

Temporomandibular Disorders (TMDs): an update and management guidance for primary care from the UK Specialist Interest Group in Orofacial Pain and TMDs (USOT)

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Abstract

This review paper provides guidance from the UK Specialist Interest group in Orofacial pain and Temporomandibular Disorders (USOT) on the management of Temporomandibular Disorders in primary care.

Background

Consideration of Temporomandibular disorders (TMDs) and chronic orofacial pain (COFP) is important in clinical practice to ensure inappropriate treatment(s), targeted at presumed dental pathology, are not provided. General dental practitioners have a unique and close relationship with their regular patients and therefore are often best placed to provide initial treatment for potentially chronic conditions such as TMDs.

Whilst there is a generalised consensus on the management of TMDs and COFP within secondary care in the UK, they can present understandable difficulties to the primary care practitioner. It was against this background that two U.K. clinicians (SD & JD) contacted other specialists around the U.K. to set-up a specialist interest group in TMDs and orofacial pain (UK specialist interest group in Orofacial pain and Temporomandibular Disorders – USOT). Clinicians and academics in specialist centres with a known clinical or research interest in TMD and COFP were invited by a snowball sampling approach to the first meeting in 2009, with the aim of, “establishing and promoting good practice in diagnosis and management of chronic orofacial pain and TMDs”. The group currently has representatives from: Oral medicine, Oral and Maxillofacial surgery, Oral surgery, Restorative dentistry and General Dental Practice.

The group held its first meeting in 2009 and established its primary objective as the development of a more holistic view of COFP and TMDs. That is, to move away from a discipline-specific narrow viewpoint and encourage cross-specialty management of COFP and TMDs. This is not to say that specific indications for discipline-specific management will be ignored. As a starting point towards achieving this goal the group decided to produce a series of papers

based on the best available evidence on the initial non-specialist management pathways for TMDs and COFP to help reduce practitioner, and patient, confusion over the myriad of possibilities, building on work previously published by the European Association of Craniomandibular Disorders¹ and consistent with the recent statement on TMDs from the American Association of Dental Research². This is the first paper of this series and it is envisaged that future papers will cover initial management pathways for Burning Mouth syndrome, Trigeminal neuralgia, Persistent Dentoalveolar Pain (Atypical odontalgia, Phantom tooth syndrome), Inferior Alveolar and Lingual nerve injuries amongst others.

This paper aims to present the evidence for the diagnosis and management of TMDs to help facilitate their initial management within Primary Care, as it is the group's belief that this is the appropriate setting for the management of a significant number of the problems that TMD patients experience.

Demographics of TMDs

TMDs are musculoskeletal disorders and represent the most common cause of chronic pain in the orofacial region. They reach a peak incidence in the second and third decades of life, affecting predominantly females³. The ratio of females to males ranges from 2:1 in the general population to 4:1 in the clinical environment⁴. TMD may affect up to a third of the general population, reportedly ranging from 5-50%; yet there is poor correlation of signs and symptoms to treatment seeking, apart from the level of pain intensity⁵. Only a very small proportion of those who have signs and or symptoms are significantly enough affected in order to present for treatment.

TMD is now considered the third most common chronic pain problem after headache and backache⁵. However, contrary to other chronic pain conditions, incidence does not appear to correlate with low socioeconomic status³.

Acute and chronic TMD

Differentiation between acute and chronic TMD pain influences management.

Acute TMJ pain is often of identifiable cause and short duration for example myofascial pain with limited opening following a difficult lower third molar surgical extraction. As acute TMD is frequently associated with, or actually causes, anxiety individuals often seek advice or take appropriate action themselves. Resting the jaw, soft diet and simple analgesics may be all that is required to resolve the condition. Although painful, the extent of damage does not overwhelm the body's biopsychosocial reparative capacity.

Chronic pain related to TMDs is often referred to as pain of longstanding, generally greater than three months in duration. No longer serving any useful biological reparative function the pain associated with the TMD may become biopsychosocially destructive resulting in depression and the onset of chronic pain behaviour and disability⁶.

The prevention of acute TMD pain entering the realms of chronicity is therefore an important consideration. Early identification of patients who are more at risk of developing chronic pain involves recognition of potential vulnerability and co-existent co-morbidities. Co-morbidity or the co-occurrence of medical conditions, particularly other chronic pains and any adverse psychosocial influences must always be considered.

Chronic TMD often does not occur in isolation. Individuals suffering from chronic pain associated with a TMD frequently report other chronic pain conditions including: chronic headache, fibromyalgia, chronic fatigue syndrome, irritable bowel syndrome, sleep disturbance and depression^{3,5,6}.

Aetiology

Several different factors acting alone or in various combinations may be responsible for the presentation of TMDs. Various biopsychosocial

factors have been implicated and TMDs are best viewed and managed as a biopsychosocial entity⁷. There is currently a large NIH sponsored prospective study into the multifactorial aetiology of TMDs, which will help provide definitive information on aetiological factors for TMDs and has released some initial findings^{3,5,8-12}.

