Title: Temporomandibular Joint (TMJ) Dysfunction

### Professional

Original Effective Date: November 22, 2013  
Revision Date(s): January 1, 2014; October 1, 2014; January 1, 2015; March 18, 2015; August 5, 2015; May 25, 2016; October 1, 2016; March 29, 2017  
Current Effective Date: August 5, 2015

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<table>
<thead>
<tr>
<th>Populations</th>
<th>Interventions</th>
<th>Comparators</th>
<th>Outcomes</th>
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</table>
| Individuals with:  
  • Suspected temporomandibular joint disorder | Interventions of interest are:  
  • Ultrasound  
  • Surface electromyography  
  • Joint vibration analysis | Comparators of interest are:  
  • Comprehensive history and physical exam  
  • Alternative diagnostic test | Relevant outcomes include:  
  • Test accuracy  
  • Test validity  
  • Other test performance measures |
| Individuals with:  
  • Confirmed diagnosis of temporomandibular joint disorder | Interventions of interest are:  
  • Introral devices or appliances  
  • Pharmacologic treatment | Comparators of interest are:  
  • Alternative nonsurgical intervention | Relevant outcomes include:  
  • Symptoms  
  • Functional outcomes  
  • Quality of life  
  • Treatment-related morbidity |
DESCRIPTION
Temporomandibular joint (TMJ) dysfunction refers to a group of disorders characterized by pain in the TMJ and surrounding tissues. Initial conservative therapy is generally recommended; there are also a variety of nonsurgical and surgical treatment possibilities for patients whose symptoms persist.

OBJECTIVE
The objective of this policy is to determine which diagnostic procedures detect TMJ dysfunction and which therapeutic procedures improve the disorder.

BACKGROUND
Temporomandibular joint disorder (TMJD) (also known as TMJ dysfunction) refers to a cluster of problems associated with the temporomandibular joint and musculoskeletal structures. The etiology of TMJD remains unclear and is believed to be multifactorial. TMJD are often divided into two main categories: articular disorders (eg, ankylosis, congenital or developmental disorders, disc derangement disorders, fractures, inflammatory disorders, osteoarthritis and joint dislocation) and masticatory muscle disorders (eg, myofascial pain, myofibrotic contracture, myospasm, and neoplasia).

In the clinical setting, TMJD is often a diagnosis of exclusion and involves physical examination, patient interview, and review of dental records. Diagnostic testing and radiologic imaging is generally only recommended for patients with severe and chronic symptoms. Diagnostic criteria for TMJD have been developed and validated for use in both clinical and research settings.1-3

Symptoms attributed to TMJD are varied and include, but are not limited to, clicking sounds in the jaw; headaches; closing or locking of the jaw due to muscle spasms (trismus) or displaced disc; pain in the ears, neck, arms, and spine; tinnitus; and bruxism (clenching or grinding of the teeth).

For many patients, symptoms of TMJD are short-term and self-limiting. Conservative treatments, such as eating soft foods, rest, heat, ice, and avoiding extreme jaw
movements, and anti-inflammatory medication, are recommended prior to consideration of more invasive and/or permanent therapies, such as surgery.

REGULATORY STATUS
Since 1981, several muscle monitoring devices have received clearance from the U.S. Food and Drug Administration (FDA) through the 510(k) process since 1981. Some examples of these devices are: the K6-I Diagnostic System (Myotronics), the BioEMG III™ (Bio-Research Associates), M-Scan™ (Bio-Research Associates), and the GrindCare Measure (Medotech A/S). These devices aid clinicians in the analysis of joint sound, vibrations, and muscle contractions when diagnosing and evaluating TMJ dysfunction. FDA Product Code: KZM.
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POLICY

A. The following diagnostic procedures may be considered medically necessary in the diagnosis of temporomandibular joint (TMJ) dysfunction:
   1. Diagnostic x-ray, tomograms, and arthrograms;
   2. Computed tomography (CT) scan or magnetic resonance imaging (MRI) (in general, CT scans and MRIs are reserved for presurgical evaluations);
   3. Cephalograms (x-rays of jaws and skull);
   4. Pantograms (x-rays of maxilla and mandible).
   (Cephalograms and pantograms should be reviewed on an individual basis.)

B. The diagnostic procedures considered experimental / investigational in the diagnosis of TMJ include the following, but are not limited to:
   1. Electromyography (EMG), including surface EMG;
   2. Kinesiography;
   3. Thermography;
   4. Neuromuscular junction testing;
   5. Somatosensory testing;
   6. Transcranial or lateral skull x-rays; intraoral tracing or gnathic arch tracing (intended to demonstrate deviations in the positioning of the jaws that are associated with TMJ dysfunction);
   7. Muscle testing;
   8. Standard dental radiographic procedures;
   9. Computerized mandibular scan (this measures and records muscle activity related to movement and positioning of the mandible and is intended to detect deviations in occlusion and muscle spasms related to TMJ dysfunction);
   10. Ultrasound imaging/sonogram;
   11. Arthroscopy of the TMJ for purely diagnostic purposes;
   12. Joint vibration analysis.

