Management of painful Temporomandibular disorder in adults

NHS England Getting It Right First Time (GIRFT) and Royal College of Surgeons' Faculty of Dental Surgery.

Contents

1. Sponsoring Body

Faculty of Dental Surgery Royal College of Surgeons England

2. Associate bodies

- Association of British Academic Oral and Maxillofacial Surgeons (ABAOMS)
- Association of Chartered Physiotherapists in Temporomandibular Disorders (ACPTMD)
- Association of Consultants and Specialists in Restorative Dentistry (RD-UK)
- British Association of Oral and Maxillofacial Surgeons (BAOMS)
- British Association of Oral Surgeons (BAOS)
- British and Irish Society for Oral Medicine (BISOM)
- British Society of Prosthodontists (BSSPD)
- British Society of Special Care Dentistry (BSSCD)
- College of General Dentistry UK
- NHS England Getting It Right First Time (GIRFT) for hospital dentistry

3. Contributors

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Guideline Development Group (Name: Specialism, institution).

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4. Glossary of terms

3Q/TMD	3 question TMD screener
A-TMD	Arthrogenous TMD
CBCT	Cone-beam computed tomography
CBD	Cannabidiol
CT	Computed tomography
COMT	Catechol-O-methyltransferase
CPI	Characteristic Pain Intensity
DC/TMD	Diagnostic Criteria for Temporomandibular Disorders
DDwoR	Disc displacement without reduction
DJD	Degenerative joint disease
ENT	Ear, nose and throat
FDS	Faculty of Dental Surgery
GDG	Guideline development group
GDP	General dental practitioner
GI	Gastrointestinal
GIRFT	Getting It Right First Time
GP	General medical practitioner
LLLT	Low level laser therapy
LSS	Lower soft splint
M-TMD	Myogenous TMD
MMO	Maximal mouth opening
MRI	Magnetic resonance imaging
NICE	National Institute for Health and Care Excellence
NSAIDs	Non-steroidal anti-inflammatory drugs
OD	Once daily
OMFS	Oral and maxillofacial surgery
OSA	Obstructive sleep apnoea
PHQ-4	Patient Health Questionnaire 4
QDS	Four times daily
RCS	Royal College of Surgeons
SSM	Supported self-management
TDS	Three times daily
TMD	Temporomandibular disorders
TMJ	Temporomandibular joint
UK	United Kingdom
US	Ultrasound scan

5. Introduction

Temporomandibular disorders (TMD) are the second most common cause of orofacial pain after "toothache" (odontogenic pain).[1] They affect up to 1 in 15 of the UK population and predominantly arise in the 20-40 age range. [1, 2] Females are marginally more likely to develop TMD than males and there are US data suggesting that TMD incidence is higher in black ethnic groups and lower in Asian ethnic groups when compared to white ethnic groups, however much more worldwide research is required to understand all aspects of TMD in different ethnic groups.[1-3] TMD are a group of musculoskeletal conditions that affect the muscles of mastication, the temporomandibular joint (TMJ) and associated structures.[4] There are twelve common types (**Table 1**) which confirmatory examination findings can attribute to being either myogenous (muscular in origin) or arthrogenous (joint or joint structure in origin).[5] Those of arthrogenous nature have a good prognosis and generally remain stable rather than progress with only around 1 in 7 cases demonstrating any progression[6] (**Table 1 footnote**).

Table 1: Twelve common types of TMD [5]

Type of TMD	Origin
1. Myalgia 2. Local myalgia 3. Myofascial pain 4. Myofascial pain with referral 5. Headache attributed to TMD	Myogenous
6. Disc displacement with reduction[a] 7. Disc displacement with reduction with intermittent locking 8. Disc displacement without reduction with limited opening 9. Disc displacement without reduction without limited opening 10. Osteoarthrosis/ osteoarthritis (Degenerative joint disease) [b] 11. Subluxation 12. Arthralgia	Arthrogenous

[a] *Data demonstrated over two-thirds of people (76%) with disc displacement have no progression of over 8 years, 10% show reversal with 14% demonstrating any progression towards any form of disc displacement without reduction.[6] Only a small number of disc displacements require intervention, these are outlined in* ***table 7*** *and* ***figure 3****.*

[b] *Degenerative joint disease (previously known as osteoarthritis and osteoarthrosis) tends to be a stable condition, with 71% of cases showing no progression towards more deterioration over an eight year-period.[6] Over the same period 14% of cases demonstrated reversal leaving a small minority (15%) which progress in any way. [6]*

TMD frequently present with moderate-intensity pain that can radiate and refer across the mouth and face causing a wide range of biopsychosocial impacts including impacts on health-related quality of life commensurate with other types of persistent pain.[1, 2] Other symptoms include joint noises (clicking, popping, crepitus [rustling or grinding]); ear pain (otalgia); changes in the range of movement of the TMJ; headaches.[2] Only a small percentage of those presenting with TMD-like symptoms have occult, mimicking neoplastic pathology (<1% are intracranial or oro/nasopharyngeal tumours [7, 8]). There are, however, well-defined and accepted red flags (**Table 2**) that should raise the index of suspicion of a mimicking pathology [9-11].

If TMD are treated early in their presentation with simple reversible management techniques, the majority (75-90%) improve to the satisfaction of the patient and are successfully managed either through resolution or by becoming intermittent and manageable [12]. Some TMD, particularly myogenous ones, have a propensity to become persistent (chronic), lasting greater than 3 months. Due to the impact of the persistent pain, they cause a reduction in generic, health-related quality of life commensurate with that caused by chronic illnesses such as arthritis and depression and exert a substantial health economic impact on the patient, the health service and the economy [1, 13]. This impact is particularly pronounced due to the expressed uncertainty of medical and dental practitioners on management and the lack of structured care pathways which often result in circular or protracted journeys to obtain care [14-18]. This guideline, therefore, seeks to provide evidence-based approaches to the provision of care along a structured and clear pathway to improve care provision, reduce the impact of painful TMD and hopefully its likelihood to become persistent.

Table 2: Red flag signs of potential mimicking condition (Adapted from [10] supplemented with information from[19])

Sign	Possible cause or origin
History of previous malignant tumour with facial pain or headache	Potential for new primary, recurrence or metastases
Lymphadenopathy, face or neck mass/swelling	Neoplastic, infective or autoimmune
Jaw claudication (Cramp like pain in tongue or jaw). Commonly presents with: Unilateral headache, flu-like symptoms, vision disturbances, inflammation of temporal artery, trismus	Giant cell arteritis
Unplanned weight loss	Neoplastic, systemic illness
Pyrexia (+/-) swelling and trismus	Infective
Neurological signs/symptoms • Acute onset loss of smell or hearing • Acute onset visual problems • Neurosensory change • Motor function changes	Neoplastic, infective or autoimmune cause
Pain with exertion, coughing or sneezing. *(Suggests raised intracranial pressure)*	Neoplastic or infective cause.
Nasal symptoms (persistent and profuse bleeding or (purulent) discharge)	Neoplastic (nasopharyngeal) or infective
Acute onset of profound, or worsening, trismus	Neoplastic, infective, severe arthrogenous or traumatic cause
Persistent hoarseness of the voice (≥3 weeks)	Neoplastic
Persistent mouth ulcer(s) (≥3 weeks)	Neoplastic, autoimmune
Occlusal changes	Neoplastic, traumatic, growth disturbance
New onset jaw pain in those taking bisphosphonates or related medication	Medication related osteonecrosis of the jaws

6. Intended Audience

This guideline provides information for all clinical dental professionals (dentists, dental hygienists, dental therapists, clinical dental technicians), general medical practitioners (GPs) and other healthcare professionals (*e.g.,* pharmacists, physiotherapists, chiropractors, osteopaths) to whom individuals living with TMD may present. The guideline supports the recognition of adults living with painful TMD and facilitates evidence-based management. It presents the most appropriate care pathway for an individual who presents with any of the 12 most common painful TMD subtypes (**Table 1**) in any health care setting. For the purpose of this document the term "adult" includes all individuals ≥18 years old.

These guidelines are applicable for all dental specialties and adult services in primary and secondary care, across general dental, community and hospital-based settings. The guidelines support informed, evidence-based discussions and shared decisions between clinical dental and medical professionals and individuals living with TMD. This guidance can be used by those living with TMD to help inform them about the management of their condition. Additionally, this guidance can be used by medical professionals and other healthcare professionals (*e.g.*, pharmacists, physiotherapists, chiropractor's and osteopaths) to inform about the care requirements for patients with TMD.

7. Statement of conflict of interest

The Faculty of Dental Surgery is funded by its fellows and members, and no contributors or reviewers were paid for their work on this guidance, and nor is any payment provided in kind.

8. Aims and Objectives

This guideline aims to consolidate the recent literature and help inform and support dental, medical and other healthcare professionals in their ability to:

1. Appropriately identify patients at risk of painful TMD
2. Accurately diagnose an individual with at least a broad TMD grouping: Myogenous, arthrogenous, or combination.
3. Clarify requirements for initial management of painful TMD including supported self-management.
4. Propose appropriate hierarchical steps for adjunctive management strategies of painful persistent TMD that can be discussed in shared decision making with patients.
5. Reinforce appropriate points for onward referral.
6. Clarify best route(s) of onward referral, if deemed appropriate.

9. Development and evidence base

This guideline supersedes the 2013 Royal College of Surgeons (RCS), Faculty of Dental Surgery document "Temporomandibular disorders (TMDs): an update and management guidance for primary care from the UK Specialist Interest Group in Orofacial Pain and TMDs".[20] Development took into consideration existing national UK guidance and recently published national and international evidence for appropriate management pathways and strategies for painful TMD and other persistent pain conditions. [11, 19, 21-27]

A modified Delphi methodology was employed by the guideline development group (GDG)[28]:

1) Evidence synthesis: All published systematic reviews on TMD available from PubMed, Scopus, EMBASE, MEDLINE and Health Management Information Consortium by 30/03/2022.
2) Evidence reviewed
3) Evidence statements created from review of evidence and appraised by GDG.
4) GRADE rating for certainty of evidence and strength of recommendations confirmed and agreed with GDG and presented in **Table 3.**
5) Guideline draft constructed from evidence statements and circulated to GDG, feedback collated, changes made, updated draft re-circulated to GDG for appraisal.

At least 75% of GDG were required to provide approval at each stage of the process: evidence statement, review and guideline drafting.

A final draft of the guideline was produced once RCS England's consultation had closed, all the associate bodies commentary collated, the GDG core team examined all consultation responses. No consultee's response highlighted substantiated, fundamental, problems with the proposed guidance and the majority were either positive endorsement of (the need for) the guidance, constructive critique of circumscribed areas of the guidance, or matters of phraseology/clarity. The GDG core team responded to each piece of feedback in each consultation submitted as well as acting on each by either re-examining the evidence base and/or adjusting text/guidance as appropriate. Any fundamental changes to the guideline were proposed to the full GDG prior to adjustment and adoption. The guideline and all supporting material were critically examined by the RCS clinical standards committee prior to publication and their comments responded to and acted upon.

Table 3: Summary of evidence table

Articles	Summary findings	GRADE
Prevalence		
Pantoja LLQ *et al*, 2019; Valesan LF *et al*, 2021; Silva MAG *et al*, 2020; Campos LGN *et al*, 2021; Chaves TC *et al*, 2014; De La Torre Canales G *et al*, 2018; Gilheaney O *et al*, 2020; Herranz-Gomez A *et al*, 2020; Xie C *et al*, 2019; Yakkaphan P *et al*, 2022.	No new information	
Pathogenesis		
Yin Y *et al*, 2020; Brancher JA *et al*, 2021; Carvalho Soares FF *et al*, 2020; da Costa GFA *et al*, 2017; Dutra Dias H *et al*, 2021; Pitance L *et al*, 2016; Yin Y *et al*. 2020; Afroz S *et al*, 2018; La Touche R *et al*, 2018. Other: Aaron LA *et al*, 2000	Polymorphisms in COMT were significantly associated with TMD. Evidence for extra segmental hyperresponsiveness and generalized hyper-excitability in the central nervous system in patients with TMD.	NOT A RECOMMENDATION JUST A FINDING MODERATE QUALITY EVIDENCE
Aetiology/presentation/epidemiology		
Al-Moraissi EA *et al*, 2017; Oghli I *et al*, 2020; Dinsdale A *et al*, 2021; Dinsdale A *et al*, 2020; Haggman-Henrikson B *et al*, 2013; Ferreira MC *et al*, 2018; Alqhtani N *et al*, 2021; Réus JC *et al*, 2021; Fan XC *et al*, 2020; Jiménez-Silva A *et al*, 2017; Rocha CP *et al*, 2013; Aranha RLB *et al*, 2021; Gilheaney Ó *et al*, 2018; Gilheaney Ó *et al*, 2017; Pigozzi LB *et al*, 2021; Al-Moraissi EA *et al*, 2017; Bueno CH *et al*, 2018; Bizzarri, P. *et al*, 2021; Farronato G *et al*, 2016; Jimenez-Silva A *et al*, 2017; Manfredini D *et al*, 2017; Marques FBC *et al*, 2021; Robinson LJ *et al*, 2016; Sabsoob O *et al*, 2021; Shu C *et al*, 2021; Visscher CM *et al*, 2015; Wilkowicz W *et al*, 2021. Other: Yanagi Y *et al*, 2003; Liu, YT *et al* 2018; NICE Suspected cancer:recognition and referral 2021; Beecroft E V, *et al* 2019; Greene C S, 2001; Beecroft E V *et al*, 2013; Breckons M *et al*, 2017; Magnusson T and Carlsson G E, Swed Dent J 1978; Magnusson T and Carlsson G E, Acta Odontol Scand 1978; Carlson C R *et al*, 1998; Aggarwal V *et al*, 2006; Elliott E *et al*, 2022; Ohrbach R *et al*, 2011; Ohrbach R *et al*, 2013	Consultation for any individual presenting with TMD should include exploration of headache symptoms.	STRONG RECOMMENDATION MODERATE EVIDENCE
Bruxism		
Lobbezoo F *et al*, 2018; Chattrattrai T *et al*, 2023; Manfredini D *et al*, 2021; Baad-Hansen L *et al*, 2019; Luiz de Barreto Aranha R *et al*, 2018; Lobbezoo F *et al*, 2014[29]; Lobbezoo F *et al*, 2023; Manfredini D *et al*, 2022; Manfredini D *et al*, 2020; Lobbezoo F *et al*, 2013; Jiménez-Silva A *et al*, 2017; Camparis CM *et al*, 2006; Manfredini D *et al*, 2023.	Remove bruxism from parafunction section as no longer considered parafunctional activity. Include new motor bruxism descriptions and distinction between awake and sleep bruxism. The association between bruxism and TMD remains unclear. Evidence is equivocal. Masticatory muscle activity in terms of bruxism is most likely not enough to cause the onset or persistence of musculoskeletal pain in the absence of other risk factors.	STRONG RECOMMENDATIONS, HIGH QUALITY EVIDENCE. MODERATE RECOMMENDATION, MODERATE QUALITY EVIDENCE. MODERATE RECOMMENDATION, LOW QUALITY EVIDENCE.

