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RAPID RECOMMENDATIONS

Management of chronic pain associated with temporomandibular disorders: a clinical practice guideline

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ABSTRACT

CLINICAL QUESTION

What is the comparative effectiveness of available therapies for chronic pain associated with temporomandibular disorders (TMD)?

CURRENT PRACTICE

TMD are the second most common musculoskeletal chronic pain disorder after low back pain, affecting 6-9% of adults globally. TMD are associated with pain affecting the jaw and associated structures and may present with headaches, earache, clicking, popping, or crackling sounds in the temporomandibular joint, and impaired mandibular function. Current clinical practice guidelines are largely consensus-based and provide inconsistent recommendations.

RECOMMENDATIONS

For patients living with chronic pain (≥3 months) associated with TMD, and compared with placebo or sham procedures, the guideline panel issued: (1) strong recommendations in favour of cognitive behavioural therapy (CBT) with or without biofeedback or relaxation therapy, therapist-assisted mobilisation, manual trigger point therapy, supervised postural exercise, supervised jaw exercise and stretching with or without manual trigger point therapy, and usual care (such as home exercises, stretching, reassurance, and education); (2) conditional recommendations in favour of manipulation, supervised jaw exercise with mobilisation, CBT with non-steroidal anti-inflammatory drugs (NSAIDs), manipulation with postural exercise, and acupuncture; (3) conditional recommendations against reversible occlusal splints (alone or in combination with other interventions), arthrocentesis (alone or in combination with other interventions), cartilage supplement with or without hyaluronic acid injection, low level laser therapy (alone or in combination with other interventions), transcutaneous electrical nerve stimulation, gabapentin, botulinum toxin injection, hyaluronic acid injection, relaxation therapy, trigger point

injection, acetaminophen (with or without muscle relaxants or NSAIDs), topical capsaicin, biofeedback, corticosteroid injection (with or without NSAIDs), benzodiazepines, and β blockers; and (4) strong recommendations against irreversible oral splints, discectomy, and NSAIDs with opioids.

HOW THIS GUIDELINE WAS CREATED

An international guideline development panel including patients, clinicians with content expertise, and methodologists produced these recommendations in adherence with standards for trustworthy guidelines using the GRADE approach. The MAGIC Evidence Ecosystem Foundation (MAGIC) provided methodological support. The panel approached the formulation of recommendations from the perspective of patients, rather than a population or health system perspective.

THE EVIDENCE

Recommendations are informed by a linked systematic review and network meta-analysis summarising the current body of evidence for benefits and harms of conservative, pharmacologic, and invasive interventions for chronic pain secondary to TMD.

UNDERSTANDING THE RECOMMENDATION

These recommendations apply to patients living with chronic pain (≥3 months duration) associated with TMD as a group of conditions, and do not apply to the management of acute TMD pain. When considering management options, clinicians and patients should first consider strongly recommended interventions, then those conditionally recommended in favour, then conditionally against. In doing so, shared decision making is essential to ensure patients make choices that reflect their values and preference, availability of interventions, and what they may have already tried. Further research is warranted and may alter recommendations in the future.

This *BMJ Rapid Recommendation* article is one of a series that provides clinicians with trustworthy recommendations for potentially practice changing evidence. *BMJ Rapid Recommendations* represent a collaborative effort between the MAGIC group (www.magic-evidence.org) and *The BMJ*. A summary is offered here and the full version including decision aids is on the MAGICapp (www.magicapp.org), for all devices in multilayered formats. Those reading and using these recommendations should consider individual patient circumstances, and their values and preferences and may want to use consultation decision aids in MAGICapp to facilitate shared decision making with patients. We encourage adaptation and contextualisation of our recommendations to local or other contexts. Those considering use or adaptation of content may go to MAGICapp to link or extract its content or contact *The BMJ* for permission to reuse content in this article.

Visual summary of recommendation

Population

This recommendation applies only to people with these characteristics:



People with temporomandibular disorder

Including:

- ✓ Adult patients with:
 - Moderate severity chronic pain (4-6 out of 10 on visual pain scale)
 - ≥3 months duration
- ✓ Associated with any type of temporomandibular disorder
 - Myofascial
 - Internal derangement of the joint
 - Degenerative joint disease
 - Mixed

May not apply to:

- ? Patients with comorbidities
 - Mental illness
 - Fibromyalgia
 - Rheumatoid arthritis
- ? Those who have previously undergone surgery for temporomandibular disorder
- ? Individuals receiving disability benefits or engaged in litigation
- ? Veterans

Does not apply to:

- ✗ Acute temporomandibular disorder pain
- <3 months duration

Strong recommendations in favour

Start with these interventions, which all or nearly all informed people would likely want. Benefits on pain relief or function are very likely to outweigh harms or burden

- ✓ Augmented cognitive behavioural therapy
- ✓ Cognitive behavioural therapy
- ✓ Jaw mobilisation
- ✓ Jaw exercise + jaw stretching
- ✓ Jaw exercise + jaw stretching + trigger point therapy
- ✓ Postural exercise
- ✓ Trigger point therapy
- ✓ Usual care

Conditional recommendations in favour

These should be considered next because most, but not all, informed people would likely want them. Benefits on pain relief or function are likely to outweigh harms or burden

- ✓ Manipulation
- ✓ Acupuncture
- ✓ Jaw exercise + jaw mobilisation
- ✓ Manipulation + postural exercise
- ✓ Cognitive behavioural therapy + NSAIDs

Conditional recommendations against

These could be considered if no others are suitable, but people would likely not want them. Benefits on pain relief and function are uncertain, and they are associated with harms or burden