C. The following nonsurgical treatments may be considered medically necessary in the treatment of TMJ dysfunction:
   1. Intraoral removable prosthetic devices/appliances, encompassing fabrication, insertion, and adjustment (such as soft and hard stabilization appliances, anterior positioning appliances, anterior bite appliances, and soft resilient appliances)
   2. Pharmacologic treatment (such as anti-inflammatory, muscle relaxing, and analgesic medications)

D. The nonsurgical treatments considered experimental / investigational in the treatment of TMJ dysfunction include the following, but are not limited to:
1. Electrogalvanic stimulation;
2. Iontophoresis;
3. Biofeedback;
4. Ultrasound;
5. Devices promoted to maintain joint range of motion and to develop muscles involved in jaw function;
6. Orthodontic services;
7. Dental restorations/prostheses, including, but not limited to, fillings, crowns, and implants;
8. Transcutaneous electrical nerve stimulation (TENS);
9. Percutaneous electrical nerve stimulation (PENS);
10. Physical therapy, including diathermy, infrared and heat and cold treatment, and manipulation;
11. Acupuncture;
12. Hyaluronic acid.

E. The following surgical treatments may be considered medically necessary in the treatment of TMJ dysfunction:
1. Arthrocentesis;
2. Arthroscopic surgery in patients with objectively demonstrated (by physical examination or imaging) internal derangements (displaced discs) or degenerative joint disease who have failed conservative treatment;
3. Open surgical procedures (when TMJ dysfunction is the result of congenital anomalies, trauma, or disease in patients who have failed conservative treatment) including, but not limited to, arthroplasties, condylectomies, meniscus or disc placation, and disc removal.

RATIONALE
An initial literature search with the MEDLINE database was performed through March 1995. The policy was updated regularly; the most recent literature review was through December 20, 2016. Recent literature searches have concentrated on identifying systematic reviews and meta-analyses. For treatment of temporomandibular (TMJ) disorders, the focus has been on studies that compared novel treatments with conservative interventions and/or placebo controls (rather than no-treatment control groups) and that reported pain reduction and/or functional outcomes, eg, jaw movement.

Diagnosis of TMJD
Several systematic reviews of the literature on specific techniques for diagnosing TMJ were identified and are described next.

Ultrasound
A 2009 literature review identified 20 studies evaluating ultrasound for diagnosing TMJDs; all studies evaluated disc displacement and several also considered osteoarthrosis and/or joint effusion. The reported sensitivity of ultrasound to detect disc displacement, compared with the reference standard (magnetic resonance imaging [MRI] in most studies), ranged from 31% to
100%, and the specificity ranged from 30% to 100%. Reviewers stated that even when changes in ultrasound technology over time were taken into account, study findings were contradictory. They noted unexplained differences between studies conducted by the same group of researchers. Reviewers concluded that additional advances need to be made in standardizing ultrasound assessment of the TMJD before it can be considered an accurate diagnostic tool.

**Surface Electromyography**

A 2006 systematic review on surface electromyography found a lack of literature on the accuracy of this method of diagnosis, compared with a criterion standard (ie, comprehensive clinical examination and history-taking). Reviewers concluded that there was insufficient evidence that electromyography can accurately identify people with facial pain from those without pain, but that the technique may be useful in a research setting.

**Joint Vibration Analysis**

In 2013, Sharma et al published a systematic review on joint vibration analysis for diagnosis of TMJDs. Reviewers identified 15 studies that evaluated the reliability and/or diagnostic accuracy of joint vibration analysis compared with a reference standard. Methodologic limitations were identified in all studies, and included the absence of well-defined diagnostic criteria, use of a nonvalidated system for classifying disease progression, variability within studies in the reference standard used, and lack of blinding. In the 14 studies reporting on diagnostic accuracy, there was a wide range of reported values, with sensitivity ranging from 50% to 100% and specificity ranging from 59% to 100%.

**Treatment of TMJD**

**Overview**

List and Axelsson (2010) published a review of systematic reviews on treatments for TMJD published through August 2009. They identified 30 reviews; there were 23 qualitative systematic reviews and 7 meta-analyses. Eighteen of the systematic reviews included only randomized controlled trials (RCTs), 3 only included case-control studies, and 9 included a mix of RCTs and case series. TMJDs were defined inconsistently in the primary studies and systematic reviews, and several of the reviews addressed the related diagnoses of bruxism, disc replacements, and myofascial pain. Twenty-nine of the systematic reviews had pain intensity or pain reduction as the primary outcome measure, and 25 reported clinical outcome measures such as jaw movement or jaw tenderness on palpation. Reviewers divided the treatments into 5 categories (some studies were included in >1 category). These categories and the main findings are listed in Table 1.

<table>
<thead>
<tr>
<th>Categories</th>
<th>No. of Articles</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occlusal appliances, occlusal adjustment, and orthodontic treatment</td>
<td>10</td>
<td>Six systematic reviews did not find significant benefit vs other treatments, 4 found no benefit vs a placebo device, and 3 found that occlusal therapy was better than no treatment</td>
</tr>
<tr>
<td>Physical treatments including acupuncture, TENS, exercise, and mobilization</td>
<td>8</td>
<td>Four reviews found no significant benefit of acupuncture over other treatments, 1 found no difference between acupuncture and placebo treatment, and 3 found that acupuncture was better than no treatment. One review found that active exercise and postural training were effective for treating TMJD-related pain</td>
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</tbody>
</table>


Contains Public Information
### Pharmacologic treatment
- Treatments found to be superior to placebo were analgesics (2 reviews), clonazepam or diazepam (3 reviews), antidepressants (4 reviews), and hyaluronate (1 review). One review found effects of hyaluronate and corticosteroids to be similar.

