Clinical Policy Title: Manipulation under anesthesia (MUA)

Clinical Policy Number: 14.02.10

Effective Date: October 1, 2016
Initial Review Date: July 20, 2016
Most Recent Review Date: June 5, 2018
Next Review Date: June 2019

Related policies:
CP# 15.02.01 Chiropractic care

ABOUT THIS POLICY: AmeriHealth Caritas has developed clinical policies to assist with making coverage determinations. AmeriHealth Caritas’ clinical policies are based on guidelines from established industry sources, such as the Centers for Medicare & Medicaid Services (CMS), state regulatory agencies, the American Medical Association (AMA), medical specialty professional societies, and peer-reviewed professional literature. These clinical policies along with other sources, such as plan benefits and state and federal laws and regulatory requirements, including any state or plan-specific definition of “medically necessary,” and the specific facts of the particular situation are considered by AmeriHealth Caritas when making coverage determinations. In the event of conflict between this clinical policy and plan benefits and/or state or federal laws and/or regulatory requirements, the plan benefits and/or state and federal laws and/or regulatory requirements shall control. AmeriHealth Caritas’ clinical policies are for informational purposes only and not intended as medical advice or to direct treatment. Physicians and other health care providers are solely responsible for the treatment decisions for their patients. AmeriHealth Caritas’ clinical policies are reflective of evidence-based medicine at the time of review. As medical science evolves, AmeriHealth Caritas will update its clinical policies as necessary. AmeriHealth Caritas’ clinical policies are not guarantees of payment.

Coverage policy

AmeriHealth Caritas considers the use of manipulation under anesthesia for the treatment of reducing pain and improving range of motion to be clinically proven and, therefore, medically necessary for the following conditions:

Knee arthrofibrosis: Manipulation under anesthesia is considered medically necessary for arthrofibrosis of the knee following total knee arthroplasty, knee surgery, or fracture in persons having less than 90 degrees range of motion four weeks to six months after surgery or trauma.

Frozen shoulder (adhesive capsulitis): Manipulation under anesthesia is considered medically necessary for chronic, refractory frozen shoulder (adhesive capsulitis) when the following criteria are met:

1. Adhesive capsulitis should be documented by restricted active and passive glenohumeral and scapulothoracic motion for at least a one-month duration which has either reached a plateau or worsened.
2. Significant reduction in range of motion (at least a 50 percent reduction in both active and passive range of motion compared with the unaffected shoulder).
3. Various degrees of impaired function exist, including limited reaching (e.g., overhead, across the chest) and limited rotation (e.g., unable to scratch the back, difficulty putting on a coat).
4. Patients undergo at least 12 weeks of failed conservative management, including analgesics or corticosteroids, physical therapy or therapeutic exercises, and subacromial corticosteroid injection or hydrodilatation (arthrographic distension, hydrolilation, hydroploasty).
5. Conventional x-rays do not show bone pathology that can explain motion loss (CMS, 2015).

Limitations:

All other uses of manipulation under anesthesia for the treatment of acute or chronic pain conditions, involving one or more of the joints cited below, are not medically necessary because they are clinically unproven, and considered experimental/investigational (this list may not be all inclusive):

- Anesthesia for manipulation of the spine or for closed procedures on the cervical, thoracic or lumbar spine.
- Manipulation of temporomandibular joint(s), therapeutic, requiring an anesthesia service (i.e., general or monitored anesthesia care).
- Manipulation of spine requiring anesthesia, any region.
- Manipulation under anesthesia, shoulder joint, including application of fixation apparatus (dislocation excluded).
- Manipulation of elbow, wrist, finger joint, hip joint under anesthesia.
- Manipulation of knee joint under general anesthesia (includes application of traction or other fixation devices).
- Closed treatment of pelvic ring fracture, dislocation, diastasis or subluxation; with manipulation, requiring more than local anesthesia.
- Manipulation of ankle under general anesthesia (includes application of traction or other fixation apparatus).