	STAB and the Bruxism Screener (BruxScreen) may be available in the near future to support identification of bruxism as part of TMD assessment in appropriate individuals.	
Otological		
Omidvar S *et al*, 2019; Skog C *et al*, 2018; Bousema EJ *et al*, 2018; Porto De Toledo I *et al*, 2017; Jose MR *et al*, 2014; Jose MR *et al* 2015; Mottaghi A *et al*, 2019; Stechman-Neto J *et al*, 2016; Stepan L *et al*, 2017; Hernandez-Nuno de la Rosa MF *et al*, 2021.	Exploring otological signs in those who complain from temporomandibular disorders should be encouraged. Referral to ENT for assessment of positive findings should be considered on an individual basis.	STRONG RECOMMENDATION MODERATE QUALITY EVIDENCE
TMD and Sleep		
Dreweck FDS *et al*, 2020; Jiménez-Silva A *et al*, 2017; Da Silva CAG *et al*, 2020; Al-Jewair T *et al*, 2021; Shibeika D *et al*, 2019; Roithmann CC *et al*, 2021; Burr MR *et al*, 2021; Alessandri-Bonetti A *et al*, 2019; Alessandri-Bonetti A *et al*, 2020; Sommer I *et al*, 2015; Veiga DM *et al*, 2013.	Sleep quality and painful TMD have a reciprocal relationship, sleep quality and quantity should be appraised at assessment and sleep hygiene advice provided for those who need additional support.	MODERATE RECOMMENDATION, MODERATE EVIDENCE
Obstructive sleep apnoea		
Lobbezoo F *et al*, 2020; Manfredini D *et al*, 2023; Pala Mendes AT *et al*, 2022; Kang JH *et al*, 2022; Alessandri-Bonetti A *et al*, 2019; Sanders AE *et al,* 2013; Alessandri-Bonetti A *et al*, 2021; Pivetta B *et al*, 2021; Chung F *et al,* 2016; Solecka *et al*, 2022; Miller *et al*, 2018; Prasad *et al*, 2017; Silva *et at*, 2011; Bernhardt *et al*, 2020. Other: Langaliya A *et al*, 2023[30]; Alessandri-Bonetti A *et al*, 2023; NICE, 2021; Ramar *et al*, 2015[31]	There is an increased incidence of TMD in those with obstructive sleep apnoea Dental teams should be aware of signs, symptoms and risk factors for obstructive sleep apnoea given its potentially life-threatening nature and facilitate formal medical assessment and appropriate management of this condition as required noting its importance and risk of morbidity and mortality. STOP-BANG questionnaire can support screening for obstructive sleep apnoea in the dental setting and in TMD patients.	STRONG RECOMMENDATIONS, MODERATE QUALITY EVIDENCE
Obesity		
Wang *et al*, 2023; Chin *et al*, 2019; Green *et al*, 2015; Narouze and Souzdalnitski, 2015; Minervini *et al,* 2023;	The prevalence of pain has been shown to be higher in obese populations. Obese individuals demonstrate reduced pressure-pain thresholds, reduced pain tolerance and higher pain sensitivity. No positive association demonstrated between obesity and TMD at this time. Positive weight management has been shown to beneficially impact pain intensity, pain related disability and health related quality of life measures in some persistent pain conditions, including primary headache conditions, known to be comorbid with TMD. It also plays a role in helping manage sleep apnea. Support and advice pertaining to healthy lifestyle habits should be routinely offered to all patients as part of holistic care model	MODERATE RECOMMENDATIONS MODERATE QUALITY EVIDENCE

Hormones		
Turner *et al*, 2011; Cheng *et al*, 2000; Berger *et al*, 2015; Okuda *et al*, 1996; Wang *et al*, 2008; Lora *et al* 2016; Robinson *et al*, 2020; Nekora-Azak *et al*, 2008.	Oestrogen deficiency has been associated with structural changes within the temporomandibular joint in animal models. Oestrogen is thought to influence pain regulatory mechanisms both peripherally and centrally. Evidence between oestrogen levels and TMD presentation is contradictory. Studies involving pharmacological stabilization of oestrogen levels fail to demonstrate improved outcomes when compared to self-management alone. Association between oestrogen and TMD is not clear at this time.	STRONG RECOMMENDATION MODERATE QUALITY EVIDENCE MODERATE RECOMMENDATIONS MODERATE QUALITY EVIDENCE STRONG RECOMMENATIONS MODERATE QUALITY EVIDENCE
Assessment / Diagnosis / Imaging		
Massaroto Barros B *et al*, 2020; Moreira A *et al*, 2021; Borges REA *et al*, 2021; de Melo DP *et al*, 2018; Costantinides F *et al*, 2020; Al-Saleh MA *et al*, 2016; Abdalla-Aslan R *et al*, 2021; Al-Belasy FA *et al*, 2018; Almeida FT *et al*, 2019; Su N *et al*, 2018; Fathima N *et al*, 2019; Gonzalez-Gonzalez AM *et al*, 2021; Hilgenberg-Sydney PB *et al*, 2018; Lopez Panos R *et al*, 2019; Meng H *et al*, 2021; Naeije M *et al*, 2013; Olchowy A *et al*, 2020; Pelai EB *et al*, 2020; Sharma S *et al*, 2013; Olchowy A *et al*, 2020. Other: Schiffman E *et al*, 2014; Durham J *et al*, 2015; Durham J *et al*, 2011; Durham J *et al*, 2010; NICE [NG193] 2021; Woefel J b *et al*, 2014; Crawford C E *et al*, 2022; Kroenke K *et al*, 2009; Lövgren a *et al*, 2016; Von Korff M *et al*, 1992; Bag a K at al, 2014; Mallya S M *et al* 2002	The literature is unable to provide evidence to support the reliability and diagnostic validity of the joint vibration analysis, infrared thermography, or assessment of electromyographic activity for TMD. Routine imaging for diagnostic or management initiation for TMD is not advocated. In cases where imaging is justified CBCT is most accurate for DJD, US and MRI for internal derangements.	STRONG RECOMMENDATION LOW QUALITY EVIDENCE STRONG RECOMMENDATION MODERATE EVIDENCE MODERATE RECOMMENDATION MODERATE EVIDENCE
Supported Self-management		
Aggarwal VR *et al*, 2019; Durham J *et al*, 2016; Storey WP *et al*, 2016; Randhawa K *et al*, 2016; Kotiranta U *et al*, 2014; Miake-Lye I *et al*, 2016; Butts R *et al*, 2017; de Freitas RF *et al*, 2013, Palmer J *et al*, 2023; Aggarwal VR *et al*, 2021; . Other: Peters S *et al*, 2015	Supported self-management plan essential for all TMD patients. No reported adverse effects of SM suggesting favourable risk: benefit ratio. Self-management plans should be regularly reviewed and adapted subject to changing pattern across course of individuals TMD. Core components of supported self-management package 1. Education (Condition and appropriate analgesic use) 2. Self-exercise therapy 3. Thermal modalities 4. Self-massage therapy 5. Diet and nutrition 6. Parafunctional behavior	STRONG RECOMMENDATIONS BASED ON MODERATE QUALITY EVIDENCE

Psychological management		
Kotiranta U *et al*, 2014; Roldán-Barraza C *et al*, 2014; Randhawa K *et al*, 2016; Penlington C *et al*, 2022; Häggman-Henrikson B *et al*, 2020; Kotiranta U *et al*, 2014; Zhang Y *et al*, 2015; Galvez-Sánchez CM *et al*, 2021; Roldán-Barraza C *et al*, 2014; Randhawa K *et al*, 2016. Other: Peters S *et al*, 2015; NICE Depression in adults: treatment and management 2022; Magesty R A, 2021	Biopsychosocial approach to management for TMD essential for positive outcome. Psychological therapies show benefit in reduction of distress and pain intensity. Low risk of adverse events from psychological therapies. Individuals displaying high psychosocial burden should receive specialist psychosocial assessment and management to support their condition.	STRONG RECOMMENDATIONS BASED ON MODERATE/LOW QUALITY EVIDENCE
Manual therapy/physiotherapy /exercise/diet modification		
de Melo LA *et al*, 2020; Armijo-Olivo S *et al*, 2016; Herrera-Valencia A *et al*, 2020; Asquini, G. *et al*, 2021; Alves BM *et al*, 2013; van der Meer HA *et al*, 2020; Zhang L *et al*, 2021; Paco M *et al*, 2016; de Melo LA *et al*, 2020; Armijo-Olivo S *et al*, 2016; Órla G *et al*, 2020; Calixtre LB *et al*, 2015; Amorim CSM *et al*, 2017; La Touche R *et al*, 2020; Brantingham JW *et al*, 2013; Dickerson SM *et al*, 2017 La Touche R *et al*, 2022. Other: Michelotti A *et al*, 2005; Wright E K G, 2020; Wänman A and Marklund S, 2020; Edwards D C, 2021; Nijs J *et al*, 2020; Lewis J A *et al* 2021; Nicolakis P *et al*, 2002; Magesty R A, 2021	Manual therapy, mobility exercises (encouragement of normal functional jaw movement), postural training, physiotherapy and therapeutic exercises should be considered for all types of TMD. Physiotherapy, mobility or a mixed approach to exercise therapies may lead to decreased pain and increased range of jaw movement. Low levels of adverse events from physiotherapy, postural training, manual therapy support its use for patients whose TMD is not well controlled despite positive self-management strategies. For individuals living with TMD building a routine of myofascial release and massage techniques twice daily as a component daily management is likely to provide symptomatic relief in the short and long term.	STRONG RECOMMENDATION MODERATE EVIDENCE MODERATE RECOMMENDATION MODERATE EVIDENCE STRONG RECOMMENDATION STRONG EVIDENCE MODERATE RECOMMENDATION MODERATE EVIDENCE
Acupuncture/electroacupuncture/dry needling/laser acupuncture		
Sung SH *et al*, 2021; Fernandes AC *et al*, 2017; Peixoto KO *et al*, 2021; Wu JY *et al*, 2017; Machado E *et al*, 2018; Vier C *et al*, 2018; Nowak Z *et al*, 2021; Gijon-Soriano AL *et al*, 2020; Liu G-F *et al*, 2021. Other: McMillan A S *et al*, 1997; Venancio Rde A *et al*, 2009	Evidence suggests acupuncture as an adjunctive treatment for individuals with muscular TMD is likely to have a positive effect on pain symptoms. Referral for acupuncture either through NHS referral if available locally or privately by acupuncturist trained for orofacial pain management should be encouraged for those with muscular TMD.	STRONG RECOMMENDATION MODERATE EVIDENCE MODERATE RECOMMENDATION BASED ON EXPERT OPINION

Splint therapy		
Zhang C *et al*, 2016; Riley P *et al*, 2020; Zhang L *et al*, 2021; Kuzmanovic Pficer J *et al*, 2017; Manrriquez SL *et al*, 2021; de Moraes Melo Neto CL *et al*, 2022[32]; Fouda Atef Abdel Hameed. 2020. Other: Greene C S and Menchel H F, 2018; Moufti M A *et al*, 2007; Truelove E, 2006; Seifeldin S A and Elhayes K A, 2015; Poorna T A *et al* 2022	Splint should be provided for myofascial TMDs, headache attributed to TMD or individuals with TMD and concomitant headache but should not be used in isolation. Splints should not be provided to manage joint noises as a result of intra-articular TMD. Full coverage splints only to be considered to prevent unfavourable dento-alveolar compensation. No evidence of increased efficacy between splint types (LSS/stabalisation splint). GDP should provide splint of a design they feel comfortable providing and maintaining. Where tolerated splint use should be prescribed for at least 3 months to assess full benefit. If splints worsen discomfort their use should be ceased. Once TMD stabilised splint use can be reduced to intermittent use to manage cyclical symptomatic flair up. Splints should not be provided to individuals with active dental disease (active decay, unstable periodontal condition) as risk of use outweigh potential benefits.	MODERATE RECOMMENDATION BASED ON MODERATE EVIDENCE STRONG RECOMMENDATIONS BASED ON MODERATE EVIDENCE STRONG RECOMMENDATIONS BASED ON EXPERT OPINION
Low level laser therapy /photo biomodulation		
Xu GZ *et al*, 2018; Sobral AP *et al*, 2021; Tuner J *et al*, 2019; Ren H *et al*, 2021; Herpich CM *et al*, 2015; Ahmad S A, *et al*, 2021.	LLLT and photo biomodulation may offer benefit to myofascial TMD but the certainty of the effect is low.	WEAK RECOMMENDATION BASED ON MODERATE EVIDENCE
Pharmacological management		
Mena M *et al*, 2020; Häggman-Henrikson B *et al*, 2017; Florent B *et al*, 2021; Januzzi E *et al*, 2013; Kulkarni S *et al*, 2020; Kulkarni S *et al*, 2019; Nouged E *et al*, 2019; Srinivasulu Y *et al*, 2020. Pablo *et al*, 2007. Other: Poluha R L *et al*, 2018; McMillan A S *et al*, 1997; Venancio Rde A *et al*, 2009;	Topical application of medicaments externally over the TMD, if completed safely with appropriate patch test pre-application is unlikely to be detrimental but may offer mild, short-term relief in come TMD cases. Certainty of benefit of topical agents is very low. Oral NSAIDs are likely to positively affect pain reduction in the TMJ and masticatory muscles and range of jaw movement. Due to side effects, they are suitable for short term use during times of acute exacerbation only. Duloxetine may be more efficacious at reducing pain for persistent TMD cases. Side effect profile of duloxetine is advantageous over amitriptyline	WEAK RECOMMENDATION VERY LOW-QUALITY EVIDENCE MODERATE RECOMMENDATION MODERATE EVIDENCE WEAK RECOMMENDATION BASED ON LOW QUALITY EVIDENCE

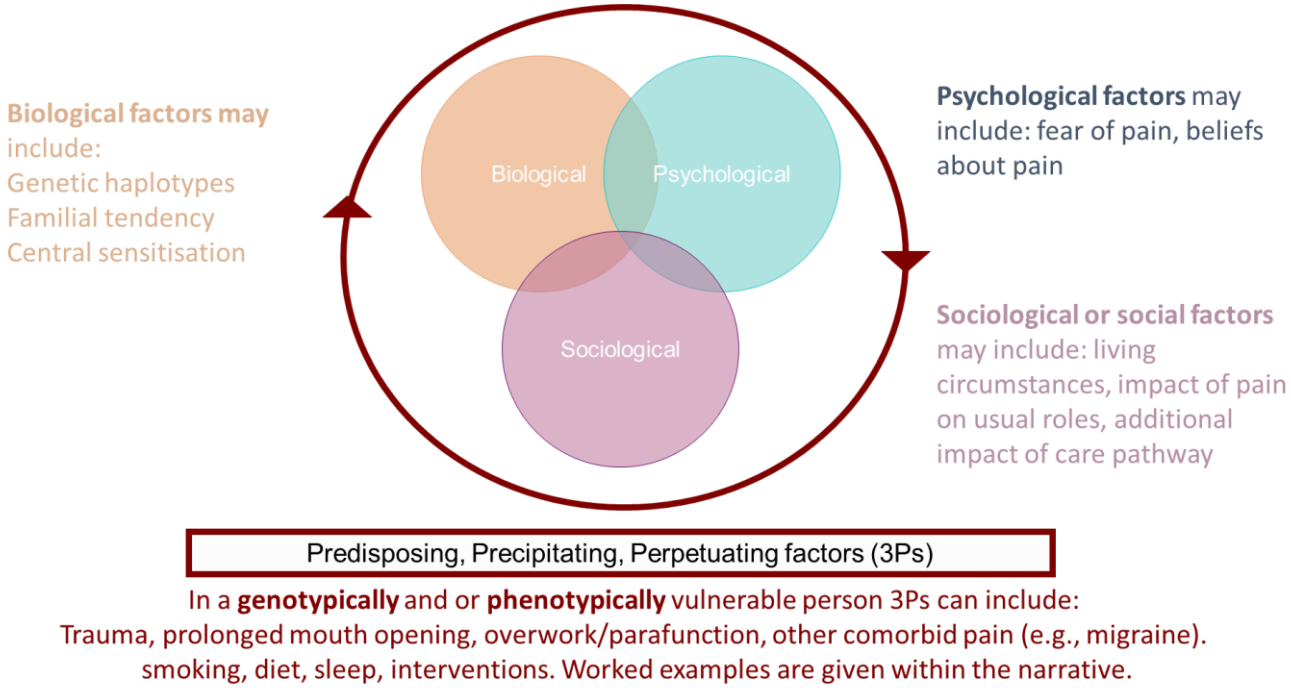
Botulinum toxin A		
Thambar S *et al*, 2020; Machado D *et al*, 2019; Patel J *et al*, 2019; Ahmed S *et al*, 2019; Awan KH *et al*, 2019; Islam S, 2016; Khalifeh M *et al*, 2016; Losada DCN *et al*, 2021; Moussa *et al*, 2023. Other: Shofiq I 2016; De La Torre Canales G *et al*, 2020; Kűn-Darbois J D *et al* 2015; Venancio Rde A *et al*, 2009	Conservative options, such as self-management with explanation and physical therapies, should be exhausted first.	MODERATE EVIDENCE OF BENEFICIAL EFFECT STRONG RECOMMENDATION THAT BOTOX IS **NOT** A FIRST LINE MANAGEMENT STRATEGY AND THAT SHARED DECISION-MAKING AND INFORMED CONSENT IS ENGAGED IN WITH PATIENTS, PARTICULARLY WITH RESPECT TO CURRENT LACK OF UNDERSTANDING ABOUT: THE SIGNIFICANCE OF BONY CHANGES IN CONDYLE; DOSING SCHEDULE AND END OF TREATMENT; (SUB-)POPULATION OF PATIENTS WHO WILL BENEFIT.
Surgical Management		
Goiato MC *et al*, 2016; Sabado-Bundo H *et al*, 2021; Goker F *et al*, 2021; Iturriaga V *et al*, 2017; Bouchard C *et al*, 2017; Vos LM *et al*, 2013; Moldez MA *et al*, 2017; Liapaki A *et al*, 2021; Ferreira N *et al*, 2018; Al-Hamed FS *et al*, 2021; Leung YY *et al*, 2020; Bousnaki M *et al*, 2017; Bermell-Baviera A *et al*, 2015; Davoudi A *et al*, 2018; Guarda-Nardini L *et al*, 2021; Gutiérrez IQ *et al*, 2021; Abrahamsson H *et al*, 2020; Al-Moraissi EA, 2015; Al-Moraissi EA *et al*, 2015; Ma J *et al*, 2015; Tocaciu S *et al*, 2019; Varedi P *et al*, 2015; Al-Moraissi EA *et al*, 2017; De Roo N *et al*, 2016; Mittal N *et al*, 2019; Sakalys D *et al*, 2020; Hu Y *et al*, 2020; Liu S *et al*, 2021; Machado E *et al*, 2013; Nagori SA *et al*, 2018; Nagori SA *et al*, 2021; Nogueira EFC *et al*, 2021.	Surgical managements not indicated for myogenous pain. There are a number of situations where surgical intervention may be appropriate namely, severe arthrogenous TMD and disc displacement without reduction. Where surgical management is advocated, it should be provided as an adjunct to SSM and conservative treatment strategies and not as a sole or first line option. If justified intra-articular injection using hyaluronic acid or platelet rich plasma most likely to provide benefit over other medicaments.	STRONG RECOMMENDATIONS BASED ON MODERATE EVIDENCE
Remote delivery of intervention		
Walumbe J *et al*, 2020; Fernandes LG *et al*, 2022; Flodgren G *et al*, 2015.	Remote delivery provides an opportunity for TMD patients to receive appropriate targeted TMD pain management programmes and early intervention which has the potential to revolutionise care. Programmes would need to be adequately planned, staff appropriately trained and access requirements for patients considered.	MODERATE RECOMMENDATION LOW QUALITY EVIDENCE
Tailored treatment/ MDT management		
Kotiranta U *et al*, 2014; Dworkin, 2002	Utilising the entire clinical dental team to support pain management for patients living with persistent TMD patients would improve access to care, reinforce self-management strategies and provide increased potential for positive impact on pain and pain related disability.	STRONG RECOMMENDATION MODERATE EVIDENCE
Other		
Porporatti AL *et al*, 2019; Talaván-Serna J *et al*, 2017; Bitiniene D *et al*, 2018; Carla Branco *et al*, 2021; Campos DES *et al*, 2021; Gewandter JS *et al*, 2015; Helgeland E *et al*, 2018; Song YL *et al*, 2018; Yadav S *et al*, 2018; Herrero Babiloni A *et al*, 2018; Allison J *et al*, 2023; Tran *et al*, 2022.	For individuals who live with or who are at risk of TMD additional care should be taken to protect the TMJ complex during procedures which involve sedation or general anaesthesia due to drop in muscle tone caused by the drugs employed and because of airway management manoeuvre's involving the joint	MODERATE RECOMMENDATION, LOW QUALTY EVIDENCE