### Maxillofacial surgery
- Three reviews evaluated surgery for patients with disc displacements and 1 addressed orthognathic surgery in patients with TMJD. Reviews of surgical treatments generally included lower level evidence (eg, case series), and did not always compare surgery with a control condition. One review of patients with disc displacements with reduction reported similar treatment effects for arthrocentesis, arthroscopy, and discectomy, and another review in patients in disc displacement without reduction found similar effects of arthrocentesis, arthroscopy, and physical therapy (used as a control intervention). Due to the lack of high-quality controlled studies, conclusions could not be drawn about intervention equivalence.

### Behavioral therapy and multimodal treatments
- Two reviews found biofeedback to be better than active control or no treatment, 1 review found a combination of biofeedback and CBT to be better than no treatment, and 2 found a combination of biofeedback and relaxation to be better than no treatment. One review found the effects of biofeedback and relaxation to be similar.  

Overall, reviewers concluded that there was insufficient evidence that electrophysical modalities and surgery would be effective for treating TMJD. They found some evidence that occlusal appliances, acupuncture, behavioral therapy, jaw exercises, postural training, and some medications could be effective at reducing pain for patients with TMJDs. However, reviewers noted that most of the systematic reviews they examined included primary studies with considerable variation in methodologic quality and, thus, it was not possible to make definitive conclusions about the effectiveness of any of the treatments.

In 2016, Randhawa et al published a systematic review of noninvasive interventions for TMJDs, which included RCTs with at least 30 individuals per treatment arm, cohort studies with at least 100 patients per exposed group, and case control interventions. Reviewers identified 31 studies for appraisal, of which 7 RCTs described in 8 publications had a low risk of bias and were assessed further. Most RCTs evaluated interventions outside the scope of our review, including cognitive-behavioral therapy and self-care management. Three RCTs evaluated occlusal devices for TMJDs of variable duration, and generally reported no significant improvements with occlusal devices in terms of pain, mouth opening, or other outcomes.

### Intraoral Devices or Appliances
In 2010, Fricton et al reported on a systematic review of RCTs on intraoral treatment of TMJDs and identified 47 publications on 44 trials. Intraoral appliances included soft and hard stabilization appliances, anterior positioning appliances, anterior bite appliances, and soft resilient appliances. Studies compared 2 types of devices or compared 1 device with a different treatment (eg, acupuncture or biofeedback). None of the studies evaluated use of 1 device during the day and a different device during the night. The primary outcome of the meta-analysis was pain. Pain was measured differently in the studies, and reviewers defined a successful outcome as at least a 50% reduction in pain on a self-report scale or at least an “improved” status when pain was measured by subjective report of status. Ten RCTs were included in 2 meta-analyses; the others were excluded because they did not measure pain, there were not at least 2 studies using similar devices or control groups, or data were not usable for pooled analysis. A pooled analysis of 7 RCTs (n=385 patients) that evaluated hard stabilization appliances and use of palatal nonoccluding appliances as a control found a significantly greater reduction in pain with hard appliances (odds ratio [OR], 2.45; 95% confidence interval [CI], 1.56 to 3.86; p<0.001). A
pooled analysis of 3 studies (n=216 patients) did not find a statistically significant effect of hard appliances compared with a no-treatment control group (OR=2.14; 95% CI, 0.80 to 5.75; p=0.12).

In 2016, Ivorra-Carbonell et al reported on a systematic review of functional advancement devices for TMJD, which included systematic reviews, meta-analyses, RCTs, case-control studies, and cohort studies. Reviewers included 21 articles evaluating some kind of advancement device, considered of medium or high quality by CONSORT criteria. Results were summarized descriptively; reviewers concluded that after treatment with mandibular advancement the condyle was in “more advanced position.”

**Stabilization Splints**

In 2012, Ebrahim et al identified 11 RCTs comparing splint therapy for TMJDs with minimal or no therapy. Nine of the 11 studies used stabilization splints, 1 used soft splints, and 1 used an anterior repositioning appliance. Reviewers used the GRADE system to rate study quality. Nine studies did not report whether allocation was concealed, and 6 studies did not report masking outcome assessors. Length of follow-up in the studies ranged from 6 to 52 weeks. A pooled analysis of study findings found that splint therapy was significantly associated with a reduction in reported pain compared with minimal or no intervention (standardized mean difference [SMD], -0.93; 95% CI, -1.33 to -0.53). Using a 100-millimeter visual analog scale (VAS) to measure pain, splint therapy was associated with an 11.5 mm lower mean VAS score (95% CI, -16.5 to -6.6 mm). There were no statistically significant differences between groups in quality of life or depression scores.

