Clinical Policy Title: Continuous passive motion

Clinical Policy Number: 15.02.08

Effective Date: July 15, 2015
Initial Review Date: June 16, 2013
Most Recent Review Date: July 20, 2016
Next Review Date: July 2017

Related Policies:

CP# 00.02.08 Intra-articular Hyaluronic Acid injection for osteoarthritis
CP# 14.03.02 Major joint replacement (hip and knee)
CP# 03.03.03 Spinal surgeries

ABOUT THIS POLICY: Keystone First has developed clinical policies to assist with making coverage determinations. Keystone First’s 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 Keystone First 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. Keystone First’s 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. Keystone First’s clinical policies are reflective of evidence-based medicine at the time of review. As medical science evolves, Keystone First will update its clinical policies as necessary. Keystone First’s clinical policies are not guarantees of payment.

Coverage policy

Keystone First considers the routine use of continuous passive motion (CPM) in the post-operative rehabilitation of total knee arthroplasty (TKA) not to be clinically proven and, therefore, not medically necessary. Unique medical, surgical or social circumstances may allow coverage determinations of CPM to be made on a case by case basis.

Limitations:

All other uses of CPM in the post-operative rehabilitation of TKA are not medically necessary.
For Medicare members only:

Keystone First considers the routine use of CPM to be a covered benefit for members who have received a total knee replacement. To qualify for coverage, use of the device must commence within two days following surgery. Coverage is limited to that portion of the three-week period following surgery during which the device is used in the patient’s home. There is insufficient evidence to justify coverage of these devices for longer periods of time or for other applications.

Alternative covered services:

A physical therapist may direct alternative rehabilitation services.

**Background**

Stabilization and improvement of motor function, and prompt return to lifestyle and work are the immediate goals of orthopedic arthroplasty. Physical therapy (PT) has traditionally been a mainstay of postoperative rehabilitative care in patients who undergo arthroplasty, including TKA.

CPM is a mechanical rehabilitative therapy for patients who have undergone arthroplasty and other orthopedic procedures on the extremities or spine. It is applied by a machine that passively moves the postoperative joint (e.g., knee) through a specified range of motion (ROM).

Because pain, limited ROM and functional difficulties in mobility or manipulation of the operated joint impact ambulation, DVT is a consistent complication in as many as 80 percent of patients who undergo TKA, and two percent of these patients go on to develop pulmonary emboli (PE). The potential catastrophic consequences of PE following TKA (and other procedures associated with physical immobility) have led to routine use of post-operative anticoagulant therapy and ambitious post-operative rehabilitation as prophylaxis against such outcome. By promoting early mobility and functionality of the operated joint CPM may offer an effective prophylactic benefit to prevent DVT. Finally, CPM has been applied to other conditions such as arthrofibrosis, distal radial fracture, ligamentous knee reconstruction, rotator cuff repair and hand surgery as primary or adjunctive care.

**Searches**

Keystone First 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 June 7, 2016. Search terms were: "Motion Therapy, Continuous Passive"[Mesh] and "continuous passive motion."

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**

One systematic review, including twenty-four clinical trials and nearly 1500 patients found only minimal impact of continuous passive motion (CPM) to reduce unwanted postoperative adverse events (i.e., DVT and thromboembolic phenomena) (Harvey 2014). The authors noted CPM technology did not impact patient quality of life (QoL), joint functionality, pain or ROM. In sum, they could not justify the routine use of CPM for postoperative TKA care as a substitute for conventional anticoagulant and PT.

He and colleagues (2012) found CPM had no material impact on prophylaxis against DVT in the setting where anticoagulant therapy was contraindicated (i.e., active bleeding). One of the studies in the review searched specifically for PE and found none. The authors noted no diagnoses of PE at all for three consecutive months during the study, drawing suspicion that there was under-reporting or perhaps undiagnosed disease. A third evaluation was unable to make a conclusive remark about DVT prophylaxis with CPM postoperative TKA or rotator cuff repair (Hayes 2013). The authors did endorse CPM for use as postoperative rehabilitation for both procedures.

Guidelines published by the American College of Occupational and Environmental Medicine (ACOEM) do not recommend CPM in the routine postoperative care of patients undergoing TKA but suggest some benefit in physically inactive patients (Hegmann 2011). The Orthopedic Section of the American Physical Therapist Association concluded that CPM may help control postoperative pain for ligamentous knee reconstructive procedures (e.g., repair of anterior cruciate ligament) based on weak evidence (Logerstedt 2010).