- ✗ Acetaminophen with or without muscle relaxants or NSAIDs
- ✗ Arthrocentesis with or without co-interventions*
- ✗ Benzodiazepine
- ✗ Beta-blockers
- ✗ Biofeedback
- ✗ Botulinum toxin injection
- ✗ Capsaicin cream
- ✗ Cartilage supplement with or without hyaluronic acid injection
- ✗ Gabapentin
- ✗ Hyaluronic acid injection
- ✗ Low-level laser therapy with or without co-interventions*
- ✗ NSAIDs with or without steroids
- ✗ Relaxation therapy
- ✗ Removable occlusal splint with or without co-interventions*
- ✗ Steroid injection
- ✗ Transcutaneous electrical nerve stimulation
- ✗ Trigger point injection
- ✗ Ultrasound-guided arthrocentesis

Strong recommendations against

Do not offer these interventions. Benefits on pain relief and function are uncertain, and they are associated with important harms

- ✗ Discectomy
- ✗ Irreversible oral splint
- ✗ NSAIDs + Opioid

Practical issues

Cost and access

- Expense may be a barrier to accessing care delivered by therapists unless patients have private coverage
- Both costs and access to cognitive behavioural therapy may be facilitated by remote delivery supported by therapists, which is less costly and likely similarly effective to in-person cognitive behavioural therapy



Patient engagement

- Patient adherence is required for active interventions such as cognitive behavioural therapy and supervised exercise. Both feasibility and patient preference should be considered when initiating a trial of active therapy



Adverse effects

- Serious adverse events are unlikely with exercise and cognitive behavioural therapy
- Opioids with NSAIDs, and invasive or irreversible procedures are associated with a small risk of serious, potentially catastrophic, harms



Values and preferences

Chronic pain

Patients who live with chronic pain place high value on small improvements in pain relief

Shared decision making

- Ensures patients are offered treatment in line with:
 - their values and preferences
 - what they have already tried
 - accessibility of treatment in their context

Acceptable risks - conservative and pharmacological therapies

Patients were willing to accept the typical risks for an improvement in pain relief approximating the minimally important difference of 1 cm on a 10 cm visual analogue scale

Acceptable risks - invasive procedures

Patients were willing to accept the typical risks for an improvement in pain approximating 3 times the minimally important difference

See the full version of this graphic online:

<https://bit.ly/bmj-rr-tmjd>



Explore MATCH-IT multiple comparisons:

<https://bit.ly/match-it-tmd>

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Our recommendations are based on a linked systematic review and network meta-analysis (see box 1).¹ The infographic provides the recommendations together with an overview of the absolute benefits and harms of interventions for chronic pain associated with temporomandibular disorders in the standard GRADE format. Clinicians and their patients can find consultation decision aids to

facilitate shared decision-making in MAGICapp (<https://app.magicapp.org/#/guideline/EQ305L>).

Box 1: Linked articles in this *BMJ* Rapid Recommendations cluster

- Busse JW, Casassus R, Carrasco-Labra A, et al. Management of chronic pain associated with temporomandibular disorders: a clinical practice guideline. *BMJ* 2023;383:e076227 doi:10.1136/bmj-2023-076227
- Yao L, Sadeghirad B, Li M, et al. Management of chronic pain secondary to temporomandibular disorders: a systematic review and network meta-analysis of randomised trials. *BMJ* 2023;383:e076226. doi:10.1136/bmj-2023-076226
 - Review of randomised trials that assessed interventions for chronic pain associated with temporomandibular disorders
- MAGICapp (<https://app.magicapp.org/#/guideline/EQ305L>). Expanded version of the results with multilayered recommendations, evidence summaries, and decision aids for use on all electronic devices

Current practice

Temporomandibular disorders (TMD) can cause pain in the jaw, face, and neck, and may present with headaches, earache, clicking, popping, or crepitus in the temporomandibular joint, and impaired mandibular function.² In 2014, the International Network for Orofacial Pain and Related Disorders Methodology (INFORM) group updated their diagnostic criteria to include 12 subtypes of TMD,^{3,4} the most prevalent of which is myalgia.⁵ However, diagnostic criteria for each subtype are largely based on subjective findings, and it is common for patients to satisfy criteria for more than one subtype.⁶⁻⁸ In 2017, the US National Institutes of Health acknowledged: “There is no widely accepted, standard test now available to correctly diagnose TMJ [temporomandibular joint] disorders.”⁹

Up to 30% of acute TMD may become chronic (≥ 3 months in duration),^{10,11} and women are more likely to be affected than men.¹² The prevalence of chronic TMD pain ranges from 6% to 9% in the general population,¹³ and psychological comorbidities are common. A 2022 systematic review, predominantly of patients with chronic TMD attending specialty clinics, found that 43% (95% confidence interval 36% to 50%) presented with (typically moderate) depression and 60% (52% to 67%) with moderate to severe somatisation.¹⁴

Chronic TMD share key symptoms with fibromyalgia and chronic fatigue syndrome (such as generalised pain sensitivity, sleep and concentration difficulties, and headache),¹⁵ and the International Association for the Study of Pain classifies chronic TMD as a primary pain condition.¹⁶ The aetiology of TMD is uncertain, and diagnostic imaging (which is commonly acquired¹⁷) can lead to incidental findings that influence treatment decisions: signs of a degenerative joint are often present in the absence of symptoms, and temporomandibular joint disc displacements occur in approximately a third of asymptomatic patients.¹⁸ In the absence of pathognomonic features, intervention has focused on symptom management, and removeable occlusal splints have become a popular treatment for chronic TMD pain.¹⁹ However, a 2020 systematic review found very low certainty evidence that oral splints were ineffective in reducing pain compared with no or minimal treatment.²⁰