In another systematic review published in 2016, Zhang et al identified 13 publications from 11 studies (n=538 patients) evaluating splint therapy for TMJDs. Risk of bias was high for 2 or more domains for all of the studies. Splint therapy group patients had greater improvement in pain control than control patients (mean difference [MD], 2.02; 95% CI, 1.55 to 2.49; I²=0.558).

An earlier Cochrane review by Al-Ani et al (2014) identified 12 RCTs that compared stabilization splint therapy for TMJD with a control intervention. (The control group was not limited to minimal or no intervention as in the Ebrahim review.) There was wide variability in the comparison interventions and no standardization of outcomes; thus, study results could not be pooled. This Cochrane review was withdrawn in 2016 for being out of date and not meeting current Cochrane methodologic standards; a new Cochrane review on occlusal interventions for managing TMJDs is planned.

**Acupuncture**

A 2011 systematic review and meta-analysis identified 7 sham-controlled RCTs on acupuncture for treating TMJD. The studies included a total of 141 patients. Sample sizes of individual studies ranged from 7 to 28 patients. Four studies used a single acupuncture session and the other 3 used 6 to 12 sessions. All 7 studies reported change in pain intensity as assessed by VAS. In 6 of the studies, pain intensity was measured immediately after treatment; the seventh measured pain after 16 weeks. A pooled analysis of findings from 5 studies (n=107) found a statistically significant improvement in pain intensity, as measured by VAS. The pooled weighted mean difference (WMD) in pain intensity was -13.63 (95% CI, -21.16 to -6.10; p<0.001). A pooled subgroup analysis of 4 studies (n=89 patients) found acupuncture to be superior to a nonpenetrating sham acupuncture (WMD = -13.73; 95% CI, -21.78 to -5.67; p<0.001). A pooled analysis of 2 studies (n=18 patients) did not find a significant difference in efficacy between
acupuncture and a penetrating sham acupuncture (WMD = -12.95; 95% CI, -34.05 to 8.15; p=0.23). The latter analysis may have been underpowered. Reviewers noted that previous studies had found that a 24.2-mm change in pain assessed by a 100-mm VAS represents a clinically significant difference and that only 2 of the included studies had a change of 24.2 mm or more. The evidence on acupuncture is limited by the small number of studies, small sample sizes, and in most studies, efficacy assessment only immediately posttreatment.

Orthodontic Services
A 2010 Cochrane review by Luther et al did not identify any RCTs evaluating orthodontic treatment for TMJDs and thus concluded that there is insufficient evidence on the efficacy of orthodontics.16 Reviewers defined orthodontic treatment as appliances that would induce stable tooth movement for a sufficient period of time to bring about permanent change in tooth position. The 2010 Cochrane review was withdrawn in 2016 for being out of date and not meeting current Cochrane methodologic standards17; a new Cochrane review on occlusal interventions for managing TMJDs is planned.

Hyaluronic Acid

Systematic Reviews
There are several systematic reviews of studies on hyaluronic acid for treating TMJDs.18-21 Only 1 of the systematic reviews limited its inclusion criteria to RCTs and pooled study findings—the 2013 Cochrane review by Shi et al.20 The Shi review included RCTs comparing the effect of at least 1 hyaluronic acid injection alone or in combination with other active treatments to placebo or glucocorticoid injections alone or in combination with the same active treatment group. Seven studies met inclusion criteria: 3 studies compared hyaluronic acid with placebo, 3 studies compared hyaluronic acid with glucocorticoids, and 2 studies compared hyaluronic acid plus arthroscopy or arthrocentesis with arthroscopy or arthrocentesis alone. (One study included 3 arms and was included in the first 2 comparisons.) Five of the 7 studies included fewer than 50 participants.

Outcomes were categorized as symptoms, which reflected subjective feeling and the judgment of the patients, and clinical signs, which reflected objective judgment of the observer. A meta-analysis of 2 trials did not find a statistically significant difference between hyaluronic acid and placebo for short-term (<3 months) improvement in symptoms (relative risk [RR], 1.24; 95% CI, 0.72 to 2.14). Similarly, a pooled analysis of 3 trials did not find a significant difference between hyaluronic acid and placebo for short-term improvement of clinical signs (RR=1.69; 95% CI, 0.80 to 3.57). However, a pooled analysis of 2 studies found a statistically significant between-group difference in long-term effect (≥3 months) on clinical signs (RR=1.71; 95% CI, 1.05 to 2.77). For the comparison between hyaluronic acid and glucocorticoids, only short-term data were available for pooling. There were no significant differences between groups for short-term improvement in symptoms (2 studies; RR=0.99; 95% CI, 0.84 to 1.17) or short-term improvement in clinical signs (3 studies; RR=0.91; 95% CI, 0.66 to 1.25). Data were not pooled for studies of combination treatments (hyaluronic acid plus arthroscopy or arthrocentesis). Reviewers found that there was insufficient consistent evidence to draw conclusions on use of hyaluronate for treating patients with TMJDs. This Cochrane review was withdrawn in 2013 for being out of date and not meeting contemporary Cochrane methodologic standards.22
**Randomized Controlled Trials**

Most published RCTs evaluating hyaluronic acid for treating TMJ Ds have had small sample sizes, short follow-up times, and/or lacked blinding. Representative RCTs published are described next. RCTs with larger sample sizes and stronger methodology were selected for description.