Limitations per CMS Local Coverage Determination

1. Manipulation under anesthesia provided for the above indications/conditions consists of a SINGLE treatment session involving an isolated joint. Multiple joint manipulations under anesthesia on the same date of service should be rare. Repeat procedures during the global period would not be expected.
2. Only M.D./D.O. physicians who have training and competency in manipulation should perform this procedure. The procedure must be performed in an outpatient surgery facility or inpatient hospital setting. An office setting would not be appropriate for performing manipulation under anesthesia.
3. Manipulation under anesthesia performed by a chiropractor is not a covered chiropractic service. Coverage for Doctors of Chiropractic “extends only to treatment by means of manual manipulation of the spine to correct a subluxation demonstrated by X-ray, provided...
such treatment is legal in the state where performed. All other services furnished or ordered by chiropractors are not covered,” see CMS Pub. 100-01, chapter 5, sections 70.6 and the FCSO Part B LCD for Chiropractic Services (CMS, 2015).

**Alternative covered services:**

Conservative medical management including:

- Physical therapy.
- Occupational therapy.
- Pain management program.
- Standard chiropractic manipulation.
- Prescription drug therapy.

**Background**

Manipulation under anesthesia is a technique aimed at reducing pain and improving range of motion and is a treatment modality that consists of manipulation and stretching procedures performed while an individual receives anesthesia (e.g., conscious sedation, general anesthesia). A chiropractor, osteopathic physician or medical physician may perform this type of manipulation with an anesthesiologist in attendance. It is also used for treatment of fractures (e.g., vertebral, long bones) and dislocations.

An individual’s protective reflex mechanism is absent under anesthesia and proponents contend it is less difficult to separate and move the joint when the reflex is absent. During manipulation under anesthesia, the chiropractor or physician performs a combination of short manipulations, passive stretches and maneuvers to break up fibrous and scar tissue around the spine and surrounding joint areas. This manipulation typically includes a high velocity thrust (i.e., a technique that adjusts the joints rapidly), which may be followed by a popping or snapping sound.

In a less frequently used technique, manipulation under anesthesia may be accompanied by fluoroscopically-guided intra-articular injections with corticosteroid agents to reduce inflammation. This procedure is referred to as manipulation under joint anesthesia/analgesia.

Manipulation under anesthesia is considered safe and effective and is a well-established method of treatment for conditions such as adhesive capsulitis of the shoulder, arthrofibrosis of the knee, and some fractures, dislocations and contractures. When performed for these specific conditions, manipulation under anesthesia generally requires a single session of treatment, most often performed unilaterally, involving a single joint (AAMUAP, 2012).

Manipulation under anesthesia can be used for conditions invarious joints. The most common of these are the shoulder and knee.
**Adhesive Capsulitis/Frozen Shoulder:** Adhesive capsulitis, also referred to as frozen shoulder, is used to describe a painful restriction (both passive and active) of shoulder motion in an individual whose radiographs are typically normal. It may also be referred to as pericapsulitis and occurs in approximately three percent of the general population. The condition affects mostly adults, especially from age 40 to 70; women have higher rates than men. Some authors contend the condition results from synovial inflammation with subsequent reactive capsular fibrosis. Early stages are treated with steroid injections and home therapy. For refractory cases, more aggressive treatment involves manipulation of the shoulder joint under anesthesia or an arthroscopic capsular release. Manipulating the joint under anesthesia breaks up the adhesions surrounding the joint and stretches the fibrotic tissue thereby increasing joint motion and reducing pain. Manipulation under anesthesia is generally recommended for individuals who do not respond to or who demonstrate little improvement after conservative treatment (Ewald, 2011).

**Postoperative/Post-traumatic Arthrofibrosis of the Knee:** Arthrofibrosis of the knee is a condition that may occur following trauma, surgery or joint replacement and results from inflammation and proliferation of scar tissue. Physiologically, traumatic injury to the knee leads to the formation of internal scar tissue with shrinking and tightening of the joint's capsule. Tendons outside the joint may also shrink and tighten, leading to a further decrease of joint mobility. Treatment of arthrofibrosis of the knee begins with physical therapy to improve motion, for refractory cases manipulation of the joint under anesthesia may be performed. However in some cases manipulation of the joint inadvertently results in femoral or tibial fracture, depending on the severity of adhesion formation and weak joints. As a result, some surgeons perform an arthroscopic internal resection of scar tissue prior to manipulating the joint in order to reduce the manipulation force and prevent fractures. Manipulation under anesthesia is indicated, with or without arthroscopy for arthrofibrosis of the knee, when there is < 90° range of motion following surgery or trauma despite physical therapy (Abdul, 2015).