Prognosis of chronic TMD pain is variable. A five year follow-up of 234 of 368 individuals with chronic TMD pain (36% loss to follow-up) found that 49% reported complete recovery, 14% reported >50% pain relief, 8% reported 20-50% pain relief, 13% were unchanged, and 16% reported $\geq 20\%$ increased pain.²¹ Improvement in pain was largely independent of changes in clinical signs (such as range of motion), and patients who were pain-free at follow-up reported significantly greater joint sounds than at baseline. Patients who were pain-free at five years endorsed low levels of psychopathology

at baseline that remained low at follow-up; however, individuals reporting $\geq 50\%$ pain relief at five years reported elevated levels of depression, anxiety, and somatisation at baseline that were significantly reduced at follow-up. The OPPERA cohort reported 24% (46 of 189) complete remission of chronic TMD pain at five year follow-up, but it had a 78% (666 of 855) loss to follow-up.²² Patients whose symptoms had resolved at follow-up showed significant decreases in pain catastrophising.

Clinical practice guidelines have emerged to support decision making for TMD, but with inconsistent recommendations (table 1) and important limitations in their development. Of the five most recently published guidelines, four do not report the methodology used for their development, and they provide lists of available conservative and invasive treatments for TMD without information on comparative effectiveness or certainty of evidence.^{20 21 25 27} The exception, the 2018 guideline from the Korea Standard CPG Development Agency, conducted systematic reviews of the literature to identify evidence to inform their recommendations, but only considered Korean medicine treatments. The authors reported use of the GRADE approach to rate the certainty of evidence, but with two problematic modifications; they rated up the certainty of evidence if the intervention was used widely in clinical practice or “when the level of evidence was low, but the benefit seemed obvious and clinically valuable.”²⁶ A systematic assessment of all clinical practice guidelines on diagnosis and management of TMD published up to May 2020, found considerable deficits in the development and reporting among each of them and concluded there was a need for rigorously developed guidelines.²⁸ Similarly, a 2020 report by the US National Academy of Sciences recommended the development of evidence based guidelines for management of TMD.²⁹

People living with chronic pain associated with TMD have several interventions from which to choose, and observational studies have reported high variability in care for similar complaints.^{30 31} One editorial acknowledged: “any dentist may employ nearly any diagnostic modality or treatment with impunity, regardless of its degree of scientific credibility. Unsuspecting TMD patients may be exposed to simple, conservative and relatively inexpensive treatments or to invasive, irreversible and costly treatments by another – both for the same set of symptoms.”³²

How this recommendation was created

Our international guideline development panel—including dentists, general internists, oral surgeons, physicians specialising in orofacial pain management, a clinical pharmacologist, epidemiologists, methodologists, statisticians, and people living with chronic pain secondary to temporomandibular disorders (TMD)—determined the scope of recommendations and the outcomes that are most important to patients. We identified methodologists and clinical experts for our panel through our networks and suggestions from *The BMJ* and identified patient partners through the Chronic Pain Centre of Excellence for Canadian Veterans. After completion of a systematic review and network meta-analysis on the benefits and harms of available treatments for chronic pain associated with TMD, the panel met online to discuss the evidence and formulate recommendations. No panel member had financial conflicts of interest; intellectual and professional conflicts were minimised and managed (see appendix 1 on bmj.com for details). We followed the *BMJ* Rapid Recommendations procedures for creating trustworthy guidance,⁴¹ including using the GRADE approach to critically appraise the evidence and create recommendations (appendix 2 on bmj.com).⁴² Our critical outcome was pain relief. We considered the balance of benefits, harms, and burdens of each intervention, the certainty of the evidence for each outcome, typical and expected variations in patient values and preferences, practical issues related to use and acceptability.⁴³

Recommendations can be strong or conditional, for or against a course of action. For strong recommendations, all or almost all informed individuals would choose the recommended course of action. Strong recommendations typically require a clear imbalance between benefits and harms supported by high or moderate certainty evidence; however, there are five paradigmatic scenarios in which a strong recommendation can be made based on low certainty evidence. One such scenario is when there is low certainty of benefit and moderate to high certainty of greater risk of important harm. For conditional recommendations, most informed individuals would choose the suggested course of action, but an appreciable minority would not, and clinicians should assist patients to arrive at a management decision consistent with their values and preferences. Conditional recommendations are typically made when the benefits and harms of an intervention are closely aligned, or when there is only low or very low certainty of effectiveness.

We required 80% consensus among panel members for strong recommendations, and a majority consensus for conditional recommendations. The consensus process was overseen by two experienced guideline methodologists (JWB, TA). The draft summary of findings were prepared prior to the panel meetings, following GRADE guidance from the accompanying network meta-analysis.¹ Interventions were presented sequentially during the panel meetings, starting with those supported by moderate to high certainty of benefit (on pain relief or physical functioning) to lower certainty, and from low to high concerns about harms. This allowed the panel to discuss and group interventions displaying similar benefits and harms together, along with consideration of practical issues and other elements of the evidence to the decision framework^{42 43} and identify clusters of interventions for each direction and strength of recommendation (strong in favour, conditional in favour, conditional against, strong against).

The evidence

The linked systematic review included 210 studies (in 233 publications), of which 153 trials (8713 participants) were included in network meta-analyses.¹ These trials reported the effects of 59 interventions, or combinations of interventions, when compared with placebo or sham procedures in patients with chronic pain associated with temporomandibular disorders (TMD). Studies typically enrolled small numbers of patients with short follow-up, and predominantly included women aged 30-39 years with longstanding chronic TMD pain of moderate severity. Most trials enrolled mixed types of TMD or did not specify which subtypes were included; of those that did provide details, the most commonly enrolled subtype of TMD was myalgia (table 2).