Aetiological factors may be described as being *predisposing, precipitating or perpetuating*¹³ although in practice such a distinction may be difficult to determine. It must be emphasized, however, that sometimes it is not possible to identify the presence of any of these factors. Some of the biopsychosocial factors implicated in TMDs are: genetics, psychological characteristics, and small roles for occlusion, parafunctional habits, and trauma¹⁴⁻²⁸.

TMD has been found to be associated with generalised pain sensitivity suggesting that TMD may be in part due to central sensitisation²⁹. Woolf goes on to suggest that this increased propensity to develop central sensitization is also found in patients with fibromyalgia, tension type headache, irritable bowel and chronic widespread pain.

History and Examination

As with any presenting condition, a full history and examination should be undertaken to enable the formulation of a provisional diagnosis. From this the clinician will then be able to institute appropriate management with an informed understanding of the likely outcomes and an idea of how to progress if outcomes are not achieved within an expected timeframe.

The history should examine the symptoms, their character and natural history, and any co-morbidities (including trauma), predisposing, precipitating, and perpetuating factors (See Key Fact Box 1). Due to the multifactorial biopsychosocial (biological, psychological and sociological) nature of TMDs, some level of psychosocial assessment is necessary, and whilst it is recognised that full assessment of the patient's psychological status may not be undertaken in the primary (dental) care environment, a

sympathetic approach by the practitioner may draw out information from the patient's social history in this area that informs the diagnosis and potentially the management of the case. Psychometrically tested short questionnaires such as the graded chronic pain scale can be invaluable making this an easier task³⁰.

One of the key aspects to the assessment will be extra-oral and intra-oral examination of the structures of the head and neck. This will help exclude dental pathology as a source of symptoms, whilst also identifying any other abnormalities present. The Temporomandibular joint (TMJ) should be palpated at its lateral pole and any tenderness should be noted, alongside its range of movement and any associated noises. The muscles of mastication should also be palpated noting any tenderness or hypertrophy. Lymph nodes should also be examined as part of the routine extra-oral examination. Any asymmetries in the mandible or face in general should also be noted and investigated appropriately through either further history taking or imaging if appropriate. In the over 50s a careful examination of the temporal vessels should also be made to exclude a potential diagnosis of temporal arteritis. Worrisome or red flag findings in the history and examination are shown in Key Fact Box 2.

There may be an indication of parafunctional habits either in the history of the patient, or evident through examination of the patient's hard and soft tissues, for example: tongue scalloping, linea alba, generalised attrition or wear facets. The following section on diagnosis gives details of several published examination and diagnostic protocols, which practitioners can examine along with the videos that accompany them to gain further information on a standardised examination of the TMJ and associated structures. There are also a number of useful sources of information freely available on the web (See Key Fact Box 3) containing diagnostic proformas and video demonstrations that practitioners may find useful.

Special investigations will involve the targeted use of radiographs to identify dental or other pathology. The role of imaging modalities has been extensively investigated³¹⁻⁴¹, and this research suggests that imaging forms more of an adjunct to clinical

diagnosis, as opposed to a definitive diagnostic tool. It should be remembered that in a significant proportion of cases of TMDs, patients present with functional, rather than pathological, changes in anatomical structures. The use of ionising radiation should, therefore, be very carefully considered and justified given that in TMD it may have little effect on treatment planning^{31,32}. It is important that patients should be involved in the planning of such investigations as part of the overall management process of the condition. Patients need to be warned that it is possible that imaging may show changes such as degeneration or erosion, but that these changes are not always of clinical consequence especially if function is unaffected.

Diagnoses of TMDs

Dentists need to be able to recognise the signs and symptoms of TMDs in order to make an early diagnosis of a TMD affecting the muscles, joints or both. In addition, the dentist is responsible for differentially diagnosing dental and non-dental causes of pain – particularly those which may indicate a serious or life threatening disease. With TMD the underlying pathology affecting the muscles and joint is often unclear so the diagnosis depends on cataloguing the clinical findings and matching these to recognised criteria. These signs and symptoms commonly include:

- Pain in and around the TMJs and muscles of mastication often worsened by function
- Muscle and joint tenderness on palpation
- Joint sounds (clicking and crepitus)
- Limitation and incoordination of mandibular movement
- Headaches
- Otagia

There are a number of recognised diagnostic systems, but those that define the different kinds of TMD and operationalize the history and examination provide the most help to the non-specialist. The gold standard for research is currently the Research Diagnostic Criteria for TMD (RDC/TMD) which provides a physical diagnosis of the more common TMDs (Axis I) and a measure of the psychosocial disability involving psychometric tests for depression, somatisation and chronic pain related disability (Axis

II) ⁴² (See International RDC-TMD Consortium. <http://www.rdc-tmdinternational.org/>, cited April 2013).