Intra-articular TMDs		
Al-Baghdadi *et al*, 2014; Al-Baghdadi M *et al*, 2014; Schiffman E L *et al*, 2014; Schiffman E L *et al*, 2013; Diraçoğlu D *et al*, 2009; Emshoff R. *et al*, 2005; Yoshida H *et al*, 2005.	Favourable expected natural course for disc displacements No significant difference between non-invasive and more invasive treatment modalities suggesting DDwoR should be managed in first instance with conservative strategies escalating to more invasive treatments only if objective clinical need. Arthrocentesis is more successful in subjects who are <25 years old and who exhibit VAS pain scores >75 mm with MMO <25mm.	STRONG RECOMMENDATIONS BASED ON HIGH QUALITY EVIDENCE

10.Background

TMD have a biopsychosocial aetiology with several perpetuating, predisposing, or precipitating factors with no single 'cause' identified (**Figure 1**).

Figure 1: Schematic summarizing the biopsychosocial model of TMD and examples of precipitating, predisposing and potentiating factors.



Genetic and phenotypic vulnerability for TMD is not the same as causation and may therefore not directly link to the development of TMD, nor always accurately predict its course or outcome. The current understanding, as demonstrated by **Figure 1**, is that multiple biopsychosocial predisposing, precipitating, and perpetuating factors interplay to result in painful TMD arising and being maintained in an individual. These can include a diverse range of factors including: polymorphisms in Catechol-O-methyltransferase (COMT) associated with TMD [1, 33, 34]; functional changes with pain processing *e.g.,* generalized hyper-excitability in the central nervous system [1, 35-38] and then a combination of behavioural changes such as seeking physical interventions, and/or attempts to fight or ignore pain may perpetuate the pain. Another individual may have phenotypic vulnerability in the form of pre-existing widespread body pain, precipitation may result from a known mandibular clenching habit whilst perpetuation may involve disruption to homeostatic patterns of sleep and activity. For readers who would like to read more on pain pathways and processes, there is a freely accessible resource from NHS England (e-Learning for health care, free once registered with the relevant healthcare regulator's registration number) which has two dental-specific modules on pain in the trigeminal system in e-Den Module 3: physiological and anatomical basis of pain; central mediators of pain.

Comorbidities

There are several comorbidities consistently associated with persistent painful TMD that can be associated with a poorer prognostic outcome (**Table 4**).[1, 39-44] Where a comorbidity exists management of TMD in isolation may be less successful, but this does not mean that simpler management strategies should immediately be omitted as they also serve as a foundation for more complex management. Dentally trained clinicians are not expected to manage comorbidities but should be able to:

1. Identify comorbidities in an individual presenting with TMD through an appropriate history taking process.
2. Discuss comorbidities with the individual presenting with TMD.
3. Initiate access to management for comorbidity through referral to appropriate service which patients' GPs may gate-keep.

Table 4: Comorbid conditions associated with persistent painful TMD that may be associated with a poorer prognosis[1, 39-44]

Systemic pain comorbidities	**Psychological comorbidities**	**Primary headache comorbidities***	**Regional pain comorbidities**
Fibromyalgia	Depression	Migraine	Irritable bowel syndrome
Myalgic Encephalomyelitis /Chronic Fatigue Syndrome	Anxiety	Chronic tension type headache	Vulvodynia
Inflammatory Arthritis	Post-Traumatic Stress Disorder		Interstitial cystitis/Painful bladder syndrome
			Endometriosis
			Chronic lower back pain

*At present some of the other primary headache disorders such as Cluster headache and Paroxysmal hemicrania (Appendix 1) do not have a proven association with painful TMD, however it is not unreasonable to hypothesise that they might. They are, however, rare but are always worth considering if autonomic signs and symptoms co-present with more classical signs and symptoms of painful TMD. Please see headache section following for guidance on how to seek further opinions/management in this instance.

Bruxism

Bruxism is repetitive masticatory muscle activity, characterised by clenching, grinding, bracing or thrusting, with or without tooth contact. [45] Signs and symptoms suggestive of bruxism include, but are not limited to: masseteric hypertrophy, reported clenching/grinding habit (self or family/friend/colleague), indentations and/or traumatic lesions of intra oral soft tissues, evidence of occlusal wear or fracture of the dentition/restorations.[46] Bruxism which occurs during sleep is termed sleep bruxism, and most commonly presents as grinding.[47, 48] When present in the day it is defined as awake bruxism and most commonly involves clenching. [47, 48] Interestingly it seems that individuals either present with awake or sleep bruxism and not both conditions. [47]

In otherwise healthy individuals' bruxism is no longer considered a parafunctional activity or disorder but a behaviour, which may act as a risk factor, or protective mechanism, for several clinical consequences *e.g.,* tooth wear, tooth fracture.[48-50]The relationship between bruxism and TMD is complex, and robust conclusions as to the association of awake or sleep bruxism and TMD cannot be made at this time. [46, 48, 51-54] A direct causal relationship between bruxism and TMD has not been confirmed.[48, 51, 54] Current evidence seems to suggest that though in some individuals' bruxism may form one component of the multifactorial aetiology of TMD, bruxism in isolation is unlikely to be responsible for onset or persistence of TMD pain in the absence of other risk factors. [45, 47, 52]

Obesity

The growing epidemic of obesity is a global health concern leading to increased risk of health conditions associated with high levels of morbidity and mortality *e.g.,* diabetes, stroke. [55] The prevalence of pain has been shown to be higher in obese populations, with obese individuals demonstrating reduced pressure-pain thresholds, reduced pain tolerance and higher pain sensitivity. [56-59] Surprisingly recent research exploring the relationship between obesity and TMD does not demonstrate a positive association.[55, 60] One recent meta-analysis displayed the opposite, risk of TMD significantly decreased in obese compared to normal weight individuals, and at the present time evidence suggests that obesity appears not to be associated with increased risk of TMD.[60]

Positive weight management has been shown to beneficially impact pain intensity, pain related disability and health related quality of life measures in some persistent pain conditions, including primary headache conditions, known to be comorbid with TMD. [56, 57, 60] As with managing any chronic illness, with or without other comorbidities, a holistic approach is advised when it is possible to appropriately support patients in this process. It is also important to note the role of weight management in obstructive sleep apnoea which can be comorbid with TMD. Though the certainty of the effect of weight management on TMD pain is currently low, support and advice pertaining to healthy lifestyle habits should be routinely offered to all patients as part of a holistic care model.

Hormones

Oestrogen continues to be of interest when considering the pathogenesis of TMD due to the sex disparity shown in TMD prevalence.[61] Oestrogen deficiency has been associated with structural changes within the temporomandibular joint in animal models.[62-65] Furthermore, oestrogen is thought to influence pain regulatory mechanisms both peripherally and centrally.[64] Despite such findings evidence between oestrogen levels and TMD presentation is contradictory and studies involving pharmacological stabilization of oestrogen levels failed to demonstrate improved outcomes when compared to self-management alone. [61, 65-68]Firm conclusions as to the relationship cannot be drawn at the present stage.

Section 10 key points:
- Exclude other important or 'red flag' conditions by a through screening during the history
- Be aware of and describe painful TMD's aetiology as multifactorial and biopsychosocial without one key factor being identified as having a predominant association with painful TMD

11.History

TMD should be considered as a persistent health condition rather than an isolated dental condition. It is therefore important for dental clinicians to be able to undertake a thorough history to allow identification of the physical symptoms of TMD and related social and psychological factors that may be contributory. Undertaking a thorough history will allow the dental clinician to identify those individuals who are at a higher risk of progressing to persistent painful TMD.

Physical Symptoms of TMD

Common physical signs and symptoms of TMD are: pain in and around the TMJ and, or muscles of mastication, which can worsen with jaw function (eating, chewing, teeth grinding/ clenching) and may be precipitated by touch to these areas; joint noises (click, pop, crepitus [rustling or grinding]); restricted joint mobility.[1, 2]

Verbal exploration of pain intensity and of other comorbidities should be undertaken to ensure that a thorough history is taken which will provide prognostic indication. Patients should be asked about pain in other areas of their body and an exploration of any diagnosed conditions which are comorbid with persistent painful TMD (**Table 4**) should be undertaken.

Clinicians should be aware of other physical presenting features including headaches and otological (ear) symptoms such as otalgia (ear pain) and tinnitus.[2, 69-72] Dental extra and intra oral clinical examination is less likely to

provide additional information for such symptoms. It is therefore advised that consultation for any individual presenting with TMD should include brief headache and ear symptom exploration.

Headache

Verbal brief exploration of headache symptoms should be completed, **Appendix 1** outlines guidance on headache questions which may aid consultation. Advice should be provided to individuals with positive headache findings which do not appear to be related to TMD to seek attention from their medical practitioner should headache symptoms persist or worsen. **Appendix 2** provides an example letter which GDPs could utilize to aid onward information transfer to GP.

Ear symptoms

Verbal brief exploration of ear symptoms (if present) should be undertaken. If ear symptoms form a major presenting feature, pathology affecting the ear should be ruled out by GP in first instance or ear, nose and throat (ENT) specialist should GP feel it is appropriate. Template letter to support referral to GP for ear related symptoms is provided in **Appendix 3**. It is important to note that managing TMD will not necessarily reduce or eliminate ear-based symptoms. Conversely, if a GP +/- ENT specialist has ruled out ear pathology consideration of TMD or odontogenic pain as potential differential diagnoses and subsequent direction to GDP for further assessment is sensible.

Psychological and Social Presenting Factors

Consultation should include assessment of psychological and social factors that can increase the risk of symptomatic TMD becoming persistent. Careful observation and listening will frequently spotlight concerns about symptoms as well as impact on mood, sleep, social activities and eating which are commonly present. Such impacts are often caused by the pain and can also become powerful maintenance factors if they are not independently addressed.

From a social perspective people with painful TMD are often in intense pain and can feel invalidated and dismissed unless this experience is recognised and explicitly acknowledged, leading to the possibility of feeling they need to consult other practitioners to search for answers. In order for conservative management to be helpful it is important that the patient can feel that their experiences have been acknowledged and understood. A plausible explanation is important, both for the person themselves and also to share with family, friends and colleagues who might find it difficult to understand the pain and how they can help.

Box 1: Template history for TMD

Complaint
[Can give suggestions for character of pain if patient struggling e.g., achy, throbby]

History of complaint (SOCRATEESS)

Site:

Onset:

Character:

Radiation/referral:

Associations with other symptoms:

- Joint noise Yes / No (provide detail if yes)
- Jaw lock – Open / Closed / None
- Headache associated: Yes / No (provide detail if yes)
- Ear symptoms: Yes / No (provide detail if yes)
- Other:

Time course:
[e.g., constant, intermittent]

Exacerbators/relievers:

Effects on everyday life?

Severity of pain out of 10 (10 worst imaginable):

Sleep – affected?
[e.g., woken from sleep or difficult to get to sleep with pain]

Psychological or social presenting factors?
[*e.g.,* stressful work of home life, impact on mood or sleep?]

Any red flag signs or symptoms? Yes / No (Provide detail if yes)

Presence of comorbid conditions? Yes / No (Provide detail if yes)

Section 11 key points:
- Take a standardized pain history but be alert for comorbid headache arising within the history.
- Explore any ear symptoms to exclude the need for a further opinion from patient's GP.

12.Examination

Every part of the consultation for a persistent pain condition should be person-centered.[21] Whilst a physical examination is important to reach a physical diagnosis it is equally important throughout the consultation to be aware of any psychological and social impacts and triggers.[21, 73, 74] This then allows the clinician to build up a multidimensional perspective of the patient's problem.[21]

Physical Examination

Clinical examination of an individual with suspected or known TMD should include visual examination of the extra-oral tissues of the face and neck; palpation to rule out lymphadenopathy or salivary gland masses; intraoral examination assessing for soft tissue pathology and clinical +/- radiological assessment of the dentition to rule out dental or periodontal pathology.[10, 24] Assessment of cranial nerve function provides formal examination for a focal neurological deficit. In cases of suspected TMD at the facial and trigeminal nerves should be tested as a minimum in primary care whilst in specialist services all cranial nerves may be examined.[10] A revision resource to support cranial nerve examination is available here. [75]

Examination of TMJ and muscles of mastication (MOM)

TMJ and MOM should be assessed clinically for "familiar" pain *i.e.,* pain which is representative of the individual's normal pain.[5] If identified familiar pain helps to guide diagnosis as the structure that is painful is likely the origin of the pain *e.g.,* masseter palpation provokes familiar pain means it is likely a myogenous TMD at least in part. Familiar pain also helps reduce the risk of false positives elsewhere in the examination creating a misdiagnosis. [5]

TMJ

The TMJ should be examined by palpating its lateral pole whilst normal functional mandibular movements (opening, closing, protrusion and lateral excursions) are completed 3 times.[5] "Familiar" response during any single cycle of movement represents a positive finding.[5] A record of deviation of mandibular opening and any mandibular motion which is out of the normal ranges, shown in **Table 5**, should be documented. Such records aid diagnosis and allows formative assessment of the condition longitudinally.

Table 5: Normal mandibular opening ranges. Table generated from information in [5, 76]

Motion	Normal[a]
Maximal unassisted inter incisal opening[b]	≥35mm
Protrusion	7 – 12 mm
Lateral Excursion	7 – 12 mm

[a]For those concerned by trismus of an unknown cause a helpful screening tool is available 'The Trismus checklist'[77, 78] a modified version of which is available within **Appendix 4**.

[b] Reliable inter-incisal measurements are more difficult in those who are edentulous or partially dentate and there is no gold standard proposed. For those who have well-fitting dentures with pontics of a size and shape representative of the natural dentition, inter-incisal opening can be measured with dentures in situ, or adjacent natural teeth can be used *e.g.,* incisal edge of lateral incisors. [79]

Joint noises

Whist palpating the TMJ through normal functional mandibular movement, joint noises should be felt and listened for. Joint noises can be challenging to detect, and presentation may be sporadic.[5] To account for this, joint noises can be documented as positive during clinical examination if the patient self-reports hearing joint noise(s) in the last 30 days and/or noise is heard by patient or clinician during examination. [5] Presence of noise, type of noise (click, pop, crepitus) and location of noise (side and point in opening/closing cycle) should be documented. The prevalence of asymptomatic (pain-free) disc displacement with reduction is around 1 in 3 (12-35%) of the population, joint noises therefore **will be detected** in **asymptomatic** individuals.[80] In such situations reassurance only should be provided, treatment to manage joint noise without pain is not justifiable as it **cannot** be guaranteed to eliminate noise.

