If a central venous catheter is being used for temporary haemodialysis access, or a fistula containing polytetrafluoroethylene is being used, antibiotic prophylaxis for invasive dental procedures may be considered by the treating medical team.

Exercise **caution when prescribing** for patients with kidney failure. Most medications are, at least in part, excreted by the kidneys. Kidney failure may result in prolonged drug activity because of reduced renal clearance. Discuss the need for drug dose adjustment with the patient's medical practitioner. In these guidelines, if an antimicrobial requires dose adjustment to account for kidney impairment, this is noted in the drug recommendations. Nephrotoxic medications, such as nonsteroidal anti-inflammatory drugs (NSAIDs) are best avoided.

Patients with kidney failure who are being considered for a **kidney transplant** should undergo a pretransplant dental assessment. This assessment should include a comprehensive dental examination and X-rays. Identify sources of infection and teeth with a poor prognosis that may pose a risk of infection during the transplant period because high-dose immunosuppression will be given at the time of the transplant operation. [Invasive dental procedures](#) should be discussed with a member of the multidisciplinary transplant team to determine whether any additional measures are required to complete the dental procedure safely. The pretransplant assessment is an opportunity to establish an oral hygiene regimen and a recall program to suit the patient's individual needs; the plans should recognise the impact of long-term immunosuppression and polypharmacy on risks of caries, periodontal disease and malignancy. Some patients may need prophylaxis after a liver transplant against osteoporosis [\[Note 1\]](#) with drugs that increase the risk of [medication-related osteonecrosis of the jaw](#) (MRONJ). Ask the treating team to clarify whether and when such drugs are likely to be started and take this into account in the treatment planning. Once all relevant treatment is completed, dentists should communicate the patient's dental fitness for transplant in writing to the transplant team.

Note 1: Multiple factors, including long-term use of corticosteroids for immunosuppression, contribute to risk of osteoporosis after transplant.

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Types of medical emergencies in dental practice

Types of medical emergencies in dental practice

Information in Therapeutic Guidelines and the Australian and New Zealand Committee on Resuscitation guidelines form the basis of the advice in this topic.

Potential medical emergencies include transient problems that resolve spontaneously (eg syncope [fainting]), serious emergencies that require transfer of the patient to hospital (eg severe asthma attack) and life-threatening emergencies that require on-site resuscitation (eg cardiac arrest). Medications have the potential to cause adverse effects, some of which are life threatening (eg anaphylaxis [severe immediate allergic reactions]). The medical emergencies discussed in these guidelines are:

- [Allergies in dental practice](#)
- [Infections presenting as emergencies in dental practice](#)
- [Cardiovascular emergencies in dental practice](#)
- [Respiratory emergencies in dental practice](#)
- [Diabetic emergencies in dental practice](#)
- [Methaemoglobinemia in dental practice](#)
- [Neurological emergencies in dental practice](#)
- [Ocular emergencies in dental practice.](#)

Printable flowcharts summarising the clinical features and immediate management of major medical emergencies in dental practice are available in relevant topics.

Overview of requirements to manage medical emergencies in dental practice

Overview of requirements to manage medical emergencies in dental practice

Medical emergencies in dental practice can be minimised by careful assessment of the patient; this includes obtaining a detailed medical and medication history. When emergencies occur, prompt diagnosis and management improve outcomes.

Dentists and other dental staff have a professional obligation to maintain competency in emergency management and basic life support. If dental assistants have not been through a formal training program, they should have, at least, a basic-level first-aid certificate.

The level of staff training and the emergency drugs and equipment required by the dental practice are determined by the patient population, the practice type and the emergency services response time. For example, a practice that is remote or provides intravenous sedation, will require a broader range of emergency drugs and monitoring equipment (in accordance with regulatory requirements and relevant guidelines) than those that do not.

The longer the time before assistance can reasonably be expected to arrive, the greater the need for staff training and equipment.

Dentists must ensure that their practice:

- has an established medical emergency plan, which considers the usual emergency services response time
- prominently displays the emergency phone number (000).

Basic life support

Basic life support

Use the basic life support flow chart ([Figure 13.76](#)) to assess and respond to a medical emergency. Lie the patient flat in the dental chair or on the floor, depending on where they have collapsed; both are firm surfaces that offer the resistance needed if chest compressions are performed.

The chart recommends the use of rescue breaths if the rescuer is willing and able; these improve survival in certain groups, including children. Bag-mask ventilation is ideal if a rescuer is trained in this technique. Alternatives include mouth-to-mask or mouth-to-mouth ventilation; see [advice on drugs and equipment](#). If available, a disposable face shield can be used by any rescuer who can deliver mouth-to-mouth – the flexible shield is fitted over a patient's face (with the one-way valve piece in the patient's mouth) to protect a rescuer giving rescue breaths. For more detail on basic life support, see the [Australian and New Zealand Committee on Resuscitation \(ANZCOR\) Guidelines](#).

Figure 13.76 Basic life support flow chart

[Printable figure](#)

Basic Life Support

D**Dangers?****R****Responsive?****S****Send for help****A****Open Airway****B****Normal Breathing?****C****Start CPR**

30 compressions : 2 breaths

D**Attach Defibrillator (AED)**
as soon as available, follow prompts**Continue CPR until responsiveness or
normal breathing return**



January 2016

NEW ZEALAND
Resuscitation Council
WHAKAHUORA AOTEAROA

This flowchart is reproduced from the [Australian and New Zealand Committee on Resuscitation \(ANZCOR\) website](#)

Drugs and equipment to manage medical emergencies in dental practice

Drugs and equipment to manage medical emergencies in dental practice

Drugs and equipment that are **essential** to have available for immediate use in managing medical emergencies occurring in a dental practice include:

- an easily portable source of oxygen and a means of administering it (by simple face mask or nasal prongs)
- adrenaline (epinephrine) for the management of anaphylaxis, in sufficient quantity to give at least 2 doses. Adrenaline is available in preloaded autoinjectors (adrenaline ‘pens’ available over the counter) and ampoules. A preloaded autoinjector is preferred because ampoules require dose calculation and must be drawn up into a syringe
- an automated external defibrillator (AED), or knowledge of the location of the nearest AED, for the management of cardiac arrest.

Other drugs that are **ideally available** for use in managing medical emergencies in a dental practice include:

- a short-acting bronchodilator inhaler (eg salbutamol) for managing an acute asthma attack and a spacer to optimise delivery of salbutamol (because patients with acute asthma cannot inhale the drug effectively)
- glucose for the management of hypoglycaemia – sources include glucose gel sachets, tablets and jellybeans
- aspirin for the management of a suspected acute myocardial infarction (heart attack).

Other equipment that is ideally available for managing medical emergencies in a dental practice includes:

- a blood pressure monitor for assessing patients with cardiovascular symptoms or collapse
- a blood glucose monitor for the management of hypoglycaemia
- a pulse oximeter for measuring arterial oxygen saturation (highly recommended if any sedation technique is used)
- additional equipment to assist in resuscitation
 - resuscitation masks that fit over a patient’s nose and mouth for use in mouth-to-mask resuscitation. An oropharyngeal airway can be used with these devices.
 - a bag-valve mask (which allows for oxygen delivery during resuscitation and can be used with an oropharyngeal airway if needed)
 - disposable plastic face shields with mouthpieces for use during mouth-to-shield resuscitation (if a resuscitation mask or bag-valve mask is not available or a rescuer is not skilled in their use).

Regularly check drugs and equipment, and replace expired or damaged items.

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Overview of allergic reactions in dental practice

Overview of allergic reactions in dental practice

Allergies can occur to drugs, food, insect bites, or environmental substances (eg pollen; contact with rubber gloves, latex or acrylates). A person can have multiple allergies. After exposure to an allergen, a reaction can be:

- immediate, typically occurring within minutes to 2 hours
- delayed, typically occurring only after more than one exposure and presenting days after the exposure, although it can occur within 6 hours of a repeat exposure.

Although they occur rarely, the most common allergies encountered in dental practice are to antimicrobials, local anaesthetics, chlorhexidine and latex. For more information on immediate and delayed reactions to antimicrobials, see [Antimicrobial hypersensitivity](#) in the Antibiotic guidelines. For more information on latex and other contact allergies, see [Common contact allergies in dental practice](#).

Always check for a history of allergy before starting dental treatment. Instruct a patient with a known life-threatening acute (anaphylactic) allergy to bring their adrenaline (epinephrine) autoinjector when attending for dental treatment.

Document any suspected allergic reaction, inform the patient's medical practitioner and consider referring the patient for confirmation of the allergy.

Common contact allergies in dental practice

Common contact allergies in dental practice

Allergy to latex is rare and usually presents as a localised contact urticaria or dermatitis starting minutes to hours after exposure. Occasionally, allergy to latex can cause anaphylaxis; in dental practice, follow the advice in [Figure 13.78](#) for first-aid management of patients with urticaria, angioedema or anaphylaxis. If a patient, dentist or staff member reports immediate hypersensitivity to latex but has not had medical assessment, refer them for confirmation of the allergy. In patients with a confirmed latex allergy, perform dental treatment in a latex-free environment.

Allergy to rubber gloves or a rubber dam commonly presents as a delayed hypersensitivity contact dermatitis beginning hours to days after exposure. This is usually associated with allergy to rubber components other than the latex protein (eg accelerants and vulcanising chemicals used in the manufacturing process). However, if contact dermatitis occurs in areas exposed to rubber materials following dental treatment, consider the possibility of latex allergy.

Allergy to acrylates usually presents as contact dermatitis. Acrylates and methacrylates (eg methyl methacrylate, 2-hydroxyethylmethacrylate) are plastic materials that are widely used in dentistry (eg dental bonding agents, materials in dentures). Acrylate contact allergy is more common in people who are frequently exposed, such as dental staff, and may occur despite the use of protective gloves.

For the medical management of contact dermatitis, see [Contact dermatitis](#) in the Dermatology guidelines.

Clinical features and management of urticaria, angioedema and anaphylaxis in dental practice

Clinical features and management of urticaria, angioedema and anaphylaxis in dental practice

Clinical features of urticaria, angioedema and anaphylaxis (life-threatening generalised immediate-type allergy) are outlined in [Figure 13.77](#). Anaphylaxis can occur within minutes of parenteral administration or mucosal exposure to a drug, and

approximately 30 minutes to 2 hours after oral ingestion. Instruct patients with a history of anaphylaxis to bring their adrenaline (epinephrine) autoinjector when attending for dental treatment.

In dental practice, follow the advice in [Figure 13.78](#) for first-aid management of patients with urticaria, angioedema or anaphylaxis. A widely available and more detailed wall chart on the recognition and initial emergency management of anaphylactic reactions is available from [Australian Prescriber](#).

Figure 13.77 Clinical features of allergic reactions in dental practice

urticaria ('hives') – red skin lesions of varying size, often fluid-filled and itchy, lasting a few minutes to 24 hours

acute angioedema – soft-tissue oedema

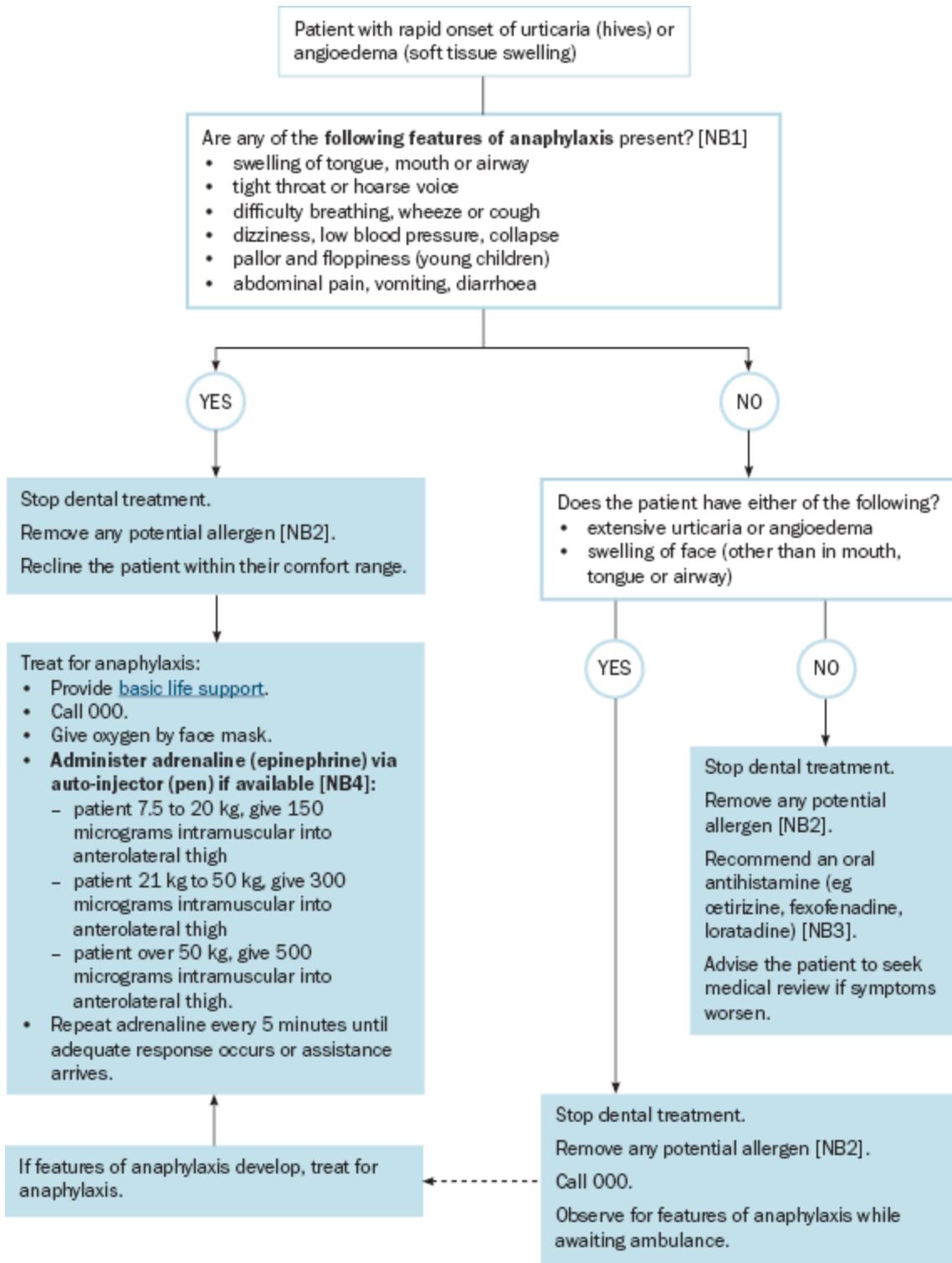
- occurs more often with urticaria than on its own
- can be painful, burning or tingling but not usually itchy
- often affects the face (around eyes or lips), tongue, glottis or genitals
- usually lasts several hours to days

anaphylaxis (life-threatening acute allergy) – can accompany urticaria or angioedema but may present alone; onset is rapid and features include:

- tongue swelling
- tightness in throat (laryngeal swelling) or hoarse voice
- difficulty breathing, wheeze or cough
- dizziness, low blood pressure or collapse
- pallor and floppiness (young children)
- abdominal pain, vomiting, diarrhoea.