A 2012 study by Manfredini et al in Italy randomized 72 patients with TMJD to 1 of 6 treatment groups: (1) single-session arthrocentesis alone; (2) single-session arthrocentesis plus corticosteroid; (3) single-session arthrocentesis plus low-molecular-weight hyaluronic acid; (4) single-session arthrocentesis plus high-molecular-weight hyaluronic acid; (5) 5 weekly arthrocenteses plus low-molecular-weight hyaluronic acid; or (6) 5 weekly single-needle arthrocenteses plus low-molecular-weight hyaluronic acid.²³ Sixty (83%) of 72 participants completed the study (between 9 and 12 patients per treatment group). In a per-protocol analysis, there were no significant differences among groups on any of the outcome variables at the 3-month follow-up. For example, the percentage change in pain at rest ranged from -29.1% in the group receiving 5 weekly single-needle arthrocenteses plus low-molecular-weight hyaluronic acid to -38.4% in the group receiving a single session of arthrocentesis alone. Limitations of the study included the small number of patients in each treatment group and the substantial number of dropouts in absence of an intention-to-treat (ITT) analysis.

A 2007 study by Bjornland et al in Norway published a double-blind RCT that included 40 patients with osteoarthritis of the TMJD.²⁴ Patients received 2 injections, 14 days apart, of sodium hyaluronate or corticosteroids. Pain was assessed using VAS from 0 to 100. Patients were followed for 6 months (assessed at 14 days, 1 month, and 6 months). There was a statistically significant reduction in pain within each group at all follow-up points. At the 6-month follow-up, pain intensity (mean VAS score) was 14 in the hyaluronic acid group and 31 in the corticosteroid group; the between-group difference was statistically significant (p<0.001). The number of patients who were pain-free at 6 months was 7 (35%) of 20 in the hyaluronic acid group and 6 (30%) of 20 in the corticosteroid group (p value not reported).

In 1993, Bertolami et al published a double-blind placebo-controlled trial that included 121 patients with TMJD.²⁵ Patients had to have a confirmed diagnosis of degenerative joint disease (DJD), reducing displaced disc (DDR) or nonreducing displaced disc (DDN), failure of other nonsurgical treatments, and severe dysfunction. Patients received a single injection of sodium hyaluronate or saline and were followed for 6 months. Eighty patients were randomized to the hyaluronate group and 41 to the placebo group. This included 57 patients in the DJD group, 50 patients in the DDR group, and 14 patients in the DDN group. Fourteen (12%) of 121 patients were excluded from the analysis because they did not meet eligibility criteria. No significant differences in outcomes were seen for the DJD group. In the DDN group, there were significant between-group differences through 1 month, favoring the hyaluronic acid group. The number of patients in the DDN group who completed follow-up after 1 month was insufficient to draw meaningful conclusions about efficacy. In the DDR group, there were no statistically significant differences between groups for any outcome at 1 or 2 months. At 3 and 6 months, 2 of 7 reported outcomes were significantly better in the hyaluronic acid group than in the placebo group. At 5 months, 5 of 7 reported outcomes were significantly better in the hyaluronic acid group. The 7 outcomes included 3 measures of dysfunction, 2 measures of patient perception of improvement, and 2 measures of change in noise. The most consistent between-group differences in the DDR group were for the 2 measures of patient perception of improvement and one of the noise variables. There were fewer between-group differences on dysfunction measures.
Surgery
A Cochrane review by Guo et al, last updated in 2009, identified 2 RCTs (total N=81 patients) that compared the effectiveness of arthrocentesis and lavage for the treatment of TMJD to arthroscopy.\textsuperscript{26} Data were pooled only for the outcome of maximum incisal opening. A meta-analysis of the 2 trials found a statistically significant difference between the interventions for this outcome, with a WMD of -5.28 (95% CI, -7.10 to -3.46) in favor of arthroscopy. The Cochrane review was withdrawn in 2015 for being out of date and not meeting current Cochrane methodologic standards\textsuperscript{27}; a new Cochrane review on surgical interventions for managing TMJDs is planned. Another Cochrane review reporting on arthroscopy for TMJD, originally published in 2010, was also withdrawn from Cochrane from 2015 for being out of date and not meeting current Cochrane methodologic standards.\textsuperscript{28}

In a 2013 systematic review, Vos et al identified 3 RCTs (total N=222 patients) that compared the efficacy of lavage of the TMJ (ie, arthrocentesis or arthroscopy) with nonsurgical TMJ treatment.\textsuperscript{29} Although reviewers assessed the quality of the studies to be adequate, only 1 study stated that allocation to treatment group was concealed; 2 studies did not explicitly state that an ITT analysis was used. The 2 primary outcomes considered were change in pain and maximal mouth opening (MMO) at 6 months compared with baseline. Pain was measured by VAS. Pooled analysis of data from the 3 trials found a statistically significant reduction in pain at 6 months with lavage versus nonsurgical therapy (SMD = -1.07; 95% CI, -1.38 to -0.76). There was no statistically significant difference in the efficacy of the 2 treatments for the other outcome variable, MMO (SMD=0.05; 95% CI, -0.33 to 0.23).