One of the more common physical diagnosis of TMD affecting the muscles is myofascial pain with or without limitation of opening. The TMJs are also affected by clicking (disc displacement with reduction) and less so by locking (disc displacement without reduction). Locking can present in practice as an extremely painful acute condition requiring immediate attention (see later). In addition, the TMJs can be affected by pain and because it is difficult to distinguish the cause of the pain (e.g. synovitis, capsulitis, retro-discitis) it is labelled “arthralgia”. However if there is pain and crepitus from the joint, indicating articular degeneration, it is diagnosed “osteo-arthritis” while “osteo-arthritis” is diagnosed if crepitus is present without pain.

The requirements of routine clinical practice and research are necessarily different. The former needs a quick and pragmatic approach to diagnosis whilst the latter requires a demonstrably reproducible approach, which is often more time consuming. Nevertheless, it is possible to make a reliable and quick physical diagnosis for a TMD patient using the Clinical Examination Protocol (CEP-TMD), which correlates well with the RDC/TMD ⁴³ and is freely available on the web (See Key Fact Box 3).

The CEP-TMD does not, however, provide a psychosocial profile of the patient and practitioners may choose to supplement it with the Graded Chronic Pain Scale which uses seven self-complete questions to help identify the level of disability the patient is experiencing as a result of their pain ⁴⁴ as assessment of chronic pain and TMDs should be multidimensional and biopsychosocial ^{7, 45}. A revised RDC/TMD is due to be published, the DC/TMD, and will provide a shorter more clinically applicable diagnostic measure for TMDs aimed at both clinicians and researchers. Further work is underway to help calibrate and train individuals in how to use this and it is a development that may benefit clinical practice within the next few years.

Dentists should also remember that for some TMD patients their symptoms are part of a systemic condition (e.g. Rheumatoid Arthritis, Fibromyalgia, hypermobility syndromes such as Ehlers Danlos). Therefore it is important to recognise such systemic conditions, as management for any TMD-like symptoms in these cases should be conducted in partnership with the physicians managing the overall condition.

Management for TMDs

The best summation of TMDs’ initial management is “first do no harm”. Reversible and non-invasive therapy should always be the initial management for TMDs. The primary goals of any reversible and non-invasive therapy should be:

- Encouraging self-management of the condition through education
- Reducing the (impact of) pain associated with the condition
- Decreasing functional limitation caused by the condition

Reducing exacerbations and educating individuals in how to manage any exacerbation of the condition

Most reversible and non-invasive initial management for TMDs is achievable within Primary Care either by the dentist alone, or in conjunction with the General Medical Practitioner or a specialist team. It is important that a management plan is constructed for each case, and this may involve a range of approaches determined by both the symptoms, and the patient’s response to the interventions applied (Figure 1). There are, however, a few patients with TMD who may be more difficult to manage in primary care and may merit referral before any treatment although the group would again encourage a provisional diagnosis and reassurance. Dentists may wish to refer such patients with:

- Multiple unsuccessful treatments
- Psychological distress
- Occlusal preoccupation
- Chronic widespread pain
- Disc displacement without reduction (closed lock)

Self-management with explanation

This is the key underpinning approach to all initial reversible, non-invasive, management and requires reassurance and counselling using a clear diagnosis and explanation, alongside simple strategies for self-help such as basic adjustments to every day living, postural exercises, and simple home physiotherapeutic exercises (Figure 2)^{46,50}.

Explanations should be action driven and motivate patients towards self-care, which will include the modification of habits and lifestyle factors. Active involvement of the patient in the management process may re-enforce their understanding of their condition and help improve their control over symptoms. Emphasis should be placed on a partnership in management: the patient fully engaging in self-management and the practitioner supporting them in this with adjunctive reversible, non-invasive, interventions. It is important to ensure that the patient understands that without full engagement in self-care there will be no foundation for the restoration of control over the signs and symptoms of TMDs. Patients need to accept that TMDs are a fluctuating condition and in some cases there may be acute exacerbations, but that with education they can self-manage these exacerbations using very simple techniques.

Physical therapies

Physical therapeutic interventions aim to reduce or correct muscle activity, and improve joint function. Physiotherapy may be useful for some cases, especially those with cervical muscular pain as an as part of a global pain picture. There appears to be little evidence as to which techniques are preferable, but most appear to be exercise based. Overall the evidence for physiotherapy would seem to suggest that it provides demonstrable short-term benefits in signs and symptoms, especially in the acute situation, but suggests that these benefits may not be sustained in the longer term^{46, 51-54}.

There is some supportive evidence for acupuncture in treatment of myogenous TMDs⁵⁵. This evidence is based on the treatment of trigger points in the

musculature, and suggests that acupuncture may be as effective as other reversible, non-invasive, interventions. As with other reversible, non-invasive therapies it may help establish control over symptoms breaking the cycle of continuous symptoms and allow self-management an opportunity to take effect. General dental practitioners can access acupuncture and or physiotherapy through discussion with the patient's general medical practitioner.

Pharmacotherapy

Pharmacotherapy may be considered in primary care. The two areas where this may be useful are in the management of pain and inflammation, in acute onset TMD.

