S I G N

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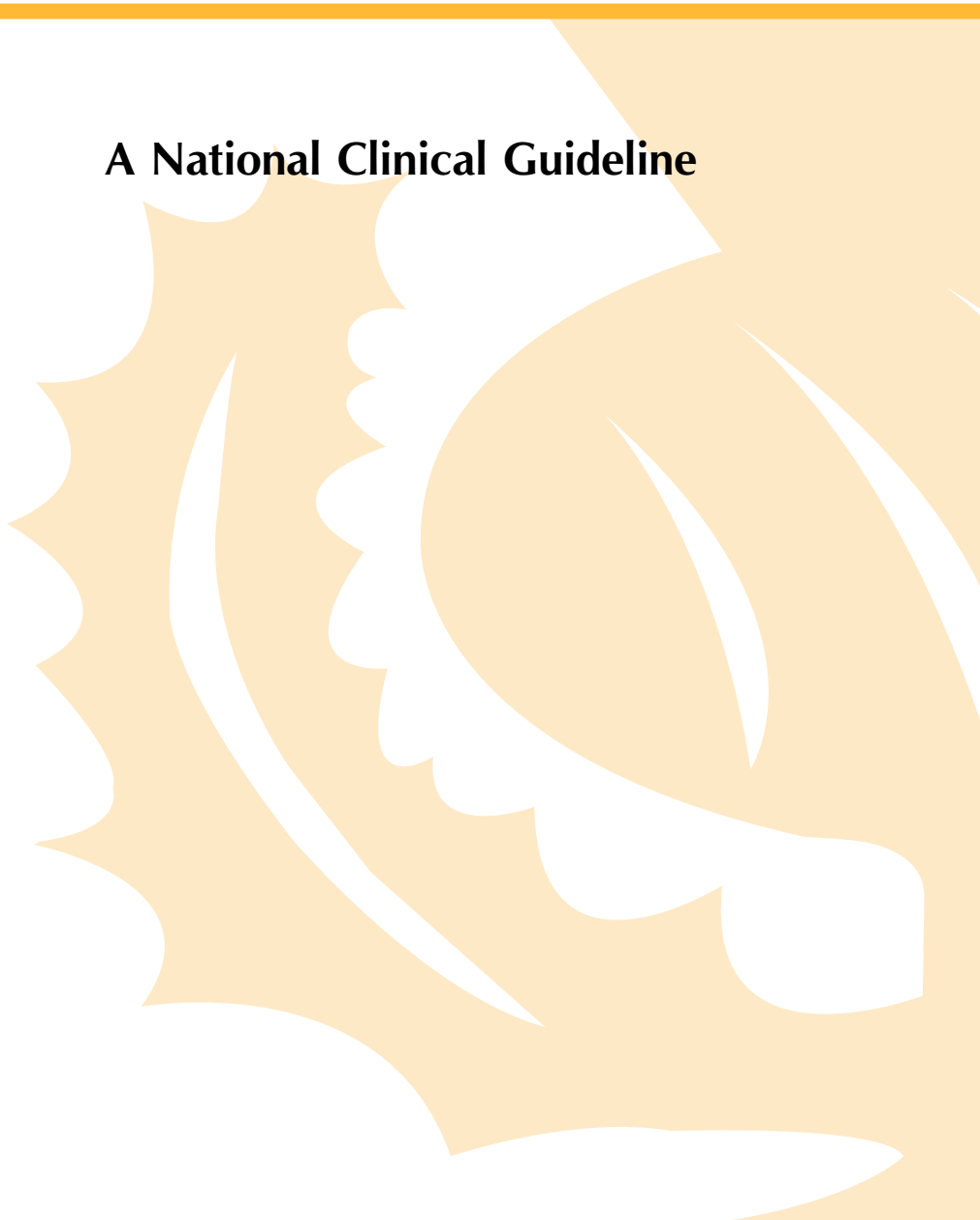
Scottish Intercollegiate Guidelines Network

Management of Unerupted and Impacted Third Molar Teeth

A National Clinical Guideline



September 1999

KEY TO EVIDENCE STATEMENTS AND GRADES OF RECOMMENDATIONS

The definitions of the types of evidence and the grading of recommendations used in this guideline originate from the US Agency for Health Care Policy and Research[1] and are set out in the following tables.

STATEMENTS OF EVIDENCE

Ia	Evidence obtained from meta-analysis of randomised controlled trials.
Ib	Evidence obtained from at least one randomised controlled trial.
IIa	Evidence obtained from at least one well-designed controlled study without randomisation.
IIb	Evidence obtained from at least one other type of well-designed quasi-experimental study.
III	Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.
IV	Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

GRADES OF RECOMMENDATIONS

A **Requires at least one randomised controlled trial as part of a body of literature of overall good quality and consistency addressing the specific recommendation.**
(Evidence levels Ia, Ib)

B **Requires the availability of well conducted clinical studies but no randomised clinical trials on the topic of recommendation.**
(Evidence levels IIa, IIb, III)

C **Requires evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities. Indicates an absence of directly applicable clinical studies of good quality.**
(Evidence level IV)

GOOD PRACTICE POINTS

☑ Recommended best practice based on the clinical experience of the guideline development group.

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Notes for users of the guideline

DEVELOPMENT OF LOCAL GUIDELINES

It is intended that this guideline will be adopted after local discussion involving clinical staff and management. The Area Clinical Effectiveness Committee should be fully involved. Local arrangements may then be made for the derivation of specific local guidelines to implement the national guideline in individual hospitals, units and practices and for securing compliance with them. This may be done by a variety of means, including patient-specific reminders, continuing education and training, and clinical audit.

STATEMENT OF INTENT

This report is not intended to be construed or to serve as a standard of medical/dental care. Standards of medical/dental care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve.

These parameters of practice should be considered guidelines only. Adherence to them will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement regarding a particular clinical procedure or treatment plan must be made by the doctor/dentist in light of the clinical data presented by the patient and the diagnostic and treatment options available.

Significant departures from the national guideline as expressed in the local guideline should be fully documented and the reasons for the differences explained. Significant departures from the local guideline should be fully documented in the patient's case notes at the time the relevant decision is taken.

A background paper on the legal implications of guidelines is available from the SIGN secretariat.

REVIEW OF THE GUIDELINE

This guideline was issued in 2000 and will be reviewed in 2002. Any amendments to the guideline in the interim period will be noted on the SIGN website. Comments are invited to assist the review process. All correspondence and requests for background information regarding the guideline should be sent to:

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Summary of recommendations

REMOVAL OF UNERUPTED AND IMPACTED THIRD MOLARS IS NOT ADVISABLE:

B In patients whose third molars would be judged to erupt successfully and have a functional role in the dentition.

C In patients whose medical history renders the removal an unacceptable risk to the overall health of the patient or where the risk exceeds the benefit.

B In patients with deeply impacted third molars with no history or evidence of pertinent local or systemic pathology.

C In patients where the risk of surgical complications is judged to be unacceptably high, or where fracture of an atrophic mandible may occur.

C Where the surgical removal of a single third molar tooth is planned under local anaesthesia the simultaneous extraction of asymptomatic contralateral teeth should not normally be undertaken.

REMOVAL OF UNERUPTED AND IMPACTED THIRD MOLARS IS ADVISABLE:

C In patients who are experiencing or have experienced significant infection associated with unerupted or impacted third molar teeth.

C In patients with predisposing risk factors whose occupation or lifestyle precludes ready access to dental care.