**SUMMARY OF EVIDENCE**
For individuals who have suspected temporomandibular joint disorder (TMJD) who receive ultrasound, surface electromyography, or joint vibration analysis, the evidence includes systematic reviews of diagnostic test studies. Relevant outcomes are test accuracy, test validity, and other performance measures. None of the systematic reviews found that these diagnostic techniques accurately identify patients with TMJD and many of the included studies had methodologic limitations. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have a confirmed diagnosis of TMJD who receive intraoral devices or appliances or pharmacologic treatment, the evidence includes randomized controlled trials (RCTs) and systematic reviews of RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. A systematic review of intraoral appliances (44 studies) and meta-analyses of subsets of these studies have found a significant benefit of intraoral appliances compared with control interventions. Other systematic reviews found a significant benefit of several pharmacologic treatments (eg, analgesics, muscle relaxants, and anti-inflammatory medications [vs placebo]). The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have a confirmed diagnosis of TMJD who receive acupuncture, biofeedback, transcutaneous electrical nerve stimulation, orthodontic services, or hyaluronic acid, the evidence includes RCTs, systematic reviews of these RCTs, and observational studies. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. The systematic reviews did not find that the above technologies improved pain and functional outcomes significantly more than control treatments. Moreover, many individual studies were
small and/or had methodologic limitations. The evidence is insufficient to determine the effects of
the technology on health outcomes.

For individuals who have a confirmed diagnosis of TMJD, who receive arthrocentesis or
arthroscopy, the evidence includes RCTs and systematic reviews of RCTs. Relevant outcomes are
symptoms, functional outcomes, quality of life, and treatment-related morbidity. Only 1 review,
which included 3 RCTs, compared arthrocentesis or arthroscopy with nonsurgical interventions
for TMJD. Pooled analyses of the RCTs found that arthrocentesis and arthroscopy resulted in
superior pain reduction than control interventions. The evidence is sufficient to determine that
the technology results in a meaningful improvement in the net health outcome.

PRACTICE GUIDELINES AND POSITION STATEMENTS
American Association for Dental Research
A policy statement, revised in 2010 and reaffirmed in 2015, by the American Association for
Dental Research recommended the following for the diagnosis and treatment of
temporomandibular joint disorders (TMJDs)30:

“It is recommended that the differential diagnosis of TMDs or related orofacial pain
conditions should be based primarily on information obtained from the patient's history,
clinical examination, and when indicated, TMJ radiology or other imaging procedures. The
choice of adjunctive diagnostic procedures should be based upon published, peer-reviewed
data showing diagnostic efficacy and safety. However, the consensus of recent scientific
literature about currently available technological diagnostic devices for TMDs is that except for
various imaging modalities, none of them shows the sensitivity and specificity required to
separate normal subjects from TMD patients or to distinguish among TMD subgroups...”

“It is strongly recommended that, unless there are specific and justifiable indications to the
contrary, treatment of TMD patients initially should be based on the use of conservative,
reversible and evidence-based therapeutic modalities. Studies of the natural history of many
TMDs suggest that they tend to improve or resolve over time. While no specific therapies
have been proven to be uniformly effective, many of the conservative modalities have proven
to be at least as effective in providing symptomatic relief as most forms of invasive
treatment...”

American Society of Temporomandibular Joint Surgeons
Consensus clinical guidelines, published in 2001, focus on TMJ associated with internal
derangement and osteoarthritis.31 For diagnosis of this type of TMJ D, a detailed history and,
when indicated, general physical examination are recommended. Imaging of the TMJ and
associated structures is also recommended. Options for basic radiography to provide information
on temporal bone and condylar morphology include use of plain films, panoramic films, and
tomograms. Also recommended is imaging of the disc and associated soft tissue with MRI or
arthrography. Other diagnostic procedures that may be indicated include computed tomography,
MRI, arthrography (for selected cases) and isotope bone scans.

Nonsurgical treatment should be considered first for all symptomatic patients with this condition.
Recommended treatment options include change in diet, nonsteroidal anti-inflammatory drugs,
maxillomandibular appliances, physical therapy, injections of corticosteroids or botulinum toxin,
and behavior modification. If adequate symptom relief does not occur within 2 to 3 weeks,
surgical consultation is advised. The guideline states that the following surgical procedures are
considered to be accepted and effective for patients with TMJ associated with internal derangement/osteoarthritis:

- Arthrocentesis
- Arthroscopy
- Condylotomy
- Arthrotomy (prosthetic joint replacement may be indicated in selected patients who have severe joint degeneration, destruction, or ankylosis)
- Coronoidotomy/coronoidectomy
- Styloidectomy

American Dental Association

Selected statements from the American Dental Association’s practice parameters for TMJDs, last revised in 1997, are:

- The key element in the design of this set of parameters for temporomandibular (TM) disorders is the professional judgment of the attending dentist, for a specific patient, at a specific time.
- Initially the dentist should select the least invasive and most reversible therapy that may ameliorate the patient’s pain and/or functional impairment.
- Any treatment performed should be with the concurrence of the patient and the dentist.
- The dentist should evaluate the effectiveness of initial therapy prior to considering more invasive and/or irreversible therapy.
- The dentist should counsel the patient that TM disorders are often managed, rather than resolved, and that symptoms of TM disorders may persist, change, or recur intermittently.
- The patient should be informed that the success of treatment is often dependent upon patient compliance with prescribed treatment and recommendations for behavioral modifications. Lack of compliance should be recorded.
- When articular derangement and/or condylar dislocation has been determined to be the etiology of the patient’s pain and/or functional impairment, manual manipulation of the mandible may be performed by the dentist.
- Oral orthotics (guards/splints) may be used by the dentist to enhance diagnosis, facilitate treatment or reduce symptoms.
- The dentist should periodically evaluate oral orthotics (guards/splints) for their effectiveness, appropriateness and possible risks associated with continued use.
- Before restorative and/or occlusal therapy is performed, the dentist should attempt to reduce, through the use of reversible modalities, the neuromuscular, myofascial and temporomandibular joint symptoms.
- The dentist may replace teeth, alter tooth morphology and/or position by modifying occluding, articulating, adjacent or approximating surfaces, and by placing or replacing restorations (prostheses) to facilitate treatment.
- Transitional or provisional restorations (prostheses) may be utilized by the dentist to facilitate treatment.
- Intracapsular and/or intramuscular injection, and/or arthrocentesis may be performed for diagnostic and/or therapeutic purposes.
- Orthodontic therapy may be utilized to facilitate treatment.
- Orthognathic surgery may be performed to facilitate treatment.
- When internal derangement or pathosis has been determined to be the cause of the patient’s pain and/or functional impairment, arthroscopic or open resective or reconstructive surgical procedures may be performed by the dentist.
U.S. PREVENTIVE SERVICES TASK FORCE RECOMMENDATIONS

Not applicable.

ONGOING AND UNPUBLISHED CLINICAL TRIALS

Some currently unpublished trials that might influence this review are listed in Table 2.

Table 2. Summary of Key Trials

<table>
<thead>
<tr>
<th>NCT No.</th>
<th>Trial Name</th>
<th>Planned Enrollment</th>
<th>Completion Date</th>
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<tr>
<td><strong>Ongoing</strong></td>
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<tr>
<td>NCT02397070</td>
<td>Effectiveness of a Jaw Exercise Program in Temporomandibular Disorder Patients</td>
<td>30</td>
<td>Jul 2015 (ongoing)</td>
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<tr>
<td>NCT02637544</td>
<td>Treatment Efficacy of Acupuncture in Non-Chronified Pain Patients with TMDs</td>
<td>40</td>
<td>Aug 2016 (ongoing)</td>
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<tr>
<td>NCT02144233</td>
<td>Restoring Masticatory Function as Treatment for Chronic Pain: a Randomized Placebo-controlled Trial</td>
<td>110</td>
<td>Jun 2017</td>
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<tr>
<td>NCT02908568</td>
<td>Effect of Stimulation of the Proprioceptive Trigeminocardiac Reflex through Medical Device for the Pain of Patients with Temporomandibular Disorders</td>
<td>36</td>
<td>Aug 2017</td>
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<tr>
<td><strong>Unpublished</strong></td>
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<td></td>
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<tr>
<td>NCT01524913</td>
<td>A Double Blind Randomized Study Comparing Hyaluronic Acid, Corticosteroid, and Placebo during Arthrocentesis for Temporomandibular Joint Dysfunction</td>
<td>103</td>
<td>Apr 2016 (completed)</td>
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</table>

NCT: national clinical trial.

CODING

The following codes for treatment and procedures applicable to this policy are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement. Please refer to the member’s contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

CPT/HCPCS

20605  Arthrocentesis, aspiration and/or injection; intermediate joint or bursa (eg, temporomandibular, acromioclavicular, wrist, elbow or ankle, olecranon bursa); without ultrasound guidance

20606  Arthrocentesis, aspiration and/or injection; intermediate joint or bursa (eg, temporomandibular, acromioclavicular, wrist, elbow or ankle, olecranon bursa); with ultrasound guidance, with permanent recording and reporting

21010  Arthrotomy, temporomandibular joint

21050  Condylectomy, temporomandibular joint (separate procedure)

21060  Meniscectomy, partial or complete, temporomandibular joint (separate procedure)

21073  Manipulation of temporomandibular joint(s) (TMJ), therapeutic, requiring an anesthesia service (ie, general or monitored anesthesia care)

21116  Injection procedure for temporomandibular joint arthrography

21240  Arthroplasty, temporomandibular joint, with or without autograft (includes obtaining graft)

21242  Arthroplasty, temporomandibular joint, with allograft

21243  Arthroplasty, temporomandibular joint with prosthetic joint replacement

29800  Arthroscopy, temporomandibular joint, diagnostic, with or without synovial biopsy (separate procedure)
29804  Arthroscopy, temporomandibular joint, surgical
70328  Radiologic examination, temporomandibular joint, open and closed mouth; unilateral
70330  Radiologic examination, temporomandibular joint, open and closed mouth; bilateral
70332  Temporomandibular joint arthrography, radiological supervision and interpretation
70336  Magnetic resonance (eg, proton) imaging, temporomandibular joint(s)
70350  Cephalogram, orthodontic
70355  Orthopantogram (eg, panoramic x-ray)