- Non-steroidal anti-inflammatory drugs (NSAIDS) such as Ibuprofen can be used to relieve pain in acute onset TMDs with an inflammatory element. However they receive only moderate support from the literature for their use in TMDs⁵⁶ and their effect has been difficult to separate from placebo effects in myogenous TMD^{57,58}. In addition topical treatments such as Ibuprofen gel⁵⁹ may be helpful in short courses in myofascial TMD. Subject to no contraindications any regimen prescribed should be short in order to help limit any adverse effects. Paracetamol prescribed in a stepwise manner alongside NSAIDS may help reduce the need for NSAIDS and therefore limit their side-effects.
- Benzodiazepines – Benzodiazepines' efficacy in TMDs has been difficult to determine with some reports suggesting that they are more efficacious than placebo and some reports suggesting the contrary is true. Their therapeutic role in TMDs is small and should be limited to the relief of the acute phase of myogenous TMDs such as myofascial pain with limited opening. Given the high potential for addiction courses should be kept short, ideally less than one week, and doses kept low^{60, 61}.

Occlusal splint (orthotic) therapy

Splints provided for patients with TMDs may be of soft or hard material and are typically worn at night⁶².⁶³ The primary aim of introducing a splint is to provide biofeedback to the patient and protect the hard tissues if patients have nocturnal or diurnal parafunctional habits.

Soft splints are simple in form and manufacture, usually being vacuum-formed using approximately 2mm of Polyethylene,^{64, 65, 66}. In many cases, the appliance design is not the crucial factor in the orthotic's effectiveness. However the presence of splints in the mouth may increase awareness of the mouth and therefore lead to hyper vigilance. There are, however, some encouraging results from a recent imaging study on healthy subjects that suggest splints may exert a more centralised effect than previously thought⁶⁷.

The Nociceptive Trigeminal Inhibition Tension Suppression System (NTI-TSS) is an anterior maxillary or mandibular partial coverage (usually just the central incisors in either arch) splint. It is more commonly used in the maxilla and has undergone some limited research in TMDs and nocturnal bruxism showing a decrease in nocturnal EMG activity in jaw closing muscles, but it has not shown superiority over a full-coverage stabilisation splint for reduction of myofascial pain and a partial coverage device is more likely to allow for occlusal changes unless patients comply carefully with treatment protocols, and are subject to careful regular follow-up. At present the group would not be consider it routine therapy for TMDs, but it may have a role as an emergency appliance worn for a very short period of time for those who are in acute myofascial pain with limited mouth opening as this can preclude the construction of any other type of full-coverage splint⁶⁸.

Occlusal equilibration has no satisfactory evidence base²⁴ and is an irreversible intervention. In occasional specific cases removal of a very obvious single occlusal interference may be beneficial, but wide scale adjustments appear ineffective, are fraught

with potential difficulties, with a high risk of exacerbating the patient's problems. Treatments should therefore be aimed at reducing external stressors, and improving patient tolerance to minor occlusal irregularities.

Psychological interventions

A review of the evidence for Cognitive behavioural therapy (CBT) suggests that most patients with pain related to a TMD may gain some benefit from CBT⁶⁹. Although trials in this review had a high risk of bias they showed positive outcomes for long term improvement in pain intensity, depression and activity interference suggesting that CBT alone or in combination with other techniques can improve outcomes for patients with a TMD⁷⁰. Given the improvement in long-term outcomes and its non-invasive nature CBT should be prioritised for initial management particularly for TMD patients whose major complaint involves significant (chronic) pain. CBT aims to increase knowledge about factors that influence TMD symptoms, increase functional and physical activities, alter dysfunctional behaviours or habits, and train individuals to use relaxation and other techniques to modify the perception of pain and related sensations using target setting and pacing⁷¹. General dental practitioners will need to liaise with the patient's general medical practitioner to identify NHS pain cognitive behavioural therapists accessible in their locality.

Application of Local anaesthetic or Botulinum Toxin to the muscles of mastication

Local Anaesthetic Trigger point or Botulinum Toxin (Botox) injections are not likely to be within the remit of every primary care practitioner. The effects of Botulinum toxin and trigger point injections with local anaesthetic have been difficult to separate from placebo and one study suggests neither is superior to simple dry needling which is essentially is a similar process to acupuncture⁷²⁻⁷⁵. Botulinum toxin has, however, shown some promising, albeit low quality, evidence of being helpful in recurrent dislocations⁷⁶.

Summary of reversible, non-invasive therapy

When instituted early reversible, non-invasive therapy has been shown to have between a 68 and 95% success rate across the subtypes of TMDs⁷⁷⁻⁸³ and failure of reversible, non-invasive therapy is not an indication to progress to irreversible treatment or more advanced pharmacotherapy. In particular the use of occlusal equilibration ahead of reversible, non-invasive therapy as first line therapy for TMDs has resulted in some practitioners being brought before the Professional Conduct Committee of the General Dental Council recently. A key component of reversible, non-invasive therapy is instituting review of the patient to identify if management is progressing as would be expected.