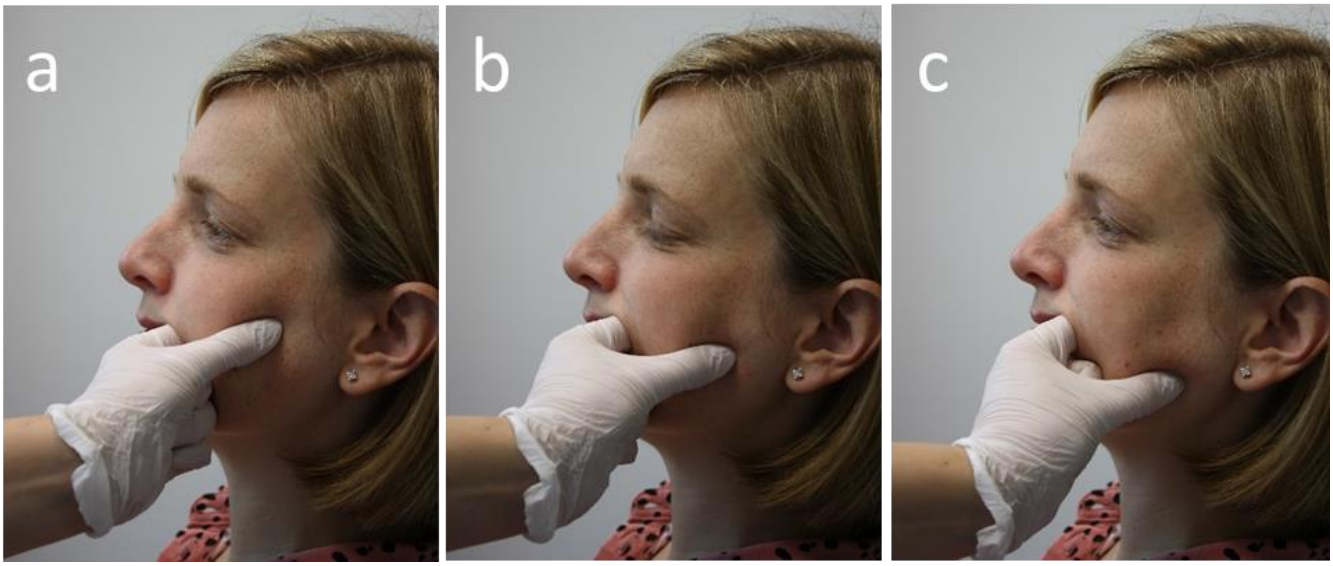
Muscles of mastication

Temporalis and masseter should be palpated from origin to insertion with masseter palpated bimanually (index finger extra oral and thumb intra-oral) (**Figure 2**) [5]. Presence of "familiar pain" on palpation, the location of the pain within the muscle and any radiation of this pain should be documented. Palpation of other muscles of mastication *e.g.,* lateral pterygoid and medial pterygoid has not been shown to improve diagnostic accuracy and so is only advised when pain location is anatomically mapped directly to the muscle(s) of concern.[5]

Figure 2: Example photographs demonstrating technique for bimanual palpation of masseter.

Palpation of superior aspect (a), body (b) and inferior aspect (c) of masseter

Note: Index finger intra-orally, thumb extra orally allowing accurate masseteric palpation between the digits.



Psychological and Social Assessment

Social history

Taking a social history is good practice for routine clinical care however, for individuals at risk of a persistent pain condition, an understanding of their social situation provides vital information. Who does an individual live with? Who supports them? Have they explained their issues with any family or friends? What social stresses may they be exposed to which could perpetuate their condition? Dependents (young and old in their care), employment or unemployment concerns, financial worries, limited social support? Do they have concerns that their pain is affecting others around them? Documentation of salient findings with relevance to TMD ensures holistic support for the individual.

Patient Health Questionnaire 4 (PHQ4) [81] – Formative screening of anxiety and depression

PHQ4 is a 4-item patient health questionnaire which supports recognition of symptoms of anxiety and depression, supporting the biopsychosocial management of TMD.[81] It is advised that this questionnaire is completed in any individual suspected of TMD in the first consultation and the results documented in the patient's notes. **Appendix 5** outlines PHQ4 questions and scoring. Scores are rated as: Normal (0-2), Mild (3-5), Moderate (6-8), and Severe (9-12).[81] PHQ4 scores representative of symptoms of severe anxiety and/or depression (score 9-12) may warrant early onward referral, further details are outlined in table 4 of this document. **Appendix 6** provides additional information with regards to mental health extremis and suicidal ideation.

Sleep

Sleep quality and painful TMD have a reciprocal relationship, sleep quality and quantity should be briefly discussed with sign-posting to sleep hygiene advice provided for those who need additional support (**Appendix 7**).[53, 82-87] For frank sleep disorders sleep hygiene advice will not be beneficial so any individual with significant sleep issues should be advised to discuss this with their GP.

Obstructive sleep apnoea

Obstructive sleep apnoea (OSA) is a sleep related breathing disorder associated with high levels of morbidity and mortality.[88-92] Unfortunately, a significant number of those with OSA are undiagnosed and untreated and this can result in life-threatening consequences. [93, 94] TMD has been shown to be more prevalent in those with OSA when compared to the general population, a relationship clinicians should be aware of. [89, 95-97] Signs and symptoms

that may be suggestive of OSA (**Box 2**) include: excessive daytime sleepiness, morning headache, mood changes, difficulty concentrating, bed partner reports gasping, snorting, choking noises, or stopping breathing during sleep. It is important to explore these types of symptoms given the morbidity and mortality associated with this condition. Any suspicion of OSA should trigger prompt referral to the individual's GP for assessment and management (**table 7** and **appendix 8**). Management of OSA is guided by NICE guidelines (NICE 2021, NG202) and dependent on severity ranges from lifestyle advice (foundation for all other management), through mandibular advancement splints, to continuous positive airway pressure ventilation at night. [54] The STOP-bang questionnaire (included in **appendix 8**) will provide an accurate, more formal OSA screening assessment, supporting onward referral. [93, 94, 98-102].

Box 2: Risk factors, signs and symptoms for obstructive sleep apnoea

Risk factors
Male
BMI >35 kg/m^2
Age >50
Neck circumference > 16 inches (40 cm)
Hypertension
Signs and symptoms
Loud snoring
Observed episodes where breathing stops when asleep
Gasping, snorting or choking noises in sleep
Repeated night waking
Insomnia
Morning headaches
Excessive daytime sleepiness (hypersomnia)
Fatigue
Daytime concentration difficulties
Mood swings

Section 12 key points:
- Elicit familiar pain to help attribute the origin of the pain and form a diagnosis
- Be aware of the range of 'normal' jaw movements
- Be mindful of risk of OSA in painful TMD and if suspicious it may be comorbid consider use of STOP-BANG and liaison with patient's GP
- Consider risk of suicide and do not be afraid to explore with patient if this is mentioned as you will not increase their risk. The whole dental team may wish to consider completing the free basic level training from the NHS on suicide awareness: Zero Suicide Alliance 'Gateway' module.

13.Further investigations

3 question TMD screener (3Q/TMD)[103]

The use of 3 screening questions in the primary care setting (3Q/TMD, **Appendix 5**) supports screening of individuals presenting with painful TMD in relation to the DC/TMD. [103] Its use is advised to support clinical history and examination findings and increase reliability when diagnosing individuals with painful TMD.

Characteristic Pain Intensity (CPI)[104]

The Characteristic pain intensity questions shown in **Appendix 5** provides a numeric rating representing an individual's average pain score over the last 30 days ranging from 0 (lowest) to 100 (highest). It is advised that this is recorded at first assessment and all subsequent reviews (**Appendix 9**) to formatively assess pain intensity.

Imaging

Plain film radiographic imaging of dentulous and edentulous regions may form a component of detailed investigation to identify sources of odontogenic pain or referred pain which may mimic TMD.[105] Routine use of ionizing imaging of the TMJ, specifically for diagnosis of painful TMD is not advocated and the appropriateness of any imaging should be determined on a case-to-case basis.[106, 107] Conventional panoramic radiographs have a limited role in evaluating the TMJ complex [105, 108] They do display gross bony form but condylar distortion, failure to visualize the anterior surface of the condyle and superimposition of the zygomatic process limits such imaging.[105] In cases where imaging is justified cone-beam computed tomography (CBCT) or conventional computed tomography (CT) scanning is more accurate for hard tissue diagnosis of DJD.[105, 108, 109] CBCT offers appropriate image clarity with lower radiation dose when compared to conventional CT of TMJ and so is preferred where available. The field of view, however, must include the condyle, glenoid fossa and articular eminence.[105]

For internal derangements magnetic resonance imaging (MRI) is the only modality which accurately depicts position of the articular disc.[105, 108, 110-112] For adequate diagnostic clarity, thin slice proton density or T1-weighted images should be taken in multiple dimensions, in closed and open mouth positions.[105, 108] If effusion is suspected additional T2-weighted imaging should be completed. [105] Contrast should only be utilised for suspected inflammatory arthropathies or concerns about occult (mimicking) tumours.

Ultrasound scan (US) for internal derangements is a modality currently under investigation.[113, 114] Benefits of US include lack of radiation dose, its relative low cost, and the fact it is readily available though, as yet, sensitivity and specificity data to validate its use for TMD is lacking.[113, 114]

Other

The reliability and diagnostic validity of the joint vibration analysis, infrared thermography, ultrasound elastography, qualitative sensory testing and assessment of electromyographic activity for TMD are unsupported by the current literature.[115-122]

At present an international team of experts are developing a Standardised Tool for the Assessment of Bruxism (STAB), including a two-part bruxism screener (BruxScreen) combining a patient completed self-assessment tool and dental clinical assessment form. [46, 48, 123] Once validated such tools are likely to support identification of those with bruxism as a component of their TMD and move towards standardized bruxism assessment and management strategies in the future.

Section 13 key points:
- Remember that physical examination is the mainstay of diagnosis as imaging has the potential for false positives and negatives. Imaging should therefore be considered an adjunct to a thorough clinical examination and not a substitute for it.
- Consider use of screening instrument for TMD to help identify it easier and use pain intensity as a basic patient reported outcome measure.
- Further validation of the BruxScreen may result in a simple and quick screening instrument for bruxism in the future.

14.Diagnosis

Information gathered from a thorough patient history and comprehensive clinical examination should be used to provide an individual with a TMD diagnosis at the earliest possible contact. Increased intensity and impact of TMD symptoms are likely to be associated with delay in provision of a diagnosis or lack of diagnostic certainty.[16]

The internationally recognised Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) support the broad grouping of the 12 different subtypes of TMD as: [5]

1. **Myogenous** affecting muscles of mastication.
2. **Arthrogenous** involving the temporomandibular joint complex.
3. **Combination** with myogenous and arthrogenous components

It is not unreasonable, outside of specialist units managing persistent orofacial pain regularly, to use the three broad groupings as outlined above, as a diagnosis. To classify further **Table 6** can be used to provide a more specific TMD subdiagnosis, as per DC/TMD.[5] TMD should be treated as a potentially persistent health condition and not a dental condition. It should have holistic management and any comorbidities that are related should be outlined in the diagnosis to strengthen the patient's appreciation of the relationship between conditions.

E.g.,

- Myogenous TMD affecting bilateral temporalis and comorbid chronic migraine.
- Arthrogenous TMD with comorbid chronic depression.
- Myogenous TMD affecting left masseter and comorbid fibromyalgia.

Table 6: Twelve most common TMD diagnostic subtypes shown in **bold**, linking clinical history and examination results to diagnosis. Luxation (*italicized*) is not one of the 12 most common subtypes but is included for completeness. Adapted from [10], generated from information from [5]; TMD: temporomandibular disorders; TMJ: temporomandibular joint.

Clinical history	Clinical examination findings	Specific findings related to pain or complaint	Diagnosis	Group
Pain in the jaw, temple, in the ear, or in front of the ear. AND Pain modified with jaw movement, function, or parafunction.	Confirmation of pain in temporalis or masseter. AND "Familiar" pain in masseter or temporalis produced during examination.	Pain of muscular origin.	**Myalgia**	Myogenous
		Pain localised to site of palpation.	**Local myalgia**	
		Pain spreads beyond site of palpation but within boundary of muscle.	**Myofascial pain**	
		Pain reported at a site beyond the boundary of the muscle being palpated.	**Myofascial pain with referral**	
Headache of any type in the temple. AND Headache modified with jaw movement, function, or parafunction.	"Familiar" headache pain in the temple area produced during examination. AND Confirmation of headache location in the area of temporalis muscles.		**Headache attributed to TMD**	
Any TMJ noise present with jaw movement or function in the last 30 days. OR Patient reports any TMJ noise during exam. (+/- TMJ pain)	Clicking, popping, or snapping detected during at least one of three repetitions of palpating the TMJ on opening/closing, lateral excursion, or protrusion.	Joint noise but no locking.	**Disc displacement with reduction**	Arthrogenous
Any TMJ noise present with jaw movement or function in the last 30 days. OR Patient reports any TMJ noise during exam. (+/- TMJ pain) AND Jaw locks with limited mouth opening, even for a moment, in the last 30 days.		Jaw locks with limited mouth opening even for a moment then unlocks in the last 30 days.	**Disc displacement with reduction with intermittent locking**	
Jaw locking so that mouth would not open all of the way. AND Limitation in jaw opening severe enough to interfere with ability to eat.	Maximum assisted opening with passive stretching less than 40 mm. The presence of TMJ noise on examination does not exclude this diagnosis.		**Disc displacement without reduction with limited opening (*i.e.,* "closed lock")**	
	Maximum assisted opening with passive stretching more than or equal to 40 mm. The presence of TMJ noise on examination does not exclude this diagnosis.		**Disc displacement without reduction without limited opening**	
Any TMJ noise present with jaw movement or function in the last 30 days. OR Patient reports any TMJ noise during exam. (+/- TMJ pain)	Crepitus detected during examination.		**Osteoarthritis and Osteoarthrosis (Degenerative joint disease**)	
Jaw locking or catching in a wide-open mouth position in the last 30 days, even for a moment, so it could not close from the wide-open position (+/- TMJ pain).	Positive finding of "open lock," which requires manipulation (self or clinician) to reduce.	Self-manoeuvre required by patient to reduce dislocation.	**Subluxation (*i.e.,* "open lock")**	
		Clinician manoeuvre required to reduce dislocation.	*Luxation (i.e., "open lock")*	
Pain in the jaw, temple, in the ear, or in front of the ear. AND Pain modified with jaw movement, function, or parafunction.	Confirmation of pain in the area of the TMJ. AND "Familiar" pain in the TMJ produced during examination.		**Arthralgia**	

15.Early secondary care referral / Adjunctive medical referral

Early secondary care or adjunctive medical referral is advocated in a small number of clinical situations **Table 7**.