Figure 13.78 Management of allergic reactions in dental practice

[Printable figure](#)



NB1: Anaphylaxis may rarely occur without any rash.

NB2: Consider what the allergen may be and when exposure occurred. Consider drugs (particularly antimicrobials, local anaesthetics), gloves and, less commonly, substances such as chlorhexidine. Onset of an immediate reaction is usually within minutes to 2 hours of exposure, but delayed reactions can occur after more than one exposure (typically within days, although they can be within 6 hours). Reactions do not resolve immediately after exposure is stopped.

NB3: Advise the patient to purchase an oral antihistamine and follow dosage instructions. These items are not on the Dental Items list on the Pharmaceutical Benefits Scheme (PBS) at the time of writing.

NB4: Autoinjector devices are adrenaline (epinephrine) ‘pens’ that deliver a set dose. Available doses are 150 micrograms, 300 micrograms and 500 micrograms. If a patient more than 50 kg requires adrenaline, and a 500 microgram device is not available, use the 300 microgram dose (as for patients more than 20 kg to 50 kg).

To manage anaphylaxis in dental practice, use:

- 1 adrenaline (epinephrine) intramuscularly, via preloaded autoinjector into the anterolateral thigh [\[Note 1\]](#). Repeat every 5 minutes until the patient responds, or assistance arrives

adult or child more than 50 kg: 500 micrograms [\[Note 2\]](#)

adult or child more than 20 kg to 50 kg: 300 micrograms

child 7.5 to 20 kg: 150 micrograms

OR

- 2 adrenaline (epinephrine) 1 in 1000 solution (adult or child) 10 micrograms/kg up to 500 micrograms (0.01 mL/kg up to 0.5 mL) intramuscularly into the anterolateral thigh. Repeat every 5 minutes until the patient responds, or assistance arrives.

Note 1: Preloaded autoinjectors contain 500 micrograms in 0.3 mL (for use in an adult or child more than 50 kg), 300 micrograms in 0.3 mL (for use in an adult or child more than 20 kg), and 150 micrograms in 0.3 mL (for use in a child 7.5 to 20 kg).

Note 2: If a patient more than 50 kg requires adrenaline, and a 500 microgram device is not available, use the 300 microgram dose (as for patients more than 20 kg to 50 kg).

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Infections presenting as emergencies in dental practice

Infections presenting as emergencies in a dental practice are most likely to be odontogenic but other infections may be seen (eg pneumonia).

Acute odontogenic infections can present with emergency features that indicate life-threatening risks of airway obstruction or sepsis. **Airway obstruction** can occur with Ludwig angina, a severe spreading infection involving the bilateral submandibular, sublingual and submental spaces, with cellulitis.

Sepsis (whatever the source) is life-threatening organ dysfunction caused by an abnormal response to infection. Early recognition of sepsis is critical.

See [Figure 13.79](#) for emergency presentations of infection and the approach to management.

Figure 13.79 Emergency management of severe infections in dental practice

[Printable figure](#)

Patient with one or more signs of severe infection requiring emergency treatment including:

- **signs associated with airway obstruction**
 - difficulty breathing [NB1]
 - difficulty swallowing
 - swelling of the floor of the mouth
 - trismus
 - neck swelling
 - swelling of the upper face that occludes the eye [NB2]
 - significant facial swelling and pain, especially together with any of the signs listed above
- **signs associated with systemic infection**
 - pallor
 - sweating
 - tachycardia
 - temperature above 38 °C or below 36 °C



Call an ambulance for transfer to a hospital. If odontogenic infection is suspected or signs of airway obstruction are present, transfer patient to a hospital with an oral maxillofacial surgeon (or anaesthetic or emergency facilities for airway management).

If the patient has difficulty breathing or looks blue, give oxygen by face mask.

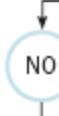
Allow the patient to adopt a position of comfort.

Alert the local service that will be managing the patient of the transfer.



Are signs of sepsis (life-threatening organ dysfunction) present, such as, in adults [NB3]?

- impaired consciousness
- respiratory rate 22 breaths/minute or more
- systolic blood pressure less than 90 mmHg
- poor peripheral perfusion (eg cold hands, cold feet) or mottled skin
- acute reduction in urine output



Monitor vital signs while awaiting the ambulance.

Be prepared to provide basic life support.



Is arrival at a hospital likely to take more than 1 hour?



If a medical or nursing practitioner who is trained to administer intravenous or intramuscular antibiotics is available, consider following local sepsis protocols on prehospital management.



NB1: In partial airway obstruction, breathing is laboured and may be noisy; some air movement can be felt at the mouth. In complete obstruction, a patient may be attempting to breathe but no breath sounds are heard and no air movement is felt from the nose or mouth.

NB2: A rare severe local feature that indicates **risk of cavernous sinus thrombosis** is swelling of the upper third of the face, occluding the eye.

NB3: In children, standard observations (eg respiratory rate, blood pressure) and signs of life-threatening organ dysfunction vary according to the patient's age; age-appropriate standard observation charts are available in most jurisdictions. Clinical features can be nonspecific and include signs (eg gasping, grunting, increased irritability or lethargy, inability to feed or eat) that are not typical of sepsis in older patients. Consider sepsis in children when their clinical state is causing significant concern to family or

clinical staff. Detailed information on recognising and managing sepsis in children is not covered in these guidelines. Age-appropriate sepsis management pathways are available in some jurisdictions.

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Clinical features and management of presyncope and syncope in dental practice

Clinical features and management of presyncope and syncope in dental practice

Presyncope (near-fainting) is a condition in which a patient feels syncope is imminent. Syncope ('fainting') is an acute fall in blood pressure, resulting in transient global cerebral hypoperfusion, causing a loss of consciousness which usually leads to loss of postural tone and falling. Secondary injury (following a syncopal fall) can result in significant harm.

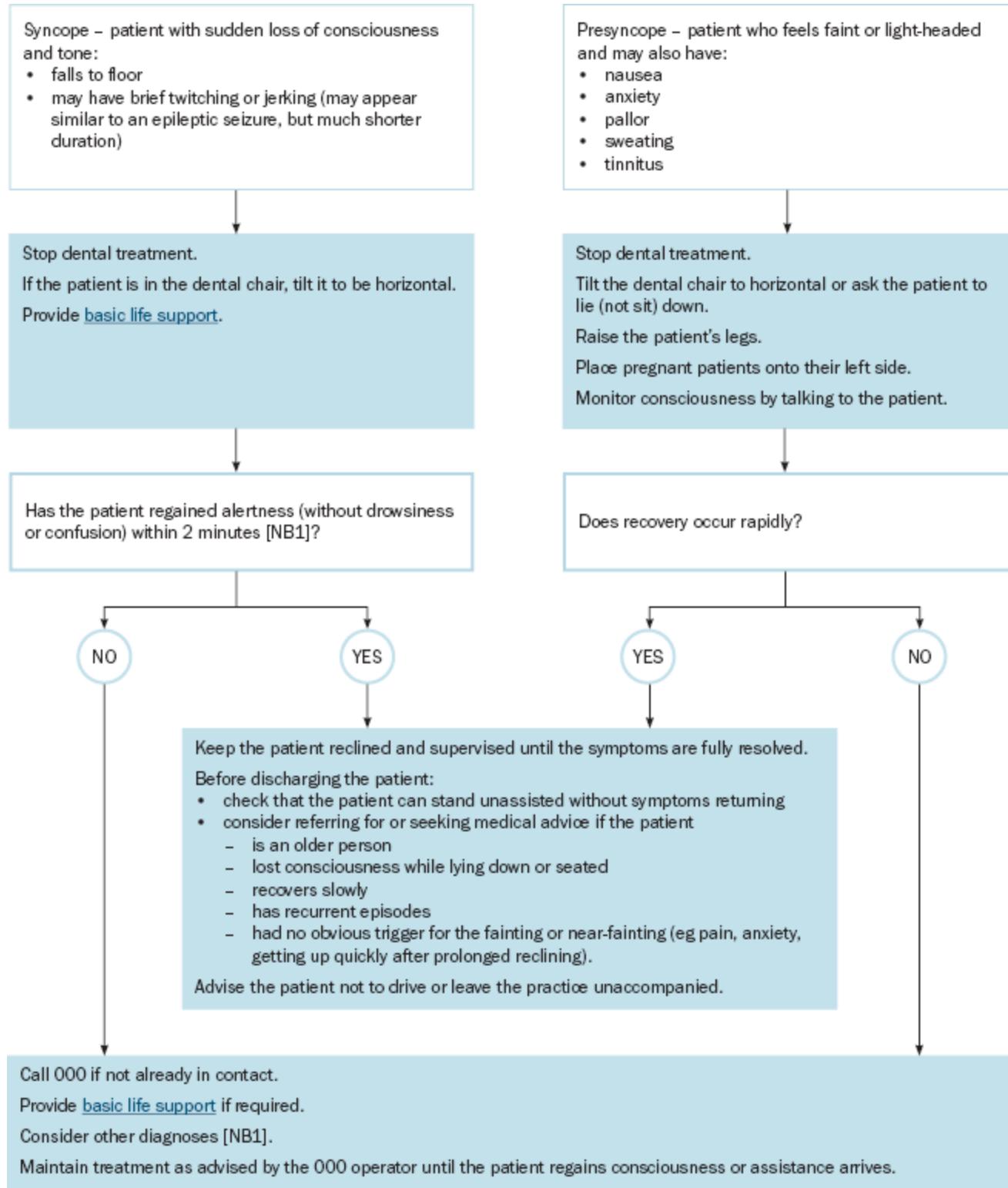
Syncopal episodes are common at all ages. Common causes of syncope in dental practice are:

- **vasovagal syncope** – can occur either as a reaction to pain, or to anxiety and fear before, during or after a dental procedure
- **orthostatic hypotension** – a fall in blood pressure that can occur when standing up after sitting or lying down for an extended period of time in the dental chair.

In dental practice, follow the advice in [Figure 13.80](#) for first-aid management of patients with syncope.

Figure 13.80 Management of presyncope and syncope in dental practice

[Printable figure](#)



NB1: Patients who have fainted usually regain alertness within 2 minutes; in contrast, patients recovering from an epileptic seizure are usually drowsy or confused. Other causes of feeling faint or losing consciousness include anaphylaxis (eg if the patient has hives, soft-tissue swelling, itch or wheeze), cardiac conditions (eg if patient has chest pain or persisting palpitations) or hypoglycaemia (in a diabetic patient, especially if they have skipped a meal).

Clinical features and management of chest pain in dental practice

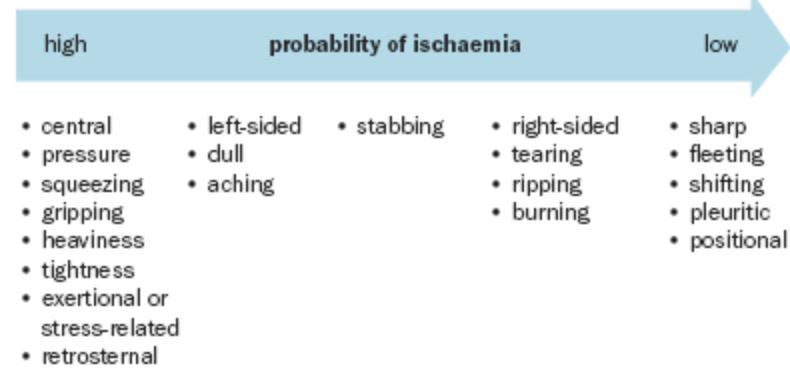
Clinical features and management of chest pain in dental practice

Chest pain can arise from multiple causes, ranging from life threatening to benign. Distinguishing between these causes can be challenging. Although cardiac causes are relatively common, other life-threatening conditions, such as pulmonary embolism, aortic dissection, pneumonia and pneumothorax may present with chest pain. Anyone with acute chest pain requires rapid evaluation by a medical practitioner.

Anyone with acute chest pain requires rapid evaluation by a medical practitioner.

Cardiac chest pain occurs when the cardiac muscle is not receiving adequate blood flow from the coronary arteries (coronary ischaemia). Figure 13.81 illustrates how the probability that chest pain is ischaemic varies with the nature of the pain.