Our guideline panel identified seven patient-important outcomes to inform their recommendations: (1) pain relief, (2) physical functioning, (3) emotional functioning, (4) role functioning, (5) social functioning, (6) sleep quality, and (7) adverse events. Pain relief was our critical outcome. Because of inadequate reporting of effects on harms among eligible trials, we surveyed the clinical experts on our panel regarding anticipated risks of serious and non-serious adverse events associated with all conservative, pharmacological, and invasive or irreversible therapies identified in our systematic review (see section below on “Absolute benefits and harms”).

Understanding the recommendations

The 59 interventions summarised in the associated network meta-analysis were classified into four sets of recommendations, according to their strength and direction, relative to placebo or sham procedures. As we found moderate to high certainty evidence for important benefits on pain relief (our critical outcome), and the guideline panel was confident that the interventions were not associated with serious harms, we issued strong recommendations in favour of: cognitive behavioural therapy (with or without

biofeedback or relaxation therapy), therapist-assisted mobilisation, manual trigger point therapy, supervised postural exercise, supervised jaw exercise and stretching (with or without manual trigger point therapy), and usual care (such as education, home exercises and stretching, self massage, and over-the-counter analgesics). Average effects of these interventions on pain ranged from -1.31 cm to -2.62 cm on a 10 cm visual analogue scale (on which the minimally important difference (MID) is 1 cm).

In contrast, the panel issued strong recommendations against the following interventions with uncertain benefits and the potential for serious harms: irreversible oral splints, discectomy, and non-steroidal anti-inflammatory drugs (NSAIDs) with opioids. The panel justified a strong recommendation based on the paradigmatic scenario outlined in “How the recommendations were created” (that is, low certainty for benefit and confidence that serious harms were possible). Between these two categories, because the evidence for pain relief was only of low or very low certainty and the panel was not confident that remaining interventions were associated with serious harms (see “Absolute benefits and harms”), the panel made conditional recommendations for 46 other interventions or combinations of interventions.

In navigating across these categories of recommendations, clinicians and patients may start by considering those interventions that are strongly recommended, then conditionally in favour, then conditionally against. In doing so, shared decision making is essential to ensure patients make choices that reflect their values and preference, availability of interventions, and what they may have already tried. Effect estimates on pain, physical function, and adverse events for all 59 interventions or combination of interventions are available on MAGICapp (<https://app.magicapp.org/#/guideline/EQ305L>).

Who does the recommendations apply to?

The recommendations apply to adult patients living with moderate chronic pain (4-6 cm on a 10 cm pain scale for ≥ 3 months duration) secondary to TMD as a group of conditions. They do not apply to the management of acute TMD pain (<3 months duration). Some treatment effects were rated down due to substantial unexplained heterogeneity, and we cannot rule out the possibility that different subtypes of TMD may benefit more or less from certain interventions.

Many trials eligible for our review excluded TMD patients with comorbid mental illness, fibromyalgia, or rheumatoid arthritis, or those who had previously undergone TMD surgery, and did not report the representation of veterans (who seem to be more prone to developing TMD³³) or of individuals receiving disability benefits or engaged in litigation. The generalisability of our recommendations to these populations is therefore uncertain.

Absolute benefits and harms

The infographic explains the recommendations and provides links to MAGICapp with evidence summaries of absolute benefits and harms of interventions for chronic pain secondary to TMD. Estimates of baseline risk for effects come from the control arms of trials eligible for the associated network meta-analysis.¹ Trials for most interventions did not report effects on adverse events, and of the 32% (19 of 59) of interventions that did report data on harms, the evidence was almost entirely very low certainty.

We therefore surveyed the clinical experts on our panel regarding the potential harms associated with each intervention. The resulting consensus was that conservative therapies were likely associated with minor harms only (such as temporary stiffness after exercise, bruising after acupuncture), and most pharmacotherapy and

supplements assessed were also likely associated with minor harms, except for the combination of long term NSAIDs and opioids that could result in serious harms (for example, gastrointestinal bleeding, addiction, overdose). Our experts felt that most invasive procedures, such as arthrocentesis and trigger point injections, were associated with the possibility of moderate harm (such as local infection), and that discectomy and irreversible splints may result in serious harms (such as permanent change in range of motion, facial nerve weakness).³⁴

The panel was thus confident that, relative to placebo or sham procedures:

- Cognitive behavioural therapy (CBT) augmented with relaxation therapy or biofeedback, therapist-assisted jaw mobilisation, and manual trigger point therapy provide the largest reduction in chronic pain severity associated with TMD, approximating twice the minimally important difference (MID) (GRADE moderate certainty evidence).
- CBT, supervised postural exercise, supervised jaw exercise and stretching with or without manual trigger point therapy, and usual care (such as education, support, home exercises and stretching) provide important, but less relief of chronic pain associated with TMD compared with other available treatments, approximating to 1.5× the MID (GRADE moderate to high certainty evidence).
- It is unlikely that new information will change interpretation for outcomes that are supported by high to moderate certainty of evidence.

The panel was less confident about:

- Whether use of other available therapies improved pain among people living with chronic pain associated with TMD (GRADE very low to low certainty evidence).
- Harms associated with available interventions to manage chronic pain associated with TMD (GRADE very low to low certainty evidence).