Table 7: Justification for early secondary care referral or adjunctive medical referral

Justification	Action and advised referral location
Any positive red flag sign/symptom in history of clinical examination (see **Table 2**)	2 week-wait[1] (if appropriate) or urgent referral to secondary care
Young (<25 years old) [124] AND Substantial decreased mouth opening (<25mm)[124]	Urgent referral to maxillofacial surgery team for assessment and consideration of early unlocking manoeuvre +/- arthrocentesis.
Severe disc displacement without reduction (closed lock) affecting ability to maintain nutritional requirements.	Urgent referral to maxillofacial surgery team for assessment and consideration of early unlocking manoeuvre +/- arthrocentesis.
Severe arthrogenous TMD with: • CPI pain score >50 • Dietary restriction due to pain • Mouth opening <25mm • +/- skeletal and/or occlusal derangement (*e.g.,* AOB, retrognathia, asymmetry)	Early referral to maxillofacial surgery team for assessment and consideration of surgical management. Patient should be counselled that surgery is not appropriate in all cases and referral does not guarantee surgical management will be recommended.
Positive headache findings which do not appear to be related to TMD with no red flag features.	TMD management initiated in primary dental setting. Patient advised to discuss with GP should headache symptoms persist, information sharing letter to GP could be considered if appropriate. *See A**ppendix 2** for template letter*
Positive ear symptoms (pain, tinnitus, fullness) which do not appear to be related to TMD with no red flag features.	Non urgent referral to GP, requesting ear symptoms are explored comprehensively by medical team whilst TMD management initiated in primary dental setting. *See A**ppendix 3** for template letter*
Mental distress and suicidal ideation (See **Appendix 6**)	Urgent (same day) assessment with GP, local CRISIS team or Emergency Department acute mental health team. Primary care clinician should telephone to arrange urgent assessment and information share about disclosure. If concern about immediate risk to life and the patient is not present or leaves abruptly the clinician should contact 999 requesting police for immediate welfare check and should telephone GP (if they are not the GP) to information share about disclosure and ensure urgent follow up.
Positive OSA findings (**Box 2**)	Urgent written referral to GP to assess, diagnose and manage OSA. *See **Appendix 8** for template letter including STOP-BANG questionnaire*. AND The referring clinician in primary care should provide TMD diagnosis and initiate SSM and make arrangements for appropriate review.
PHQ4 score ≥ 9 [125] *i.e.,* Severe anxiety and/or depression symptom score	Urgent written referral to GP to assess, diagnose and manage anxiety and/or depression. *See **Appendix 10** for template letter*. AND The referring clinician in primary care should provide TMD diagnosis and initiate SSM and make arrangements for appropriate review.
PHQ4 score 3-8 *i.e.,* mild-moderate anxiety and/or depression symptom score	Discuss score with patient, ask if further support with regards to anxiety or depression would be helpful and explain it isn't the cause of TMD but can make it worse and treatments can be more effective by managing both. If patients indicate that a psychological assessment would be helpful, consider advising them that they can search online and self-refer to their local NHS Talking Therapies for Anxiety and Depression service accessed through this link. With their permission write to inform their GP of this conversation. Alongside this TMD management should be initiated in primary care setting. *See **appendix 10** for template letter*

[1] At the time of writing the NHS is changing its cancer care pathways through the 'Faster Diagnosis Framework'. This will remove the 'two-week rule' from Oct 2023. This will include a 28-day diagnosis standard which indicates a patient with suspected cancer should have it ruled out or diagnosed within 28 days. The new pathway for suspected head and neck malignancy will likely therefore demand the same urgency of referral and bespoke pathway but its details are yet to be confirmed and may depend on local trust protocols. Clinicians are advised to check their local protocols but to remain aware that expedition of all parts of the patient's care journey to diagnosis is critical.

16.Management

As for any condition, clinicians should have an awareness of unconscious bias and its ability to impact on TMD treatment planning and management.[3, 126, 127] Pain in black people has been shown to be underdiagnosed and undertreated. [3, 126, 127] Clinicians should be aware of this, and steps should be taken to ensure bias does not influence opportunity or quality of care provided.[3, 126, 127] Management should focus around reversible, non-invasive conservative care which has been shown to be successful in 75-90% of cases.[12] Emphasis should be placed on a partnership in management, the individual living with TMD engaging with self-management and practitioner(s) supporting them in this with adjunctive reversible, non-invasive interventions. It is important to ensure that the individual understands that without full engagement with self-management there will be no foundation for the restoration of control over the signs and symptoms of TMD.

Management for TMD is not linear, "failure" of conservative management strategies is not a justification for initiation of more invasive surgical or pharmacotherapeutic strategies. Similarly, there are a small number of instances in which referral and consideration of more invasive management strategies may be appropriate at an early stage, **Table 7** and care pathway flow chart (**Figure 3)** highlight such cases. Following diagnostic confirmation by an appropriately trained clinician, utilization of the entire clinical dental team to support pain management for individuals living with TMD would improve access to care, reinforce self-management strategies and provide increased potential for positive impact on pain and pain related disability. Of equal importance is the recognition of comorbid illnesses or disorders that have a bearing on management of the painful TMD and appropriate liaison with the clinician managing that comorbidity. For example, comorbid mental health illness with or without prescription of psychotropic medications and liaising with the patient's GP and or Psychiatry team before pursuing pharmacological management of painful TMD.

Supported self-management.

All individuals diagnosed with painful TMD (any sub diagnosis) should be actively involved in the development of a supported self-management (SSM) plan with their primary care practitioner. SSM allows an individual to gain ownership of their condition and take positive steps to manage their own discomfort. SSM has been shown to support reduction in pain intensity and pain related disability with no reported adverse effects, suggesting favorable risk: benefit ratio, for low economic cost.[128-136] SSM plans should be regularly reviewed and adapted subject to changing pattern across course of individuals TMD. **Appendix 7** provides links to high quality resources for SSM which practitioners can use, and patients can be signposted to, in addition to the patient support document published with this guideline.

Supported self-management should include the following core components, which will address immediate symptoms and pain exacerbations: [137]

1. Diagnosis alongside education about condition and appropriate analgesic use
2. Self-exercise therapy
3. Thermal modalities
4. Self-massage therapy
5. Diet and nutrition
6. Parafunctional behavior

Wider lifestyle factors, such as monitoring and addressing sleep and any of its disorders (*e.g.,* reducing weight through dietetic support if excessive in cases of OSA), physical activity, mood, and relationships are important for longer-term management.

SSM provides a healthy foundation that can promote both symptom improvement and reduced interference in valued activities alone or alongside other management approaches. Clinicians can introduce SSM in three stages.

1. Education and explanation of the relevance of SSM.
2. Introducing recommendations for managing immediate symptoms or pain flare-up(s).
3. Introducing lifestyle-based recommendations for longer-term management.

Education and explanation of the relevance of SSM

Education

Following diagnosis, time should be spent educating an individual with regards to the aetiology and pathogenesis of TMD in lay terminology. Acknowledgement that TMD pain can be intense, and debilitating is important to validate patient symptoms. Clear explanations which relate the individual's diagnosis to their symptoms can help positive engagement with care (**Appendix 11** provides support with such discussions). Reassurance should form a component of patient education; individuals should be educated as to the benign and usually non progressive nature of TMD, though expectations should be managed. There is no "cure" for persistent TMD, however the condition and its impact can be successfully managed most effectively through active engagement in SSM by the individual. An appreciation that symptoms can fluctuate and that there will be acute exacerbations of over time is important. Advice to engage with SSM in times of flare up is likely to be beneficial in most cases.

Education around presenting comorbid conditions (**Table 4**) is essential in order to provide holistic care. It should be highlighted that these conditions do not cause TMD but can perpetuate TMD. *E.g.,* An individual who has myogenous TMD affecting left masseter with comorbid chronic depression or chronic migraine might be explained as "*whilst the depression/migraine is not causing the TMD we do know that if we only treat one part of these two conditions we don't get as good as results as if both are actively managed, as each element can exacerbate the other*".

Explaining the relevance of SSM

Patients with TMD may present expecting passive forms of management to try and "fix" the problem' for example a dental treatment to "solve" the issue. It will therefore be important to carefully explain the relevance of supported self-management to them so they understand why it might be helpful. One approach is to explain that established TMD represents both a jaw problem and a pain problem and that it is important to address both. Supported self-management is focused on the "pain problem" element and includes being supported to follow simple and active management recommendations that can "turn down the volume" on pain over time. These include strategies focused on the jaw and on directly managing pain and broader and more holistic strategies that aim to "calm" the nervous and pain systems. Clinicians should explain that immediate pain relief is an unlikely outcome of using self-management strategies but that their consistent use over a period of time will help the pain to gradually settle. Clinicians should emphasize that supported self-management is an important part of the overall treatment plan and will act as a foundation for other management options that may be indicated.

Recommendations for managing immediate flare up(s)

Self-exercise therapy

Self-exercise therapy facilitates relaxation and masticatory muscle inhibition, supporting jaw function and pain reduction. Confidence to use the mandible normally reduces fear and anxiety improving pain related disabilities. [138-151] **Appendix 7** documents QR code link to videos demonstrating self-exercise techniques, **Appendix 14** describes the self-care practices narratively.

Thermal modalities

Local application of moist heat (warm flannel/covered hot water bottle or proprietary heat pack) or covered ice pack to affected structures daily supports relaxation, healing, and reduction of inflammation.[149, 150] Single application will produce short lived symptomatic benefit but use long term as part of a continued self-care routine capitalizes on the pain management potential. Individuals should be advised to trial a period of moist heat and covered ice and utilize the strategy which is most effective for their pain. A QR code link to videos on this technique is available in **Appendix 7** whilst **Appendix 14** describes these self-care practices narratively.

Self-massage therapy

For individuals living with TMD building a routine of myofascial release and massage techniques twice daily as a component daily management is likely to provide symptomatic relief in the short and long term. [130, 139, 143-147, 149, 150] A QR code to links supplying videos on these techniques is available in **Appendix 7** whilst **Appendix 14** describes self-care practices narratively.

Diet and nutrition

Dietary restriction and nutritional deficiencies are secondary consequences of TMD because of painful jaw function, functional limitation of jaw movements and fear of worsening pain.[152, 153] Individuals should be advised to eat an inclusive diet containing all major food groups, in addition to ensuring adequate hydration with water. A nutritionally complete diet can protect against exacerbation of neuroinflammation, and central sensitization associated with initiation and maintenance of persistent pain conditions [154]. The global TMD patient advocacy agency the "Temporomandibular Joint Association" have produced a useful diet and nutrition guide for individuals living with TMD available here.

Parafunctional activities

Parafunctional activities *e.g.,* nail biting, chewing gum, clenching and grinding, if pervasive (large number of different parafunctional behaviours or very high frequency) can be implicated as part of the complex multifactorial underpinnings of a presenting TMD.[155, 156] They are not, however, a singular 'cause'.[155, 156] Exploring if an individual has any parafunctional activities and if so, suggesting strategies to change behaviour may positively influence TMD outcome.

Introduction of lifestyle based SSM recommendations for longer-term benefit.

Clinicians can also signpost patients to lifestyle-related self-management (**Appendices 7 and 14)** for longer-term impact. Managing activity levels and mood and ensuring that enjoyable and meaningful activities are prioritized for their beneficial impacts are key skills that become increasingly important when dealing with the discomfort and stress of persistent pain. Live Well with Pain has good web resources for longer-term self-management available here. Increasingly many GP practices also have links to social prescribers who may be able to help or may refer locally to pain management groups or services.

Further management

Though SSM is the mainstay of care for many individuals there are a range of other management options which may be beneficial on a case-to-case basis and should be discussed with patients in a process of shared-decision making given the variability in the evidence supporting their effectiveness.

Physical Management Options

Manual therapy, exercise therapy and movement re-education

Manual therapy, therapeutic exercises and movement re-education should be considered for all types of TMD. Musculoskeletal Physiotherapists with specific training in the management of TMD are well placed to deliver this combination of treatments, however such treatments can also be offered by other trained practitioners (*e.g.,* Chiropractors, osteopaths) with a special interest in the management of TMD should there be an absence of suitably trained physiotherapists locally. Such physical forms of management should be individually tailored to the patient's presentation in keeping with a patient-centered care model of practice and can provide a short-term break in the 'cycle of pain' and stabilization of the neuromuscular function of the masticatory apparatus. [138-148]

Contemporary physiotherapy education advocates physiotherapists follow the principles of "high value care" recommended in all persistent pain conditions.[157] This is delivered by incorporating education about the biopsychosocial nature of pain, cultivating a strong clinical alliance with the patient through patient-clinician shared-decision making and the delivery of coaching for a healthy lifestyle overall.[157] Such physical management techniques may lead to decreased pain, increased range of jaw movement and function[139-142, 145, 146, 148] and support increased self-efficacy. [138-148] Low levels of adverse events and generally positive outcomes from physiotherapy support its use for individuals whose TMD is not well controlled despite positive SSM strategies.[138, 139, 142] Musculoskeletal Physiotherapists also offer the added opportunity to treat the primary headaches and cervical spine disorders that frequently accompany and compound TMD symptomatology. [155]

Access to NHS physiotherapy varies with geographical location. Dental clinicians can contact local NHS physiotherapy units to confirm appropriate referral protocols. In some areas, dental clinicians may need to request referral for physiotherapy through GPs. Alternatively, when potential benefits are explained, an individual may choose to seek care in the private setting. Dental clinicians or their patients may want to explore the availability of suitably trained physiotherapists in the NHS and independent sector through the 'Find a TMD Specialist' section on the Association of Chartered Physiotherapists in Temporomandibular Disorders (ACPTMD) website available here.

Acupuncture or dry needling

Evidence suggests acupuncture or dry needling for individuals with myogenous TMD is likely to have a positive effect on pain symptoms.[158-164] The short-term pain relief offered through acupuncture supports active engagement in SSM in the post needling window of improved clinical symptoms and acupuncture should be seen as an adjunctive treatment alongside SSM and or other interventions. Referral for acupuncture either through NHS referral, if available locally or privately by acupuncturist with experience in facial pain should be encouraged for those with myogenous TMD. As for physiotherapy, dental clinicians can contact local NHS physiotherapy units to assess whether acupuncture or dry needling is offered and confirm appropriate referral protocols. To make acupuncture more cost effective and accessible, future service and research development should focus on nurse led care within the primary care setting.

Splint therapy

Clinical evidence with regards to splints for the management of TMD is equivocal.[165-170] Although they may help alleviate symptoms in some subtypes of TMD, they should generally be considered an adjunctive therapy rather than a first-line treatment. SSM is the expected first-line standard management for TMD which may be supplemented, where appropriate, with splint therapy. Splints should not be a sole management strategy. Splints are most likely to be beneficial for myogenous TMD, headache attributed to TMD, and individuals with TMD and concomitant headache.[165, 169] Splints should not be used with the sole purpose of treating joint noise associated with intra-articular TMDs and ideally should be avoided in the presence of active dental disease (active decay, unstable periodontal condition).[166] They should therefore only be used following review by an appropriately trained dental professional.

There are a number of recognised terms used to identify splints of different types (**Box 3**). There is no evidence of either increased efficacy between splint types (soft splint or stabilisation splint) or of superiority of effect of splints covering maxillary or mandibular teeth.[171-173] GDPs should therefore use splints of a material and design they feel comfortable providing and maintaining.

Soft splints and particularly part-coverage splints can produce changes in occlusion and may exacerbate arthrogenous pain. If such appliances are prescribed, their use should be restricted to short term, under continual clinical supervision and regular review. Full coverage stabilisation splints that provide equal bilateral contact with teeth in the opposing arch are more robust and do not cause unfavourable occlusal changes.[174] Information on how to make and fit a stabilisation splint is available here.[175]

Night-time splint use can be advised initially for at least 3 months to assess full benefit. Gradual improvement of symptoms would be expected within this timeframe. Day time use might be of benefit for patients with awake bruxism. For individuals with bruxism (sleep or awake) and TMD, splints may limit bruxism, support pain management and in combination with restorative care and monitoring, protect against tooth surface loss/tooth damage.[176] If splint therapy worsens the TMD symptoms, use of the splint use should be discontinued immediately, and the exacerbation should resolve quite quickly. Once TMD symptoms are controlled, use of the splint can be discontinued or be used intermittently to manage cyclical symptomatic flare-up.

Splints should be maintained regularly by primary care dental practitioners at routine dental health check appointments where they should be reviewed to assess fit, stability of occlusion, effectiveness and whether the patient has found the splint tolerable and been able to use it. It is important to note that some patients, for a variety of reasons, may not find splints easy to tolerate and therefore different treatment avenues should be explored. Splints that become damaged or experience excessive wear from parafunctional habits should be replaced.

Box 3: Terms used for two major splint types.

Soft splints	Stabilisation splints
Soft bite appliance	Hard splint
Bite guard	Michigan splint (Upper arch)
Vacuum formed splint	Tanner appliance (Lower arch)
Soft bite raising appliance	Occlusal splint
Night guard	Fox appliance
Soft acrylic splint	Centric relation appliance

Low Level Laser Therapy/ Photo Biomodulation

LLLT (Low Level Laser Therapy) / photo biomodulation may offer benefit to myogenous TMD but the certainty of the effect is low.[177-181] They involve using a low powered laser producing a monochromatic and coherent light of a single wavelength. LLLT is applied to affected areas of muscle to cause a photochemical effect and modulate biochemical pathways. Its actual mechanism of action is uncertain, but it is thought to potentially reduce inflammation, cause the release of endogenous opioids, and help with healing and repair. [182].

Psychological management options

A biopsychosocial and holistic approach to the management of TMD from all encountering the patient is essential to maximize prognosis. Psychological therapies *e.g.,* Cognitive behavioural therapy, show benefit in reduction of distress and pain intensity with a low risk of adverse events and is likely beneficial for all TMD subtypes. [22, 130, 131, 183, 184] Dependent on their training clinicians may not be equipped to manage the psychological components of an individual's presentation but with the support of PHQ4 questionnaire (**Appendix 5**) they should:

1. Be aware of the comorbid presentation of psychological conditions with TMD (**Table3**)
2. Show empathy for how living with persistent orofacial pain can affect an individual psychologically and socially and ensure they are clear that comorbid anxiety or depression does not cause the pain but will tend to potentate or prolong it if left unmanaged.
3. Appropriately refer individuals depending on PHQ4 rating (**Table 7** and **Appendix 10**)

Supportive psychological and social advice can and should, be provided by all clinicians. Encouraging an individual living with TMD to take 30 minutes out of each day to do something they enjoy, encouraging exercise, fresh air and maintaining healthy social interactions and relationships are positive strategies which support all persistent health conditions. Reaffirming simple advice such as this by all clinicians is an important part of supporting positive change.