Figure 13.81 Probability that chest pain is ischaemic in origin based on common descriptions of pain



Source: Gulati M, Levy PD, Mukherjee D, Amsterdam E, Bhatt DL, Birtcher KK, et al. 2021

AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation 2021;144(22):e368-e454. [URL](#)

Presentations of coronary ischaemia include:

- stable angina – episodic provoked retrosternal chest discomfort (pain or tightness) lasting 10 minutes or less, subsiding promptly with rest. It is commonly provoked by physical activity or emotional stress
- unstable angina – episodes of angina that are prolonged (lasting more than 20 minutes) at rest, new and severe, or becoming more severe (eg lasting longer, becoming more frequent or more readily provoked, angina occurring after a recent heart attack)
- heart attacks (myocardial infarction [damage to cardiac muscle from inadequate blood supply]) – cannot be distinguished clinically from unstable angina.

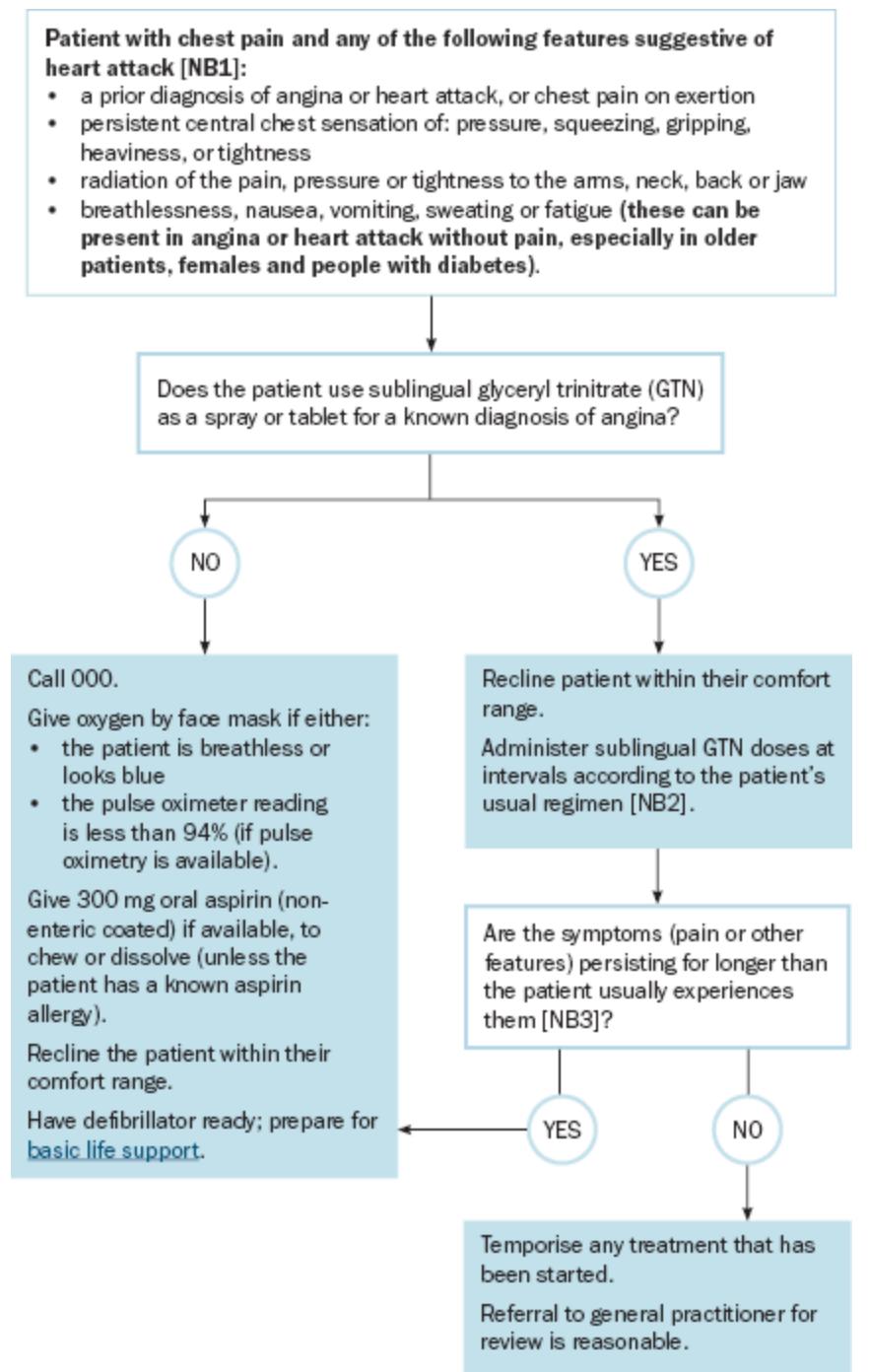
Unstable angina and heart attacks are medical emergencies.

For more detail on the evaluation of acute chest pain, see Acute chest pain of possible cardiac origin in the Cardiovascular guidelines.

Advise patients who use glyceryl trinitrate for angina to bring their medication to their appointment so that it can be administered if required. If an episode of chest pain occurs, follow the advice in Figure 13.82.

Figure 13.82 Management of chest pain in dental practice

[Printable figure](#)



NB1: Many people with chest pain do not have angina or a heart attack, but anyone with acute chest pain requires rapid medical evaluation for potentially life-threatening causes. The likelihood of angina or heart attack increases with the number of suggestive features.

NB2: Sublingual glyceryl trinitrate (GTN) dosing is a 400 microgram spray (or 300 to 600 microgram tablet) generally administered every 5 minutes to a maximum of 3 doses. Ask patients who use GTN to bring their GTN to their dental appointment so that it can be administered if chest pain occurs.

NB3: If symptoms (pain or other features that may indicate angina) last longer than the patient's usual angina symptoms, urgent medical evaluation of a possible heart attack or other urgent condition is required.

If administering nitrates, recline the patient because blood pressure can be reduced by administration. To manage chest pain in a patient with a history of angina, use:

- 1 glyceryl trinitrate spray 400 micrograms sublingually, repeat every 5 minutes if pain persists, up to a total of 3 doses if tolerated

OR

- 1 glyceryl trinitrate tablet 300 to 600 micrograms sublingually, repeat every 5 minutes if pain persists, up to a total of 3 doses if tolerated.

To manage chest pain if angina or heart attack is suspected, provided no contraindication (eg aspirin allergy) is present, use:

aspirin (non-enteric coated) 300 mg orally, chewed or dissolved before swallowing.

Clinical features and management of cardiac arrest in dental practice

Clinical features and management of cardiac arrest in dental practice

Clinical features of cardiac arrest include:

- sudden loss of consciousness (patient not responding to vigorous tactile stimulus such as a trapezius [upper back muscle] squeeze [\[Note 1\]](#))
- absent or abnormal breathing (eg slow gasping or gurgling).

To manage a cardiac arrest in dental practice, call 000 and provide basic life support; see [Figure 13.76](#).

Note 1: This test assesses response to a painful stimulus by pinching the trapezius muscle (which runs from the back of the neck to the shoulder) between thumb and forefinger and observing whether a person responds by moving.

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Clinical features and management of hyperventilation syndrome in dental practice

Clinical features and management of hyperventilation syndrome in dental practice

Hyperventilation syndrome can occur when a patient hyperventilates (overbreathes). It is common, and is often associated with anxiety or panic attacks. Signs and symptoms may be similar to syncope, asthma attack, anaphylaxis or a myocardial infarction. These differential diagnoses should be considered before attributing the symptoms to hyperventilation. For symptoms and signs of hyperventilation syndrome, see Table 13.38.

Observe patients for hyperventilation after the administration of a local anaesthetic, because hyperventilation syndrome may be triggered by associated anxiety.

In dental practice, follow the advice in Figure 13.83 for first-aid management of patients with hyperventilation syndrome.

Table 13.38 Symptoms and signs of hyperventilation syndrome

Symptoms	Signs
light-headedness	
dizziness	rapid breathing
shortness of breath	occasional deep sighing breaths
feeling of panic and impending death	rapid heart rate
blurred vision	altered consciousness
tingling in the fingers, toes and lips	involuntary contraction of the hands and fingers
feeling of detachment	

Figure 13.83 Management of hyperventilation syndrome in dental practice

Stop dental treatment.

Encourage the patient to slow their breathing, and to breathe in through their nose and out through their mouth.

Reassure the patient, explain the cause of the symptoms, and have them talk to you.

Rebreathing into a bag is not recommended.

If acute symptoms persist for more than 5 to 10 minutes, call 000 and monitor the patient until assistance arrives.

Clinical features and management of acute asthma in dental practice

Clinical features and management of acute asthma in dental practice

Acute asthma attacks can be fatal. Ask patients with asthma to bring their reliever inhaler with them when attending for dental treatment. Many patients with asthma have an asthma action plan, or a good understanding of how to manage their asthma.

If an acute asthma attack occurs, perform a rapid physical examination to evaluate the severity of the attack (see [Table 13.39](#)). Wheezing is an unreliable indicator of the severity of an asthma attack and may be absent in a severe attack. Cyanosis (blue skin or lips) indicates life-threatening asthma – patients require urgent transfer to hospital. In patients with a history of anaphylaxis, assess for signs of anaphylaxis; see [Clinical features and management of urticaria, angioedema and anaphylaxis in dental practice](#).

Patients with severe asthma may not wheeze. Cyanosis indicates life-threatening asthma. [Table 13.39 Initial assessment of the severity of an acute asthma attack in adults and children](#)

Severity	Signs [NB1]
	can walk and can speak whole sentences in one breath
Mild or moderate	for young children: can move around and can speak in phrases oxygen saturation greater than 94% [NB2]
	any of these findings:
	<ul style="list-style-type: none"> • inability to complete sentences in one breath • may have wheeze but this may be absent in very severe asthma • use of shoulder muscles or bracing with arms to aid breathing
Severe	<ul style="list-style-type: none"> • ‘sucking in’ of tissues around trachea on breathing in • ‘sucking in’ of rib muscles on breathing in (‘abdominal breathing’) • visibly breathless • oxygen saturation 90 to 94% [NB2]
	any of these findings:
Life-threatening	<ul style="list-style-type: none"> • reduced consciousness or collapse • exhaustion • cyanosis (blue skin or lips) • oxygen saturation less than 90% [NB2] • poor respiratory effort, soft or absent breath sounds (quiet patient)

NB1: If a patient has a history of anaphylaxis, assess also for signs of anaphylaxis; see [Figure 13.78](#).

NB2: If oxygen therapy has already been started, it is not necessary to stop oxygen to measure pulse oximetry. Oxygen saturation levels are a guide only and are not definitive; clinical judgement should be applied.

Source: Adapted from National Asthma Council Australia. Australian asthma handbook Version 2.2 [online]. Melbourne: National Asthma Council Australia; 2019; Accessed April 2024. [URL](#)

An acute asthma attack is initially treated with a short-acting bronchodilator (eg salbutamol, terbutaline). Using a spacer device with a pressurised metered dose inhaler enables better drug delivery to the lungs and is easier to use effectively than an inhaler alone. A spacer is a plastic chamber shaped like a football or a tube. An inhaler is slotted into one end so that puffs can be discharged singly into the chamber, allowing the patient to breathe each puff from the chamber. Spacers are essential for management of a severe asthma attack, because patients with acute asthma cannot inhale the drug effectively. However, salbutamol should never be withheld on the grounds that a spacer is not available. Spacers can be purchased from a pharmacy and are not costly. The [National Asthma Council website](#) has videos to show adults and children the techniques for using puffers with spacers. For management of mild to moderate asthma in dental practice, see [Figure 13.84](#). For management of severe asthma, see [Figure 13.85](#).

Spacers are essential for management of a severe asthma attack. [Figure 13.84 Management of a mild or moderate acute asthma attack in dental practice](#)

Patients with mild or moderate asthma:

- can walk and can speak whole sentences in one breath
- if they are young children, can move around and can speak in phrases
- have oxygen saturations greater than 94% (if oximetry is available) [NB1].

To manage mild or moderate asthma:

Stop dental treatment. Sit the patient upright.

Give 4 puffs of salbutamol inhaler via a spacer, 1 puff at a time. Shake the inhaler before each puff.

Ask the patient to take 4 breaths in and out of the spacer after each puff.

Wait 4 minutes.

If there is little or no improvement, give another 4 puffs using the technique above.

Assess the patient's status. If there is little or no improvement, manage as for a severe attack (see [Figure 13.85](#)).

If the patient recovers swiftly after an acute mild or moderate asthma attack:

Temporise the dental state.

Make another appointment to complete the dental treatment (if needed).

Observe the patient until they are breathing easily.

Advise the patient to take their asthma medication as prescribed and seek medical review.

If the asthma attack becomes severe or life threatening, manage according to [Figure 13.85](#)

NB1: If oxygen therapy has already been started, it is not necessary to stop oxygen to measure pulse oximetry. Oxygen saturation levels are a guide only and are not definitive; clinical judgement should be applied.

Figure 13.85 Management of severe asthma in dental practice

[Printable figure](#)

Patient with **wheeze or other features of suspected asthma** (eg cough or breathlessness) and **severe features** such as [NB1]:

- inability to complete sentences in one breath
- use of shoulder muscles or braced arms to aid breathing
- 'sucking in' of tissues around trachea or around ribs on breathing in
- oxygen saturation less than 94% (if pulse oximetry is available)



Call 000.

Sit the patient upright.

Give oxygen by face mask [NB2].

Give salbutamol by inhaler (with spacer if available; 4 breaths in and out after each puff):

- adult or child 6 years or older: 12 puffs
- child younger than 6 years: 6 puffs.