The Agency for Healthcare Quality and Research (AHRQ) found evidence of a modest benefit of CPM with regard to earlier return to work in patients receiving CPM with PT versus postoperative PT alone in TKA (Seida 2010). A systematic review of nine randomized controlled trials (RCTs) comprising 724 patients postoperative TKA showed CPM conferred a short-term benefit in ROM, but longer-term outcomes of ROM and functionality of the knee joint were not impacted (Viswanatha 2010).
In patients undergoing surgical release of arthrofibrosis of the knee or manipulation of the knee under anesthesia, results of a narrative review suggested improvement in early post-operative motion with CPM as a possible substitute for active PT (Cosgarea 1994). These observations possibly may be extended to other joints, such as the elbow, where arthrofibrosis is a common complication of trauma, although the quality and quantity of supporting evidence was moderate to low (Michlovitz 2004).

Handoll (2006) found CPM in the short-term (one month) beneficial in the treatment of distal radial fractures, specifically with regard to improved hand function, but could not distinguish between the relative effectiveness of CPM versus other modalities used to rehabilitate patients with fractures of the distal radius. Results of one RCT with 22 total patients suggested CPM was ineffective in increasing motion or strength after following metacarpophalangeal (MCP) arthroplasty in adults with rheumatoid arthritis (Massy-Westropp 2008).

A significant caveat to the studies above exists: except for a handful of high-quality systematic reviews, the majority of data regarding CPM comes from moderate to low quality analyses. For example, the SRs cited above would be expected to yield more confident statements of benefit; but they were limited by insufficient or suspect data. Based on the available evidence, CPM does not have clinically important effects on active knee flexion, ROM, pain control, function or quality of life postoperative TKA; CPM does not materially impact DVT prophylaxis following TKA; CPM as adjunct to PT may be beneficial after rotator cuff repair.

**Policy update:**

We identified one new Cochrane review and a new evidence-based policy statement for this update (Handoll 2015, White 2015). The Cochrane review—an update of a previous 2006 review—found very low quality evidence from one small trial (seven patients) suggesting a possible short-term benefit of CPM in adults with surgically treated distal radial fractures (Handoll 2015). In partnership with the Choosing Wisely campaign to reduce waste and promote best practices in health care, the APTA identified CPM as one of five services that are commonly performed despite evidence that the service is not effective and, in some cases, may be harmful (White 2015). According to the APTA, rehabilitation protocols now support early mobilization, and the use of CPM following uncomplicated TKA should be questioned unless medical or surgical complications exist that limit or contraindicate rehabilitation protocols that foster early mobilization. The cost, inconvenience and risk of prolonged bed rest with CPM should be weighed carefully against its limited benefit (White 2015). These results do not change previous findings. Therefore, no policy changes are warranted.