The flowchart for management of TMDs depicted in Figure 1 includes the use of more common simple pharmacological treatments, but in future will probably need to be revised to account for the emergence of new pharmacological therapies based on advances in the understanding of the genetic and physiological basis of TMDs.

Irreversible Therapies

Occlusal therapy

Occlusal adjustment has no evidence base in the primary prevention or management of a TMD²⁴. It is, therefore, extremely unusual for occlusal adjustment to be used as a first line approach for managing TMD. An exception would be when TMD symptoms have recently arisen as a result of an acute occlusal change (e.g. associated with a newly placed restoration with a defective occlusal surface), particularly in patients who already have a history of TMD symptoms⁸⁴. Occasionally, occlusal adjustment by means of extraction may be indicated to allow an occlusal splint to be fitted. This situation may arise from an over erupted wisdom tooth causing a gross deflective contact and because of its poor position would in any case be indicated for extraction.

Usually, reversible treatments are sufficient to control patients' TMD symptoms and minor occlusal adjustment plays very much a secondary role in those few patients who are aware of a specific

uncomfortable occlusal prematurity or interference following a stabilization splint treatment which has otherwise successfully controlled TMD symptoms.

Prosthodontic reconstruction

In the same way as occlusal adjustment - prosthetic reconstruction is not regarded as an effective primary treatment for TMD. Nevertheless, as with any patient with worn or missing teeth prosthetic treatment may be required to provide a comfortable and stable occlusion. With a TMD patient it is important to use reversible, non-invasive treatment (e.g. a stabilization splint) to control symptoms before undertaking prosthetic reconstruction⁸⁵.

Pharmacotherapy

As illustrated in a recent review of pharmacological interventions in TMDs most of the evidence for the medications used in the management of TMDs falls well below the standard required for validated clinical use^{57, 86}. As a result most pharmacological interventions for TMDs fall into unvalidated clinical practice and unlicensed applications. The following medications have been used for the management of TMDs in the UK:

- Tricyclic antidepressants (TCA) – There is limited evidence to support the use of TCAs in TMDs⁸⁶⁻⁸⁸. TCA's use in TMDs may have developed through their proven efficacy in chronic pain conditions affecting other parts of the body⁸⁹. TCA's therapeutic role in TMDs is, therefore, in the management of chronic pain associated with TMDs despite initial reversible, non-invasive, therapy. TCAs tend to be prescribed at night-time, to limit the experience of side-effects, and at a lower dose than that needed to treat depression.
- Corticosteroids – their efficacy in TMDs is undetermined, but they have generally been used to help decrease inflammation through intra-articular injection. Their role has mainly been limited to helping the management of the arthritic types of TMDs. Intra-articular injections should be limited as otherwise it is possible to induce condylar lysis^{90, 91}.

Other pharmacological managements recently reported include: Gabapentin for myofascial TMD⁹²; Propranolol for myofascial TMDs with or without arthralgia⁹³ and Sodium Hyaluronate intra-articular injections for osteoarthritis⁹⁴.

Orthodontics

A recent Cochrane review has concluded that there is a lack of evidence that orthodontics either prevents or treats TMDs²³. On the basis of the evidence at the time of writing orthodontic treatment should not, therefore, be offered as a treatment that may help prevent the development of TMDs or be used to manage TMDs.

Surgery

Only a tiny minority of patients with an arthrogenous or disc disorder TMD require surgery⁹⁵ and extreme care should be taken not to expose patients who clearly have chronic pain and no functional problems to surgery as their pain is only likely to worsen after surgery.

Surgical options range from minimally invasive to open joint surgery. The most minimally invasive surgical therapeutic option is an arthrocentesis and the group would suggest that this is one of the first surgical options considered in non-myogenous TMDs with a **significant functional** problem previously unexposed to surgery prior to any more advanced or open joint procedures. Arthroscopy has been shown to have limited benefits over simple arthrocentesis^{96, 97}.

Total joint replacements have recently been reviewed by NICE and there is extensive guidance on where and when these may be indicated. This is usually end-stage **disease** when autogenous reconstructive options have either failed or been exhausted for example Rheumatoid Arthritis affecting the TMJ.

Recurrent TMJ dislocation is probably one of the more common reasons for TMJ surgical procedures and there are a number of options to try and help reduce the chance of dislocation ranging from minimally invasive autologous blood injected into the

joint, to open surgery such as an eminectomy, eminoplasty, or down fracture of the Zygomatic arch (Dautrey procedure). A good review of these procedures is provided by Shorey and Campbell⁹⁸.

Outcome assessment

One of probably the most common methods for outcome assessment in dentistry is the assessment of current symptoms through a repeated history at the review visit. Interestingly though this global approach has recently been shown to allow clinicians to both under and over estimate improvement in patients with TMDs almost to equal effect⁹⁹. Given the biopsychosocial nature of TMDs, and dependent on the nature and origin (myogenous or arthrogenous), there are a number of areas that should probably be assessed in attempting determining outcome of treatment: “objective” clinical measurements repeated over time; repeated measurement of “simple” pain scales; multidimensional patient reported outcome measures (PROMs).