Are **life-threatening features** present?

such as:

- reduced consciousness
- exhaustion
- cyanosis (blue lips, skin, nailbeds)
- pulse oximetry less than 90% (if oximetry available)
- poor respiratory effort, soft or absent breath sounds (quiet patient)



YES



NO

Give oxygen continuously and prepare to provide [basic life support](#).

Repeat salbutamol dose every 20 minutes if needed while awaiting the ambulance.

NB1: If a patient also has a history of anaphylaxis, assess for signs of anaphylaxis; see [Figure 13.77](#).

NB2: If the patient has an alert card or alert bracelet related to carbon dioxide retention, follow advice regarding oxygen supplementation given on the card.

Managing airway obstruction in dental practice

Managing airway obstruction in dental practice

Airway obstruction can complicate an acute odontogenic infection but other causes include an inhaled or swallowed object. [Table 13.40](#) outlines the signs of partial and complete airway obstruction.

Table 13.40 Signs of airway obstruction

Signs of partial airway obstruction

breathing is laboured

breathing may be noisy

Signs of complete airway obstruction

there may be attempts to breathe

absent breathing sounds

some movement of air can be felt from the mouth

no air movement from nose or mouth

Source: Australian and New Zealand Committee on Resuscitation (ANZCOR), 2025, Guideline 4 – Airway, accessed 18 May 2025, <https://www.anzcor.org/home/basic-life-support/guideline-4-airway>

For urgent management advice on severe acute odontogenic infections with airway obstruction, see [Figure 13.79](#).

For advice on managing obstruction from inhaled or swallowed objects, see [Figure 13.87](#).

Managing inhaled or swallowed objects in dental practice

Managing inhaled or swallowed objects in dental practice

An inhaled or swallowed object can present a significant risk to the patient.

Use preventive measures to minimise the risk of an object being inhaled or swallowed during dental treatment (see [Figure 13.86](#)).

Swallowed objects usually pass through the gastrointestinal tract without causing harm; however, occasionally they require removal.

Inhaled objects must be removed urgently because they can cause [partial or complete airway obstruction](#).

In dental practice, follow the advice in [Figure 13.87](#) for first-aid management of patients who may have inhaled or swallowed an object. For signs and management of choking, see [Figure 13.88](#).

Figure 13.86 Preventive measures to minimise the risk of inhaled or swallowed objects during dental treatment
If possible, use a rubber dam for procedures with a high risk of inhaling or swallowing a foreign object.

If the procedure precludes the use of a rubber dam, other precautions include:

- ensuring a careful and unrushed approach
- tying dental floss to any object that can be dropped (if appropriate)
- rotating the patient's head so that a dropped object will fall to the side of the mouth
- using high-volume suction.

Figure 13.87 Management of suspected swallowing or inhalation of a foreign object in dental practice
Stop dental treatment.

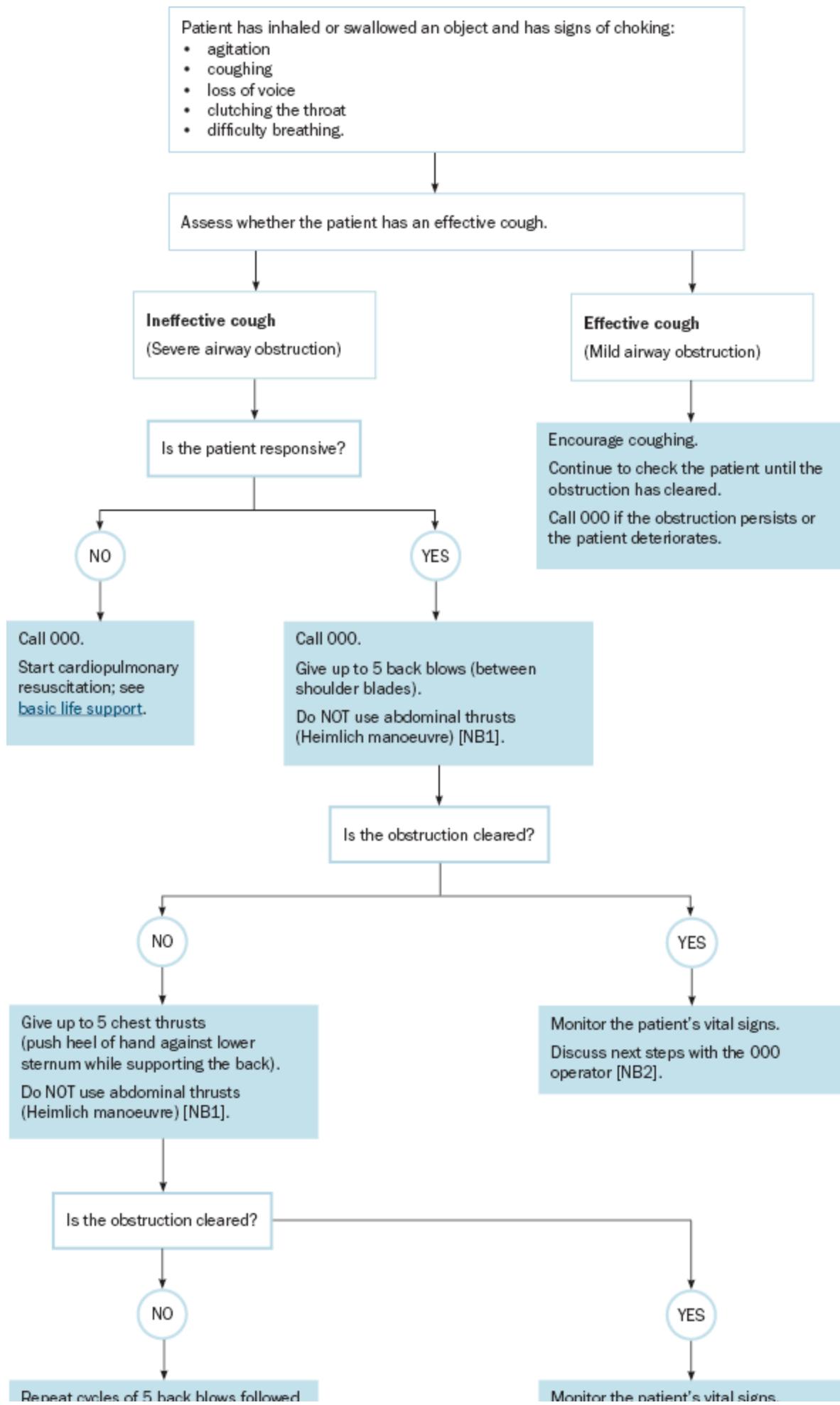
Check whether the object is present in the patient's mouth or clothes and, if so, remove it.

If the object is not found:

- put the patient into an upright position
- if any signs of choking are present, manage according to [Figure 13.88](#)
- if the patient is stable and asymptomatic, refer the patient for further medical assessment and management. It may be appropriate to complete dental treatment before referring.

Figure 13.88 Management of choking in dental practice

[Printable figure](#)



by 5 chest thrusts until obstruction clears or assistance arrives.

Be prepared to perform cardiopulmonary resuscitation; see [basic life support](#).

Discuss next steps with the 000 operator [NB2].

NB1: Life-threatening complications associated with the use of abdominal thrusts (Heimlich manoeuvre) have been reported in multiple observational studies.

NB2: Review by a paramedic or transfer to hospital may be indicated, even if the obstruction appears to have resolved because there might be complications, particularly if the obstruction was severe or prolonged, or the patient has comorbidities.

This algorithm was adapted from information in [ANZCOR Guideline 4: Airway](#).

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Clinical features and management of hypoglycaemia in dental practice

Hypoglycaemia is defined as a blood glucose concentration below 4 mmol/L; however, symptoms and signs of hypoglycaemia may occur at a higher blood glucose concentration. See [Figure 13.89](#) for clinical features of hypoglycaemia. Hypoglycaemia can also occur without symptoms and signs, particularly in patients who have had diabetes for more than 10 years. Hypoglycaemia is rare in people without diabetes.

Factors that increase the risk of hypoglycaemia in diabetic patients include:

- inappropriately high doses of insulin or sulfonylureas
- fasting, or forgotten or delayed meals
- insufficient carbohydrate intake (especially if the patient is using a rapid-acting insulin, sulfonylurea or gliptin)
- rigorous or prolonged exercise (which can have a delayed effect).

If the patient who is taking medication for diabetes has missed a meal but does not have symptoms or signs of hypoglycaemia, if possible, ask them to eat a long-acting carbohydrate (eg dried fruit, yoghurt, sandwich) to reduce the risk of hypoglycaemia. Start the dental procedure 30 minutes later or reschedule the appointment. Do not give patients fast-acting glucose (eg a sweetened drink) 'just in case'; hypoglycaemia can recur and their diabetes management can be destabilised.

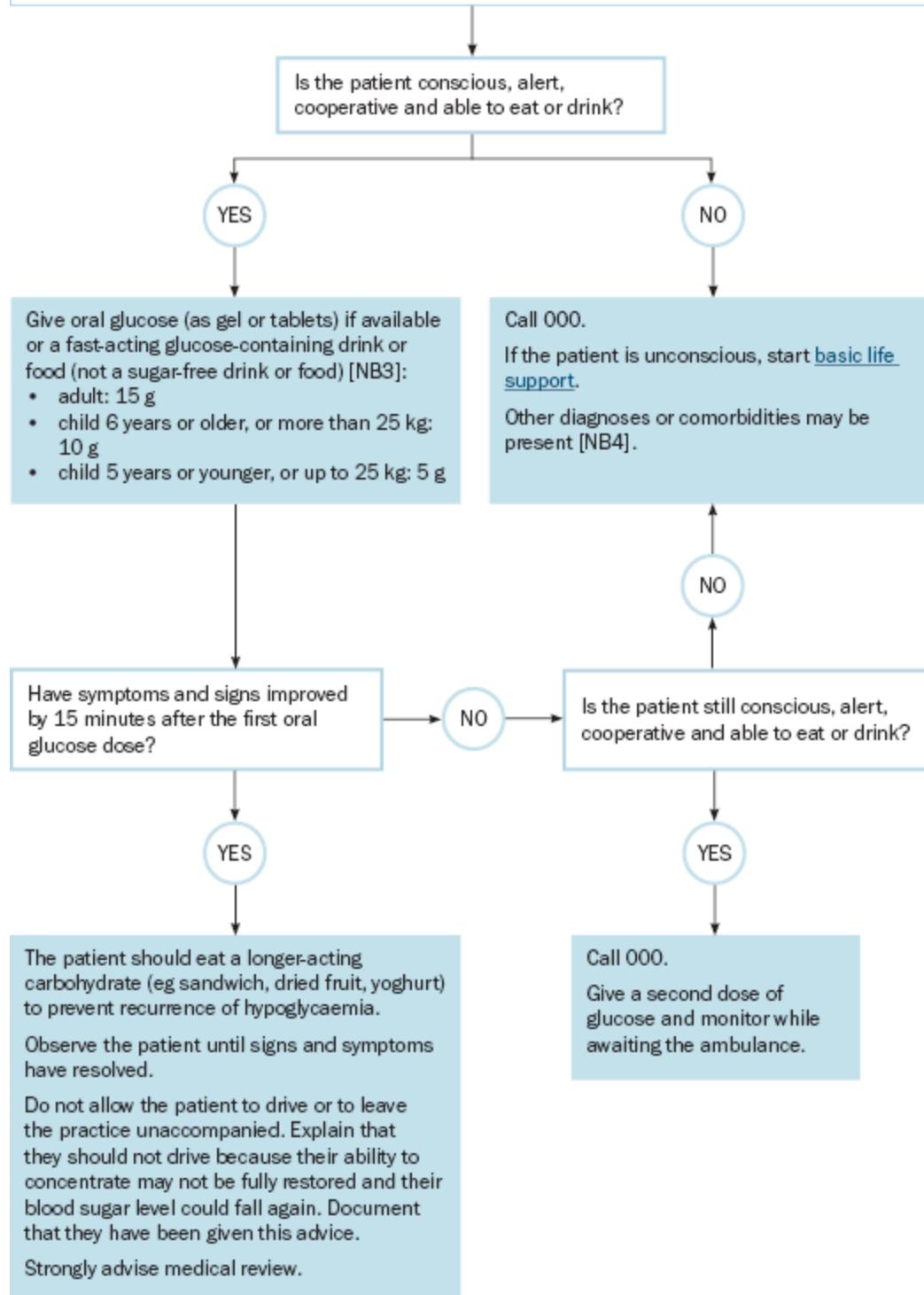
If a patient has symptoms or signs of hypoglycaemia in dental practice, if possible, obtain a blood glucose measurement to confirm hypoglycaemia. If a blood glucose monitor is not available, start management of hypoglycaemia based on clinical symptoms or signs. See [Figure 13.89](#) for management of suspected hypoglycaemia in diabetic patients.

Figure 13.89 Management of suspected hypoglycaemia in diabetic patients in dental practice

[Printable figure](#)

Patient with diabetes and symptoms or signs suggestive of hypoglycaemia such as [NB1] [NB2]:

- pallor
- sweating
- shaking
- palpitations
- anxiety
- hunger
- poor concentration
- confusion
- inappropriate behaviour
- loss of consciousness
- seizures



NB1: If possible, obtain a blood glucose measurement to confirm hypoglycaemia (blood glucose below 4 mmol/L) and assist monitoring of progress. If a blood glucose monitor is not available, start management of hypoglycaemia based on symptoms or

signs. Symptoms and signs may occur at concentrations above 4 mmol/L but it is still appropriate to follow the management advice in this flowchart.