**Manipulation Under Anesthesia for Other Conditions:** Aside from adhesive capsulitis/frozen shoulder and arthrofibrosis of the knee, manipulation under anesthesia has been used for other conditions, including:

1. **Arthrofibrosis of the elbow,** which often occurs following injury (e.g., operative, fracture): Manipulation under anesthesia has been used when there is failure to progress improve and progress following the use of bracing.
2. **Fracture and/or Dislocation:** Manipulation under anesthesia has also been for some types of fractures (e.g., vertebral, long bones) and acute/traumatic dislocations (e.g., perched cervical facet). It is typically performed with surgical repair and other medically necessary procedures such as arthroscopy.
3. **Chronic Contracture of Upper or Lower Extremity Joint:** A joint contracture is a limitation in the passive range of motion of a joint. Joint contractures prevent normal movement of the associated body part and can result from a variety of causes such as spasticity or prolonged immobilization.
4. **Spine:** Theoretically, spinal manipulation as a method of treatment for subluxation stretches the joint capsules and resets the spinal cord and nerve position, allowing the nervous system to function optimally. In addition, anesthesia itself carries a small but clinically significant risk.

Although guidelines from the American Academy of Manipulation Under Anesthesia Physicians were issued 2001, no standards as to when to recommend a patient receive manipulation under anesthesia treatment exist (Di Giorgi, 2018). The American Association of Manipulation Under Anesthesia Providers issued a guideline for providers. The document includes a statement that endorses conditions that fall within “recognized categories of conditions” of manipulation under anesthesia; nine such conditions are included, including those related to the shoulder, knee, and spine, with various citations (AAMUAP, 2012).

A 2014 guideline on manipulation under anesthesia for spinal conditions acknowledges lack of unequivocal support for effectiveness based on randomized controlled trials and meta-analyses, but lower-level evidence exists (Gordon, 2014). According the American College of Occupational and Environmental Medicine practice guidelines regarding physical methods of treatment for low back disorders (Hegmann, 2007; Hegmann, 2008), due to insufficient evidence manipulation under anesthesia and medication-assisted spinal manipulation for acute, subacute or chronic low back pain is not recommended.

In a guideline on the diagnosis and treatment of low back pain prepared by the Work Loss Data Institute, manipulation under anesthesia is listed as a procedure that was evaluated and that is not recommended (WLDI, 2007).

**Searches**

AmeriHealth Caritas searched PubMed and the databases of:
- UK National Health Services Centre for Reviews and Dissemination.
- Agency for Healthcare Research and Quality’s National Guideline Clearinghouse and other evidence-based practice centers.
- The Centers for Medicare & Medicaid Services (CMS).

We conducted searches on April 13, 2018. Search terms were: “manipulation under anesthesia, spinal manipulation under anesthesia, manipulation of a joint under anesthesia.”

We included:
- **Systematic reviews**, which pool results from multiple studies to achieve larger sample sizes and greater precision of effect estimation than in smaller primary studies. Systematic reviews use predetermined transparent methods to minimize bias, effectively treating the review as a scientific endeavor, and are thus rated highest in evidence-grading hierarchies.
- **Guidelines based on systematic reviews.**
• **Economic analyses**, such as cost-effectiveness, and benefit or utility studies (but not simple cost studies), reporting both costs and outcomes — sometimes referred to as efficiency studies — which also rank near the top of evidence hierarchies.

**Findings**

**Adhesive Capsulitis/Frozen Shoulder:** Two systematic reviews of manipulation under anesthesia for frozen shoulders appear in the medical literature. One review of four studies (n=571) included patients undergoing rotator cuff repair, including 460 with no stiffness and 111 with stiffness. Only patients with stiffness also underwent manipulation under anesthesia. The “stiff” group had significantly lower range of motion before treatment than the “non-stiff” group; no differences existed after treatment, indicating manipulation helped improve range of motion (Sabzevari, 2017).

The other systematic review of 22 studies (n=989) of patients with adhesive capsulitis of the shoulder compared effects of manipulation under anesthesia versus capsular release, followed for a median of 35 months. Authors observed improvements in both groups for abduction, flexion, and external rotation range of motion; each was insignificantly greater for those in the capsular release group. The rate of complications was 0.5 percent for both groups (Grant, 2013).