**Summary of clinical evidence**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
</tr>
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<tbody>
<tr>
<td>Handoll (2015; update of 2006 review)</td>
<td>Key points:</td>
</tr>
<tr>
<td>Citation</td>
<td>Content, Methods, Recommendations</td>
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| Cochrane review Rehabilitation for distal radial fractures | • Systematic review of rehabilitative interventions in adults with conservatively or surgically treated distal radial fractures.  
• One very low quality trial (seven patients) suggested short-term benefit of CPM post-external fixation.  
• Relative effectiveness of CPM versus other modalities not assessed. |
| White (2015) for the APTA TKA | Key points:  
• Evidence-based recommendations for not using CPM for the postoperative management of patients following uncomplicated total knee replacement.  
• Based on evidence of no clinically important effects on short-term or long-term knee extension, long-term knee flexion, long-term function, pain, and QOL in patients undergoing TKA. |
| Harvey (2014) Postoperative TKA | Key points:  
• Systematic review of 24 RCTs (1,445 total patients).  
• CPM does not materially impact outcomes (i.e., ROM, pain control, functionality or QOL).  
• CPM reduces risk of adverse events (i.e., DVT) to very modest degree.  
• Authors concluded CPM does not have clinically important effects on active knee flexion ROM, pain, function or QOL to justify its routine use. |
| He (2014) Postoperative TKA | Key points:  
• Systematic review and meta-analysis of 11 RCTs (808 total patients).  
• CPM had no effect on preventing DVT after TKA.  
• Insufficient evidence to conclude that CPM reduces DVT after TKA. |
| Hayes (2013) TKA and rotator cuff repair | Key points:  
• CPM may decrease pain and improve ROM following TKA and rotator cuff repair.  
• The authors endorsed CPM as adjunct to physical therapy after TKA and rotator cuff repair.  
• No definitive conclusions regarding DVT prophylaxis using CPM. |
| Du Plessis (2011) Rotator cuff repair | Key points:  
• Systematic review of three RCTs of unstated number of patients.  
• Multiple devices applied as CPM, inconsistency precluded meta-analysis. |
| Hegmann (2011) for the ACOEM TKA | Key points:  
• Organizational statement: Routine use of CPM postoperative TKA is not recommended. It may be useful for select, substantially physically inactive patients post-operatively. |
| Logerstedt (2010) for the APTA ACL repair | Key points:  
• Organizational statement: With specific regard to knee laxity and arthroplasty, CPM may benefit pain control post-operatively based on weak evidence. |
| Seida (2010) for AHRQ Rotator cuff repair | Key points:  
• Systematic review of 11 RCTs compared CPM with PT versus PT alone.  
• Provided only modest evidence for earlier return to work with CPM. |
| Viswanatha (2010) TKA | Key points:  
• Systematic review of nine RCTs inclusive of 724 patients.  
• Modest short-term improvements of ROM.  
• Knee function and long-term ROM were not impacted by CPM postoperative TKA. |
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<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
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<tbody>
<tr>
<td>Massy-Westropp (2008)</td>
<td>Key points:</td>
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<tr>
<td>Hand</td>
<td>• RCT of 22 patients.</td>
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<td></td>
<td>• Hand function and ROM post CPM in MCP arthroplasty unimproved.</td>
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<tr>
<td>Michlovitz (2004)</td>
<td>Key points:</td>
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<tr>
<td>Elbow</td>
<td>• Systematic review of 24 RCTs with 1,034 patients.</td>
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<td></td>
<td>• CPM improved ROM in elbow following arthrofibrosis release.</td>
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<td></td>
<td>• Data insufficient to make statements of benefit.</td>
</tr>
<tr>
<td>Cosgarea (1994)</td>
<td>Key points:</td>
</tr>
<tr>
<td>Knee</td>
<td>• Narrative review suggests CPM permits early post-operative motion.</td>
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<td>• CPM is considered a substitute for active PT.</td>
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**Glossary**

**Anticoagulant** — An agent that thins the blood to prevent coagulation (clotting).

**Arthrofibrosis** — Scar tissue within the joint space that limits movement and may be painful.

**Arthroplasty** — A catch-all term for reconstruction of a bony joint (e.g., total knee arthroplasty).

**Deep venous thrombosis (DVT)** — A blood clot (thrombus) that forms within the deep veins (typically of the lower extremities and pelvis) and may extend superiorly into the vena cava.

**Ligamentous knee reconstruction** — Knee surgery to correct laxity of the joint from injury to the ligaments inside the knee (e.g., anterior cruciate ligament).

**Metacarpophalangeal (MCP)** — Bones that make up the human forehand.

**Osteoarthritis (OA)** — Degenerative of joint cartilage and underlying bone most commonly resulting from advancing age or trauma.

**Pulmonary embolus (PE)** — A serious complication of DVT in which a piece of thrombus migrates through the blood stream to the lungs, where it cuts off circulation and oxygenation of the blood.

**Rheumatoid arthritis (RA)** — Autoimmune disease that manifests as joint discomfort, typically worsened with movement of the involved joint(s).

**Rotator cuff** — The group of muscles (scapulo-humeral) and tendons that stabilize the shoulder.

**Thromboembolic** — Referring to thrombus actively moving in the circulatory system.

**References**
Professional society guidelines/other:


Peer-reviewed references:


**Clinical trials:**

Searched Clinicaltrials.gov on June 7, 2015 using terms: Continuous passive motion| Open Studies. 16 studies found, 1 relevant.


**CMS National Coverage Determination (NCDs):**

“Continuous passive motion devices are devices covered for patients who have received a total knee replacement. To qualify for coverage, use of the device must commence within 2 days following surgery. In addition, coverage is limited to that portion of the 3-week period following surgery during which the device is used in the patient’s home. There is insufficient evidence to justify coverage of these devices for longer periods of time or for other applications.”

CMS Local Coverage Determinations (LCDs):

No LCDs identified as of the writing of this policy.

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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