NB2: Hypoglycaemia can occur without symptoms or signs, particularly in patients with diabetes for more than 10 years.

NB3: Examples of food and drink containing 15 g of glucose include glucose jelly beans (6 or 7 regular, or 4 large); 3 teaspoons of sugar or honey; 125 mL of fruit juice (approximately one glass or a small popper or box); 150 mL of soft drink (not 'diet'); 100 mL of oral glucose solution (eg Lucozade).

NB4: Other diagnoses or comorbidities could include (but are not limited to) cardiac conditions (eg arrhythmia, angina, heart attack) or neurological presentations (eg stroke or epilepsy).

Clinical features and management of hyperglycaemia in dental practice

If a patient presents with hyperglycaemia in the absence of symptoms, this is rarely a medical emergency. Advise patients to take their usual medications for diabetes and to seek medical review if their blood glucose concentration remains high.

Patients with hyperglycaemia may develop a life-threatening emergency such as diabetic ketoacidosis (DKA) or hyperglycaemic hyperosmolar state (HHS). Symptoms or signs may develop over several hours and include abdominal pain, nausea, vomiting, fatigue, shortness of breath and an altered conscious state. If a patient with known diabetes appears unwell, seek medical advice, call 000 or start basic life support as appropriate.

Patients taking a sodium-glucose co-transporter 2 (SGLT2) inhibitor (eg dapagliflozin, empagliflozin) may develop DKA with a normal blood glucose concentration – call 000 if they develop any symptoms or signs of DKA.

References: Diabetic emergencies in dental practice

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Clinical features and management of methaemoglobinaemia in dental practice

Clinical features and management of methaemoglobinaemia in dental practice

Methaemoglobinaemia is a rare condition in which the blood's ability to transport oxygen to the tissues is reduced due to changes in haemoglobin. This can follow use of local anaesthetics; for more details on the drug and dose associations, see [Methaemoglobinaemia following local anaesthesia in dental practice](#). The clinical features of methaemoglobinaemia are described in [Figure 13.90](#).

Methaemoglobinaemia can escalate and be life threatening; it requires emergency referral to hospital. In dental practice, follow the advice in [Figure 13.91](#) for first-aid management of patients with methaemoglobinaemia. For the medical management of methaemoglobinaemia, see [Methaemoglobinaemia](#) in the Toxicology and Toxinology guidelines.

Figure 13.90 Clinical features of methaemoglobinaemia
slate-grey or blue skin, lips and nail beds (the most distinctive feature)

headache

shortness of breath

fatigue, drowsiness, confusion

tachycardia

Figure 13.91 Management of methaemoglobinaemia in dental practice
Stop dental treatment.

Call 000.

Start supplemental oxygen via face mask at 15 L/minute. Pulse oximetry may be performed if available but may be inaccurate; oxygen supplementation can improve tissue oxygenation without observable change in pulse oximetry or the patient's discolouration.

Start [basic life support](#) if required.

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Clinical features and management of stroke in dental practice

Clinical features and management of stroke in dental practice

A stroke is a medical emergency. Recognising the signs of stroke early and starting emergency treatment reduces the risk of brain damage and improves survival.

For common signs of stroke, see [Figure 13.92](#). All patients with suspected stroke require urgent transfer to an emergency department. In dental practice, follow the advice in [Figure 13.92](#) for first-aid management of patients with stroke.

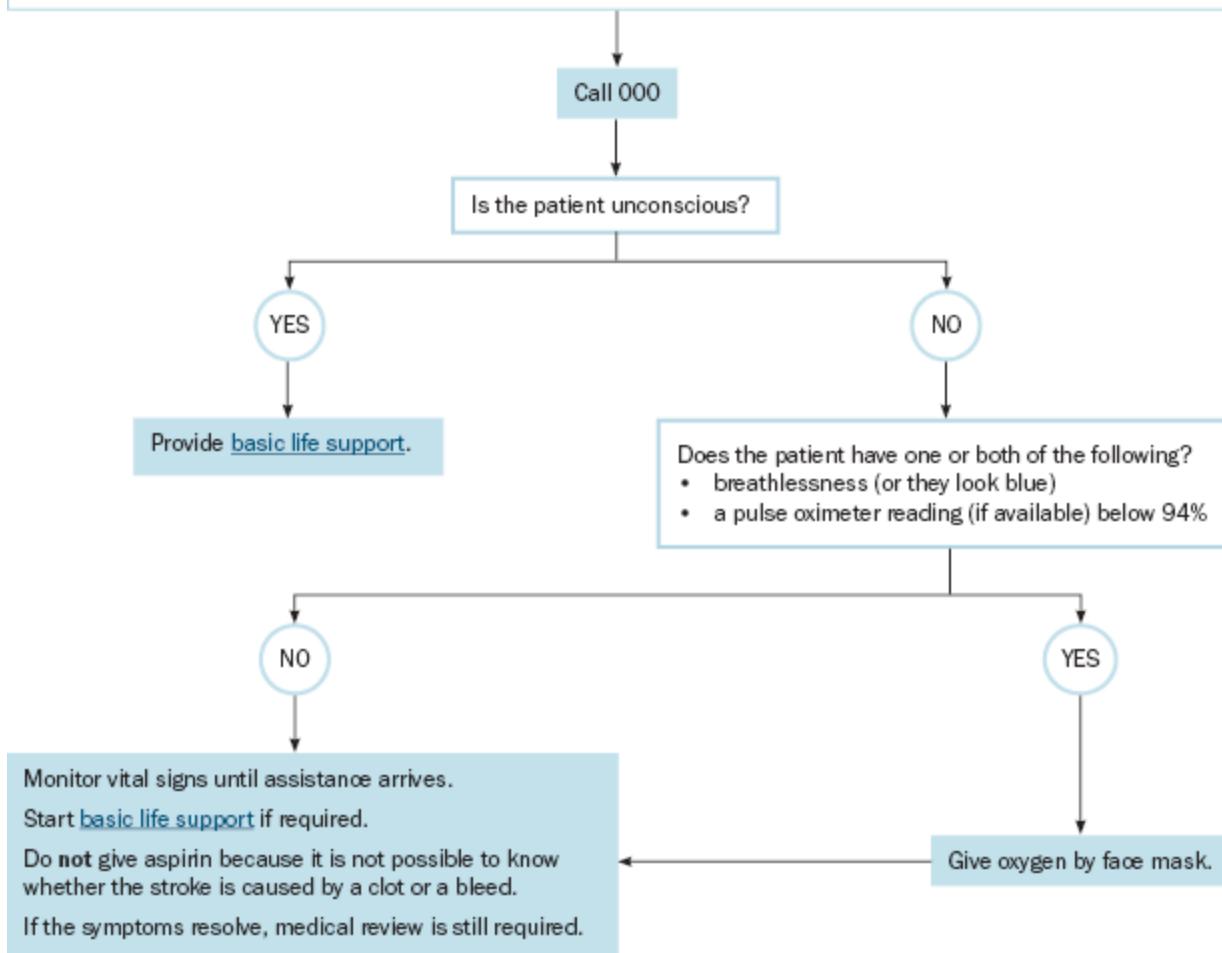
Most strokes result from either blockage of a cerebral artery (caused by atherosclerosis or an embolus) or haemorrhage from a cerebral blood vessel. Rarely, dermal filler that is injected inadvertently into an artery causes stroke; see advice on [unilateral blindness following injection of dermal fillers](#).

Figure 13.92 Management of stroke in dental practice

[Printable figure](#)

Patient has one or more signs of possible stroke [NB1]:

- **B** – balance. Does the patient have sudden loss of balance?
- **E** – eyes. Does the patient have sudden loss of vision in one or both eyes?
- **F** – face. Has the mouth drooped? Is one side numb?
- **A** – arms or legs. Is an arm (and/or leg on same side) suddenly weak, hanging down or numb?
- **S** – speech. Is the speech slurred or has the patient become suddenly confused?
- **T** – terrible headache. Is the patient experiencing a sudden onset headache (worst of the patient's life)? [NB2]



NB1: Symptoms of stroke can also be caused by other conditions (eg epilepsy, migraine, hypoglycaemia).

NB2: The T in this acronym can also represent Time (the importance of calling an ambulance immediately).

Clinical features and management of seizures in dental practice

Clinical features and management of seizures in dental practice

Seizures can present with one or more features (see [Figure 13.93](#)). Brief twitching or convulsive movements that can accompany syncope can sometimes be mistaken for epilepsy, but patients with syncope recover swiftly and completely.

Causes of seizures include epilepsy, hypoglycaemia, stroke, drug or alcohol withdrawal, intoxication with drugs (eg local anaesthetic systemic toxicity) or poisons, and other causes listed in [Some causes of acute symptomatic seizures](#). In young children, fever can cause seizures. In dental practice, follow the advice in [Figure 13.93](#) for first-aid management of patients with seizures.

Figure 13.93 Management of seizures in dental practice

[Printable figure](#)

Patient with one or more of the following potential signs of a seizure [NB1]:

- muscle spasm (tonicity)
- jerking movements of one or more body parts
- loss of or change in consciousness [NB2]
- tongue biting
- frothing at the mouth
- incontinence



Stop dental treatment. Move the bracket table and instruments away from the patient.

Protect the patient from falling from the chair or assist them onto the floor.

Note the time the seizure starts.

Turn the patient onto their side (if possible) to reduce the risk of aspiration.

Maintain the airway but do not place anything in the patient's mouth during a seizure.

If a patient with known epilepsy has a personal epilepsy management plan available, refer to it to help guide care.



Call 000 if any of the following apply:

- The patient has not been previously diagnosed with epilepsy.
- The seizure lasts for more than 2 minutes.
- The patient is still unresponsive 5 minutes after a seizure has stopped.
- The seizure has stopped and then restarts.
- An acute medical condition (eg hypoglycaemia or stroke) is suspected to be the seizure trigger.
- The patient is thought to be pregnant.
- The patient was eating or drinking at the time the seizure started.
- The patient's responsiveness is difficult to assess.



YES

Has the operator advised that transfer to hospital is required?

NO

Maintain the airway.

Monitor the patient until the ambulance arrives.

Be prepared to provide basic life support if required.

↓

↓

The patient is likely to remain drowsy for 30 to 60 minutes after the seizure stops. Once the seizure has stopped in a patient with a known diagnosis of epilepsy:

- Assess consciousness by talking to the patient.
- Remove any vomit from the mouth or pharynx using high-volume suction.
- Observe the patient for at least 30 minutes after they have recovered completely.
- Do not allow the patient to drive or leave unaccompanied. Document that they have been given this advice and warned about the risks of driving.

NB1: Causes of seizures include epilepsy, hypoglycaemia, stroke, drug or alcohol withdrawal, and intoxication with drugs (eg local anaesthetic systemic toxicity) or poisons. In young children, fever can cause seizures.

NB2. For isolated loss of consciousness, consider other causes such as fainting and start basic life support.

Clinical features and management of temporary unilateral paralysis of the facial muscles in dental practice

Clinical features and management of temporary unilateral paralysis of the facial muscles in dental practice

If a local anaesthetic is inadvertently injected into the parotid gland (eg a misdirected mandibular block or posterior maxillary infiltration), it will diffuse to the branches of the seventh cranial (facial) nerve. This may cause temporary paralysis of the facial muscles on the injected side (also known as an acute facial palsy). The whole of the side of the face is affected, unlike in stroke where the mouth droops but the muscles of the forehead are spared.

Figure 13.94 shows a patient with right-sided facial palsy.

In dental practice, follow the advice in Figure 13.95 for first-aid management of patients with temporary unilateral paralysis of the facial muscles.

Figure 13.94 Patient with right-sided facial palsy



This patient had a right posterior superior infiltration for restoration of the maxillary molars. Note the inability to close the right eye and right side of the lips. The left side is functioning normally.

Patient permission was obtained for use of this image.

Figure 13.95 Management of temporary unilateral paralysis of the facial muscles in dental practice

Stop the local anaesthetic injection and dental treatment.

Explain what has happened and reassure the patient that the paralysis is temporary.

Advise the patient not to rub the eyes.

Close and patch the affected eye.

Keep the patient under observation until the ability to blink starts to return. This usually happens within the hour, depending on the dose and strength of the local anaesthetic.

The patient should not drive that day and should be escorted home.

Check on the patient by phone later that day. If the patient has not fully recovered within 12 hours, medical review is required.

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References: Neurological emergencies in dental practice

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Overview of ocular emergencies in dental practice

Patients' eyes are vulnerable to injury during dental treatment. Injuries can also happen to members of the dental team.

Eye injuries can be caused by:

- chemicals (eg endodontic irrigating solutions), particularly alkaline solutions
- foreign bodies (eg calculus, fragments of fillings)
- penetrating objects (eg drills, endodontic instruments).

The risk of injury is minimised by wearing eye protection during oral examination and treatment, and is essential at all times for both patients and staff. Do not pass chemicals and instruments over the patient's face.

Rapid emergency treatment can minimise the extent of injury and the risk of blindness.

For an extensive resource with illustrations of various conditions, see the [Eye Emergency Manual](#).

Managing chemical eye injuries in dental practice

Caustic solutions used in dental treatments can cause severe chemical eye injuries. In particular, alkaline solutions cause liquefactive necrosis because they burn the ocular tissues. In dental practice, follow the advice in [Figure 13.96](#) for first-aid management of patients with a chemical eye injury.

Figure 13.96 Management of chemical eye injuries in dental practice

Stop dental treatment.

Immediately irrigate the eye with water.

Hold the eyelid open.

Remove contact lens if present.

Continue irrigation with water, poured from a cup or beaker or from a tap, for at least 15 minutes.

Do not use an eyecup because a continuous flow of water over the eye is required.