C In patients with a medical condition when the risk of retention outweighs the potential complications associated with removal of third molars (e.g. prior to radiotherapy or cardiac surgery).

C In patients who have agreed to a tooth transplant procedure, orthognathic surgery, or other relevant local surgical procedure.

C Where a general anaesthetic is to be administered for the removal of at least one third molar, consideration should be given to the simultaneous removal of the opposing or contralateral third molars when the risks of retention and a further general anaesthetic outweigh the risks associated with their removal.

THERE ARE STRONG INDICATIONS FOR REMOVAL WHEN:

C There have been one or more episodes of **infection** such as pericoronitis, cellulitis, abscess formation; or untreatable pulpal/periapical pathology.

B There is **caries** in the third molar and the tooth is unlikely to be usefully restored, or when there is caries in the adjacent second molar tooth which cannot satisfactorily be treated without the removal of the third molar.

B There is **periodontal disease** due to the position of the third molar and its association with the second molar tooth.

B In cases of **dentigerous cyst formation** or other related oral pathology.

B In cases of **external resorption** of the third molar or of the second molar where this would appear to be caused by the third molar.

OTHER INDICATIONS FOR REMOVAL:

C
- **For autogenous transplantation to a first molar socket.**
- **In cases of fracture of the mandible in the third molar region or for a tooth involved in tumour resection.**
- **An unerupted third molar in an atrophic mandible.**
- **Prophylactic removal of a partially erupted third molar or a third molar which is likely to erupt may be appropriate in the presence of certain specific medical conditions.**
- **Atypical pain from an unerupted third molar is a most unusual situation and it is essential to avoid any confusion with temporomandibular joint or muscle dysfunction before considering removal.**
- **An acute exacerbation of symptoms occurring while the patient is on a waiting list for surgery may be managed by extraction of the opposing maxillary third molar.**
- **A partially erupted or unerupted third molar, close to the alveolar surface, prior to denture construction or close to a planned implant.**

CLINICAL ASSESSMENT

☑ **Clinical assessment** should be carried out with the aim of assessing the status of the third molars and excluding other causes of the symptoms. A complete examination should include assessment of:
- the eruption status of the third molar
- the presence of local infection
- caries in, or resorption of, the third molar and the adjacent tooth
- periodontal status
- orientation and relationship of the tooth to the inferior dental canal
- occlusal relationship
- temporomandibular joint function
- regional lymph nodes.

Any associated pathology should also be noted.

☑ **Radiological assessment** is essential prior to surgery, but does not require to be carried out at the initial examination.

B **Routine radiographic examination of unerupted third molars is not recommended.**

☑ The following information should be noted in relation to lower third molars:
- the type and orientation of impaction and the access to the tooth
- the crown size and condition
- the root number and morphology, including the presence of apical hooks
- the alveolar bone level, including the depth and the point of elevation and density
- the follicular width
- the periodontal status, together with that of the adjacent tooth
- The relationship or proximity of upper third molars to the maxillary antrum and of lower third molars to the inferior dental canal.

B The following signs have been demonstrated to be associated with a significantly increased risk of nerve injury during third molar surgery:

- diversion of the inferior dental canal
- darkening of the root where crossed by the canal
- interruption of the white lines of the canal

In the presence of any of these findings, great care should be taken in surgical exploration and the decision to treat should be carefully reviewed. The patient should be carefully advised of the risk.

☑ If on the initial radiograph there is a suggestion of an intimate relationship between the roots of the lower third molar, and the inferior dental canal, a second radiograph should be taken using different project geometry.

REFERRAL

☑ The referring clinician should provide information as to the clinical findings on presentation, medical history, and any radiographs pertinent to the case.

☑ All preoperative radiographs should be transferred between clinicians concerned with the assessment and treatment of the patient. At the completion of treatment, radiographs should be returned to the originating clinician. The operating surgeons should retain a duplicate in situations where the level of morbidity raises concern.

CLINICAL MANAGEMENT

☑ After referral but prior to surgery **interim measures** may include systemic antibiotic administration, chlorhexidine mouth rinses, operculectomy, local dressing and lavage.

☑ Referring practitioners should contact the surgeon to expedite treatment if a patient on a waiting list experiences recurrent bouts of infection.

☑ The **whole tooth** should be removed and wound toilet completed. Any suspected pathological material should be sent for a histopathology report.

☑ **Resorbable sutures** may be used at any time but in particular where no review is planned.

☑ The limited evidence available is insufficient to make a recommendation on the routine use of **antibiotics** for third molar removal. However, in severe cases where there is acute infection at the time of operation, significant bone removal, or prolonged operation, antibiotics should not be withheld.

A **Preoperative steroids** should be considered (unless contraindicated) where there is a risk of significant postoperative swelling.

COMMON COMPLICATIONS ASSOCIATED WITH TREATMENT

☑ Haemorrhage must be controlled at the time of surgery. Soft tissue bleeding may require haemostatic agents, bipolar diathermy and/or sutures. Occasionally, a small amount of bone wax is necessary to control bleeding from bone, but this must be used with caution. Haematoma formation outwith the socket can occur and may require drainage.

☑ Patients should be informed that bruising is common and self-limiting and will usually resolve within two weeks of surgery.

B Where signs of **systemic involvement** are present (pyrexia, regional lymphadenopathy) antibiotics should be prescribed.

C When a **retained root fragment** gives rise to symptoms, it should be removed.

☑ Appropriate instruments should be in place prior to elevation to help minimise the occurrence of **displacement**. Where displacement occurs, every effort should be made at the time of surgery to recover the displaced tooth, but referral to a specialist centre may be required.

☑ Where **wound dehiscence** occurs without the development of pain and infection, patients should be advised to continue wound toilet, e.g. hot salty mouthwashes and socket syringing.

☑ Patients should be told about **damage to adjacent teeth** at the time of surgery or, if under sedation or general anaesthetic, when they are fully conscious. The consequences of this damage should be explained to the patient and recorded in the patient's notes. If repair is required, then the operator should arrange appropriate management.

SERIOUS COMPLICATIONS ASSOCIATED WITH TREATMENT

☑ **Fracture of the mandible** should be noted at the time of surgery and repaired if necessary. If the operator is unable to do this, he/she must arrange immediate referral.

☑ **Tuberosity fractures** may occur and should be treated at the time of surgery. If the operator is unable to do this he/she must arrange an immediate referral.

☑ **Oro-antral communication** identified at the time of surgery should be repaired, usually with a buccal advancement flap. Antibiotic therapy is advisable and the patient should avoid nose blowing.

☑ Any **broken instrument** should be removed at the time of the operation. If not retrievable, the patient should be told and this recorded in the notes.

☑ **Complete transection of the lingual or inferior dental nerves** requires immediate nerve repair by an experienced surgeon. Where there is partial damage, gentle debridement and the maintenance of good apposition of the ends is normally undertaken. The patient should be informed of the situation.

B **Late recognition of nerve damage** may require further surgical exploration.

FOLLOW UP

☑ A review appointment is required:
- Where non-resorbable sutures have been placed
- Where complications arise
- At the patient's or surgeon's request.

☑ A discharge letter should always be sent to the referring clinician.
- How to look after their mouth postoperatively
- Possible complications and side effects of the operation in general and any problems specific to the operation undertaken
- Any drug therapy required
- Whether a review appointment is required and if so, when
- That the referring practitioner will receive a letter postoperatively.

1 Introduction

1.1 BACKGROUND

Third molars generally erupt between the ages of 18 and 24 years, although there is wide variation in eruption dates. One or more third molars are absent in approximately 25% of adults[2-5] but they may still be present in the elderly, otherwise edentulous, patient.