Other studies of manipulation’s effect on shoulder capsulitis are not systematic, and are typically small in size. A group from Finland published three of these articles. One review of 57 patients documented that optimal results are obtained if the procedure is performed six to nine months after onset of symptoms (Vastmaki, 2015). Another study of 15 patients successfully treated with manipulation under anesthesia documented that range of motion in the treated shoulder was equivalent to the contralateral shoulder after 23 years (Vastamaki, 2013). Another study included 83 patients treated for frozen shoulder, by observation (n=51) or non-operative treatment (n=32, with 20 by manipulation under anesthesia), for an average of 15 months. At last follow-up, range of motion had improved to the contralateral level in 94, 91, and 91 percent in the untreated group, the nonoperative group, and the manipulation group. Fifty-one percent of patients in the untreated group (Vastamaki, 2012).

One of the earliest studies of manipulation involved rotator cuff repair of 125 patients, 30 of whom had moderate shoulder stiffness. Adding arthroscopic capsular release and manipulation to the stiffness group, and virtually all of the outcome measures showed no statistical difference between the two groups, up to one year (Oh, 2008).

In a study of 792 shoulders of patients with a frozen shoulder given manipulation under anesthesia, 126 shoulders required a manipulation beyond the original. Improvement in mean Oxford Shoulder Scores was not statistically different for the entire group (26 to 42) than the multi-manipulation group (28 to 42) (Woods, 2017).

A study of 295 persons with frozen shoulders who had manipulation under anesthesia revealed a significant improvement in Oxford Shoulder Score and range of motion at 28 days and (average 3.6
years, significant at \( p < .0001 \). Females benefitted more than males (\( p < .0025 \)), and a secondary adhesive capsulitis significantly (\( p < .0001 \)) reduced efficacy of manipulation (Theodorides, 2014).

Post-operative/Post-traumatic arthrofibrosis of the knee. A systematic review of nine studies (\( n = 451 \)) of computer-navigated medial total knee arthroplasty found that five, or 1.1 percent, required manipulation under anesthesia (Naziri, 2018).

A systematic review included patients with knee arthroplasty requiring manipulation under anesthesia to improve range of motion. It included 22 studies (\( n = 1488 \)) with manipulation after knee arthroplasty, and four studies (\( n = 81 \)) with repeat manipulation. All studies reported mean pre-manipulation range of motion less than 90°, and 20 of 22 studies reported mean range of motion exceeding 90° after repeat manipulation. For repeat manipulation cases, the mean range of motion rose after manipulation from 80° to 100.6° (Gu, 2017).

A systematic review of persons with arthrofibrosis after total knee arthroplasty included 25 studies (\( n = 798 \)). Authors found that persons with manipulation under anesthesia had a mean increase in range of motion of 38.4°, higher than those undergoing arthroscopic release (36.2°), and revision total knee arthroplasty (24.7°), but lower than those undergoing open surgical release (43.4°) (Ghani, 2012). In another systematic review of patients in 20 studies who have arthrofibrosis after total knee arthroplasty, the gains in range of motion after manipulation under anesthesia and arthroscopy (with or without manipulation) are similar, and greater than those with open arthrolysis, indicating superior results for manipulation (Fitzsimmons, 2010).

A systematic review of 14 studies (\( n = 913 \)) followed range-of-motion arc improvements in patients who underwent manipulation under anesthesia after total knee arthroplasty. At the 1-, 5-, and 10-year periods, gains over preoperative range of motions were 30°, 33° and 33°, indicating that initial gains are maintained long-term (Pivec, 2013).

In a study of 141,016 persons undergoing total knee arthroplasty, 4.3 percent required manipulation under anesthesia within six months; and these persons have a significantly higher rate of early revision total knee arthroplasty (Werner, 2015). A Cochrane review of 684 studies found scarce information that continuous passive motion reduces risk of manipulation under anesthesia (Harvey, 2014).

A literature search reviewed manipulation under anesthesia as a means of reducing knee stiffness with limited range of motion after total knee arthroplasty. Authors found manipulation is an effective treatment option, especially if performed within three months after surgery. More scientific evidence is needed on how to rehabilitate patients after manipulation (Kornuijt, 2018).