“Objective” clinical measurements of improvement suggested for TMDs tend to focus on repeated measurements over time of the following: the range of motion of the mandible, the presence of joint sounds, pain on palpation of the masticatory musculature/TMJ. Clearly these measurements may be important, dependent on the nature of the TMD, in monitoring the success of therapy, but their measurement must be reliable and in the case of the range of motion should have a norm reference¹⁰⁰. Reliability for TMJ sounds and pain on muscular palpation has been shown to be only fair and improved only slightly after recalibration. The reliability of pain on palpation of the TMJ and range of motion has been shown to be good to excellent¹⁰¹. Maximal mouth opening (inter-incisal distance), either unassisted or assisted, has sufficient reliability to be repeatedly measured over time in patients with functional limitation, but is unlikely as a singular assessment of outcome to adequately examine all the impacts of such a functional limitation and therefore should not be assessed in isolation to other biopsychosocial impacts.

“Simple” pain intensity can be measured simply on a 0 - 10 numerical scale or asking patients to mark a “visual analogue” scale (a 10cm line with anchors at one end describing no pain and at the other end “worst pain imaginable”). It is worth remembering that pain intensity measurements are only a snap shot in a condition where pain levels can vary significantly with time¹⁰². Measurements will also vary depending on whether the patient is asked about their current pain, or the worst, average or least pain over a specified time (e.g. last week, month or 6 months). Pain diaries are an ideal way to overcome the problem of patients needing to make a retrospective assessment of pain intensity, but given their labour intensity tend to be used more as a research instrument than in routine clinical care. Pragmatically, asking patients what their current pain intensity is and the average over the previous week can help show beneficial changes, or a lack of them, with treatment. Pain is, however, a multidimensional experience for patients and its comprehensive measurement is complex.

The biopsychosocial nature of TMDs makes them ideally suited to the use of patient reported outcome measures (PROMS), which have come increasingly to the fore in the NHS and recent literature^{103, 104}. PROMS are essentially validated and reliable questionnaires that assess a patient’s reported problem from their perspective in a multidimensional manner. In this respect multidimensional pain questionnaires¹⁰⁵, quality of life questionnaires^{106, 107} and functional limitation questionnaires^{108, 109} might all form useful measures of outcome for patients with a TMD. The difficulty is that any questionnaire used must be sensitive to (clinical) change in the individual patient. Data for quality of life questionnaires in this respect are lacking but currently being researched.

At present, in everyday clinical practice, the best summation of the overall therapeutic goal for TMDs is to educate the patient about the condition and equip them so they feel able to self-manage the condition and its occasionally fluctuant nature. Clinicians should be wary of: a) over interpreting the

history and findings, especially muscular palpation, on repeated physical examination; b) reliance on “objective” tests to the detriment of any other biopsychosocial impacts of the TMD. Clinicians should, therefore, carefully discuss with patients their perceived ability in self-managing the condition throughout the time they are undergoing management. This is in itself an important outcome measure.

Conclusion

The authors hope that this paper provides support and guidance to help primary care practitioners feel comfortable identifying red flags, diagnosing and performing initial reversible non-invasive therapy for TMDs. Provision of a diagnosis for TMDs and reassurance over the benign nature and largely self-limiting course of conditions is an absolute necessity before starting simple reversible, non-invasive therapies. This first line management is likely to be effective in the vast majority of simple cases.

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Key fact box | Signs and symptoms of TMDs and key questions in taking a history from a patient with a suspected TMD.

Signs and symptoms of TMDs (can present with one of or a combination of)	
Pain in joint and associated musculature	
Joint noises	
Restricted range of movement	
Headache related to temporalis pain	
Sometimes patients can also present with a non-specific toothache or sensitivity	
Pain history questions	Potential findings
SOCRATES (www.medicalmnemonics.com)	
Site	<i>Primary sites: TMJ, muscles of mastication, within the ear. Not necessarily well localised (see radiation and referral)</i>
Onset	<i>Can be sudden or gradual</i>
Character	<i>Aching, deep, continuous with potential acute exacerbations</i>
Radiation and referral	<i>To ear, angle of jaw, temple, teeth</i>
Associated and alleviating factors	<i>Rest, analgesia may help, dynamic movements worsen</i>
Timing – duration and frequency	<i>Can worsen through day or through the night, but often present continuously</i>
Exacerbating factors	<i>Chewing, yawning, prolonged mouth opening</i>
Severity (Score out ten with ten being “worst pain imaginable”)	<i>Variable</i>
Other questions relevant to TMD history ^{42, 110}	Relevance
Have you had pain in the face, jaw, temple, in front of the ear, or in the ear in the past month?	<i>Indicative of TMDs</i>
Have you ever had any clicking or grinding noises from your jaw joint in front of your ear?	<i>Indicative of disc disorder or arthritides</i>
Have you ever had your jaw lock or catch so it won’t open all the way?	<i>Indicative of a disc displacement without reduction</i>
During the last month, have you often been bothered by: feeling down, depressed or hopeless? having little interest or pleasure in doing things?	<i>Answer yes to either of these questions and the patient should be assessed by a practitioner competent in mental health assessment</i>