The prevalence of unerupted third molars varies widely and is influenced by age, gender and ethnicity. The failure of eruption of third molars is a very common condition[3, 6-8] and the extraction of impacted third molar teeth is one of the most frequent surgical procedures carried out in the NHS. It has been reported that a significant proportion of those on oral and maxillofacial surgery waiting lists are awaiting third molar removal.[9-11]

1.2 THE NEED FOR A GUIDELINE

Surgical procedures for extraction of unerupted third molar teeth are associated with significant morbidity including pain and swelling, together with the possibility of temporary or permanent nerve damage, resulting in altered sensation of lip or tongue.[12] There appears to be substantial variation in management and it has been reported that conservative treatment with more rigorous adherence to specific indicators for removal would reduce surgical cases by up to 60%.[13] A recent review by the NHS Centre for Reviews and Dissemination concluded that 'there appears to be little justification for the removal of pathology-free impacted third molars.'[3]

A number of guidelines on this topic have been produced in recent years. The most recent document, produced by a working party of the Faculty of Dental Surgery of the Royal College of Surgeons of England, was published during the development of this SIGN guideline.[7] The members of the SIGN guideline development group are grateful for the co-operation offered by the Royal College of Surgeons of England working party and have benefited from the information contained in their document. The SIGN guideline development group considered carefully whether a further guideline was necessary, and concluded that there was scope to build on existing guidelines by using SIGN methodology to develop recommendations based upon the best evidence available.

1.3 AIM OF THE GUIDELINE

The aim of this national guideline is to assist individual clinicians, hospital departments, hospitals and commissioners of health care to produce local guidelines for the identification of patients who might benefit most from removal of unerupted third molar teeth and those for whom removal is not necessary.

1.4 DEVELOPMENT OF THE GUIDELINE

The SIGN guideline development methodology involves an extensive review and appraisal of the existing literature (see Annex 1).[14] A similar exercise carried out by the NHS Centre for Reviews and Dissemination found that there were no randomised controlled trials to compare the long term outcome of early removal with the deliberate retention of pathology-free third molars, and a dearth of relevant

good quality primary studies.[3, 15] The systematic literature review carried out by the SIGN third molar guideline development group confirmed this lack of evidence from well-designed randomised controlled trials.

The available evidence is generally from non-experimental descriptive studies (evidence level III) and the recommendations, although based on the best evidence available, are therefore mostly graded as B or C. However, it should be emphasised that this grading relates only to the strength of supporting evidence for each recommendation, and not to the importance of the recommendation.

1.5 DEFINITIONS AND TERMINOLOGY

Recently published guidelines have included definitions7, 1 and for the purposes of this guideline minor modifications of the previously reported definitions have been introduced:

- **An unerupted tooth** is a tooth lying within the jaws, entirely covered by soft tissue, and partially or completely covered by bone.
- A **partially erupted tooth** is a tooth that has failed to erupt fully into a normal position. The term implies that the tooth is partly visible or in communication with the oral cavity.
- An **impacted tooth** is a tooth which is prevented from completely erupting into a normal functional position. This may be due to lack of space, obstruction by another tooth, or an abnormal eruption path.

Throughout the guideline the term **third molar** refers to unerupted and partially erupted third molar teeth which may or may not be impacted.

The general principles in the guideline apply to both **upper** and **lower** third molar teeth, but surgical management of upper third molars is in general much less complex and most of the difficulties apply to lower third molars. Upper wisdom teeth cause less discomfort, are more likely to erupt, and are simpler to remove unless unerupted and encased in bone. Removal of upper third molars results in far less postoperative morbidity, and general anaesthetics are rarely required.

Wherever possible, the guideline development group have employed the most commonly used terminology, e.g. the term local anaesthesia is used in place of local analgesia.

2 Advisability of removal

This section considers the broad principles which underpin the decision to remove or not to remove an unerupted or partially erupted third molar tooth. Specific indications are considered in greater detail in section 3.

As a general principle, teeth should not be removed without due cause. This applies to third molars as much as it does to any other teeth. All forms of surgery, whether under local anaesthesia or general anaesthesia, carry some risk of complications – at worst, death – and there is an inevitable and measurable morbidity associated with surgical removal of teeth. Even in the best of hands, unpredictable accidents can occur and when very large numbers of teeth are being considered in the population this must happen to the occasional patient. Quite apart from this, there is a question of cost to the Health Service as well as to the patient. There needs, therefore, to be a distinct reason for the removal of third molar teeth and this reason should be clearly identified.

2.1 FOR WHICH PATIENTS IS REMOVAL NOT ADVISABLE?

2.1.1 It is self evident that there is no strong indication for removing third molars which are completely asymptomatic and disease free except under special circumstances (see section 2.2), as the risks of intervention may lead to complications both minor and major. [7-24] Non-intervention avoids these risks and may preserve potentially functional teeth and the bony ridge. The teeth might also be used for transplantation purposes.

There is general agreement that, where there is adequate space, unerupted teeth should be left in situ to erupt and that during childhood even impacted teeth may change their position. It is not possible to predict accurately which asymptomatic teeth will erupt[25-27] and there is little evidence that the teeth become significantly more difficult technically to remove with age, or that more complications occur by leaving them in situ. However, it should be remembered that as the patient grows older there is an increased risk of surgical morbidity.[28]

Evidence level Ia

B **Third molars which would be judged to erupt successfully and have a functional role in the dentition should not be removed.**

C **Third molars should not be removed in patients whose medical history renders the removal an unacceptable risk to the overall health of the patient or where the risk exceeds the benefit.**

C **In patients where the surgical removal of a single third molar tooth is planned under local anaesthesia the simultaneous extraction of asymptomatic contralateral teeth should not normally be undertaken.**

2.1.2 In the case of deeply impacted third molars without evidence of pathology, especially when completely covered by soft tissue and or bone, there is a risk of significant loss of periodontal support from the adjacent second molar following surgery to remove these teeth. There are therefore definite indications for leaving these teeth *in situ*. The same is not true for partially erupted impacted teeth, where there is good evidence that they are likely at sometime to cause symptoms.[25, 29, 30]

Evidence level Ia

B **Deeply impacted third molars in patients with no history or evidence of pertinent local or systemic pathology** (other than the exceptions identified in sections 2.3 and 3) **should not be removed.**

2.1.3 Where the patient has no symptoms and the third molar is buried, pathology-free and in close relationship with the inferior dental nerve or where there is a very atrophic mandible with little risk of trauma then it is considered good practice to leave the third molar in situ.[3, 31]

Evidence level IV

C **Third molars should not be removed in patients where the risk of surgical complications is judged to be unacceptably high, or where fracture of an atrophic mandible may occur.**

2.2 FOR WHICH PATIENTS IS REMOVAL ADVISABLE?

There are some definite indications for removal of third molars. For example, where infection can be predicted and therefore avoided, where there has been recurrent pain and discomfort with the likely use of antibiotics, and where there have been multiple episodes of conservative treatment, then removal of third molars should be the usual consequence. In these circumstances, timely removal of the third molar reduces the cost to the patient, time off work, and the risks associated with repeated conservative treatment, e.g. with antibiotics. Other situations where it is in the patient's best interest to have early removal of third molars include those who are in occupations where they may have to work in situations isolated from expert treatment, or when medical or surgical conditions are likely to arise leading to difficulty or risk with their removal.