ICD-9 Diagnoses
524.01  Major anomalies of jaw size; Maxillary hyperplasia
524.02  Major anomalies of jaw size; Mandibular hyperplasia
524.03  Major anomalies of jaw size; Maxillary hypoplasia
524.04  Major anomalies of jaw size; Mandibular hypoplasia
524.05  Major anomalies of jaw size; Macrogenia
524.06  Major anomalies of jaw size; Microgenia
524.09  Major anomalies of jaw size; Other specified anomaly
524.10  Anomalies of relationship of jaw to cranial base; Unspecified anomaly
524.11  Anomalies of relationship of jaw to cranial base; Maxillary asymmetry
524.12  Anomalies of relationship of jaw to cranial base; Other jaw asymmetry
524.19  Anomalies of relationship of jaw to cranial base; Other specified anomaly
524.4  Malocclusion, unspecified
524.50  Dentofacial functional abnormalities; dentofacial functional abnormality, unspecified
524.51  Dentofacial functional abnormalities; abnormal jaw closure
524.52  Dentofacial functional abnormalities; limited mandibular range of motion
524.53  Dentofacial functional abnormalities; limited mandibular range of motion
524.54  Dentofacial functional abnormalities; insufficient anterior guidance
524.55  Dentofacial functional abnormalities; centric occlusion maximum intercuspation discrepancy
524.56  Dentofacial functional abnormalities; non-working side interference
524.57  Dentofacial functional abnormalities; lack of posterior occlusal support
524.60  Temporomandibular joint disorders, unspecified
524.61  Adhesions and ankylosis (bony or fibrous)
524.62  Arthralgia of the temporomandibular joint
524.63  Articular disc disorder (reducing or non-reducing)
524.64  Temporomandibular joint sounds on opening and/or closing the jaw
524.69  Other specified temporomandibular joint disorders
526.89  Congenital anomaly (includes condylar hypoplasia/hyperplasia)
526.9  Jaw disease
959.0  Injury; jaw

ICD-10 Diagnoses
M26.601  Right temporomandibular joint disorder, unspecified
M26.602  Left temporomandibular joint disorder, unspecified
M26.603  Bilateral temporomandibular joint disorder, unspecified
M26.611  Adhesions and ankylosis of right temporomandibular joint
M26.612  Adhesions and ankylosis of left temporomandibular joint
M26.613  Adhesions and ankylosis of bilateral temporomandibular joint
M26.621  Arthralgia of right temporomandibular joint
M26.622  Arthralgia of left temporomandibular joint

Contains Public Information
M26.623  Arthralgia of bilateral temporomandibular joint
M26.631  Articular disc disorder of right temporomandibular joint
M26.632  Articular disc disorder of left temporomandibular joint
M26.633  Articular disc disorder of bilateral temporomandibular joint
M26.69   Other specified disorders of temporomandibular joint
M27.8   Other specified disease of jaws
M27.0   Developmental disorders of jaws
M27.9   Disease of jaws, unspecified

**REVISIONS**

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<td>01-01-2014</td>
<td>Policy added to the bcbsks.com web site.</td>
</tr>
<tr>
<td>10-01-2014</td>
<td>Description section updated</td>
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<td>▪ Removed Item E 2 &quot;Manipulation for reduction of fracture or dislocation of the TMJ&quot; as it was not felt to be unique to this policy subject.</td>
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<td>▪ Corrected CPT Code 90336 to be 70336</td>
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<td>01-01-2015</td>
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<td>▪ Added CPT Code: 20606 (Effective January 1, 2015)</td>
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<td>▪ Revised CPT Code: 20605 (Effective January 1, 2015)</td>
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<td>03-18-2015</td>
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<td>▪ In Item C 1, added &quot;(such as soft and hard stabilization appliances, anterior positioning appliances, anterior bite appliances, and soft resilient appliances)&quot;</td>
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<td>▪ In Item D 7, added &quot;including, but not limited to, fillings, crowns, and implants&quot;</td>
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<td>08-05-2015</td>
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<td>▪ In Item A 4, removed &quot;Panoramic radiographic image&quot; and added &quot;Pantograms&quot; to read &quot;Pantograms (x-rays of maxilla and mandible).&quot;</td>
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<td>▪ In Item B 6, removed &quot;gnathic&quot; and added &quot;gothic&quot; to read &quot;Transcranial or lateral skull x-rays; intraoral tracing or gothic arch tracing&quot;</td>
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<td>▪ Removed Item B 9, &quot;Range of motion measurements&quot;</td>
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<td>▪ Updated nomenclature to codes 20606, 21050, 21060, and 70355.</td>
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<td>▪ In Item B 6, removed &quot;gothic&quot; and added &quot;gnathic&quot; to read &quot;Transcranial or lateral skull x-rays; intraoral tracing or gnathic arch tracing (intended to demonstrate deviations in the positioning of the jaws that are associated with TMJ dysfunction);&quot;</td>
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<td>▪ Termined ICD-10 codes effective 09-30-2016: M26.60, M26.61, M26.62, M26.63</td>
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REFERENCES


Other References
1. Blue Cross and Blue Shield of Kansas Dental Advisory Committee, April 2014; April 2015; April 2016.