Pharmacotherapy

There are several pharmacotherapeutic options, which may be appropriate for TMD and need to be considered on an individual basis. All pharmacotherapeutic options come with a risk of adverse effects which should be openly discussed prior to initiation of therapy. For a number of different reasons pharmacotherapy may not be an option that an individual wishes to explore. The decision not to take medications should not be used by the clinical team as a representative measure of the intensity of an individual's pain and does not stop individuals from engaging with other forms of treatment. For all individuals utilising pharmacotherapy, after an appropriate length of stabilisation of TMD symptoms sensible review protocols should be in place to discuss efficacy and justification for continuation of pharmacotherapy.

Topical medicaments

Topical application of Ibuprofen gel externally over the TMJ, if completed safely, with appropriate patch test pre-application, is unlikely to be detrimental and may offer mild, short-term relief in some TMD cases. Certainty of benefit of topical agents is very low.[185] Short-term use for not more than 2 weeks is advisable. If beneficial repeated short-term application during cyclical periods of acute exacerbation is appropriate.

There is insufficient evidence to support the routine use of capsaicin, Theraflex-TMJ, bee venom, Ping On, or Cannabidiol (CBD) topically at this time.[185, 186]

Oral medicaments

Oral analgesics

Oral NSAIDs (non-steroidal anti-inflammatory drugs) are likely to positively affect pain reduction in the TMJ and masticatory muscles and range of jaw movement. [186, 187]Due to adverse effects, they are suitable for short term use during times of acute exacerbation only. **Table 8** offers short term dose suggestions subject to no relative and absolute contraindications. The stepwise utilization of paracetamol alongside non-steroidal anti-inflammatory drugs (NSAIDs) may help reduce dose and limit side effects of NSAIDs.[24, 188] For gastroprotection concomitant prescription of proton pump inhibitor may be advisable for those at increased risk of gastrointestinal problems (**Table 9**). [188]

Table 8: An appropriate 7-day regimen for oral analgesics during acute exacerbation of TMD

Medication	Dose	Frequency
Paracetamol	1g	Four times daily
OR		
Ibuprofen	400-600mg	Three times daily *Preferably after food*
Where paracetamol or ibuprofen alone is ineffective for acute TMD pain, they can both be used. If both paracetamol and ibuprofen are being used: 1. They should be alternated. *i.e.,* paracetamol 9am, ibuprofen 11am, paracetamol 1pm *etc.* 2. Dose and frequency should not exceed advice in this table.		
Lansoprazole OR **Gastro-resistant Omeprazole capsules**	15mg 20mg	Once daily *For duration of ibuprofen course*
Concomitant prescription of proton pump inhibitor should be provided with ibuprofen for individuals with increased risk of gastrointestinal problems (**Table 9**).		

Table 9: Clinical circumstances associated with elevated risk of GI bleeding or dyspepsia. Figure generated from information in [189]

Concomitant use of drugs that are known to increase the risk of GI bleeding *e.g.,* NSAIDs and anticoagulants.
Excessive alcohol consumption
Heavy smoking
History of GI ulcer, GI bleeding or gastroduodenal perforation
Older age
Serious medical comorbidity such as advanced cancer

Neuromodulatory agents

The neuromodulatory agents advocated for pain management of persistent myogenous TMD, their mechanism of action and common side effects are shown in **Table 10**. These agents may be used for myogenous TMD management in specialist dental and primary general medical settings. Neuromodulatory agents have not been shown to be beneficial for arthrogenous TMD sub diagnoses and their use in such situations is not advocated. The evidence base for effectiveness in the management of myogenous TMD is building, but remains weak, historically effectiveness has been extrapolated from other persistent pain conditions.[10, 24, 190-194] Should a patient opt for a neuromodulatory agent, initiation, monitoring and eventual withdrawal will often come under the remit of the individual's GP, either directly or in consultation with specialist teams. Dosing advice for neuromodulatory agents for TMD can be found in **Appendix 12**. The gold standard should be that individuals are slowly titrated off medications after a 6-8month period of stable control of their TMD symptoms with minimal numbers remaining on long term medication and if remaining on medication they should be at the lowest possible dose and be subject to periodic medications review by their GP.

Table 10: Neuromodulatory agents supported for use in muscular TMD, their drug class, mechanism of action and common side effects.

Drug†	Class	Main mechanism of action for persistent pain	Common side effects
Amitriptyline or Nortriptyline	Tricyclic antidepressant	Blocks voltage-gated sodium channels on presynaptic terminals, stabilizing neurons and reducing generation of action potentials. Inhibit reuptake of norepinephrine and serotonin in neuronal cell membranes.	Sedated state, nausea, vomiting, drowsiness, confusion, nightmares, dry mouth, headaches, arrhythmia, weight gain
Duloxetine	Serotonin-norepinephrine reuptake inhibitor *	Inhibits reuptake of serotonin and noradrenalin in the central nervous system. Supports descending inhibitory pain pathways in brain and spinal cord.	Urinary retention, nausea, constipation, diarrhoea, dizziness, fatigue, insomnia, sedated state, headache, xerostomia.
Gabapentin	Gabapentinoid	Calcium channel inhibition resulting in decreased activation of neurons. Additionally reduces noradrenaline release in the brain – linked to pain persistency	Drowsiness, dizziness, ataxia, fatigue, dependency.

*Though rare, SNRIs and SSRIs have been linked to antidepressant associated bruxism, which could perpetuate TMD pain, close monitoring for such adverse effects is advised. [195]

There is no current evidence to support the use of other SNRIs (*e.g.,* Venlafaxine) or SSRIs (*e.g.,* Citalopram, escitalopram, fluoxetine, sertraline, paroxetine) for management of M-TMD.

†Always check BNF interactions and liaise with other prescribing clinician if patient on other psychotropic medication and or has significant comorbid mental health illness.

Oral benzodiazepines

The effectiveness of oral benzodiazepines is difficult to determine from the literature. Their therapeutic role is restricted to instances of acute and severe myogenous pain with limited opening (+/- disc displacement without reduction). In such cases diazepam 2 mg up to three times daily, for 5 days initially, up to a total maximum duration of 2 weeks if symptoms remain at the 5-day review may offer benefit for some cases. [11] Medical and social contraindications must be assessed and National Institute for Health and Care Excellence (NICE) prescribing information for Diazepam in TMD available here must be followed.[11]

Oral corticosteroids

The evidence suggests that oral corticosteroid use in the management of TMD is restricted to the specialist, secondary care setting for management of some disc displacements without reduction presenting with severe localized TMJ pain.[196] In such instances in addition to diazepam, a short course of oral prednisolone can be prescribed, subject to no contraindications and following NICE prescribing information for oral corticosteroids available here. [189, 196, 197] **Table 11** outlines dose advice for oral prednisolone for such circumstances. Individuals being prescribed prednisolone who are at elevated risk of gastrointestinal (GI) bleeding or dyspepsia (**Table 9**) should be co-prescribed a proton-pump inhibitor (Lansoprazole 15 mg OD or Gastro-resistant omeprazole capsules 20mg OD) for the duration of the course.[189, 198]

Table 11: Advised dose regime for oral prednisolone in instances of disc displacement without reduction [196, 197]

Oral Prednisolone 6-day course	
Day	**Dose**
1 - 6	20mg od
Advise dose is taken in the morning after breakfast. As short course (<3 weeks) can be stopped abruptly *i.e.,* Tapered reduction not required.	

Injectable medicaments

Local Anaesthetic

Muscular trigger points are hyper-responsive points within skeletal muscles which when palpated cause local and or referred pain.[199] For myogenous TMD with well-defined muscular trigger points, local anaesthetic trigger point injections may be beneficial in some individuals.[161, 163, 200-202]

Botulinum toxin A

Botulinum toxin A is not expected to provide any benefit for painful arthrogenous TMD sub diagnoses although it may have a role in recurrent dislocation when applied to the lateral pterygoids. Though Botulinum toxin A may be effective in some individuals there is no clear evidence in favour or against the use of Botulinum toxin A in myogenous TMD at the present time.[202-209] Muscle atrophy and reduction in coronoid and condylar bone volume, cortical thickness and cancellous and trabecular density in the TMJ have been documented following Botulinum toxin A placement, the potential impact of these changes has not yet been fully explored [210-213]. As definitive evidence is lacking at this time, Botulinum toxin A should **not** be first line treatment. Any decision to move forwards with Botulinum toxin A treatment should be made in a shared-decision making fashion with informed consent from the patient especially relating to the uncertainty about bony changes,[213] who benefits, the dosing schedule and stopping 'rules'.

The authors acknowledge that the current situation may change, as the National Institute for Health and Care Research (NIHR) in the UK has just commissioned the world's largest ever trial into the use of Botulinum toxin A for myogenous TMD (MitiGatE trial) which not only looks at effectiveness of Botulinum toxin, Amitriptyline/Gabapentin, and Lignocaine in myogenous TMD but also their adverse effects profile in detail. An improved clinical evidence base is therefore expected over the forthcoming years. At present a therapeutic trial of Botulinum toxin A may be considered appropriate in individual myogenous TMD cases advocated by a senior clinician (consultant or specialist) and may require individual pharmacy approval for funding at a local level. If approved, a detailed informed consent process should include the requirement for repeated application, candid discussion of risks and uncertainties (as in preceding paragraph and table 3), and advice that efficacy for pain management may reduce over time.

Hyaluronic Acid

There is evidence building for the use of hyaluronic acid as an intra-articular injection in surgical TMJ procedures (*e.g.,* arthrocentesis).[214-218] At present its use in TMJs remains off label and so appropriate approval from relevant regulatory authorities would be needed and the off-license nature should be made clear in the consent process.

Intra-articular corticosteroid

Evidence for the beneficial effects of intra-articular corticosteroid injection is weak.[219, 220] Recent literature (see above) suggests intra-articular hyaluronic acid offers more potential benefit in terms of pain reduction and functional improvement and avoids the risks associated with intra-articular corticosteroid deposition including potential adrenal insufficiency and condylar lysis.[221-223]

Surgical Management

There are two situations where surgical intervention may be appropriate, severe arthrogenous TMD and disc displacement without reduction with specific case features (see **Table 7** and **Figure 3**). The informed consent process should outline that conservative treatment may also help resolve symptoms in these situations. This document has highlighted such circumstances in a bid to clarify patient pathway, expedite assessment in the oral and maxillofacial setting and capitalize on potential surgical benefits within most appropriate clinical timeframe improving outcome. The in-progress Oral & Maxillofacial Surgery GIRFT follow up report covers in detail all surgical management options for TMD and their clinical evidence base and referral to this document once published is advised for further detail. Where surgical management is advocated, it should be provided as an adjunct to SSM and conservative treatment strategies and not as a sole or first line option. There remains no evidence that surgical management will provide benefit in myogenous TMD.

Other considerations

Disc displacement without reduction with limited opening

As **Table 7** highlights disc displacement without reduction with limited opening is a TMD sub diagnosis more likely to justify earlier secondary care referral and consideration of early intervention. **Appendix 13** documents evidence-based management advice for disc displacement without reduction with limited opening from primary care, secondary care and surgical perspective.

Dental care for those with known or suspected TMD

For individuals with known or suspected TMD additional care should be taken to protect the TMJ complex during all dental procedures but particularly procedures which involve sedation or general anaesthesia due to drop in muscle tone caused by the drugs employed and because of airway management manoeuvres involving the joint. The use of bite blocks, minimizing jaw opening time and gentle manipulation of TMJ complex when required is advised. Positive SSM strategies should be discussed as part of the consent process and post operatively to promote recovery and reduce postoperative TMD discomfort following intervention. Contemporary guidance on the dental care of those living with TMD has just been published [224] and is available here.

Remote delivery of care

For diagnosis of TMD face to face consultation remains gold standard. Remote delivery however offers a potential opportunity for TMD patients to receive appropriate targeted supported self-management pain programs, early intervention and flexible, accessible review opportunities with the potential to revolutionize care. [135, 225-227] Regardless of location quality of consultation is the most important factor and programs would need to be adequately planned, staff appropriately trained and access requirements for patients considered.

17. Development of service

This comprehensive review has highlighted important areas of cross sector development which if supported through policy change have the potential to benefit individuals living with TMD, clinicians involved in the care of those living with TMD, and the health service through rationalization of healthcare use and potential for economic savings.

Management of the vast majority of persistent TMD cases is both more appropriate and more accessible in the primary care setting. For TMD, as with all other persistent pain conditions, consultation time and its representative cost has been identified as a major driver of healthcare utilization costs.[228] Despite this, remuneration for time required for such cases needs to be addressed.

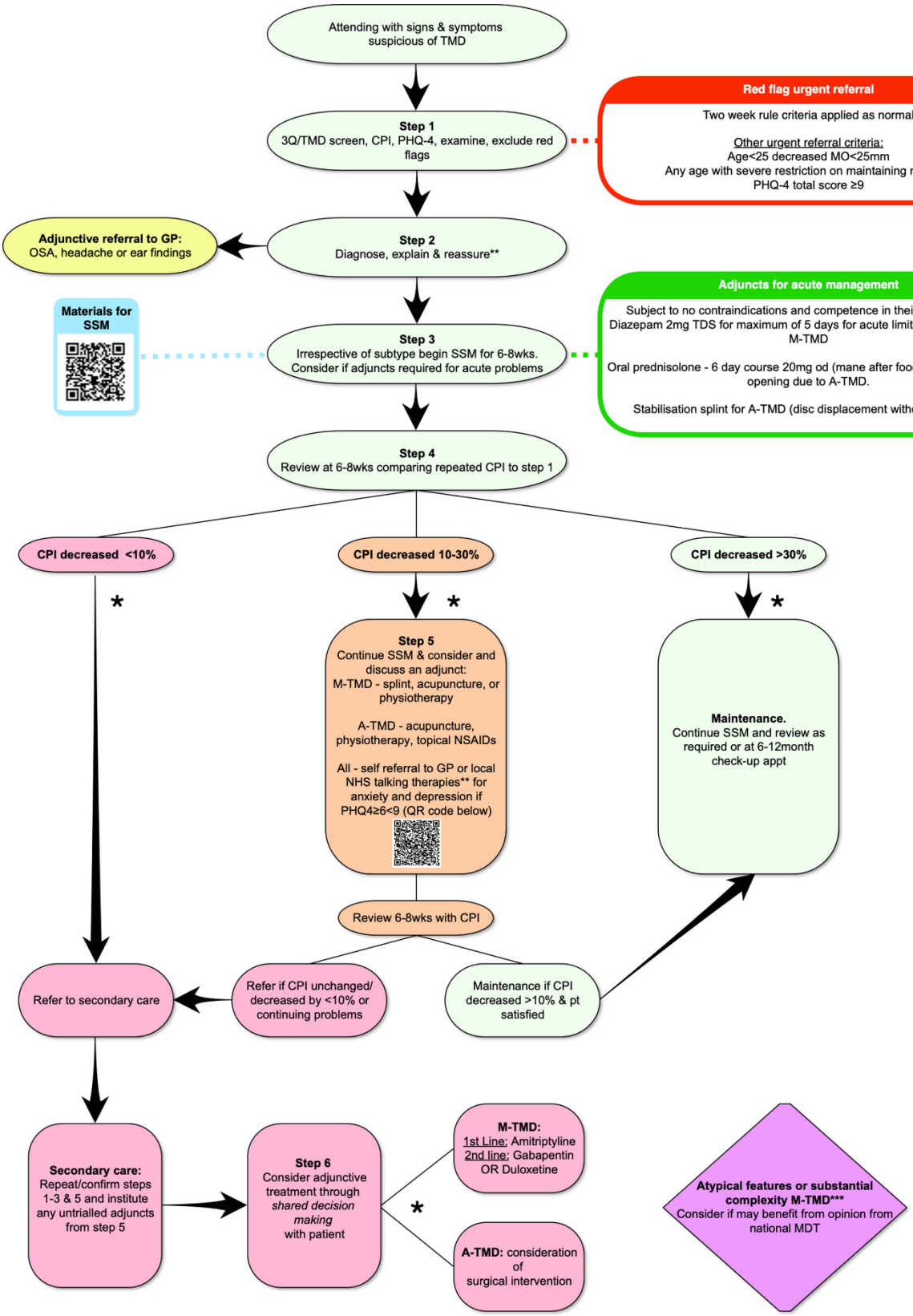
Further areas of development and service improvement and investment in the below situations is recommended:

- Evidence of potential ethnic variations of TMD aetiology, pathogenesis and management is lacking and should be prioritized as a research directive, as should obtaining truly representative samples from the population of interest and then clearly reporting the variation in ethnicity within the sample in the most granular manner.
- Further investigation in a qualitative and quantitative manner to understand the role of deprivation (and or social factors) in the aetiology, pathogenesis and management of TMD.
- Review and reconsider appropriate remuneration in NHS dental contract for management of persistent orofacial pain conditions.
- Under and post graduate dental education in persistent orofacial pain conditions for dentists and GPs
- Under and post graduate education into management of TMD for dental hygienists, dental therapists, clinical dental technicians.
- Advanced training opportunity for dental nurses and general nurses into persistent orofacial pain management
- Investment in acupuncture training and service development in primary care for persistent pain conditions
- Investment in training and service development of specialist pain management physiotherapists in primary and secondary care, and their integration in orofacial pain multi-disciplinary teams.
- Investment in training and service development of specialist pain management clinical psychologists.