2.2.1 There is some evidence to suggest that a decision should be made to remove third molars where there is a likelihood of infection. There is no evidence that it is in the patient's best interest to wait until infection arises.[4, 32, 33]

Evidence level III and IV

C **Removal is advised in patients who are experiencing or have experienced significant infection associated with unerupted or impacted third molar teeth.**

2.2.2 If the patient has had infection or is very likely to have infection, e.g. a partially erupted tooth, and is likely to be in a position in which he or she cannot obtain access to surgical care then early removal may be appropriate. The consensus is that it is better to remove the cause of the infection than repeatedly to treat it with antibiotics.[11, 18, 31]

Evidence level IV

C **Removal of third molars is advised in patients with predisposing risk factors whose occupation or lifestyle precludes ready access to dental care.**

2.2.3 Teeth at risk of infection which could result in osteoradionecrosis or endocarditis should be removed. Although the risks of these conditions developing may be small, their serious nature precludes the retention of a potentially infected third molar. [7, 34]

Evidence level IV

C **Removal is advised in patients with a medical condition when the risk of retention outweighs the potential complications associated with removal of third molars** (e.g. prior to radiotherapy or cardiac surgery).

2.2.4 There is a consensus view that where the third molar may complicate orthognathic surgery or another surgical procedure to the jaw, then it is reasonable to remove that tooth, provided the risks of complications and the severity of those complications do not outweigh the benefits. [16, 34]

Evidence level IV

C **Removal of third molars may be considered in patients who have agreed to a tooth transplant procedure, orthognathic surgery, or other relevant local surgical procedure.**

2.2.5 Disease-free non-functional upper third molars would normally be removed under general anaesthesia when impacted lower third molars are to be extracted and when the risks of retention and a further general anaesthetic outweigh the risks associated with their removal.[16, 18, 31, 34, 35] Diminishing use of general anaesthesia makes this less of a consideration than in the past, but where a general anaesthetic has to be given there are obvious risks attached to this procedure and if it has to be repeated this increases that risk.

Evidence level IV

C **Where a general anaesthetic is to be administered for the removal of at least one third molar, consideration should be given to the simultaneous removal of the opposing or contralateral third molars when the risks of retention and a further general anaesthetic outweigh the risks associated with their removal.**

3 Indications for removal

In the absence of evidence from randomised controlled trials, the indications for removal of third molar teeth are likely to remain the subject of debate. In some areas there is evidence for clear indications for removal, but it is important to recognise that these indications may be modified by the general health of the patient and local circumstances.

3.1 STRONG INDICATIONS FOR REMOVAL

3.1.1 There are a number of reasons for removal of third molars where there is pathology in and around the third molar. It is considered good practice and it is reasonable to assume that recurrent acute attacks of infection associated with third molars necessitate the early removal of the affected teeth. There is no evidence to suggest that leaving the teeth *in situ* makes surgery easier and there is strong evidence that morbidity increases with age.[21, 30, 36]

Evidence level III and IV

C **Removal of any symptomatic wisdom tooth should be considered, especially where there have been one or more episodes of infection such as pericoronitis, cellulitis, abscess formation; or untreatable pulpal/periapical pathology.** [37, 38]

3.1.2 If a second molar requires to be extracted it is sensible to remove the adjacent unerupted third molars unless the third molar could erupt into the position of the second molar. Similarly, it may be difficult to fill a carious impacted third molar and this tooth should be removed unless there is a very high risk of complications associated with the removal of that tooth. [4, 5]

Evidence level III

B **Removal should be considered where there is caries in the third molar and the tooth is unlikely to be usefully restored, or when there is caries in the adjacent second molar tooth which cannot satisfactorily be treated without the removal of the third molar.**

3.1.3 Where there is periodontal disease and pocketing between the third molar and the second molar, there is some evidence to suggest that if removal of the third molar is delayed beyond the age of 30 years then the condition may be irreversible. Removal of the third molar will result in repair of the injured periodontium and therefore early removal of the impacted third molar is beneficial. Untreated horizontal and mesio-angular impaction are particularly prone to cause bone loss distal to the second molar. Late removal of such impacted teeth has not been shown to improve the periodontal status of the adjacent second molar, but early extraction of the impacted wisdom tooth reduces periodontal damage.[41, 43]

Evidence level III

B **Removal should be considered in cases of periodontal disease due to the position of the third molar and its association with the second molar tooth.**

3.1.4 Dentigerous cyst formation and other related oral pathology are considered to be rare in association with third molars, but there is evidence of dentigerous cyst formation occurring in association with impacted third molars.[7] In most cases there is a strong indication for removal of the third molar in order to prevent expansion or recurrence of a keratocyst.[43]

Evidence level IIb and III

B **Third molar removal should be considered in cases of dentigerous cyst formation or other related oral pathology.**

3.1.5 External resorption of the third molar or of the second molar is relatively rare. Root resorption occurs principally in the 21-30 year old age group. The incidence after the age of 30 has been shown to be remote.[44]

Evidence level III

B **Third molar removal should be considered in cases of external resorption of the third molar or of the second molar where this would appear to be caused by the third molar.**

3.2 OTHER INDICATIONS FOR REMOVAL

3.2.1 Third molar removal may occasionally be indicated for orthodontic reasons. However there is evidence, including a single prospective randomised controlled trial,1 that the removal of third molars in the lower arch will not prevent, limit, or cure imbrication of the lower anterior teeth.[30, 46-57]

Evidence levels Ib and III

Removal of the third molar may be indicated prior to orthognathic surgery, e.g. when a sagittal split osteotomy is planned, removal of the third molar diminishes the risk of surgical complications with regard to that osteotomy.[16, 18]

Evidence level IV

☑ Removal of the third molar may be indicated prior to orthognathic surgery.

There is no reliable evidence that third molar removal affects the growth of the mandible.

3.2.2 There are a number of other indications for removal of unerupted and impacted third molar teeth. These are all relative indications and are quite uncommon. These include the occasional use of the third molar tooth, when it is sound, for autogenous transplantation – usually to a first molar socket site. [34] The low incidence of success with the procedure means it is not widely used except in special circumstances.

Evidence level IV

C **Third molar removal may be considered for autogenous transplantation to a first molar socket.**

3.2.3 The presence of a tooth in a fracture line increases the risk of infection in some cases, especially when that tooth has been displaced or rendered non vital.[58, 59] A similar situation arises with tumour resection and irradiation of the tissues may lead to a reduction in the blood supply, infection, or osteoradionecrosis. Early removal of teeth at the site of the resection reduces the risk of infection. [34, 60]

Evidence level IV

C **Removal may be considered in cases of fracture of the mandible in the third molar region or when a tooth is involved in tumour resection.**

3.2.4 Rarely, an unerupted third molar may lie in an atrophic mandible and a careful choice needs to be made whether it is better to remove the tooth or leave it in situ. There is no clear evidence as to what is best to do and a degree of common sense must therefore prevail.[7]

Evidence level IV

C **Removal of an unerupted third molar in an atrophic mandible may be appropriate.**

This situation needs to be carefully evaluated. In very elderly patients the third molar might be left but in a middle-aged patient where there is a risk of spontaneous fracture or where minor trauma might cause a fracture then prophylactic removal is appropriate.