Values and preferences

We surveyed our panel using a standardised process for identifying patient values and preferences.^{35 36} Respondents advised that, overall, people living with chronic pain associated with TMD were likely to accept the typical risks associated with conservative treatments and most pharmacotherapy and supplements for an improvement in pain approximating to the MID (1 cm on a 10 cm visual analogue scale). However, due to the greater risk of moderate or serious harms, patients would likely require an improvement in pain approximating three times the MID with invasive or irreversible procedures. The panel recognised that values and preferences were likely to vary between patients, further highlighting the importance of shared decision.

Practical issues and other considerations

Box 2 outlines the key practical issues for patients and clinicians discussing interventions for chronic pain associated with TMD (further details in MAGICapp plus decision aids to support shared decision making). Most trials (134/153; 88%) that informed the evidence for this guideline were conducted in high- or middle-income countries. Each recommended intervention requires clinician administration and depends on access and patient participation, and may entail costs that are borne by patients. Most trials we reviewed that explored the effectiveness of CBT delivered

treatment in person; however, one trial administered therapy via a programme on the internet supported by asynchronous therapist feedback.³⁷ A systematic review of 32 randomised trials found high certainty evidence that therapist-supported, remotely delivered CBT is equally effective to in-person delivery for a range of psychiatric and somatic complaints.³⁸ Remote CBT is also more cost-effective,³⁹ and the World Health Organization Global Oral Health Action Plan has proposed that member states should strengthen access and capacity for using digital technologies to ensure that digital health approaches do not increase inequalities.⁴⁰

Box2: Practical issues concerning interventions for chronic pain associated with temporomandibular disorders (TMD)

Cost and access

- Expense may be a barrier to accessing therapists-delivered care unless patients have private health coverage or reside in a jurisdiction where these services are included in public health care
- Access to cognitive behavioural therapy (CBT) may be facilitated by therapist-supported remote delivery, which is less costly than and likely similarly effective to in-person CBT^{38 39 44}

Patient engagement

- Patient adherence is required for active interventions (such as CBT, supervised exercise): both feasibility and patient preference should be considered when starting a trial of therapy

Adverse effects

- Serious adverse events are unlikely with exercise⁴⁵ and CBT⁴⁶
- Long term opioids, NSAIDs, and invasive or irreversible procedures are associated with a small risk of serious, potentially catastrophic, harms

Costs and resources

When formulating the recommendations, the guideline panel focused on patients' perspectives rather than that of society. However, both availability and costs of interventions for chronic pain associated with TMD may influence decision making.

Future research

Key research questions to inform decision makers and future guidelines include:

- Are there systematic differences in treatment effects of interventions based on TMD subtypes?
- Is remote CBT as effective as in-person CBT for chronic pain associated with TMD?
- What are the effects of interventions targeting chronic pain associated with TMD on patient-important outcomes that were poorly reported among trials that informed our evidence synthesis; specifically, physical functioning, role functioning (including return to work), social functioning, mental functioning, sleep quality, and adverse events?

How patients were involved in the creation of this article

Three patients with lived experience of chronic pain associated with TMD were full members of our guideline panel. These panel members identified important outcomes and informed the discussion on values and preferences. Our patient partners agreed that, while several conservative interventions showed important net benefits for pain relief and/or functional improvement, individual patients may prefer some types of interventions over others. Such preferences, as well as cost and access to therapy, should be considered in decision making with patients. These

panel members participated in the teleconferences and email discussions and met all authorship criteria.

Education into practice

- Chronic pain associated with temporomandibular disorders (TMD) is common. How might you share these recommendations with colleagues?
- Aside from usual care, there are seven interventions with strong recommendations in favour; however, they all require active participation by patients. What information could you share with your patient to support decision making that considers engagement and adherence?
- Having read the article, can you think of one thing you have learnt which might alter how you consult with patients living with chronic pain associated with TMD?

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Transparency: JWB affirms that the manuscript is an honest, accurate, and transparent account of the recommendation being reported; that no important aspects of the recommendation have been omitted; and that any discrepancies from the recommendation as planned (and, if relevant, registered) have been explained.