18. Suggested TMD Care Pathway

Individuals living with TMD are known to have had challenging care pathways with multiple unnecessary referrals and visits due to the structure and lack of certainty within the healthcare system.[17] The evidence-based care pathway, **Figure 3,** has been agreed with RCS FDS Eng., NHS England GIRFT and associate bodies of this guideline as the standard pathway to follow for TMD management. Each step has explanatory notes and further information for all healthcare providers provided as **Appendix 14**. The evidence base which informed this TMD care pathway are summarized in **Table 3**. There is strong evidence for the use of SSM for all TMDs, other options are supported by less robust evidence, but outline considerations to be discussed with patients in a process of shared decision making if further (adjunctive) management is required or indicated.

Figure 3: Evidence based TMD care pathway



*If at any point the patient is comfortable and happy to move to maintenance there is no objective need to progress with further therapy and maintenance can be initiated

**Self-referral to GP if PHQ ≥6 <9 or to talking services for anxiety and depression which can be identified at: https://www.nhs.uk/mental-health/talking-therapies-medicine-treatments/talking-therapies-and-counselling/nhs-talking-therapies/

***Unfortunately following step 6 management options there is likely to be little further that can be offered. A national virtual MDT opinion may be appropriate when there is substantial complexity or comorbidity between a TMD and other conditions. This national MDT is currently being established and contact details are to follow.

Care pathway acronyms: Three question TMD screener (**3Q/TMD**); Arthrogenous TMD (**A-TMD**); Characteristic pain intensity (**CPI**); Mane (**in the morning**); Mouth opening (**MO**); Myogenous TMD (**M-TMD**); Once daily (**OD**); Obstructive sleep apnea (**OSA**); Patient health questionnaire 4 (**PHQ4**); Supported self-management (**SSM**)

19. Conclusion

The authors hope that this updated guideline will support all clinical dental professionals, GPs and other healthcare professionals to whom individuals living with TMD may present. This guidance is based upon the current available evidence and should aid practitioners in assessment, diagnosis, and management of persistently painful TMD in adult patients. The suggested care pathway should provide clarity of appropriate points and routes of onward referral to ensure national consistency of care. Evidence supported development requirements locally and nationally have the potential for improved patient outcome, rationalization of service use and economic savings for the health service as a whole.

20. Appendices

Appendix 1: Headache exploration table developed from information gathered in [229]

Question	Comments
Do you suffer with headaches?	If no, no further questioning required. If yes but longstanding with formal diagnosis and active intervention *e.g.,* known migraineur, TMD management should be implemented. The association between TMD and primary headache condition should be explained, and the individual counselled how their conditions can precipitate and perpetuate each other. Positive management of the TMD or headache may reduce but not eliminate the other issue. If yes, new or changing, headache symptoms should be explored in detail and referral to GP for further assessment considered if justifiable.
Can you describe your headache pain?	Headache attributed to TMD commonly throbbing ache which worsens with jaw movement (chewing, talking). It can be uni or bilateral depending on where TMD is presenting. Migraine is more commonly described as pounding, pulsating or throbbing pain and is usually unilateral (~60%). Bilateral presentation is more common in children. Chronic tension type headaches are commonly described as tight bilateral pressure around the head. Cluster headache is described as severe strictly unilateral pain. Pain is associated with ipsilateral conjunctival injection, lacrimation, nasal congestion, rhinorrhoea, forehead and facial sweating, miosis, ptosis and/or eyelid oedema, and/or with restlessness or agitation.
Where do your headaches present?	Headache attributed to TMD most commonly presents in the regions of temporalis, masseter or over the TMJ in the preauricular region. Migraines are most common in the frontotemporal region. Tension type headaches most commonly affect the frontal and occipital regions of the skull and the posterior neck. Cluster headaches present in orbital, supraorbital or temporal region(s).
Does anything make the headache worse?	Headache worsened by jaw function is likely to be headache attributed to TMD, positive TMD management would be expected to result in reduction in headache symptoms. Headaches which occur when TMD pain is not present or is not worsened by jaw function are unlikely to be associated with TMD and advice should be given for the individual to discuss this with their GP if headache continues.
Do any features precede the headache?	Preceding sensory awareness (aura) more commonly associated with migraine
When you have a headache are you sensitive to bright lights or loud noises?	Positive response is suggestive of migraine
Do you ever feel sick or be sick when you have your headaches?	Positive response is suggestive of migraine.

Headache “red flag” signs and symptoms are documented below.[230] Any single headache red flag symptoms warrants urgent assessment with GP.

- Sudden onset severe (“thunderclap”) headache
- New onset headache in person aged >50
- Progressive or persistent headache or headache which has changed dramatically.
- Headache with associated features such as: fever, impaired consciousness, seizure, neck pain/stiffness, photophobia
- Papilloedema (optic disc swelling)
- New onset focal neurological deficit, change in personality, cognitive impairment, and/or altered consciousness.
- Atypical aura (duration >60 minutes, or including motor weakness, double vision, visual symptoms affecting only one eye, or impaired balance, new aura occurring in a person taking the oral contraceptive pill).
- Dizziness
- Visual disturbance
- Vomiting
- Preceding head trauma (last 3 months)
- Headache triggered by Valsalva (coughing, sneezing, bending or exertion)
- Headache which worsens on standing
- Headache which worsens with lying down
- Current or past malignancy (especially if <20 years old); a history of malignancy known to metastasize to the brain (lung, breast, multiple myeloma)
- Current or recent pregnancy

Appendix 2: Template letter to facilitate TMD and headache symptom information sharing with GP.

Dear [insert GP's name],

Re: Patient name, date of birth, NHS number

The above patient presented today due to a complaint relating to facial pain.

Clinical examination demonstrated:

Familiar pain from the muscles of mastication/TMJ [delete as required] on the left/right/both side(s) [delete as required].

This would equate to a diagnosis of temporomandibular disorder (TMD), for which I have initiated conservative management strategies including [insert details of initial management strategies suggested to patient]. Our review plan is [insert details here].

The patient also, however, complains of headache symptoms which do not appear related to their TMD. Symptoms include [Insert appropriate history and clinical findings as necessary].

This letter is to support information sharing of TMD diagnosis and current management strategies, I have advised the patient to monitor their headache symptoms and seek advice from you should these persist or worsen.

Yours sincerely,

Appendix 3: Template letter to facilitate referral to GP for exploration of ear symptoms.

Dear [insert GP's name],

Re: Patient name, date of birth, NHS number

The above patient presented today due to a complaint relating to facial pain and ear pain.

Clinical examination demonstrated:

Familiar pain from the muscles of mastication/TMJ [delete as required] on the left/right/both side(s) [delete as required].

This would equate to a diagnosis of temporomandibular disorder (TMD), for which I have initiated conservative management strategies including [insert details of initial management strategies suggested to patient]. Our review plan is [insert details here].

The patient also, however, complains of ear pain/fullness, tinnitus affecting the left/right/both side [delete as necessary]. As I am unable to examine aurally, the patient has been advised to book an appointment you to exclude any potential otological problems contributing to the patient's presentation.

Yours sincerely,

Appendix 4: Trismus checklist adapted from [77]

Trismus checklist: for completion in patients with reduced mouth opening		
	Yes	**No**
Inter incisal opening <20mm		
Progressively worsening trismus		
Absence of history of TMD related symptoms (*incl.* Clicking)		
Pain of non-myofascial origin (neuralgia *etc.*)		
Swollen lymph glands		
Suspicious intra-oral soft tissue lesion		
Older than 45 years		
Difficulty swallowing		
Recent weight loss		
Neurological signs/symptoms • Acute onset loss of smell or hearing • Acute onset visual problems • Neurosensory change • Motor function changes		
If any of the answers are yes: • Primary care setting: urgent oral and maxillofacial surgery referral • Secondary care setting: urgent senior consultant assessment and urgent TMJ imaging as per senior consultant advice.		

Appendix 5: Formative screening questions which are advised for use at first assessment.

This page can be printed, provided to the patient to complete, and scanned into patient records.

1. 3Q/TMD - 3 questions temporomandibular disorder screening instrument [103]

Do you have pain in your temple, face, jaw, or jaw joint once a week or more?	**Score**
a) No b) Yes	**0** **1**
Do you have pain once a week or more when you open your mouth or chew?	
a) No b) Yes	**0** **1**
Does your jaw lock or become stuck once a week or more?	
a) No b) Yes	**0** **1**
Total Score = *≥1 point = positive screen for TMD,*	

2. PHQ-4 - Patient Health Questionnaire 4 screening[81]

Over the past 2 weeks have you been bothered by these problems? Please tick **ONLY one box** for of the below questions	**Not at all** **0**	**Several days** **1**	**More than half of the days** **2**	**Nearly every day** **3**
1. Feeling nervous, anxious or on edge				
2. Not being able to stop or control worrying				
3. Feeling down, depressed, or hopeless				
4. Little interest or pleasure in doing things				

Total Score =

Total score is determined by adding together the scored of each of the 4 items.
Scores are rated as: Normal (0-2), Mild (3-5), Moderate (6-8), and severe (9-12)
Total score ≥3 for first 2 questions suggests anxiety. Total score ≥3 for last 2 questions suggests depression
Patients scoring 2 points or more from any single depression screen question (question 3 or 4) GP should be informed[125]

3. CPI - Characteristic pain intensity [104]

1. How would you rate your mouth and or face pain on a 0 to 10 scale AT THE PRESENT TIME, that is right now, where 0 is "no pain" and 10 is "pain as bad as could be". *(Circle number)*

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as it could be

2. In the PAST MONTH, how intense was your WORST mouth and or face pain? *(Circle number)*

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as it could be

3. In the PAST MONTH, on AVERAGE, how intense was your mouth and or face pain? (That is, your usual pain at times you were experiencing pain.) *(Circle number)*

	0	1	2	3	4	5	6	7	8	9	10	
No pain												Pain as bad as it could be

Total Score:

CPI is calculated by summing the values from Q1-3 multiplying by 10 and dividing the product by 3

Appendix 6: Mental distress and suicidal ideation

Where patients present in significant distress or have indicated depressive symptoms on PHQ4 question 3 and 4, it is recommended to directly ask if they have considered ending their life.[125] Talking to individuals about suicidal intent **does not** increase the risk of the individual attempting or taking their own life.[231-233] Talking allows valuable information to be gathered, protecting the individual and reducing their risk.[231]

Urgent assessment as outlined in **Table 7** should be actioned immediately and documentation of all discussions should be recorded within the clinical notes.

For further information please see the suicide alliance and Health Education England free online training packages:

Suicide awareness training - gateway module. (5-10 minutes)

Suicide awareness training - full version (20 minutes)

HEE - We need to talk about suicide e learning module

Appendix 7: Recommended links for SSM individuals diagnosed with TMD can be signposted to

Newcastle Upon Tyne NHS Hospitals foundation Trust TMD resources

Weblink: **Here**

QR code for self-physiotherapy, jaw exercise, thermal modalities, facial massage and TMD advice videos:

Temporomandibular joint association

Website: https://tmj.org/

TMD, nutrition and you: http://tmj.org/wp-content/uploads/2020/08/TMJ_nutrition_Guide.pdf or click this link.

Orofacial pain UK

Website: https://orofacialpain.org.uk/

Live well with pain

Website: https://livewellwithpain.co.uk/

Sleep well with pain leaflet available here.

The Leeds Teaching Hospital Trust/Leeds School of Dentistry

Patient experience video: here.

Downloadable TMD patient pain manual discussed in patient experience above:
https://licensing.leeds.ac.uk/product/self-management-of-chronic-orofacial-pain-including-tmd [234]

Association of Chartered Physiotherapists in Temporomandibular disorder

Weblink: **here.** *This site, alongside other information can provides support helping to locate a physiotherapist with a special interest in treatment of TMD in your area.*

Appendix 8: Template letter to facilitate referral to GP for exploration of OSA signs and or symptoms.

Dear [insert GP's name],

Re: Patient name, date of birth, NHS number

The above patient presented today due to a complaint relating to facial pain and potential obstructive sleep apnoea.

Clinical examination demonstrated:

Familiar pain from the muscles of mastication/TMJ [delete as required] on the left/right/both side(s) [delete as required].

This would equate to a diagnosis of temporomandibular disorder (TMD), for which I have initiated conservative management strategies including [insert details of initial management strategies suggested to patient]. Our review plan is [insert details here].

The patient also, however, presented with features suggestive of sleep apnoea [insert details here], the patient has been advised to book an appointment with you to formally assess and initiate management as appropriate for obstructive sleep apnoea.

Below is their STOP-bang sleep apnoea questionnaire

STOP		
Do you **SNORE** loudly (louder than talking or loud enough to be heard through closed doors)?	Yes	No
Do you often feel **TIRED**, fatigued, or sleepy during daytime?	Yes	No
Has anyone **OBSERVED** you stop breathing during your sleep?	Yes	No
Do you have or are you being treated for high blood **PRESSURE**?	Yes	No
BANG		
BMI more than 35kg/m2?	Yes	No
AGE over 50 years old?	Yes	No
NECK circumference > 16 inches (40cm)?	Yes	No
GENDER: Male?	Yes	No
Each Yes = 1 Total score = *High risk of OSA: 5 – 8, Intermediate risk: 3 – 4, Low risk: 0 -2*		

Yours sincerely,

Appendix 9: 6–8-week review documentation

This page can be printed, provided to patient to complete, and scanned into patient records.

Dental Clinician to complete: **INITIAL CPI SCORE** ☐

Patient to complete: **CPI - Characteristic pain intensity review [104]**

1. How would you rate your mouth and or face pain on a 0 to 10 scale AT THE PRESENT TIME, that is right now, where 0 is "no pain" and 10 is "pain as bad as could be". *(Circle number)*

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as it could be

2. In the PAST MONTH, how intense was your WORST mouth and or face pain? *(Circle number)*

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as it could be

3. In the PAST MONTH, on AVERAGE, how intense was your mouth and or face pain? (That is, your usual pain at times you were experiencing pain.) *(Circle number)*

	0	1	2	3	4	5	6	7	8	9	10	
No pain												Pain as bad as it could be

Total Review Score:

CPI is calculated by summing the values from Q1-3 multiplying by 10 and dividing the product by 3

Dental Clinician to complete: **% CPI SCORE CHANGE** ☐

Subtract the Review CPI Score from Initial CPI score gives you the percentage change.

If it is positive, it is an improvement.

If it is negative, the pain has worsened.

*See **Figure 3** for suggested next stage of management.*

Appendix 10: Template letter to facilitate referral to GP secondary to PHQ4 findings.

Dear [insert GP's name],

Re: Patient name, dob, NHS number

The above patient presented today due to a complaint relating to facial pain.

Clinical examination demonstrated:

Familiar pain from the muscles of mastication/TMJ [delete as required] on the left/right/both side(s) [delete as required].

This would equate to a diagnosis of temporomandibular disorder (TMD), for which I have initiated conservative management strategies including [insert details of initial management strategies suggested to patient]. Our review plan is [insert details here].

Upon assessment the patients PHQ4 (symptoms of anxiety and depression score) was [INSERT NUMERIC SCORE HERE] suggesting symptoms of [delete as appropriate moderate, severe] anxiety and/or depression.

When discussed with the patient they reported feeling [document any pertinent information here]. I would be grateful if you could arrange to assess, diagnose and manage their condition as you see appropriate.

Yours sincerely,

Appendix 11: Example patient explanations for aspects of TMD

What is TMD?

- TMD describes a variety of conditions which affect the jaw joints and or the muscles around the jaw.
- TMD is very common.
- Problems may occur on one or both sides of the jaw.
- Many people have some signs of TMD, but only a small number suffer pain or other symptoms because of TMD.
- TMD can be mostly due to problems in the muscles or mostly due to problems in the joints or a bit of both.
- TMD is not usually serious, and symptoms usually only last a few months before getting better, though they may come back from time to time.
- TMD is generally not a progressive disease and TMD is not linked with other serious illnesses.