3.2.5 In the presence of specific medical conditions such as cardiac valvular disease or in a situation when the patient may require radiotherapy it is clear that where there is a potential for infection, this should be eliminated. A partially erupted third molar tooth would come into this category, whereas a completely unerupted tooth which was never likely to erupt would not. In borderline situations, removal should be undertaken if symptoms are likely in the future. Other medical conditions such as organ transplantation, chemotherapy, or the insertion of alloplastic implants should be considered in a similar way.[7, 34]

Evidence level IV

C **Prophylactic removal of a partially erupted third molar or a third molar which is likely to erupt may be appropriate in the presence of certain specific medical conditions.**

3.2.6 The situation with regard to facial pain of an atypical nature is a difficult one and removal of a completely buried tooth should only be considered as a last resort and only when the patient points to that area as the source of pain. In some cases this relieves the pain but there is no guarantee. It is not known why a completely buried third molar should cause pain.

Much more commonly, atypical facial pain is associated with temporomandibular joint dysfunction and this possibility must be eliminated. Signs of muscle spasm are normally present in dysfunctional situations. Confusion can arise when there is concomitant muscle pain associated with a clenching habit and local third molar pain.[4, 61]

Evidence level III

C **Atypical pain from an unerupted third molar is a most unusual situation and it is essential to avoid any confusion with temporomandibular joint or muscle dysfunction before considering removal.**

3.2.7 Pain associated with the lower third molar tooth is commonly exacerbated by the upper third molar biting on the gum flap, causing pain and discomfort. If the upper third molar tooth is easy to remove and it is non functional then immediate removal of that tooth will often dramatically relieve the pain from the area. This is particularly useful where there is likely to be delay in the surgical removal of the lower third molar.

C **Acute exacerbation of symptoms occurring while the patient is on a waiting list for third molar surgery may be managed by extraction of the opposing maxillary third molar.**

3.2.8 If the third molar tooth is close to the surface or has broken through the surface in relation to an upper or lower denture then it is appropriate to remove that tooth before or as soon as symptoms arise, as they are likely to persist and become more severe if the tooth is not removed.[7, 31]

Evidence level IV

C **Removal of a partially erupted or unerupted third molar close to the alveolar surface should be considered prior to denture construction or close to a planned implant.**

There are virtually no controlled trials or rigorous studies in the situations described above, although the outcome of an American Association of Oral and Maxillofacial Surgeons five-year prospective multicentre international study may provide valuable information. In most cases, the individual situation is self evident and the line of treatment is obvious. However, where there is doubt, careful consideration should be given as to the risks and benefits of removal of third molars in these patients.

4 Assessment and referral

4.1 CLINICAL ASSESSMENT

Patients suffering from symptoms which relate to a third molar tooth may present to a General Dental Practitioner (GDP), a General Medical Practitioner (GMP), or to a hospital Accident & Emergency department.

Initial assessment should include a full medical and dental history, extra-oral and intra-oral clinical examination. Positive findings from this examination which suggest that treatment of the third molar or related structures may be indicated, require that a more detailed examination is carried out. This should determine whether removal is indicated and/or advisable *(see sections 2 and 3)*, and should include radiological assessment.

☑ Clinical assessment should be carried out with the aim of assessing the status of the third molars and excluding other causes of the symptoms. A complete examination should include assessment of:

- the eruption status of the third molar
- the presence of local infection
- caries in, or resorption of, the third molar and the adjacent tooth
- periodontal status
- orientation and relationship of the tooth to the inferior dental canal (IDC)
- occlusal relationship
- temporomandibular joint function
- regional lymph nodes.

Any associated pathology should also be noted.

☑ Radiological assessment is essential prior to surgery, but does not require to be carried out at the initial examination.

4.2 RADIOLOGICAL ASSESSMENT

4.2.1 RADIOGRAPHIC EXAMINATION

Radiographic examination should provide the information necessary for adequate assessment of all third molar teeth.

Prior to the age of 13, radiographic examination is not normally indicated for the assessment of third molars[62] and films taken from the age of 20 are most useful in assessing the likelihood of eruption.[63] When more than one third molar requires to be assessed, the radiographic examination of choice is a panoramic radiograph as the radiation dose of a panoramic radiograph is lower than from four periapical views and the diagnostic yield higher.[62, 64, 65] Doses from panoramic radiography can be further limited by using field size limitation to prevent exposing areas not required in the field of view.[66] Periapical or oblique lateral radiographs may be taken as an alternative. All radiographs should be of a diagnostically acceptable standard.[67]

Evidence level III and IV

B **As no large-scale study has demonstrated a sufficient incidence of pathological change associated with unerupted third molars, routine regular radiographic examination of unerupted third molars is not recommended.**

4.2.2 RADIOLOGICAL EVALUATION

The purpose of a careful radiological evaluation is to complement the clinical examination by providing additional information about the third molar, the related teeth and anatomical features, and the surrounding bone. This is necessary in order to make a sound decision about the proposed surgical procedure, the most appropriate location for this to take place, and to highlight aspects of management which may require specific mention to the patient:.

☑ The following information should be noted in relation to upper and lower third molars:

- the type and orientation of impaction and the access to the tooth.
  (The distinction between vertical and disto-angular orientation may affect the surgical approach, in particular with regard to the requirements for bone removal.)
- the crown size and condition
- the root number and morphology, including the presence of apical hooks
  (Identification of such hooks is important, as they may fracture during removal of the tooth and a decision is then required as to whether to attempt their removal: see section 5.3)
- the alveolar bone level, including the depth and the point of elevation and density
- the follicular width
  (There is no substantive evidence as to the dimension of follicular space which clearly indicates that cystic change has taken place.[29, 42, 68, 69] *Where doubt exists as to the likelihood of cystic change and there are no other positive indications for removal of the tooth, radiological review between six and 12 months is the recommended course of action.)*
- the periodontal status, together with that of the adjacent tooth
- the relationship or proximity of upper third molars to the maxillary antrum and of lower third molars to the inferior dental canal.

The following signs have been demonstrated to be associated with a significantly increased risk of nerve injury during third molar surgery:[22]

- diversion of the IDC
- darkening of the root where crossed by the canal
- interruption of the white lines of the canal.

Evidence level III

B **In the presence of any of the above findings, great care should be taken in surgical exploration and the decision to treat carefully reviewed. The patient should be advised of the risks.**

☑ If on the initial panoramic radiograph there is a suggestion of a relationship between the roots of the lower third molar, and the IDC, a second radiograph should be taken[70, 71] using different projection geometry.

4.3 REFERRAL

Once it has been decided that a third molar should be removed, consideration should be given as to the appropriate treatment setting. GMPs are encouraged to refer to a GDP, although this does not preclude direct referral to a department of Oral and Maxillofacial Surgery or specialist practitioner.

The basis of this decision should take account of the general suitability of the facilities for operative procedures and recovery, the competence of support staff, and the training of the practitioner. In addition, each case should be assessed with regard to the patient's medical history and the expected degree of difficulty of surgical treatment *(see section 5)*

☑ The referring clinician should provide information as to the clinical findings on presentation, medical history, and any radiographs pertinent to the case.

☑ All preoperative radiographs should be transferred between clinicians concerned with the assessment and treatment of the patient. At the completion of treatment, radiographs should be returned to the originating clinician. The operating surgeons should retain a duplicate in situations where the level of morbidity raises, or may raise, concern.

The surgeon should by letter confirm receipt of the referral, and outline the treatment plan, specific information provided to the patient, the form of anaesthesia and what follow-up arrangements are required.

☑ A discharge letter should always be sent to the referring clinician.

5 Clinical management

Every effort should be made at the time of the operation to minimise or avoid complications and side effects of the operative procedures.