If chemical injury and minor eye irritation have occurred, organise medical review for the same day. However, if a known caustic chemical injury or a marked inflammatory response has occurred:

- call 000
- inform the 000 operator which chemical caused the injury
- continue irrigation until assistance arrives.

Managing foreign bodies lodged on the surface of the eye in dental practice

Foreign bodies can lodge on the surface of the eye. It may be difficult to determine whether a foreign body has penetrated the eye; however if a penetrating eye injury is suspected (eg if a sharp instrument is involved), see Managing suspected penetrating eye injuries in dental practice.

In dental practice, follow the advice in Figure 13.97 for first-aid management of patients with foreign bodies lodged on the surface of, but not penetrating, the eye.

Figure 13.97 Management of foreign bodies lodged on the surface of the eye in dental practice

Stop dental treatment.

Immediately irrigate the eye.

Hold the eyelid open.

Do not touch the eye surface.

Do not attempt to remove the foreign body.

If the foreign body does not dislodge following a short attempt at irrigation, transfer the patient to an emergency department.

If the patient has any symptoms (eg discomfort, irritation of the eye surface) despite apparent removal of the foreign body, organise prompt medical review.

Managing suspected penetrating eye injuries in dental practice

Sharp objects can penetrate the unprotected eye; it may be difficult to determine whether a foreign body has penetrated the eye. In dental practice, follow the advice in Figure 13.98 for first-aid management of patients with suspected penetrating eye injuries.

Figure 13.98 Management of suspected penetrating eye injuries in dental practice

Stop dental treatment.

Call 000 – the patient must be taken urgently to an emergency department.

Do not attempt to remove the penetrating object from the eye.

Do not irrigate the eye.

Prevent the patient from rubbing the eye.

Cover the eye with an eye shield, or use the base of a polystyrene cup and tape it on so that it rests on the bony rim of the eye socket.

Keep the patient calm until assistance arrives.

Describe the object that penetrated the eye to the medical team (or show them a similar instrument).

Managing unilateral blindness in dental practice

Unilateral blindness can occur following accidental intra-arterial injection of a local anaesthetic containing a vasoconstrictor, or following accidental intravascular injection of dermal fillers in the face.

Unilateral blindness following injection of local anaesthetic containing a vasoconstrictor

Accidental intra-arterial injection of a vasoconstrictor causes spasm of the ophthalmic artery and related blood vessels. Loss of consciousness may occur. Patients usually have spontaneous full recovery of their vision.

In dental practice, follow the advice in [Figure 13.99](#) for first-aid management of patients with unilateral blindness following injection of local anaesthetic containing a vasoconstrictor.

Figure 13.99 Management of unilateral blindness following injection of local anaesthetic containing a vasoconstrictor in dental practice

Stop dental treatment.

Call 000 – the patient must be taken urgently to an emergency department.

If the patient is unconscious, start [basic life support](#).

Unilateral blindness following injection of dermal fillers

Accidental intravascular injection of dermal fillers (eg hyaluronic acid) can cause unilateral blindness by occluding the ophthalmic artery. Vision loss may be permanent.

In dental practice, follow the advice in [Figure 13.100](#) for first-aid management of patients with unilateral blindness following injection of dermal fillers.

Figure 13.100 Management of unilateral blindness following injection of dermal fillers in dental practice

Stop treatment.

Call 000 – the patient must be transferred urgently to an emergency department.

Note the time of onset of blindness.

While awaiting transfer to an emergency department, assess:

- visual deficit
- signs of stroke such as facial weakness (mouth droop), unilateral limb weakness, difficulty with speech
- cutaneous symptoms or signs (eg pain, blanching of the skin).

If hyaluronic acid was used as the dermal filler, inject hyaluronidase if appropriate [NB1].

NB1: Hyaluronidase is essential for the management of serious adverse effects associated with hyaluronic acid; practitioners using hyaluronic acid must be familiar with the use of hyaluronidase.

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Triaging dental presentations for medical practitioners

Triaging dental presentations for medical practitioners

Patients with dental problems commonly present first to a medical practitioner. The medical practitioner should usually redirect these patients to a dentist, particularly if the presentation relates to previous dental treatment (eg complications after tooth extraction). However, medical practitioners often provide acute care for dental problems, particularly in rural or remote settings, if access to an oral health professional is not available – see [Table 13.41](#) for advice on triage.

Table 13.41 Common dental problems encountered by medical practitioners

[acute dental pain](#)

[conditions presenting after an oral or dental procedure](#)

[oral and maxillofacial trauma](#)

[conditions affecting the gums](#)

[conditions affecting the jaw](#)

[other oral presentations](#)

Presenting problem

Comments

Urgency and referral

acute dental pain

see [Table 13.21](#) for a guide to differentiating and managing causes of acute dental pain

urgency and referral depend on the diagnosis

conditions presenting after an oral or dental procedure

[bleeding after oral surgery \(eg tooth extraction\)](#)

manage with direct pressure and measures including local haemostatic techniques as outlined in [Table 13.14](#)

if bleeding is not controlled, arrange urgent transfer to the nearest hospital with an oral and maxillofacial surgery service

[pain and swelling after oral surgery \(eg after tooth extraction\)](#)

pain and swelling usually peak 48 to 72 hours after surgery, before starting to resolve

refer to or consult with the practitioner who performed the oral surgery as soon as practical

prolonged numbness (anaesthesia) or altered sensation in the mouth (paraesthesia) that persists the day after a dental procedure

can be caused by nerve trauma or local anaesthetic neurotoxicity; see [Nerve injury after dentoalveolar surgery](#)

refer to or consult with the practitioner who performed the procedure as soon as practical

oral and maxillofacial trauma

broken tooth or filling, or lost filling (or other restoration)

if a tooth is broken, assess for concurrent injuries (eg head, neck) that require urgent hospital transfer

in a patient without pain, refer to a dentist (to be reviewed within a few days)

assess whether dentine or pulp has been exposed

in a patient with pain or evidence of pulp exposure, refer to a dentist (preferably for review within 24 hours, to prevent further damage or infection)

antibiotics are not indicated

assess for concurrent injuries (eg head, neck) that require urgent hospital transfer

primary teeth (baby teeth) must not be replanted

prevent permanent (adult) avulsed teeth from drying out; replant urgently; see Figure 13.66

for a permanent tooth, refer for immediate review by a dentist

tooth avulsion (knocked-out tooth) or displaced tooth

for initial management

for a primary tooth, refer for nonurgent review by a dentist

ensure tetanus immunisation is current if a tooth is avulsed or oral lacerations are present

see advice on splints

for emergency splinting of displaced (luxated) or avulsed teeth

assess for concurrent injuries (eg head, neck) that require urgent hospital transfer

maxillofacial trauma, deranged occlusion (teeth not biting together normally)

address any life-threatening complications immediately

for patients with significant trauma, arrange urgent transfer to a hospital

all patients require thorough assessment

conditions affecting the gums

bleeding gums caused by minor trauma (eg eating, cleaning teeth)

exfoliating teeth are a common cause in children

for adults (or children if exfoliation is not the cause), refer to a dentist

spontaneously bleeding gums

with pain, halitosis, necrosis or ulceration of the interdental papillae, the likely cause is necrotising gingivitis

necrotising gingivitis requires urgent referral to a dentist; see management advice for initial medical management

also consider drugs or medical conditions affecting haemostasis, including malignancy (eg haematological)

if the cause of bleeding is not known, urgent dental review is indicated to exclude local causes before considering investigations for malignancy

causes include:

- adverse drug effects (eg calcium channel blockers, phenytoin, ciclosporin)
- pregnancy gingivitis
- malignancy
- an acute odontogenic infection if swelling is localised

gingival enlargement with or without bleeding

if the cause of bleeding is not known, urgent dental review is indicated to exclude local causes before considering investigations for malignancy

if a nonmalignant cause is known, refer to a dentist

(resection of gum enlargement may be an alternative to stopping a causative drug)

encourage improved oral hygiene

consider possible malignancy if other causes are not evident

swollen, painful or bleeding gums around a dental implant, or a loose or broken implant

can occur following implant surgery; causes include peri-implantitis and failed placement of an implant

refer to the dentist who placed the implant or performed the procedure (urgency depends on severity)

remove denture and examine the mouth and denture, consider denture hygiene

consider trauma from an ill-fitting denture – it may need adjustment

sore areas beneath dentures

consider oral or oropharyngeal candidiasis or denture-associated erythematous stomatitis (see Oral and oropharyngeal infection caused by Candida and related species)

refer to a dentist; urgent referral is indicated if red flags for oral cancer are present

consider possible malignancy

consider medication-related osteonecrosis of the jaw (MRONJ)

conditions affecting the jaw

jaw clicking without pain, discomfort or trismus

this condition is normal – referral is not needed

jaw clicking or locking with acute unilateral or bilateral pre-auricular pain

consider temporomandibular disorders and their differential diagnoses

refer to an oral medicine specialist or oral and maxillofacial surgeon (urgency depends on severity)

restricted mouth opening (trismus) consider:

- medical emergencies (eg tetanus, spreading odontogenic infections or peritonsillar abscess)
- dystonic reactions, including drug-related dystonic reactions (eg metoclopramide)

if medical causes are excluded, refer to a dentist (for review within 24 hours)

- procedural complications (eg haematoma)
- partially erupted wisdom tooth
- temporomandibular disorders
- head and neck cancers (or their treatment); see Oral cancer

jaw clenching or grinding when awake (awake bruxism) or asleep (sleep bruxism)

consider associated conditions and differential diagnoses

consider nonurgent dental referral for adults to discuss occlusal splints in sleep bruxism

other oral presentations

oral malodour (halitosis)

commonly caused by oral conditions, but may be a symptom of systemic disease

see Table 13.15 for causes and management may require referral to a dentist (urgency depends on likely intraoral cause)

acute onset of numbness (anaesthesia), altered sensation (paraesthesia) or weakness of the mouth

consider malignancy, multiple sclerosis

urgent investigations or specialist referral

Preventive interventions by medical practitioners for oral and dental health

Preventive interventions by medical practitioners for oral and dental health

Preventive oral health interventions are relevant for all patients, but particularly for people who experience higher rates of caries (dental decay), periodontal disease and oral cancer. Factors that contribute to poor oral health include:

- barriers to accessing dental treatment (eg social or economic disadvantage, geographic factors)
- barriers to undertaking oral hygiene practices (eg cognitive or physical disability)
- conditions such as ageing, poor nutrition, suboptimally managed diabetes, and oral adverse effects of medications or other substances.

Figure 13.101 lists some groups who experience higher rates of poor oral health. A shared strengths-based approach to healthcare that recognises each patient's unique cultural determinants and circumstances is essential.

Figure 13.101 Groups who experience higher rates of poor oral health

People who experience higher rates of caries and periodontal disease include some individuals from the following groups:

- homeless people
- refugees
- people from culturally and linguistically diverse populations

- Aboriginal and Torres Strait Islander peoples
- people in correctional facilities
- older people (including people in residential care)
- rural and remote populations
- people with cognitive or physical disabilities that impair oral hygiene practices
- people with psychiatric disorders or disorders of substance use
- people with dry mouth
- people with suboptimally managed diabetes.

Groups who experience higher rates of oral cancers include some individuals who:

- are older than 50 years who smoke tobacco
- chew tobacco or betel nut
- have excessive alcohol use
- have had excessive sun exposure (lip cancer risk).

Preventive interventions for medical practitioners to use in promoting oral health include:

- providing advice on caries risk management
- oral hygiene promotion
- recommending regular dental reviews
- helping patients to reduce use of substances that are risk factors for oral cancer, such as tobacco, alcohol and betel nut
- dental trauma prevention by recommending customised mouthguards
- performing opportunistic oral examinations in people at increased risk of caries, periodontal disease or oral cancer; see Figure 13.101.

Examination is aided by using a torch and, ideally, a dental mirror (particularly to examine the posterior teeth and mucosa). Look for:

- dental caries
- worn or broken teeth
- signs of dry mouth
- inflamed or bleeding gums
- halitosis
- red flags for oral cancer.

A video providing guidance on how to perform an oral health assessment in an older patient is available on the [South Australia Dental website](#).

For more information on considerations in oral health for specific patient groups, see advice for [people planning pregnancy or who are pregnant](#), [people with special needs](#), [older people](#), [patients with palliative care needs](#) and [children](#). For advice on preventive oral and dental health care for Aboriginal and Torres Strait Islander peoples, see the chapter on oral and dental health in the [National Aboriginal Community Controlled Health Organisation–Royal Australian College of General Practitioners guideline](#).

Oral and dental health in people planning pregnancy or who are pregnant: advice for medical practitioners

Oral and dental health in people planning pregnancy or who are pregnant: advice for medical practitioners
Medical practitioners are the first contact for patients in pregnancy and pregnancy planning; they play an important role in promoting oral health (see [Preventive interventions by medical practitioners for oral and dental health](#)) and discussing the links between oral health and pregnancy.

A dental check-up is recommended for people planning to become pregnant, so that any required treatment can be completed beforehand. Emergency treatment can be performed throughout pregnancy, but in general, elective treatment is best in the second trimester (the fourth, fifth and sixth months); for considerations on timing, see [Dental treatment during pregnancy and breastfeeding](#).

Physiological changes in pregnancy (including hormonal) increase the risk of oral diseases. Conversely, oral health may impact on pregnancy outcomes; severe periodontal disease is associated with preterm birth, low birthweight and pre-eclampsia.

Pregnancy increases the risk of:

- [dental caries](#)
- enamel erosion
- [gingivitis and periodontitis](#)
- pregnancy epulis (granuloma).