What causes TMD?

- Today we believe that TMD is caused by many things acting together, some of which may have little or nothing to do with your teeth. These may include changes in some of your body's pain and flight or fight (stress) systems.

Will it get worse?

- TMD does not usually keep getting worse. In the majority of cases the problem tends to come and go, often feeling worse during times of emotional difficulty. Studies demonstrate that it does not tend to get worse with age.
- Simple treatments and things you can do yourself will help resolve or control TMD in the vast majority of cases.

Reassurance as to the benign nature of TMD

"*With TMD the pain that you feel does not indicate that there is damage occurring within the jaw joint or the structures surrounding it, continuing to use your jaw normally is unlikely to make the condition worse."*

Explanation of persistent myogenous TMD

"*With your condition the main muscles which move the jaw are sending pain signals, which are real messages, but they are not indicating injury. The pain nerves have become extra-responsive after things have healed and are being over-protective producing significant pain when the muscle has no injury. It is a bit like when you stub your toe and the whole toe goes red and sore despite only stubbing it in a small area. As it improves the toe no longer looks red but will still be a bit sore in areas where you did not stub it. We know this extra-responsiveness is normal for a period but that in some people it can last a longer time without any ongoing damage."*

"The good news is that everything is healthy, however the muscles around your jaw are very tender at present. This can happen because the muscles are overworked from e.g., clenching and grinding your teeth and need a rest so doing what we can to give them a break for a week or two may help. Pain like this can also be maintained by overactivity of the pain signalling system itself – pain works like an alarm which can become highly sensitised in certain conditions. We therefore need to look at ways to calm the overall alarm system alongside treating muscle tension and reversing subconscious habits (clenching, grinding, chewing fingernails etc) that exacerbate the muscular tension."

Explanation of disc displacement with reduction

"*The lower jaw sits in its socket in the skull with a flat cap of cartilage (like a cap on someone's head) on top of it. This cap is supposed to move in sync with the jaw as it hinges and then slides forwards. In some people the disc moves further one way or another during opening or closing, and then clicks back into place. Approximately 30% of all adults have a "clicky jaw", the click itself is nothing to worry about. The click does not mean there is any damage taking place to the disc or the jaw joint. We now understand that overtime the disc reshapes itself, for some people this means a click may start or stop. The aim of management is to reduce the pain you feel and cannot be guaranteed to eliminate your click."*

Explanation to manage expectations of the likely course for persistent TMD.

"TMD is a condition for which unfortunately there is no absolute cure. What I mean by that is that there is not one single intervention that will eliminate all of your pain. For people who have TMD, they will likely have symptoms to one degree or another throughout life. Symptoms will usually come in cycles with periods of no or significantly less pain followed by short periods of flare up. Though I said there is no one thing we can do that can eliminate all of the pain there are lots of management strategies we can utilise which can help reduce the frequency of flare up periods and can also reduce how severe the pain is during times of flare up. It is possible to interrupt the vicious pain cycle and block the pain response by understanding your condition and how simple self-management strategies like regular use of massage and heat/ cold application to the overactive muscles can allow you to break the pain cycle and 'live well with TMD' by reducing its impact on your activities of daily living".

Appendix 12: Neuromodulatory agents suggested dosing regimens for myogenous TMDs for those experienced and trained in their use.

Amitriptyline or Nortriptyline begun at 10mg with 10mg incremental tapers every 4-8weeks up to a maximum dose of 50-75mg (50mg is the threshold where often patients report more intolerable side-effects).

The taper off is similarly as slow at 10mg increments every 4-8 weeks after 6-8 months of stable control or in absence of positive effect.

Gabapentin begun either 100mg OD day 1, 100mg BD day 2, 100mg TDS day 3 **or** 300mg day 1, 300mg bd day 2, 300mg tds day 3. It can then be titrated across all 3 doses by 100-300mg increments every 4-8 weeks. If a therapeutic effect hasn't been achieved by 1200-1500mg total daily dose it is likely there will be more side-effects reported rather than benefit above this dose.

The taper off mirrors the incremental taper upwards and is done slowly after 6-8 months stable control or in absence of positive effect.

Duloxetine begun at 20mg OD, after 6-8 weeks increase to 30mg OD. If required at 6-8 weekly intervals dose can be raised by additional 30 mg to a maximum of 90mg total daily dose. 90mg total daily dose is the threshold where more side-effects are reported.

Tapering off the medication mirrors the incremental upwards approach in a slow manner and is done after 6-8 months of stable control or in absence of positive effect.

<table>
<tr><td colspan="2">Anti-epileptics</td><td colspan="2">Antidepressants</td></tr>
<tr><td colspan="4">If neither type are contraindicated shared decision making with patient should inform choice</td></tr>
<tr><td></td><td></td><td>1st line</td><td>Amitriptyline*</td></tr>
<tr><td>2nd line</td><td>Gabapentin</td><td>2nd line</td><td>Duloxetine or Nortriptyline**</td></tr>
<tr><td colspan="4">Could add Duloxetine to Gabapentin</td></tr>
<tr><td colspan="4">*A stronger evidence base for beneficial effect of amitriptyline for M-TMD exists supporting its position as first line agent. [190-192]
**Risk of anti-cholinergic side effects, sedation and postural hypotension are expected to be lower with secondary amines (nortriptyline) than tertiary amines (amitriptyline).[235] In some circumstances this may mean nortriptyline is either prescribed in preference or switching from amitriptyline to nortriptyline to mediate side effects may be advised.[236]</td></tr>
</table>

Appendix 13: Disc displacement without reduction with limited opening - Detailed evidence-based management recommendations

Initial management for disc displacement without reduction with limited opening

1) Make diagnosis on clinical grounds.

   Clinical history:

   - Jaw locking so that mouth would not open all of the way AND Limitation in jaw opening severe enough to interfere with ability to eat.[5]

   Clinical examination findings:

   - Maximum assisted opening with passive stretching less than 40 mm.[5]
   - The presence of TMJ noise on examination does not exclude this diagnosis.[5]

2) Provide diagnosis, education and reassurance.
3) Initiate conservative management ASAP.
   - Signpost patients to Supported self-management resources **(Appendix 7)**
   - Initiate supported self-management practices **(Appendix 14)**
   - Must include the joint exercises: Coordination training, static stretching, mobilisation exercises **(Appendix 14)**
4) If symptoms are acute advise oral analgesics (**Table 8** for suggested dose regimen)
5) Early provision of a stabilization splint as an adjunctive therapy may help alleviate symptoms[166]
6) If symptoms are acute and severe related to myogenous pain consider prescribing diazepam 2 mg up to three times daily, for 5 days initially, up to a maximum/total of 2 weeks if issue remain at day 5 review.[11]
7) If any of the below criteria refer to OMFS at initial patent contact appointment:
   - Any TMD red flag sign or symptom
   - ≤25 years old (as early arthrocentesis more likely to be curative)
   - Severe closed lock affecting ability to maintain nutritional requirements.
   - Pain unmanageable
8) Review at 6-8/52 weeks assess CPI (**Appendix 9**)
   - CPI improvement < 10% secondary care referral at this point
   - Improvement in CPI >10% and improved mouth opening continue conservative management strategies as it can take 6 to 18 months to completely form a pseudo disc and functional limitation to resolve.

Secondary care management for disc displacement without reduction with limited opening

1. Confirm diagnosis on clinical grounds (MRI should be confirmatory only)

2. Provide diagnosis, education and reassurance.
3. Review conservative management that has been completed. (Type, duration, effectiveness.)
    - Motivate with regards to supported self-management
    - Emphasize joint exercises: Coordination training, static stretching, mobilisation exercises.
4. Assess requirement for multi-disciplinary team involvement *E.g.,* Pain psychologist, specialist pain management team, physiotherapy, and facilitate referral as appropriate.

If not already completed in primary care, consider:

a. Early provision of a stabilization splint as adjunctive therapy may help alleviate symptoms[166]
b. If symptoms are acute and severe consider prescribing diazepam, if appropriate, 2 mg up to three times daily, for 5days initially, up to a maximum/total of 2 weeks if issue remains at day 5 review.[11]
c. If symptoms localized, TMJ pain severe and it is appropriate to do so consider prescribing in addition to diazepam, oral prednisolone as per **Table 11** (+/- proton pump inhibitor for gastroprotection as required).[196, 197]

5. If improvement: Continue conservative management
6. If no improvement options:
    - Ongoing conservative management
    - Referral for surgical opinion

Surgical management of disc displacement without reduction with limited opening

a. Unlocking manoeuver is the most practical and realistic approach that can be attempted first in every closed lock patient as an initial diagnostic/therapeutic approach.[237-239] Success of this procedure is possible regardless of duration of lock but is more likely in those with a short lock duration <4weeks. “Success” is normally an increased range of motion rather than a ‘recaptured’ disc. [237]
b. Arthroscopic surgery is recommended over arthroplasty since it is equally effective with regard to reducing pain and dysfunction, it costs less and is less invasive.[238-240]
c. Arthrocentesis/scopy ideally planned for <6months [237, 239]
    - Informed consent should include that pseudo disc nearly always forms and things regress back to near normal from 6-18months and older patients and those with >6months of lock are less likely to respond to arthrocentesis.
d. Early Arthrocentesis/scopy may be appropriate if:
    - Unresponsive to conservative management at 6-8 weeks
    - ≤25 years old and mouth opening <25mm[124]
    - CPI pain scores >75 [124]

Appendix 14: Explanatory notes and supplemental materials for the steps of the care pathway

Step 1: Examination and screening

Assess for ref flags in medical and clinical history (**Table 2**)

Rule out dental pathology clinically and/or radiographically

Provide patient with screening documents to complete, 3Q/TMD, PHQ4, CPI (**Appendix 5**)

Record results of screening in patient records.

TMD focused clinical examination

Step 2: Diagnose, explain, and reassure.

Examples of lay descriptions which could be used to explain TMD aetiology and pathogenesis to patients are provided in **Appendix 11**.

Step 3: Initiate Supported Self-Management

Step 3 instructions for professional:

Supported self-management begins with an individualized plan developed in collaboration with the individual diagnosed with TMD. The clinician should introduce the individual to management techniques likely to benefit, advise how to complete the management and why they may be beneficial.

Clinicians should feel confident to discuss that for many with persistent TMD elimination of symptoms is unrealistic however management of symptoms and maintenance of function is very possible. **All individuals diagnosed with any TMD should have a review appointment 6-8 weeks following initiation of supported self-management to assess for change and determine need for further care.**

Clinicians can explain to patients that although there is not a guaranteed medical cure for TMD, there are simple and active management recommendations available that are known to reduce the severity of pain and its impact. Following these management recommendations over time, on a regular basis, is the single most important thing likely create the best conditions for reduction of active symptoms and their impact. The benefits of self-management are likely to occur over a period of time and may not be immediately evident.

Step 3 instructions for patients:

In addition to the information provided by your clinician, there are two excellent short animations that explain TMD and its management at link 1 and link 2.

The following are some self-management techniques and home physiotherapy that your healthcare professional can support you in completing.

The below QR code and link will direct you to a website containing supported the self-management techniques outlined below.

QR code: **Weblink:** here

Supported self-management techniques expected to provide benefit for all TMD:

1. **Changes to daily living and habits**
    - **a.** Avoid caffeine as this is a stimulant and likely to increase stress and cause muscle tension
    - **b.** Give yourself time to perform self-care exercises and relaxation techniques throughout every day
    - **c.** 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.
    - **d.** Do not chew gum, pen tops, pencils, nails etc. as these habits will all produce unneeded extra strain in your chewing system.
    - **e.** Apart from when you are eating you should keep your teeth apart.
    - **f.** 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.

2. **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 expand 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.

3. **Thermal modalities** [149, 150] (demonstrated at this link.)

Apply moist heat or ice to affected muscles, areas on your head, face and neck where you feel pain. For some people heat benefits, for others cold feels more effective. Trying heat for 3 days and then cold for 3 days may help provide information as to which works for you. 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 and 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).

4. **Facial massage** [149, 150](demonstrated at this link.)

Temporalis muscle (in your temple): Using index and middle fingers apply gentle pressure to temporal region either side of the head. Make small circular motions applying pressure to any tender regions.

Masseter muscle (in your cheek in front of your ear): Place left thumb inside the right cheek, the left index finger outside the right cheek. Between the thumb and index finger is the masseter muscle. Gentle squeeze thumb and finger together to apply pressure to the muscle. The muscle should be stretched from top to bottom and back to front.

Massages should be completed for one minute per muscle three times a day, using freshly washed (clean) hands.

5. **Coordination training** [149, 150, 241, 242](demonstrated at this link.)

i) Practice the retrusive position of your jaw (‘n-stretch’). 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 20 repetitions up to four times a day.

ii) 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 ('n-stretch combined"). Do this in a slow, controlled manner over five-six seconds (one set). Complete five-six sets up to four times a day.

Additional techniques for use in specific circumstances

Isometric tension exercises [149, 150, 241](demonstrated at this link.)

Isometric tension exercises for use with muscular TMD

Only complete this if you have been told that your TMD has a muscular origin (M-TMD).

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.

The same exercise is completed with gentle pressure placed to the side of your lower jaw while you open and move your jaw to one side. Again, opening with lateral movement should be against gentle resistance and at maximum opening laterally opening should be help against the resistance for five to six seconds. Complete five-six sets up to four times a day.

Isometric tension exercises for disc displacement with reduction [151]

Only complete this if you have specifically been told you have a disc displacement with reduction.

Place the back of your hand under your lower jaw and provide gentle resistance upwards as you try to open and push lower jaw forwards (protrude jaw) whilst opening. Complete 10 repetitions each held for 5-6 seconds 2-3 times a day.

Static stretching for reduced mouth opening [149, 150, 241] demonstrated at this link.

Only complete these if you have been told by a professional that your mouth is not opening fully.

i) Apply thermal modality (as above) to jaw joints for 5 minutes prior to static stretch exercises.

ii) Gently open to point of maximum opening

iii) place your index fingers on the lower canine teeth and your thumbs on your upper canine teeth (fingers and thumbs will be crossed)

iv) Stretch gently for 30 seconds to the point of discomfort and a small amount further and hold for 30 seconds

v) Complete 5-6 repetitions up to 3 times per day

Mobilisation for disc displacement with reduction and limited opening [149] demonstrated at this link.

Only use if you have been told by a professional that you have a diagnosis of disc displacement with reduction and limited opening.

i) Lightly hold a small cotton wool roll between your upper and lower front incisor teeth.

ii) While gently holding the cotton wool roll move the lower jaw to one side then back to the center over 5-6 seconds

iii) Continue to gently hold the cotton wool roll and move to the lower jaw to the opposite side over 5-6 seconds

iv) 5-6 repetitions should be completed 3-4 times daily with each movement made over 5-6 seconds in a slow controlled manner

Step 4: Review, reassess CPI and initiate onward management plan[243]

At 6–8-week review appointment CPI should be reassessed and compared to baseline. (**Appendix 9**)

At this point if CPI is worsened, unchanged or improved by <10% from baseline then onward referral to local unit managing TMD is advised.

If CPI has decreased by 10-30% from baseline, then adjunctive care is advised as outlined in the below section.

If CPI has decreased by >30% from baseline the ongoing SSM should be advised for TMD maintenance and TMD symptoms should be re-assessed at routine dental health check appointments.

Regardless with CPI change any individual who is comfortable and happy to go to maintenance there is no objective need to progress with further therapy at that stage and maintenance can be initiated.

Step 5: Adjunct care

For individuals at review whose CPI has decreased by 10-30% from baseline additional adjunctive management to support supported self-management strategies may be beneficial at this point. It is advised for myogenous TMDs adjunctive options to discuss and plan in consultation with the patient include splint therapy, acupuncture or physiotherapy (accessed as outlined in management section). For arthrogenous TMDs acupuncture, physiotherapy or topical utilization of NSAIDS to skin overlying TMJ may provide additional relief and should be discussed openly. Should adjunctive treatment be initiated a further 6–8-week review appointment should be made, at this point CPI reassessed and ongoing management determined as step 4 of flowchart onwards.

Step 6: Onward management

Should shared decision making determine that pharmacological management is appropriate for an individual living with myogenous TMD, subject to no contraindications neuromodulatory options, their risks, potential benefits and side effects (outlined in **Table 10**) should be discussed. If the decision is made to utilise neuromodulatory agents, **Appendix 12** provides suggested dosing regimens.

Unfortunately, if all management step 6 management options there is likely to be little further that can be offered.

A national virtual MDT opinion may be appropriate, not in the case of exhaustion of management options but when there is substantial complexity or comorbidity between a TMD and other conditions. This MDT is currently being established and contact details will be provided in due course.

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