5.1 PREOPERATIVE MANAGEMENT

Preoperative management requires, as a minimum, the taking of a detailed history plus clinical and radiological assessment *(see section 4)*. A decision is made with regard to which third molars should be removed *(see sections 2 and 3)* and, once fitness for surgery is established, informed consent must be obtained (*see section 5.8).*[72]

☑ After referral but prior to surgery, interim measures may include systemic antibiotic administration, chlorhexidine mouth rinses, operculectomy, local dressing and lavage.[7]

☑ Referring practitioners should contact the surgeon to expedite treatment if a patient on a waiting list experiences recurrent bouts of infection.

5.2 ANAESTHESIA

Methods of anaesthesia include local anaesthesia, local anaesthesia with intravenous sedation, and general anaesthesia. It is common practice to use local anaesthesia in general anaesthesia cases to improve field of vision and cardioprotection. In general dental practice, the former two methods are considered appropriate, but still require suitable facilities to be available.[73] General anaesthesia may be needed for complex and lengthy procedures but it must be recognised that local anaesthesia carries less risk.[72] Recent General Dental Council guidance emphasises that general anaesthesia is a procedure which is never without risk and that 'in assessing the needs of an individual patient, due regard should be given to all aspects of behavioural management and anxiety control before deciding to prescribe or to proceed with treatment under general anaesthesia'. [74]

Evidence level IV

5.3 SURGICAL PROCEDURE

The procedure is variable and is influenced by the type of impaction and surrounding structures, for example proximity of the inferior alveolar and lingual nerves. Generally surgery involves the raising and protection of soft tissue flaps and bone removal with either chisel or bur with water cooling irrigation. There is conflicting evidence as to the most appropriate form of protection for the lingual nerve.[75, 76]

☑ The whole tooth should be removed and wound toilet completed. Any suspected pathological material should be sent for a histopathology report.

☑ Resorbable sutures may be used at any time but particularly where no review is planned.

Occasionally a decision to leave a small fragment of apical root of a vital tooth may be made if its removal carries a greater risk of complications than retention.[77] The patient should be informed and such events recorded in the notes.[78]

5.4 OTHER PROCEDURES

Other, rarely performed procedures include surgical periodontics, which can be considered in carefully selected cases with the proviso that subsequent removal of the tooth may be required. In selected cases, surgical exposure can be carried out. Surgical reimplantation/transplantation may be appropriate treatment in selected cases. The advice of an experienced orthodontist is helpful in these cases.

5.5 PERIOPERATIVE DRUG THERAPY

5.5.1 ANTIBIOTICS

Where there is significant bone removal, prolonged operation time, or the patient is at increased risk of infection, it is common practice to prescribe antibiotics.[79, 80] However, the limited evidence available is insufficient to make a recommendation on the routine use of antibiotics for third molar removal.

Evidence level IV

☑ In severe cases, where there is acute infection at the time of operation, significant bone removal, or prolonged operation, antibiotics should not be withheld.

5.5.2 ANALGESIA

Normal practice is to prescribe or advise oral analgesics such as paracetamol or ibuprofen for outpatients.[81] For inpatients a number of options including non-steroidal anti-inflammatory agents and opiates are commonly prescribed. Pre-emptive analgesia may be considered.

Evidence level IIb

5.5.3 STEROIDS

Where there is a risk of significant postoperative swelling, pre- or peri-operative administration of dexamethasone or methyl prednisolone has been shown to reduce swelling and discomfort.[82-84]

Evidence level Ib

A **Preoperative steroids should be considered** (unless contraindicated) **where there is a risk of significant postoperative swelling.**

5.6 COMPLICATIONS ASSOCIATED WITH TREATMENT

As noted earlier, removal of third molars is a common surgical procedure and – as with all surgical procedures – there is a risk of operative and postoperative complications. The rate of complications and their severity varies,[12] but the management of common and more serious complications is described below.

5.6.1 COMMON COMPLICATIONS

(a) Haemorrhage

☑ Haemorrhage must be controlled at the time of surgery. Soft tissue bleeding may require haemostatic agents, bipolar diathermy and/or sutures. Occasionally a small amount of bone wax is necessary to control bleeding from bone, but this must be used with caution. Haematoma formation outwith the socket can occur and may require drainage.

(b) Ecchymosis

☑ Patients should be informed that bruising is common and self-limiting and will usually resolve within two weeks of surgery.

(c) Infection

Infection of the soft tissues may result in secondary haemorrhage, cellulitis or, rarely, abscess formation.[85]

Evidence level III

B **Where signs of systemic involvement are present (pyrexia, regional lymphadenopathy) antibiotics should always be prescribed.**

Alveolar osteitis (dry socket) may occur in c. 20% of patients, particularly in those who smoke.[86] Irrigation with saline (or chlorhexidine 0.2%) and/or placement of an obtundent, such as proprietary iodoform based medication, usually reduces the pain.[87]

Evidence level III

Rarely, osteomyelitis may occur which requires long term antibiotic therapy and/or further surgery in a hospital environment.

(d) Retention of root fragment

C **When a retained root fragment gives rise to symptoms it should be removed.**[73]

Any infection should be controlled prior to surgical exploration.

(e) Displacement of tooth

A lower third molar or tooth fragment may be displaced into the lingual tissues, whilst an upper third molar may pass into the infratemporal fossa.

☑ Appropriate instruments should be in place prior to elevation to help minimise the occurrence of displacement. Where this occurs, every effort should be made at the time of surgery to recover the displaced tooth, but referral to a specialist centre may be required.

(f) Wound dehiscence

☑ Where wound dehiscence occurs without the development of pain and infection, patients should be advised to continue wound toilet, e.g. hot salty mouthwashes and socket syringing.

(g) Damage to adjacent teeth

☑ Patients should be told about damage to adjacent teeth at the time of surgery or, if under sedation or general anaesthetic, when they are fully conscious. The consequences of this damage should be explained to the patient and recorded in the patient's notes. If repair is required, then the operator should arrange appropriate management.

(h) Periodontal health

The periodontium distal to the mandibular second molar may be affected by removal of an impacted third molar. Early removal of mesio-angular horizontal impacted third molars is associated with better periodontal health.[41]

Evidence level III

5.6.2 SERIOUS COMPLICATIONS

The following complications carry significant risk of morbidity and may require immediate referral. The patient should be informed, and a record entered in the patient's notes.

Evidence level III

(a) Fracture of the mandible

☑ Fractures should be noted at the time of surgery and repaired if necessary. If the operator is unable to do this, he/she must arrange immediate referral.

(b) Fracture of the maxilla

☑ Tuberosity fractures may occur and should be treated at the time of surgery. If the operator is unable to do this he/she must arrange an immediate referral.

(c) *Oro-antral communication*

Oro-antral communication is probably a more frequent occurrence than is realised and thus probably often heals spontaneously.

☑ Any such defect identified at the time of surgery should be repaired, usually with a buccal advancement flap. Antibiotic therapy is advisable and the patient should avoid nose blowing.

(d) *Retained foreign body*

☑ Any broken instrument should be removed at the time of the operation. If not retrievable, the patient should be told and this recorded in the notes.

(e) *Nerve damage*

☑ Complete transection of the lingual or inferior dental nerves requires immediate nerve repair by an experienced surgeon. Where there is partial damage, gentle debridement and the maintenance of good apposition of the ends is normally undertaken. The patient should be informed of the situation.

One recent study has shown that significant improvement in nerve function can be achieved by specialist surgical investigation and repair.[88]

Evidence level III

B **Late recognition of nerve damage may require further surgical exploration.**

5.7 OUTCOMES OF UNERUPTED THIRD MOLAR MANAGEMENT

Outcomes in response to surgical or non-surgical management of third molar teeth may be successful or unsuccessful. Outcomes must be defined and quantified to enable audit to establish best practice. The success or otherwise of the procedure ideally should be viewed from the perspective of the patient.