Key fact box 2 – Red flag signs and symptoms ¹¹¹⁻¹¹⁵

	Sign or symptom
Headache symptoms suggesting is secondary headache as opposed to primary. SSNOOP₄ (American Headache society) ¹¹¹⁻¹¹³	S ystemic disease/symptoms eg weight loss
	S econdary headache risk factors eg previous history of malignancy
	N eurological signs or symptoms eg: cranial nerve dysfunction
	O nset abrupt – “thunderclap”
	O lder. >50 and new onset headache
	P revious headache history and p rogression. Very sudden increase in pain to this level P recipitated by Valsalva P ostural aggravation P apilloedema
Oral and maxillofacial signs and symptoms suggestive of pathology	Near absolute trismus preventing full oral examination
	Erythroplakia, Erythroleukoplakia, leukoplakia or frank ulceration of oral mucosa
	Cranial nerve dysfunction
	Previous history of head and neck carcinoma
	Preauricular masses
	Lymphadenopathy
Ear nose and throat signs and symptoms suggestive of pathology ¹¹⁴	Repeated nose bleeds
	Loss of smell
	Persistent nasal obstruction or purulent discharge
	Loss of hearing
	Lymphadenopathy
Signs and symptoms suggestive of Temporal arteritis (generally in over 50s age-group) ¹¹⁶	Fatiguing and pain in masticatory musculature when chewing. Jaw claudication pain during eating due to muscle ischemia producing reduced arterial flow into muscles.
	Headache
	Ocular symptoms such as blurring of vision
	Scalp tenderness – specifically enlarged, palpably tender superficial temporal arteries
	[Raised erythrocyte sedimentation rate (ESR)]

Key fact box 3 – Reference material available on web

Nature of material	Source	Website addresses
Patient information	National Institute for Health	http://www.nidcr.nih.gov/oralhealth/topics/tmj/tmjdisorders.htm
	American Academy of Orofacial Pain	http://www.aaop.org/content.aspx?page_id=22&club_id=508439&module_id=108085
	European Academy of Craniomandibular Disorders	http://www.eacmd.org/patient.php
	NICE Clinical Knowledge summary on TMDs	http://cks.nice.org.uk/tmj-disorders
	Newcastle University/Newcastle Dental Hospital Patient information sheet and exercises	http://www.ncl.ac.uk/dental/AppliedOcclusion/assets/TMD%20info%20and%20exercise%20sheet.pdf
Examination of TMJ and muscles of mastication	Research Diagnostic Criteria for TMD consortium network	http://www.rdc-tmdinternational.org/OtherResources/TrainingReliability/RDCExaminerTraining.aspx
	E-learning for healthcare	http://portal.e-lfh.org.uk/ Requires registration and working within the NHS. “The three minute examination of the articulatory system” video in the session on “Assessing the articulatory system” By S.Davies and Z. Al-Ani
	Newcastle University	http://www.ncl.ac.uk/dental/AppliedOcclusion/
	Cardiff University	http://www.paincommunitycentre.org/article/diagnosis-and-treatment-non-dental-facial-pain