Caries risk (risk of dental decay) is increased by snacking to satisfy cravings, and an acidic environment caused by [pregnancy-associated vomiting](#) [Note 1] in the first trimester, and gastro-oesophageal reflux in the third trimester. An acidic environment also increases the risk of **enamel erosion**. Advise patients with nausea or vomiting to wait 60 minutes after vomiting before brushing their teeth; allowing an interval reduces the risk of damage to enamel recently exposed to gastric acid. In the interim, to help neutralise acid and remove bad taste, patients should rinse the mouth with water and consider applying fluoride toothpaste or [fluoride+CPP-ACP 900 ppm+10% cream](#), using a finger not a brush. After applying the cream or paste, patients should avoid eating, drinking or rinsing the mouth.

Bleeding from the gums in pregnancy is most often a sign of **pregnancy gingivitis**; less common causes include periodontitis and pregnancy epulis. Hormonally driven gingivitis affects 40 to 94% of pregnant people and usually resolves after giving birth; however, it can exacerbate pre-existing **periodontitis**. **Pregnancy epulis** is a pyogenic granuloma, which can bleed readily and may need removal, although this is not usually required. Although most gum bleeding in pregnancy will resolve after giving birth, recommend dental review to assess the periodontal condition.

To optimise oral health in pregnancy, recommend increased oral hygiene and professional in-chair cleaning for all pregnant patients. Patient information on oral health in pregnancy is available from the [Australian Dental Association website](#).

Note 1: Nausea or vomiting associated with pregnancy usually begins around week 6 and resolves around week 14; severe nausea and vomiting is called hyperemesis gravidarum and can warrant hospital admission.

Oral and dental health in people with special needs: advice for medical practitioners

Oral and dental health in people with special needs: advice for medical practitioners

Poor oral hygiene is common in patients whose oral hygiene practices are hampered by cognitive or physical impairment. Medical practitioners have an important role in promoting the oral health of people with special needs through:

- encouraging oral hygiene practices
- performing opportunistic oral examinations depending on the patient's ability to co-operate and the clinician's skills in undertaking them
- facilitating dental referrals.

Encourage supervised or assisted daily oral hygiene practices, tailored to the patient's abilities, to ensure effective plaque removal. Advice for carers on supervising and assisting are available from a range of sources; see Table 13.27.

Consider recommending the use of an electric toothbrush with an oscillating head; these often have a wider handle and improve grip for people with limited manual dexterity. These brushes also assist with technique when brushing is being performed by carers.

Although more research is required to establish the effectiveness of water flossers, these devices offer a practical advantage over traditional interdental cleaning techniques for people with limited manual dexterity or for carers performing interdental hygiene.

An oral health assessment by a dentist should be part of a patient's annual health assessment; encourage patients to attend annually.

Be aware of local dental services and help patients to access care by providing referrals (for annual preventive oral health assessment, and evaluation of any symptoms as needed) because it can be challenging for patients with special needs to navigate healthcare systems.

For a broader discussion of dental care for people with cognitive disability, see Oral and dental health in people with cognitive disability: information for dental practice.

Oral and dental health in older people: advice for medical practitioners

Oral and dental health in older people: advice for medical practitioners

Medical practitioners have an important role in promoting oral health in older people, who may rarely see a dentist. Perform an oral examination – see Preventive interventions by medical practitioners for oral and dental health. Encourage older people to have regular dental reviews.

Medical practitioners have an important role in promoting oral health in older people, who may rarely see a dentist.

Poor oral hygiene is common in older people, particularly in residential aged-care facilities. Maintaining oral hygiene is often hampered by cognitive or physical impairment (eg dementia, depression, poor manual dexterity, arthritis, blindness). Promote oral hygiene – the use of a powered toothbrush is an effective strategy to prevent dental caries and periodontal disease.

Undiagnosed or suboptimally managed dental conditions that cause pain can contribute to behavioural issues (including limiting food intake) in patients with dementia. Older people, particularly those in residential aged-care facilities, often have complex oral health issues.

Dry mouth and falls that pose risk of oral trauma are common, particularly in patients taking multiple medications.

Denture use is associated with:

- traumatic oral ulcers
- denture-associated erythematous stomatitis
- oral candidiasis
- medication-related osteonecrosis of the jaw (MRONJ)
- angular cheilitis.

Ask about denture fitting and check denture hygiene is correct and effective. However, denture use is declining as older people are increasingly retaining their teeth; this is contributing to a significant increase in the incidence of dental caries and periodontal disease.

Dental caries in older people is exacerbated by dry mouth, poor oral hygiene and changes in diet. The stages of dental caries are depicted in Figure 13.19 and associated photographs. Consider recommending the use of toothpaste containing 5000 ppm of fluoride while a patient awaits dental review. Reassure patients that, in some situations, dental caries can be managed with professionally applied topical treatments (eg fluoride varnish, silver fluoride formulations) that do not require tooth extraction or fillings.

Periodontal disease (eg gingivitis, periodontitis) is common in older people. There is growing evidence that poor periodontal health is associated with many systemic diseases, including aspiration pneumonia, cerebrovascular events, atherosclerosis, diabetes, autoimmune diseases (eg rheumatoid arthritis) and other chronic diseases.

For patients with lesions in the mouth, have a high index of suspicion for oral cancer. Oral cancer is more common in older people and can mimic many oral mucosal diseases (see Assessment of oral mucosal disease).

Oral and dental health in children: advice for medical practitioners

Oral and dental health in children: advice for medical practitioners

Overview of oral and dental health in children

Overview of oral and dental health in children

Medical practitioners may encounter oral and dental presentations in children. Common presentations are outlined below:

- tooth eruption and teething pain
- dental caries – if untreated, this can lead to hospital admission for extractions under general anaesthesia; encourage regular dental review and good oral hygiene and perform opportunistic oral examinations
- tooth avulsion (knocked-out tooth)– a primary (baby) tooth should not be replanted. A permanent (adult) tooth requires immediate replanting and urgent dental referral. When replanting a tooth, check tetanus vaccination is current. In children aged 5 to 8 years, it can be challenging to determine whether a tooth is primary or permanent, but crown size and tooth colour are the most reliable indicators; if in doubt, treat the tooth as a permanent tooth.

Painful intraoral lesions in children may be caused by oral infection with herpes simplex virus (see [Advice on herpes simplex virus infections in Therapeutic Guidelines](#)). This may resemble [necrotising gingivitis](#), which is rarely, if ever, seen in children.

[Periodontitis](#) in children is rare and usually associated with systemic disease (eg leukaemia, type 1 diabetes, cyclic neutropenia).

Tooth eruption and teething pain

Tooth eruption and teething pain

Tooth eruption (teething) in infants is often accompanied by local pain and swelling, drooling, irritability and occasionally a mild fever. Rubbing the gums with a clean finger, teething rings and cold compresses can provide symptomatic relief of teething pain. Teething rings should be cold but not frozen. Systemic analgesics (eg paracetamol or ibuprofen) can be used.

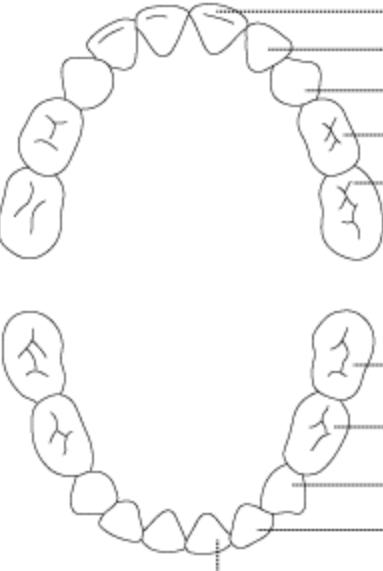
Changes will occur in the gums as teeth are erupting; an eruption cyst can occur at the site of eruption; it has a bluish appearance caused by fluid or blood in the contents and is identified clinically. Reassure parents that the eruption cyst will resolve when the tooth erupts. Dental referral is rarely required.

Teething gels should not be used because of the lack of evidence of efficacy and the potential for harm. Some teething gels contain salicylates, which can cause pain on ulcerated mucosa, and excessive doses or prolonged use can cause systemic toxicity. Teething gels containing local anaesthetic should not be used for teething pain in infants and children because of the risk of serious adverse effects (eg seizures, cardiac effects, death).

Teething gels should not be used because of the lack of evidence of efficacy and the potential for harm. Amber teething necklaces are ineffective and dangerous because they are a choking and strangulation hazard.

For the average ages at which primary tooth eruption occurs, see [Figure 13.102](#) and, for the average ages at which permanent tooth eruption occurs, see [Figure 13.103](#).

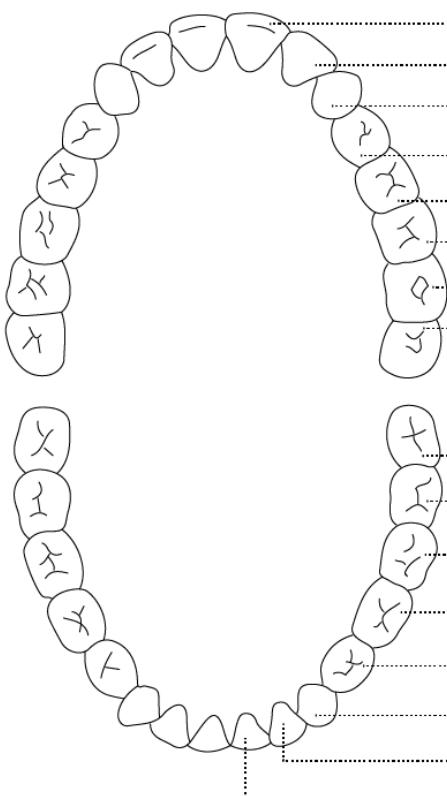
Figure 13.102 Primary teeth eruption and exfoliation pattern with average ages of eruption



Upper Teeth	Erupt	Exfoliate
central incisor	8 to 12 months	6 to 7 years
lateral incisor	9 to 13 months	7 to 8 years
canine (cuspid)	16 to 22 months	10 to 12 years
first molar	13 to 19 months	9 to 11 years
second molar	25 to 33 months	10 to 12 years

Lower Teeth	Erupt	Exfoliate
second molar	23 to 31 months	10 to 12 years
first molar	14 to 18 months	9 to 11 years
canine (cuspid)	17 to 23 months	9 to 12 years
lateral incisor	10 to 16 months	7 to 8 years
central incisor	6 to 10 months	6 to 7 years

Figure 13.103 Permanent teeth eruption pattern with average ages of eruption



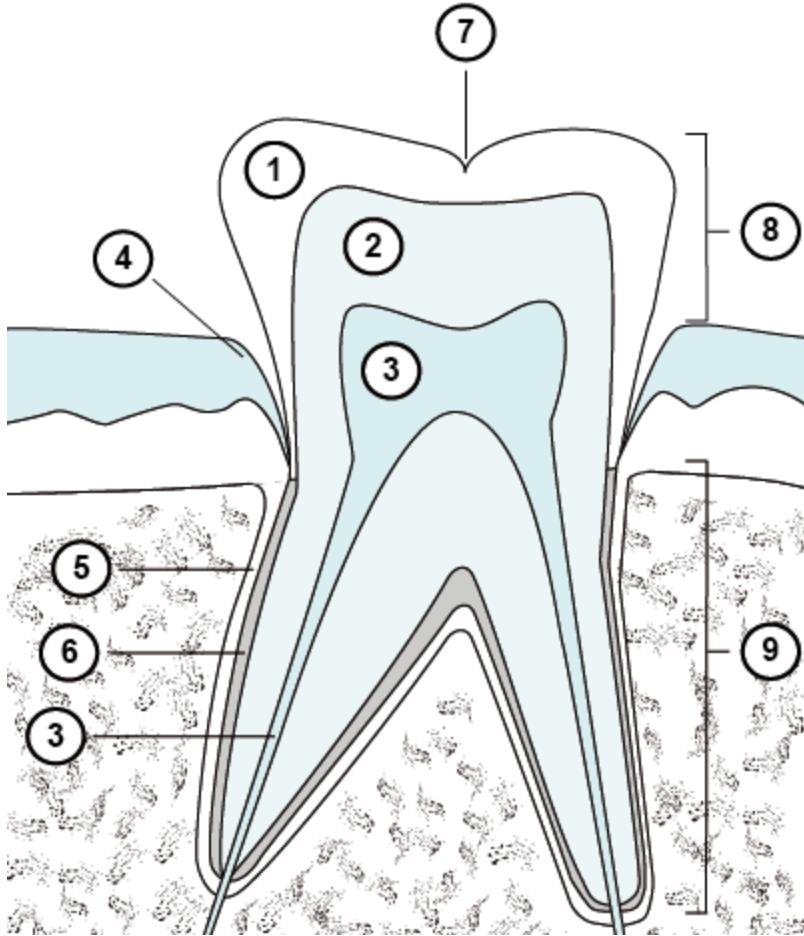
Upper Teeth	Erupt
central incisor	7 to 8 years
lateral incisor	8 to 9 years
canine (cuspid)	11 to 12 years
first premolar (first bicuspid)	10 to 11 years
second premolar (second bicuspid)	10 to 12 years
first molar	6 to 7 years
second molar	12 to 13 years
third molar (wisdom tooth)	17 to 21 years

Lower Teeth	Erupt
third molar (wisdom tooth)	17 to 21 years
second molar	11 to 13 years
first molar	6 to 7 years
second premolar (second bicuspid)	11 to 12 years
first premolar (first bicuspid)	10 to 12 years
canine (cuspid)	9 to 10 years
lateral incisor	7 to 8 years
central incisor	6 to 7 years

Dental anatomy and terminology

Dental anatomy and terminology

Anatomy of the tooth and surrounding tissues



1. **Enamel:** The hard, calcified substance that is the surface of a crown of a tooth.
2. **Dentine:** The calcified tissue that forms the major part of a tooth. In the crown of the tooth, the dentine is covered by enamel. The pulp chamber of the tooth is enclosed by dentine.
3. **Pulp:** The organ at the centre of a tooth containing blood vessels, connective and neural tissue, and cells that produce dentine. Blood vessels and neural tissue enter the tooth from the apex of the root.
4. **Gingiva:** The marginal part of the gum that surrounds the tooth where it emerges from the deeper, supporting tissues.
5. **Periodontal ligament:** The ligament that connects a tooth, by its root, to the supporting bone.
6. **Cementum:** The calcified tissue on the surface of the root of a tooth, which provides attachment for the periodontal ligament.
7. **Fissure:** A naturally occurring crevice in the enamel.
8. **Crown:** The part of the tooth that is visible and is above the gingival margin.
9. **Root:** The part of the tooth below the gingival margin; it is connected through cementum on its surface and the fibres of the periodontal ligament to the supporting bone.