☑ A review appointment is required:[89]

- When non-resorbable sutures have been placed
- When complications arise
- At the patient's or surgeon's request.

5.7.1 SUCCESSFUL OUTCOME

This is achieved when the presenting symptoms and signs of disease associated with a third molar tooth have been eliminated and the tissues have fully healed with no residual functional deficit.

During normal healing it is usual for the patient to experience some discomfort, swelling and trismus over the first three postoperative days. Symptoms should gradually resolve over the next two weeks.

5.7.2 UNSUCCESSFUL OUTCOME

This indicates that complications associated with treatment have occurred and are persistent. These long term complications may include:

- **Persistent pathology**

  Severe infection, for example osteomyelitis, requires long term antibiotic therapy and probably further surgery.

- **Sensory nerve damage**

  Damage to the lingual nerve leading to sensory disturbances usually improves with time. However, persistence of symptoms beyond three months indicates that a return to normal function is unlikely and that consideration should be given to nerve repair.[88]

  Damage to the inferior alveolar nerve, leading to persistent hypoaesthesia/ dysaesthesia in its sensory distribution, is less amenable to surgical repair. The prognosis for spontaneous nerve regeneration after six months is poor.[12]

- **Oro-antral fistula**

  This requires surgical repair as outlined earlier *(see section 5.6.2)*.

- **Temporal mandibular joint dysfunction**

  Appropriate jaw exercises, soft diet, analgesia and oral appliances may be helpful.

- **Psychological complications**

  Such complications are rare. It is best practice to refer the patient to their GMP as there may be other underlying contributing factors.

- **Damage to adjacent teeth**.

An audit trail should be set up to enable outcome to be monitored, both clinically and from the patient's viewpoint.

5.8 PATIENT INFORMATION

It is recognised that good communication is central to the clinician-patient relationship and to good clinical care. Patients require information about the options available for management of their third molars, together with an explanation of the operation/procedure itself.

At the preoperative appointment, the potential outcome of any chosen course of action – adverse or otherwise – should be explained to the patient in terms that they can easily understand. Details should be noted in the patient's records and should include aspects relating to the patient's quality of life.[90, 91] In addition, care should be taken to explain to the patient the consequences of not having the tooth removed and other treatment options which may be required in this event.

The information provided should be sufficient to enable the patient or their carer to make a valid informed decision and give consent.[72] The US National Institutes of Health recommend that patients should be informed of potential surgical risks including any transitory condition that occurs with an incidence >5% and any permanent condition with an incidence >0.5%.[31]

At the time of surgery, the patient should be reminded of the possible complications and side-effects of the operation. The operator should ensure that consent has been obtained, that the patient still wants to go ahead with the procedure, and a note should be made in the patient's records.

☑ At the time of the operation, the patient should know:

- How to contact the surgeon in case of emergency
- How to look after their mouth postoperatively
- Possible complications and side effects of the operation in general and any problems specific to the operation undertaken
- Any drug therapy required
- Whether a review appointment is required and if so, when
- That postoperatively the referring practitioner will receive a letter detailing the treatment undertaken.

Key messages for patients from this guideline are noted in Annex 2.

6 Recommendations for audit and research

Well-designed and managed randomised controlled trials (RCTs) regarding the management of third molars which incorporate a sufficiently large sample population to detect clinically important differences have not been carried out. It has been suggested that large scale studies in regions of the world with poor provision of oral health care might help determine the level of pathology associated with unerupted third molars in different age groups. However, given the multiple variables which affect populations in different parts of the world, it is doubtful whether such an approach would inform surgical practice in the UK.

The outcome of a prospective international large multicentre trial over five years may provide valuable information but meaningful data is likely to take many years to emerge.

In the absence of well designed RCTs and given the difficulties in conducting such studies in a large number of centres in the UK, the guideline development group has suggested a number of areas where well defined research or audit studies could reveal significant information.

The following research/audit projects would provide valuable information to support the future development of this guideline:

- What proportion of asymptomatic unerupted third molar teeth within different age cohorts will require active management in the future?
- Is local anaesthesia administration, for operations under general anaesthetic, helpful in reducing post operative pain in the short and long term?
- Which factors affect morbidity following the removal of unerupted third molar teeth, e.g. age, steroid and/or antibiotic therapy?
- What are the relative cost benefits of undertaking third molar removal in different clinical settings (general dental practice, specialist practice or hospital)?
- How does third molar removal influence quality of life?
- What is the relationship between radiologically determined follicular signs and histologically confirmed follicular pathology?
- What are the complications associated with third molar removal in different clinical settings?
- An audit of the necessities and frequencies of therapeutic intervention after third molar surgery.
- Audit of the necessity for review appointments.
- Audit of factors affecting wound healing following third molar surgery.

Annex 1

DETAILS OF THE SYSTEMATIC REVIEW UNDERTAKEN FOR THIS GUIDELINE

The initial literature search was carried out in May 1997 and was updated during the course of the guideline development.

The MEDLINE database from 1966 was searched for evidence-based literature. This identified 119 papers. The EMBASE database from 1974 was searched for evidence-based English language papers relating to human subjects. This identified 313 results.

The evidence-based search criteria included research or evidence-based guidelines, meta-analyses, systematic reviews or overviews, literature or academic reviews, randomised controlled trials or studies, placebos, random allocation, triple, double or single blind method or masks or procedure, clinical trials, specifically excluding letters, historical articles, reviews of reported cases or multicase reviews or studies.

The search was limited by subject to impacted, unerupted, asymptomatic third or 3rd molar or molars or wisdom tooth or teeth.

In addition a general subject search of the MEDLINE database for English language papers relating to human subjects from1985 identified 738 citations.

The general subject search for impacted, unerupted, asymptomatic third or 3rd molar or molars or wisdom tooth or teeth, but not limited to the evidence-based criteria listed above, covered mainly specific subject areas.

Annex 2

KEY MESSAGES FOR PATIENTS

Note: *These key messages are not intended for direct dissemination to patients, but may be incorporated into local patient information materials. A project to develop a patient version of this guideline is presently in progress. Further details will be available on the SIGN website (www.sign.ac.uk) from Autumn 2000.*

The pros and cons of removing unerupted and impacted third molar teeth:

- As a general principle, teeth should not be removed without due cause. This applies to third molars as much as it does to any other teeth.
- All forms of surgery carry some risk of complications. Extraction of unerupted and impacted third molar teeth sometimes leads to problems such as pain and swelling, together with the possibility of altered sensation in the lips or tongue. Even in the best of hands, accidents can occur.
- Where there is adequate space, unerupted teeth should be left in place to erupt. In childhood, even impacted teeth may change their position. It is not possible to predict accurately whether teeth will erupt and there is little evidence that the teeth become more difficult to remove with age, or that more complications occur by leaving them in place.
- However, there are some definite indications for removal of third molars. For example, where there has been recurrent pain and discomfort due to multiple episodes of infection, then removal of third molars may be appropriate to reduce the pain and inconvenience to the patient, time off work, and the risks and costs associated with repeated antibiotic treatment.
- Other situations where it may be in the patient's best interest to have early removal of third molars include those whose jobs mean that they may have to work in situations isolated from expert treatment, or when medical conditions may lead to difficulty or risk with their removal.

How will the decision be made?