This finding duplicated a study of 2128 total knee arthroplasties, 144 of whom required manipulation under anesthesia. A comparison of “early” (within six weeks after the procedure) and “late” (more than 26 weeks after) manipulations showed the “early” group had a significantly higher mean gain in flexion.
(36.5° versus 17°), higher final range of motion (119° versus 95°), higher Knee Society objective (89 versus 84 points) and higher function scores (88 versus 83 points) (Issa, 2014).

A randomized trial of 276 patients undergoing total knee arthroplasty divided into those with and without a post-operative manipulation, and followed them an average of 8.5 years. Nine knees in each group underwent revision surgery, and mean Knee Society and clinical scores were similar for the two groups. Authors concluded that manipulation did not raise risk of revision surgery (Pierce, 2017).

A review of 5414 revision total knee arthroplasties documented that 1.7 percent (n = 96) underwent manipulation after surgery, 69 percent in the first three months after revision surgery. Patients under 50 years of age experienced a six-fold greater risk of requiring manipulation than older patients (p < .0001). No differences were observed between gender or presence of obesity, diabetes, anxiety and/or depression, previous history of narcotic use, or a history of smoking (Dowdle, 2018). These findings differed somewhat from a study of 141,016 patients (4.3 percent requiring manipulation within six months), which found elevated risk of manipulation for those age under 50 (p<0.0001), age 50-65 (p<0.0001), females (p<0.0001), and smokers (p<0.0001) (Werner, 2015).

A review of 1729 total knee arthroplasty patients revealed manipulation was performed in 3.6 percent of patients (n=62). The risk of manipulation was significantly greater in younger persons (p < .001), current smokers (21.0 versus 7.3 percent, p < .001) and prior procedure (59.7 versus 40.4 percent, p = .002), No difference was observed in pre-procedure flexion or early manipulation group, but final flexion in the late manipulation group was significantly lower (p = .001) (Newman, 2018).

A review of 252,109 total knee arthroplasty patients in California from 2005 – 2013 focused on incidence of manipulation under anesthesia by type of surgery. Ninety (90) days after the procedure, incidence of manipulation was 2.14 percent for unilateral arthroplasty (n=4,398), 2.11 percent for staged bilateral (n=724), and 1.62 percent for simultaneous bilateral (n=195), which was significantly lower than the other two groups. After 180 days, the respective percentages had risen to 3.07, 2.89, and 2.29, the latter number still significantly lower (Meehan, 2017).

**Reduction of Displaced Fracture.** A review of 1001 children who underwent manipulation under anesthesia for displaced fracture of the distal forearm found a fracture displacement rate of 10.6 percent at two-week follow-up. Three-fourths of patients had casting indices of > 0.8 (an indicator that the patient is prone to re-displacement), and a displacement rate of just 5.58 percent (Kamat, 2012). A study of 143 pediatric patients treated with manipulation for distal radius fractures found acceptable results in redisplacement rates and degrees of reangulation, both in residents and attending physicians (Abson, 2016).

**Reduction of acute-traumatic dislocation.** A review of 5904 patients showed that the reoperation rate for complications for in stabilizing dislocated shoulders using manipulation under anesthesia was just 0.15 percent (Wasserstein, 2013). In a study of 40 pediatric patients with Monteggia fractures treated over a 20 year period, 80 percent were managed with manipulation under anesthesia and above-elbow
plaster, while the other 20 percent had to undergo Open Reduction of Internal Fixation of the ulna. At five-year follow up, all manipulation patients had excellent results, indicating emergency manipulation is an effective treatment in most of Monteggia fractures (Leonidou, 2012).

**Spine.** Evidence in the published, peer-reviewed scientific literature has failed to demonstrate the safety and efficacy of manipulation under anesthesia when used for the treatment of pain associated with the spine. A Cochrane study of 26 randomized controlled trials with 6070 participants reported that high quality evidence did not demonstrate any added clinically relevant effectiveness of spinal manipulation therapy compared to other interventions for chronic low back pain (Rubinstein, 2011). The same team produced another Cochrane review soon after, including 20 randomized controlled trials (n=2674), and found that for acute low back pain, spinal manipulation is no more effective than inert interventions, and other recommended therapies (Rubinstein, 2012).