Dental numbering system

Dental numbering system

There are numerous dental numbering systems to identify teeth and their maturity. The most commonly used system in Australia is the Federation Dentaire Internationale (FDI) system (see [Figure 13.105](#)). When communicating with a dentist, identify which

numbering system is being used.

The FDI numbering system divides the mouth into quadrants. The first number indicates the quadrant and whether it is a primary (baby) or permanent (adult) tooth. The second number indicates the tooth; tooth numbering begins at the central incisor and counts backward to the molars.

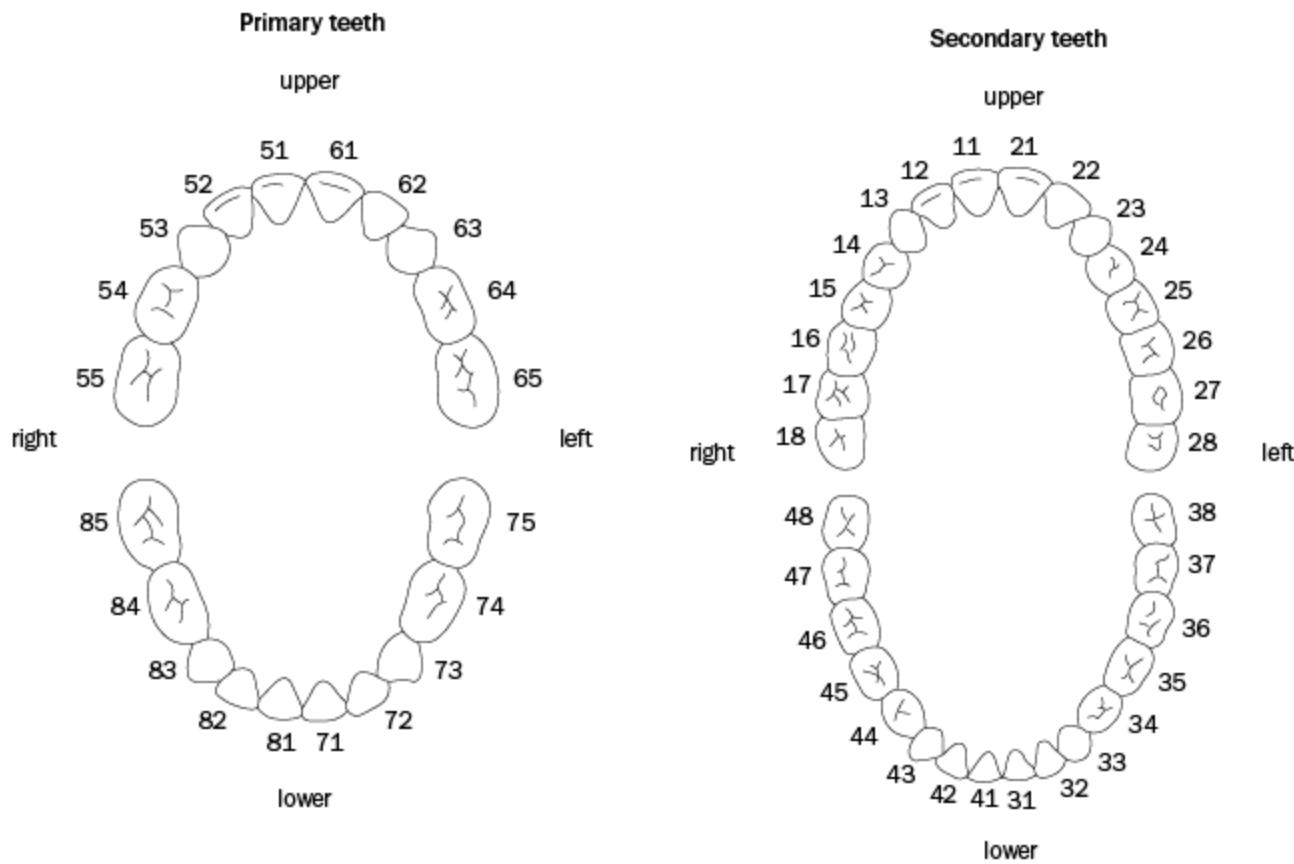
Using the FDI numbering system, for adults, the quadrants are numbered as:

- patient's upper right is quadrant 1
- patient's upper left is quadrant 2
- patient's lower left is quadrant 3
- patient's lower right is quadrant 4.

For primary teeth in children, the quadrants are numbered as:

- patient's upper right is quadrant 5
- patient's upper left is quadrant 6
- patient's lower left is quadrant 7
- patient's lower right is quadrant 8.

Figure 13.105 The Federation Dentaire Internationale (FDI) dental numbering system



As an example of how to describe dental numbering in this system, the top right wisdom tooth in an adult is 18

(pronounced ‘one-eight’ not ‘eighteen’). This indicates that the tooth is in quadrant 1 and is the eighth tooth from the midline.

Advice for medical practitioners on promoting use of sports mouthguards

Advice for medical practitioners on promoting use of sports mouthguards

To reduce the risk of oral and dental trauma, promote the use of sports mouthguards; there is substantial evidence for their effectiveness. Mouthguards are designed to reduce stresses and absorb the energy generated by an impact to the teeth. Stock mouthguards are economical and readily available in pharmacies; however, custom-fitted mouthguards are markedly more comfortable. Custom-fitted mouthguards are made by a dentist or prosthodontist from a digital or physical impression of an individual's teeth; these mouthguards fit very well, allow easier breathing and speaking than stock mouthguards, and can be modified to suit specific requirements or sports. If a custom-fitted mouthguard is not an option, use of a stock mouthguard is recommended. Mouthguards should be introduced as soon as children start organised sport, to instil good habits, and maximise injury prevention.

Oral hygiene information for patient education in medical practice

Oral hygiene information for patient education in medical practice

General information on oral hygiene for patient education in medical practice

General information on oral hygiene for patient education in medical practice

Regular oral hygiene by mechanical brushing and cleaning between the teeth removes soft dental plaque. When dental plaque becomes mineralised (calculus), it must be removed by a dental practitioner. Dental plaque and calculus can cause periodontal disease (eg gingivitis) and dental caries.

Frequent exposure to dietary sugar and carbohydrates leads to an increase in the risk of caries (dental decay). Advise patients to avoid sucrose in sticky forms and limit other sugars (eg acidic drinks) and carbohydrates as snacks between meals. Vaping has been associated with an increase in caries risk (possibly because of sticky residue on teeth) but evidence is limited.

Advise patients to avoid drinks at bedtime other than water after brushing their teeth (including milk, formula and expressed breastmilk fed through a bottle) – saliva flow diminishes during sleep and the sugar from the drink remains on the teeth overnight. This is a common cause of dental caries in children and older people. If night feeding via a bottle is unavoidable, do not allow the child to fall asleep with the bottle in their mouth; consider wiping their teeth with a soft cloth and rinsing with a small amount of water, if practical. There is no need to limit breastfeeding at night to protect against tooth decay.

People with dental implants, bridges, crowns that are joined together, and orthodontic brackets should follow the oral hygiene advice from their dentist.

Printable information for patients on oral and dental health is available from:

- The Australian Dental Association
 - New South Wales Health
 - Queensland Health
 - South Australia Dental
 - Tasmanian Department of Health

- [Dental Health Services Victoria.](#)

Interdental cleaning advice for patient education in medical practice

Interdental cleaning advice for patient education in medical practice

Interdental cleaning using floss or interdental brushes is recommended at least once each day. Brushing teeth with a toothbrush does not remove plaque from between the teeth or below the gum line.

Dental floss can be used to remove plaque between teeth. Manual dental floss and floss-holding devices are available – the choice is based on personal preference or level of dexterity.

Interdental brushes are as effective as dental floss in plaque removal, and often more effective for debris removal. They require less dexterity than dental floss. Interdental brushes are particularly useful in larger spaces between the teeth (eg in patients with periodontal disease). When using an interdental brush, it is important to select the correct brush size and avoid forcing a brush into a space because this can lead to gingival trauma.

Interdental wood sticks can remove food particles, but do not effectively remove plaque.

Water flossers have been shown to reduce the amount of plaque between teeth. Although initial evidence suggests some benefit in their use, further research is needed, especially to compare them with other methods of interdental cleaning.

Ultrasonic scalers for removing calculus are not recommended for home use because of the risk of damage to the gingivae, enamel and existing restorations.

Tooth and tongue cleaning advice for patient education in medical practice

Tooth and tongue cleaning advice for patient education in medical practice

Soft-bristle toothbrushes are recommended for toothbrushing; hard-bristle toothbrushes are not more effective and can damage the gums and the softer root surface. Children younger than 6 years should use a children's toothbrush. Powered toothbrushes with a rotation oscillation action are slightly more effective at plaque removal than manual brushes. Powered toothbrushes are useful for people with limited dexterity or disability, and for carers. Toothbrushes should be replaced once damaged or when the bristles become deformed.

Advise patients to use a fluoride-containing toothpaste; for recommended concentrations of fluoride in toothpaste, see [Table 13.16](#). Toothpastes that do not contain fluoride provide little protection against dental caries.

Toothpastes that do not contain fluoride provide little protection against dental caries.

Advise patients to brush teeth for 2 minutes, twice each day with fluoride toothpaste. Toothpaste should be spat out and not swallowed; this minimises fluoride ingestion. To promote increased uptake of residual fluoride from the saliva into the enamel, advise all patients using fluoride toothpaste not to rinse the mouth after brushing.

Advise patients that if they brush or scrape the tongue, this should be done gently to avoid trauma; they should not brush or massage the gums [\[Note 2\]](#).

Note 2: Further information on oral hygiene techniques can be found in Daly C. Prescribing good oral hygiene for adults. Australian Prescriber 2009;32(3):72-5. URL

Advice for medical practitioners on the role of mouthwash in patient oral hygiene

Advice for medical practitioners on the role of mouthwash in patient oral hygiene

Mouthwash is usually not required as part of a standard oral hygiene routine, provided mechanical cleaning (toothbrushing, interdental cleaning) is performed properly. Mouthwash should not be used as substitute for proper mechanical teeth cleaning.

Fluoride-containing mouthwashes can be used as an additional source of fluoride for people at high risk of dental caries on the recommendation of a dentist (see [Fluoride use in dental practice](#)).

Mouthwash that inhibits plaque formation (eg chlorhexidine [[Note 3](#)]) can be used for a short duration in addition to mechanical tooth cleaning, usually when pain associated with periodontal disease or severe [oral mucositis](#) restricts mechanical cleaning (see [Management of necrotising gingivitis](#) and [Gingivitis](#)).

Alcohol-containing mouthwashes may increase the risk of oral cancer and are not recommended. See [Mouthwashes and other topical formulations used in dentistry](#) for further information on mouthwashes.

Rinsing with water following flossing and toothbrushing is not recommended because it will remove the fluoride residue designed to be left behind from toothpaste use. If a patient has excess food debris, it is best they rinse their mouth with water before starting routine oral hygiene.

Note 3: When used for more than a few days, chlorhexidine may cause a superficial discolouration of the teeth and fillings (see [Chlorhexidine for intraoral use](#) for more information).

Advice for medical practitioners on promoting denture hygiene

Advice for medical practitioners on promoting denture hygiene

Dentures should be regularly cleaned twice a day to remove food particles and plaque. Advise patients to remove dentures from the mouth and clean them with warm water, mild soap and a brush (toothbrush, denture brush or soft nail brush). The denture should be rinsed in plain water before it is replaced; this helps create suction in full dentures. Avoid cleaning dentures with hot water, toothpaste, kitchen detergents, laundry bleaches, methylated spirits, antiseptics or abrasives (unless instructed to by a dental practitioner). Patients should clean their gums and remaining teeth with a soft toothbrush and toothpaste.

Advise patients to place dentures in a dry environment overnight after cleaning them. Traditionally, it was recommended that dentures were kept in liquid overnight. However, allowing the cleaned denture to dry out at night is more effective for reducing yeast colonisation and plaque accumulation, compared with both denture cleansers and water. Although repeated cycles of hydration and dehydration can change the shape of the denture, these changes are small and not clinically significant.

Dentures should be cleaned then placed in a dry environment at night.

If there is a build-up of hard deposits (tartar, calculus), dentures can be soaked overnight in a solution of white vinegar (diluted 1:4), then cleaned as usual. Advise patients to see their dentist for professional denture cleaning if hard deposits cannot be removed.

Denture-associated erythematous stomatitis is prevented by regular cleaning of the dentures and storing them in a dry environment overnight. Advise patients with denture-associated erythematous stomatitis to optimise denture hygiene – it can take 1 month for symptoms to improve; see [Differential diagnoses of oral and oropharyngeal infection caused by Candida and related species](#) for further information.

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