- Your dentist or doctor will carry out a full assessment, including taking your medical and dental history, and a clinical examination to see if removal of the tooth or teeth is indicated and is advisable. He or she will discuss with you the advantages and disadvantages of removal in your particular case, as well as the possible risks of the operation. You will also have one or more *x*-rays of your teeth taken before any decision to operate is agreed. The clinician should also explain the implications of a decision not to remove the tooth and any possible problems in the future.

The operation itself:

- General anaesthesia may be needed for complex and lengthy operations, but local anaesthesia carries less risk of complications.
- Bruising and swelling often occur following third molar surgery, but usually go within two weeks
- Other common complications of third molar surgery include bleeding, minor infection, and damage to the adjacent teeth. Your doctor or dentist will inform you if any problems arise during surgery and discuss with you if any further treatment is needed.

After the operation:

- Your doctor or dentist will advise you how to look after you mouth after the operation, e.g. with hot salty mouthwashes; and what painkillers to take, e.g. paracetamol or ibuprofen.
- There is no evidence to suggest that antibiotics should routinely be prescribed following third molar removal, but they may be needed in some cases.
- Before leaving, you should know how to contact the surgeon in case of emergency. A review appointment may be arranged, but this is not always necessarily. A letter will also be sent to your own dentist to let him or her know about the operation and any follow up arrangements.

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SIGN

Management of Unerupted and Impacted Third Molar Teeth

Quick Reference Guide

REMOVAL OF UNERUPTED AND IMPACTED THIRD MOLARS IS NOT ADVISABLE:

- B ✗ In patients whose third molars would be judged to erupt successfully and have a functional role in the dentition.
- C ✗ In patients whose medical history renders removal an unacceptable risk to the overall health of the patient or where the risk exceeds the benefit.
- B ✗ In patients with deeply impacted third molars with no history or evidence of pertinent local or systemic pathology.
- C ✗ In patients where the risk of surgical complications is judged to be unacceptably high, or where fracture of an atrophic mandible may occur.
- C ✗ Where the surgical removal of a single third molar tooth is planned under local anaesthesia the simultaneous extraction of asymptomatic contralateral teeth should not normally be undertaken.

REMOVAL OF UNERUPTED AND IMPACTED THIRD MOLARS IS ADVISABLE:

- C ✓ In patients who are experiencing or have experienced significant infection associated with unerupted or impacted third molar teeth.
- C ✓ In patients with predisposing risk factors whose occupation or lifestyle precludes ready access to dental care.
- C ✓ In patients with a medical condition when the risk of retention outweighs the potential complications associated with removal of third molars (e.g. prior to radiotherapy or cardiac surgery).
- C ✓ In patients who have agreed to a tooth transplant procedure, orthognathic surgery, or other relevant local surgical procedure.
- C ✓ Where a general anaesthetic is to be administered for the removal of at least one third molar, consideration should be given to the simultaneous removal of the opposing or contralateral third molars *when the risks of retention and a further general anaesthetic outweigh the risks associated with their removal*.

STRONG INDICATIONS FOR REMOVAL:

- C ✓ One or more episodes of infection such as pericoronitis, cellulitis, abscess formation; or untreatable pulpal/periapical pathology.
- B ✓ Caries in the third molar which is unlikely to be usefully restored, or caries in the adjacent second molar which cannot satisfactorily be treated without the removal of the third molar.
- B ✓ Periodontal disease due to the position of the third molar and its association with the second molar.
- B ✓ Cases of dentigerous cyst formation or other related oral pathology.
- B ✓ Cases of external resorption of the third molar or of the second molar where this would appear to be caused by the third molar.

OTHER INDICATIONS FOR REMOVAL:

- C ✓ For autogenous transplantation to a first molar socket.
- C ✓ In cases of fracture of the mandible in the third molar region or for a tooth involved in tumour resection.
- C ✓ An unerupted third molar in an atrophic mandible.
- C ✓ Prophylactic removal of a partially erupted third molar or a third molar which is likely to erupt may be appropriate in the presence of certain specific medical conditions.
- C ✓ A partially erupted or unerupted third molar close to the alveolar surface, prior to denture construction or close to a planned implant.

KEY A B C indicates grade of recommendation ☑ good practice point

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CLINICAL ASSESSMENT

☑ Clinical assessment should be carried out with the aim of assessing the status of the third molars and excluding other causes of the symptoms.

B Routine radiographic examination of unerupted third molars is NOT recommended.

☑ Radiological assessment is essential prior to surgery, but does not need to be carried out at the initial examination.

CLINICAL ASSESSMENT

- *eruption status of third molar*
- *presence of local infection*
- *caries in or resorption of the third molar or adjacent tooth*
- *periodontal status*
- *orientation and relationship of the tooth to the inferior dental canal*
- *occlusal relationship*
- *temporomandibular joint function*
- *regional lymph nodes*

Any associated pathology should be noted.

RADIOLOGICAL ASSESSMENT

- *type and orientation of impaction and the access to the tooth*
- *crown size and condition*
- *root number and morphology*
- *alveolar bone level, including depth and density*
- *follicular width*
- *periodontal status, adjacent teeth*
- *relationship or proximity of upper third molars to the maxillary antrum and lower third molars to the inferior dental canal*

B
- **Diversion of the inferior dental canal**,
- **darkening of the root where crossed by the canal**, or
- **interruption of the white lines of the canal**

are associated with a significantly **increased risk of nerve injury** during third molar surgery.

Great care should be taken in surgical exploration and the decision to treat should be carefully reviewed. **The patient should be carefully advised of the risk.**

CLINICAL MANAGEMENT

☑ At operation, the whole tooth should be removed and wound toilet completed. Any suspected pathological material should be sent for examination.

B Consider **preoperative steroids** if risk of significant postoperative swelling.

B Consider **antibiotics** if signs of sytemic involvement (pyrexia, regional lymphadenopathy).

☑ Consider antibiotics also in severe cases where there is acute infection at the time of operation, significant bone removal, or prolonged operation.

SERIOUS COMPLICATIONS

Fracture of the mandible or maxilla:
Treat at time of surgery or arrange immediate referral.

Oro-antral communication: Repair at time of surgery, usually with a buccal advancement flap. Antibiotic therapy is advisable and the patient should avoid nose blowing.

Broken instrument: Remove at time of surgery. If not retrievable, inform the patient and record in notes.

Nerve damage: For complete transection of lingual or inferior dental nerves, arrange immediate nerve repair by experienced surgeon. For partial damage, debride gently and maintain good apposition of the ends.

COMMON COMPLICATIONS

Haemorrhage:
Control at time of surgery. Soft tissue bleeding may require haemostatic agents, bipolar diathermy and/or sutures.

Bruising:
Patients should be informed that bruising is common and will usually resolve within two weeks.

Displacement:
Appropriate instruments should be in place prior to elevation to help prevent displacement. Recover any displaced tooth at time of surgery if possible, or arrange referral to a specialist centre.

Wound dehiscence:
If no pain or infection, advise patients to continue wound toilet (e.g. hot salty mouthwashes, socket syringing).

Damage to adjacent teeth:
Inform patient at time of surgery (or when fully conscious). Record in notes and arrange repair if required.

☑ A review appointment is required:
- where non-resorbable sutures have been placed
- where complications arise
- at the patient's or surgeon's request.

Derived from the national clinical guideline recommended for use in Scotland by the Scottish Intercollegiate Guidelines Network (SIGN), Royal College of Physicians of Edinburgh, 9 Queen Street, Edinburgh EH2 1JQ

Available on the SIGN website: www.sign.ac.uk

This guideline was issued in March 2000 and will be reviewed in 2002