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- 1 Yao L, Sadeghirad B, Li M, et al. Management of chronic pain secondary to temporomandibular disorders: a systematic review and network meta-analysis of randomized trials. *BMJ* 2023;383:e076226. doi: 10.1136/bmj-2023-076226.
- 2 Cooper BC, Kleinberg I. Examination of a large patient population for the presence of symptoms and signs of temporomandibular disorders. *Cranio* 2007;25:26. doi: 10.1177/crn.2007.018 pmid: 17508632
- 3 Ohrbach R. Diagnostic criteria for temporomandibular disorders: assessment instruments. 2016. <https://buffalo.app.box.com/s/y4et4t256no06nrjqvrd4yqf79j1gfvu>.
- 4 Ohrbach R, Gonzalez Y, List T, et al. Diagnostic criteria for temporomandibular disorders (DC/TMD) clinical examination protocol. 2014. https://ubwp.buffalo.edu/rdc-tmdinternational/wp-content/uploads/sites/58/2017/01/DC-TMD-Protocol-2013_06_02.pdf.
- 5 Slade GD, Ohrbach R, Greenspan JD, et al. Painful temporomandibular disorder: decade of discovery from OPPERA studies. *J Dent Res* 2016;95:92. doi: 10.1177/0022034516653743 pmid: 27339423
- 6 Kraus SL. Characteristics of 511 patients with temporomandibular disorders referred for physical therapy. *Oral Surg Oral Med Oral Pathol* 2014;118:9. doi: 10.1016/j.oooo.2014.06.005 pmid: 25240990
- 7 Lobbezoo-Scholte AM, Lobbezoo F, Steenks MH, De Leeuw JR, Bosman F. Diagnostic subgroups of craniomandibular disorders. Part II: symptom profiles. *J Orofac Pain* 1995;9:43. pmid: 7581203
- 8 Latremoliere A, Woolf CJ. Central sensitization: a generator of pain hypersensitivity by central neural plasticity. *J Pain* 2009;10:926. doi: 10.1016/j.jpain.2009.06.012 pmid: 19712899
- 9 National Institute of Dental and Craniofacial Research. TMJ disorders. 2017. <https://www.nid-cr.nih.gov/sites/default/files/2017-12/tmj-disorders.pdf>.
- 10 Rammelsberg P, LeResche L, Dworkin S, Mandl L. Longitudinal outcome of temporomandibular disorders: a 5-year epidemiologic study of muscle disorders defined by research diagnostic criteria for temporomandibular disorders. *J Orofac Pain* 2003;17:20. pmid: 12756926
- 11 Forssell H, Kauko T, Kotiranta U, Suvinen T. Predictors for future clinically significant pain in patients with temporomandibular disorder: A prospective cohort study. *Eur J Pain* 2017;21:97. doi: 10.1002/ejp.916 pmid: 27461164
- 12 Maixner W, Diatchenko L, Dubner R, et al. Orofacial pain prospective evaluation and risk assessment study--the OPPERA study. *J Pain* 2011;12(Suppl):11.e1, 2. doi: 10.1016/j.jpain.2011.08.002 pmid: 22074751
- 13 Macfarlane TV, Glenny AM, Worthington HV. Systematic review of population-based epidemiological studies of oro-facial pain. *J Dent* 2001;29:67. doi: 10.1016/S0300-5712(01)00041-0 pmid: 11809323
- 14 Felin GC, Tagliari CVDC, Agostini BA, Collares K. Prevalence of psychological disorders in patients with temporomandibular disorders: A systematic review and meta-analysis. *J Prosthet Dent* 2022; S0022-3913(22)00482-6. doi: 10.1016/j.prodent.2022.08.002 pmid: 36114016
- 15 Aaron LA, Burke MM, Buchwald D. Overlapping conditions among patients with chronic fatigue syndrome, fibromyalgia, and temporomandibular disorder. *Arch Intern Med* 2000;160:7. doi: 10.1001/archinte.160.2.221 pmid: 10647761
- 16 Nicholas M, Vlaeyen JWS, Rief W, et al. IASP Taskforce for the Classification of Chronic Pain. The IASP classification of chronic pain for ICD-11: chronic primary pain. *Pain* 2019;160:37. doi: 10.1097/j.pain.0000000000001390 pmid: 30586068
- 17 Hunter A, Kalathingal S. Diagnostic imaging for temporomandibular disorders and orofacial pain. *Dent Clin North Am* 2013;57:18. doi: 10.1016/j.cden.2013.04.008 pmid: 23809300
- 18 Aiken A, Bouloux G, Hudgins P. MR imaging of the temporomandibular joint. *Magn Reson Imaging Clin N Am* 2012;20:412. doi: 10.1016/j.mric.2012.05.002 pmid: 22877948
- 19 Aggarwal VR, Joughin A, Zakrzewska J, et al. Dentists' preferences for diagnosis, management and referral of chronic oro-facial pain: Results from a national survey. *Health Educ J* 2012;71:9. doi: 10.1177/0017896911419350
- 20 Riley P, Glenny AM, Worthington HV, et al. Oral splints for temporomandibular disorder or bruxism: a systematic review. *Br Dent J* 2020;228:7. doi: 10.1038/s41415-020-1250-2 pmid: 32060462
- 21 Ohrbach R, Dworkin SF. Five-year outcomes in TMD: relationship of changes in pain to changes in physical and psychological variables. *Pain* 1998;74:26. doi: 10.1016/S0304-3959(97)00194-2 pmid: 9520246
- 22 Fillingim RB, Slade GD, Greenspan JD, et al. Long-term changes in biopsychosocial characteristics related to temporomandibular disorder: findings from the OPPERA study. *Pain* 2018;159:13. doi: 10.1097/j.pain.0000000000001348 pmid: 30028791
- 23 Shah A, Naqvi A. Temporomandibular disorder: A guide for general dental practitioners. *Prim Dent J* 2022;11:25. doi: 10.1177/2050168422112513 pmid: 36073047
- 24 Beaumont S, Garg K, Gokhale A, Heaphy N. Temporomandibular disorder: a practical guide for dental practitioners in diagnosis and management. *Aust Dent J* 2020;65:80. doi: 10.1111/adj.12785 pmid: 32562281
- 25 Royal College of Dental Surgeons of Ontario. Diagnosis and management of temporomandibular disorders. 2019. https://az184419.vo.mscnd.net/rcdso/pdf/guidelines/RCDSO_Guidelines_Diagnosis_and_Management_of_TMD.pdf.