Figure 1 – Flowchart for management of TMDs in Primary Care

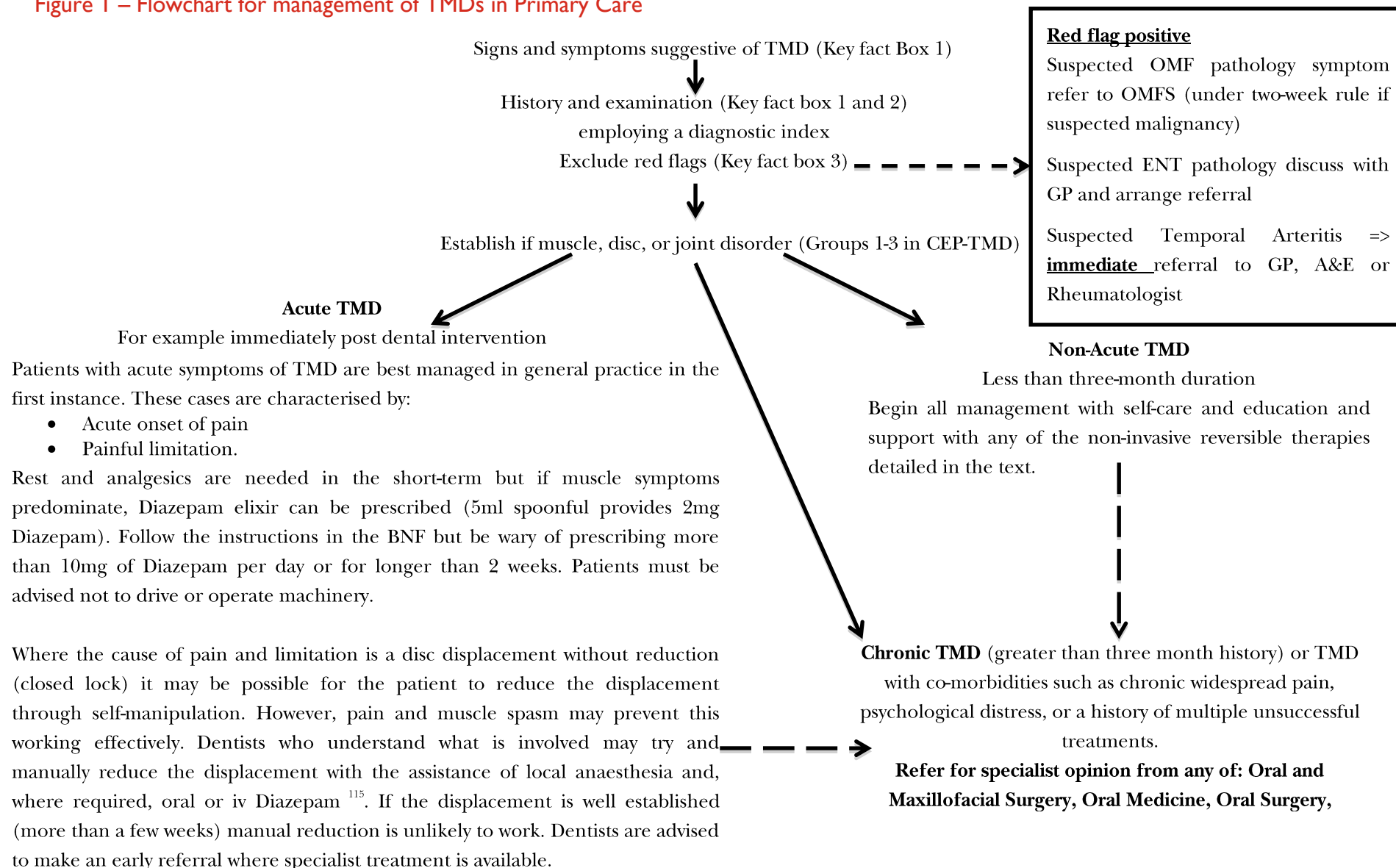


Figure 2 - Self care programme and home physiotherapy

Adapted and taken from Clark 2008, Micchlotti et al 2005, Nicolakis et al 2002, Wright 1995, Wright 2009^{46, 47, 117-119}.

Changes to daily living and habits:

- Avoid caffeine as this is a stimulant and likely to increase stress and cause muscle tension
- Give yourself time to perform self-care exercises and relaxation techniques throughout every day
- When experiencing pain in the muscles or around the joint adapt your diet and take a softer diet with the consistency of foods such as pasta, omelettes etc
- Do not chew gum, pen tops, pencils, nails etc as these habits will all stress your chewing system.
- Apart from when you are eating your teeth should be apart.
- Examine your posture and try and maintain your head up and shoulders back. Examine your usual positions during the day for instance working at a desk and ensure that they are ergonomic.

Practice diaphragmatic breathing to aid relaxation.

When first starting to learn how to perform this type of breathing it is easiest to practice it whilst lying down in a dimly lit room without distractions. Concentrate on taking deep slow breaths in through your nose and feeling your chest inflate with your hands on your stomach. Your hands will move inwards and slightly upwards if you are doing it correctly. Once you master the breathing there is no absolute need to lie down or be in a dimly lit room, you can just use the technique for five minutes every two hours to aid relaxation and whenever you start to feel tension or stress develop through the working day.

Simple self-physiotherapeutic techniques

Apply moist heat or ice to affected muscles.

Usually applied to Temporalis and masseter.

A warm moist flannel wrapped around a proprietary heat pack or warm hot water bottle will provide moist heat. Apply for 15-20minutes twice daily to the affected muscles. You can then go onto performing

the prescribed exercises; if you have limited opening it will be beneficial to apply moist heat prior to your stretching exercises.

Ice can be applied to affected muscles using an ice pack wrapped in a tea towel placed onto the skin overlying the affected muscle until the muscle feels frozen and numb (usually within 5-10 minutes of application of covered ice pack).

Isometric tension exercises.

Place the back of your hand under your lower jaw and provide gentle resistance upwards as you try to open. Try and open against this resistance and hold your opening against this resistance for five-six seconds (one set). Complete five-six sets up to four times a day

Coordination training

- Practice opening straight in the mirror and use a hand lightly on either side of your face to gently guide you to straight opening if you are moving off to one side. Do this in a slow, controlled manner over five-six seconds (one set). Complete five-six sets up to four times a day
- Practice the retrusive position of your jaw. Open normally and then curl your tongue to the top and back of your mouth. You should feel your jaw move backwards slightly. Keeping your tongue in this position close in a slow controlled manner over five-six seconds (one set). Complete five-six sets up to four times a day.

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