A review of evidence in the literature found efficacy of manipulation of the spine is largely anecdotal. Types of spinal conditions most suitable for manipulation lack clear-cut consensus, relying on opinions practitioners (DiGiorgi, 2013). A follow up to this review by the same author on spinal manipulation under anesthesia lists some of the process and outcome limits found in the literature, including lack of treatment precautions, contraindications, and predictions of poor clinical outcomes (DiGiorgi, 2018).

**Policy updates:**

A total of two guidelines/other and 19 peer-reviewed references were added to, and six guidelines/other and seven peer-reviewed references removed from, this policy in April 2018.

**Summary of clinical evidence:**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
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<tbody>
<tr>
<td>Sabzevari (2017)</td>
<td><strong>Key points:</strong></td>
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<tr>
<td>Manipulation under</td>
<td>• Systematic review of four studies (n=571), patients undergoing rotator cuff repair.</td>
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<td>anesthesia for one-</td>
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<td>treatment for rotor</td>
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<td>cuff tears</td>
<td>stiff” group, but no differences existed after treatment.</td>
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<td>• Authors conclude manipulation helped improve range of motion.</td>
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<p>| Gu (2017)           | <strong>Key points:</strong>                                                                                   |
| Efficacy of         | • Systematic review of 22 studies (n=1488) of patients with knee arthroplasty, and four studies    |
| manipulation        | (n=81) with repeat manipulation under anesthesia.                                                  |
| under anesthesia to  | • All studies reported pre-manipulation mean range of motion less than 90°.                        |
| improve range of    | • All but 2 of 22 studies reported mean range of motion exceeding 90°.                             |
| motion after knee   | • For repeat manipulation cases, the mean range of motion rose after manipulation from             |
| arthroplasty        |   80° to 100.6°.                                                                                  |
|                     | • Results show manipulation under anesthesia to be effective.                                     |</p>
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<tr>
<th>Citation</th>
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| Pivec (2013)    | Long term outcomes for persons with total knee arthroplasty who also had manipulation under anesthesia | • Systematic review of 14 studies (n=913), patients followed for 10 years.  
• Range of motion arc improvements in patients who underwent manipulation under anesthesia after total knee arthroplasty.  
• 1, 5, and 10 years after procedure, gains in range of motion were 30°, 33° and 33°,  
• Authors conclude that initial gains after manipulation are maintained long-term. |
| Grant (2013)    | Comparison of manipulation and arthroscopic capsular release for adhesive capsulitis (shoulder) | • Systematic review of 22 studies (n=989), patients with shoulder adhesive capsulitis.  
• Comparison of effects of manipulation under anesthesia versus capsular release.  
• Patients were followed for a median of 35 months.  
• Improvements observed in both groups for abduction, flexion, and external rotation range of motion; all insignificantly greater for those in the capsular release group.  
• The complication rate was 0.5 percent for both groups |
| Ghani (2012)    | Management of stiffness of total knee arthroplasty | • Systematic review of 25 studies (n=798), comparing modalities of treatment of arthrofibrosis after total knee replacement  
• Range of motion increase under manipulation under anesthesia (MUA) was 38.4 degrees, compared to arthroscopic release (36.2), open surgical release (43.4), and revision total knee arthroplasty (24.7) |

**References**

**Professional society guidelines/other:**


Peer-reviewed references:


**CMS National Coverage Determinations (NCDs):**
No NCDs identified as of the writing of this policy.

**Local Coverage Determinations (LCDs):**

[https://www.cms.gov/medicare-coverage-database/details/lcd-details.aspx?LCDId=33594&ver=4&CoverageSelection=Both&ArticleType=All&PolicyType=Final&s=All&KeyWord=manipulation&KeyWordLookUp=Title&KeyWordSearchType=And&bc=gAAAAACAAAAA&](https://www.cms.gov/medicare-coverage-database/details/lcd-details.aspx?LCDId=33594&ver=4&CoverageSelection=Both&ArticleType=All&PolicyType=Final&s=All&KeyWord=manipulation&KeyWordLookUp=Title&KeyWordSearchType=And&bc=gAAAAACAAAAA&).  

**Commonly submitted codes**

Below are the most commonly submitted codes for the service(s)/item(s) subject to this policy. This is not an exhaustive list of codes. Providers are expected to consult the appropriate coding manuals and bill accordingly.

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<tr>
<td>27570</td>
<td>Manipulation of knee joint under general anesthesia</td>
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