- 26 Kim KW, Ha IH, Lee YJ, et al. A clinical practice guideline for temporomandibular disorders in traditional Korean medicine: an evidence-based approach. *Eur J Integr Med* 2018;23:33doi: 10.1016/j.eujim.2018.10.007 .
- 27 American Association of Oral and Maxillofacial Surgeons. Statement by the American Association of Oral and Maxillofacial Surgeons Concerning the Management of Selected Clinical Conditions and Associated Clinical Procedures. Temporomandibular disorders. 2017. https://www.aaoms.org/docs/practice_resources/clinical_resources/tmd_disorders.pdf.
- 28 Barrette LX, Connolly J, Romeo D, Ng J, Moreira AG, Rajasekaran K. Quality appraisal of clinical practice guidelines for temporomandibular joint disorders using the AGREE II instrument. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2022;133:11. doi: 10.1016/j.oooo.2021.10.021 pmid: 35165058
- 29 National Academies of Sciences E. *Medicine. Temporomandibular Disorders: Priorities for Research and Care*. The National Academies Press, 2020.
- 30 Von Korff MR, Howard JA, Truelove EL, Sommers E, Wagner EH, Dworkin S. Temporomandibular disorders. Variation in clinical practice. *Med Care* 1988;26:14. doi: 10.1097/00005650-198803000-00007 pmid: 3352327
- 31 Türp JC, Kowalski CJ, Stohler CS. Treatment-seeking patterns of facial pain patients: many possibilities, limited satisfaction. *J Orofac Pain* 1998;12:6.pmid: 9656900
- 32 Reid KI, Greene CS. Diagnosis and treatment of temporomandibular disorders: an ethical analysis of current practices. *J Oral Rehabil* 2013;40:61. doi: 10.1111/joor.12067 pmid: 23691977
- 33 Minervini G, Franco R, Marrapodi MM, Fiorillo L, Cervino G, Cicciù M. Post-traumatic stress, prevalence of temporomandibular disorders in war veterans: systematic review with meta-analysis. *J Oral Rehabil* 2023;50:9. doi: 10.1111/joor.13535 pmid: 37300526
- 34 Bouloux GF, ed. *Complications of temporomandibular joint surgery*. Springer International Publishing AG, 2017doi: 10.1007/978-3-319-51241-9 .
- 35 Zeng L, Helsing LM, Brettthauer M, et al. A novel framework for incorporating patient values and preferences in making guideline recommendations: guideline panel surveys. *J Clin Epidemiol* 2023;161:72. . doi: 10.1016/j.jclinepi.2023.07.003 pmid: 37453455
- 36 Zeng L, Li SA, Yang M, et al. Qualitative study of guideline panelists: innovative surveys provided valuable insights regarding patient values and preferences. *J Clin Epidemiol* 2023;161:80. . doi: 10.1016/j.jclinepi.2023.07.014 pmid: 37517505
- 37 Lam J, Svensson P, Alstergren P. Internet-based multimodal pain program with telephone support for adults with chronic temporomandibular disorder pain: randomized controlled pilot trial. *J Med Internet Res* 2020;22:e22326. doi: 10.2196/22326 pmid: 33048053
- 38 Zandieh S, Abdollahzadeh M, Inness BE, et al. Remote versus in-person cognitive behavioural therapy: a systematic review and meta-analysis of randomized trials. *CMAJ* forthcoming.
- 39 Nordgren LB, Hedman E, Etienne J, et al. Effectiveness and cost-effectiveness of individually tailored Internet-delivered cognitive behavior therapy for anxiety disorders in a primary care population: a randomized controlled trial. *Behav Res Ther* 2014;59:11. doi: 10.1016/j.brat.2014.05.007 pmid: 24933451
- 40 Eaton K, Yusuf H, Vassallo P. Editorial: The WHO Global Oral Health Action Plan 2023-2030. *Community Dent Health* 2023;40:9.pmid: 37265395
- 41 Siemieniuk RA, Agoritsas T, Macdonald H, Guyatt GH, Brandt L, Vandvik PO. Introduction to BMJ Rapid Recommendations. *BMJ* 2016;354: . doi: 10.1136/bmj.i5191 pmid: 27680768
- 42 Guyatt GH, Oxman AD, Vist GE, et al.GRADE Working Group. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008;336:6. doi: 10.1136/bmj.39489.470347.AD pmid: 18436948
- 43 Andrews JC, Schünemann HJ, Oxman AD, et al. GRADE guidelines: 15. Going from evidence to recommendation-determinants of a recommendation's direction and strength. *J Clin Epidemiol* 2013;66:35. doi: 10.1016/j.jclinepi.2013.02.003 pmid: 23570745
- 44 Lundström L, Flygare O, Andersson E, et al. Effect of internet-based vs face-to-face cognitive behavioral therapy for adults with obsessive-compulsive disorder: a randomized clinical trial. *JAMA Netw Open* 2022;5:e221967. doi: 10.1001/jamanetworkopen.2022.1967 pmid: 35285923
- 45 Niemeijer A, Lund H, Stafne SN, et al. Adverse events of exercise therapy in randomised controlled trials: a systematic review and meta-analysis. *Br J Sports Med* 2020;54:80. doi: 10.1136/bjsports-2018-100461 pmid: 31563884
- 46 Gullickson KM, Hadjistavropoulos HD, Dear BF, Titov N. Negative effects associated with internet-delivered cognitive behaviour therapy: an analysis of client emails. *Internet Interv* 2019;18:100278. doi: 10.1016/j.invent.2019.100278 pmid: 31890627

Infographic: Summary of recommendations

Appendix 1: Full list of authors' declarations of interests

Appendix 2: Methodology for development of BMJ Rapid Recommendations

Table 1 | The five most recent guidelines for management of temporomandibular disorders (TMD)

Guideline	Recommendations
Temporomandibular disorder: a guide for general dental practitioners. 2022 ²³	Conservative approaches should be pursued first, including reassurance and education, avoidance of wide mouth opening or aggravating activities, soft diet, jaw exercises, massage, non-steroidal anti-inflammatory drugs (NSAIDs), heat and/or cold, bite plate in the presence of bruxism, physiotherapy, mindfulness, yoga, meditation, acupuncture, splint therapy, cognitive behavioural therapy, paracetamol, and neuromodulatory medications (eg, amitriptyline, gabapentin). Surgery should be considered only after non-response to conservative therapy, including arthrocentesis, arthroscopy, or open surgery of the temporomandibular joint.
Temporomandibular disorder: a practical guide for dental practitioners in diagnosis and management. 2020 ²⁴	Unless there are specific and justifiable indications to the contrary, treatment of TMD should be based on the use of conservative, reversible, and evidence-based treatment modalities. Examples provided: reassurance; jaw rest; avoiding irritating behaviours (eg, excessive movement); heat; NSAIDs; oral appliance in the presence of bruxism; physiotherapy; pharmacotherapy; meditation/relaxation strategies; education about sleep hygiene; psychological/cognitive behavioural therapy; botulinum injections; hypnotherapy; biofeedback; and in some cases, temporomandibular joint surgery.
Royal College of Dental Surgeons of Ontario, 2019 ²⁵	First line options provided: analgesics, muscle relaxants, anti-inflammatory drugs, tricyclic amines, anticonvulsants, and compounded topical ointments; jaw exercises, application of superficial heat or cold, massage, manual mobilisation, ultrasound, low-intensity laser, transcutaneous electrical nerve stimulation, acupuncture, psychological, psychotherapeutic or psychiatric treatment, and stabilisation type of occlusal appliances; trigger/tender point injections of local anaesthetics, corticosteroids, or botulinum toxin. Options provided if first line care was unsuccessful: intra-articular injections, arthrocentesis, arthroscopic procedures, arthrotomy/arthroplasty, disc surgery, coronoidotomy/coronoidectomy, condylectomy, reduction of recurrent or chronic dislocation, and joint replacement in selected patients with joint destruction or ankylosis. Recommended against routine irreversible alteration of temporomandibular joints, jaws, occlusion, or dentition.
Korea Standard CPG Development Agency, 2018 ²⁶	Moderate certainty evidence for acupuncture. Low certainty evidence for laser acupuncture, pharmacopuncture (eg, bee venom), herbal medicine, Chuna manual therapy, exercise therapy, thread embedding acupuncture, and Korean medicine physiotherapy. Insufficient evidence for intra-oral balancing devices.
American Association of Oral and Maxillofacial Surgeons, 2017 ²⁷	Non-surgical management options provided: medication (eg, NSAIDs), orthotic appliance, and physical therapy. Surgical options provided: manipulation under anaesthesia, arthrocentesis, non-arthroscopic lysis and lavage and manipulation, arthroscopic surgery, open arthroplasty with or without autograft, open arthroplasty with alloplast, disc repair or removal, coronoidectomy, condylectomy, mandibular condylectomy, myotomy, orthognathic surgery, and partial or total joint reconstruction.

Table 2 | Characteristics of 153 eligible randomised clinical trials (8713 patients) included in the network meta-analysis of interventions for chronic pain associated with temporomandibular disorders (TMD). (Additional details in linked network meta-analysis¹)

Trial features	Mean (interquartile range) of means across trials (unless specified otherwise)
No of patients enrolled	46 (35 to 63)*
Length of follow-up (weeks)	12 (5 to 52)
Age (mean years at baseline)	35 (30 to 39)
Sex (% women)	83 (78 to 91)†
Patient-important outcomes reported (No (%) of trials)	Pain relief: 148 (97%) Physical functioning: 36 (24%) Adverse events: 31 (20%) Role functioning: 10 (7%) Mental functioning: 8 (5%) Sleep quality: 4 (3%) Social functioning: 1 (1%)
Median (interquartile range) baseline pain on a 10 cm visual analogue scale	5.4 (4.3 to 6.6)
Pain duration (% of trials' enrolled patients)	Duration ≥3 months: 18% Duration ≥6 months: 11% "Chronic" without other details: 40% Duration of chronic pain specified: 31% (median of average duration 42 months)
Criteria used to diagnose TMD (No (%) of trials)	Clinical diagnosis: 13 (8%) Clinical diagnosis and radiographs: 14 (9%) Research diagnostic criteria for temporomandibular disorders: 110 (72%)*‡ Criteria of the American Board of Orofacial Pain: 7 (5%) Other criteria: 9 (6%)
Types of TMD represented (No of trials, No patients)	Myalgia TMD: 38, 2406‡ Internal derangement of the joint: 26, 1126 Degenerative joint disease: 11, 483 Unspecified or mixed types of TMD: 78, 4698
Types of funding (No (%) of trials)	Not reported: 68 (44%) Non-industry funding: 62 (41%) Unfunded: 23 (15%)
Study settings (No (%) of trials)	High income countries (80 (52%)), including US (n=20), Sweden (n=10), Spain (n=8), Italy (n=7), Germany (n=5)§ Upper middle income countries (54 (35%)), including Turkey (n=27), Brazil (n=23)¶ Lower middle income countries (19 (12%)), including India (n=10), Iran (n=6)**

* Total number of enrolled patients using arm-level data (the 153 trials included 59 treatment arms).

† Proportion among eligible trials.

‡ Studies used the term myofascial pain, which was defined by the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD), and myalgia, which was defined in the more recent Diagnostic Criteria for Temporomandibular Disorders (DC/TMD).

§ Additional trials were in Japan (n=4), Finland (n=4), Canada (n=3), Croatia (n=3), Netherlands (n=3), Australia (n=2), Israel (n=2), Norway (n=2), Portugal (n=2), UK (n=2), Austria (n=1), Belgium (n=1), and Poland (n=1).

¶ Additional trials were in China (n=2) and Iraq (n=2).

** Additional trials were in Egypt (n=2) and Bangladesh (n=1).