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 15, 2015
Next Review Date: June 2016

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

Coverage Policy

Arbor Health Plan considers the routine use of Continuous Passive Motion (CPM) in the post-operative rehabilitation from total knee arthroplasty (TKA) 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:

Arbor Health Plan considers all other uses of CPM in the post-operative rehabilitation from TKA as not medically necessary.

Alternative Covered Services:

Policy contains:
- Continuous passive motion (CPM)
- Total knee arthroplasty (TKA)
- Deep vein thrombosis (DVT)
- Physical therapy
- Rehabilitation
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 total knee arthroplasty (TKA).

Continuous passive motion (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 range of motion, and functional difficulties in mobility or manipulation of the operated joint impact ambulation, deep venous thrombosis is a frequent complication of TKA. By promoting early mobility and functionality of the operated joint CPM may offer an effective prophylactic benefit to prevent deep venous thrombosis.

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.

**Methods**

**Searches:**

Arbor Health Plan searched PubMed and the databases of:

- Agency for Healthcare Research and Quality’s National Guideline Clearinghouse and other evidence-based practice centers.
- The Centers for Medicare & Medicaid Services.

Searches were conducted on June 19, 2015, using the terms "passive motion", "continuous passive motion" and "CPM."

Included were:

- 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.
Randomized controlled trials which are clinical trials of a therapeutic agent's efficacy, in which patients are randomly assigned to different treatment, placebo, or "gold standard" arms of a study.

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**

A consistent complication, in as many as 80% of patients who undergo total knee arthroplasty (TKA), is deep venous thrombosis (DVT). Fortunately, only 2% of these patients go on to develop pulmonary emboli (PE); but the potential catastrophic consequences of PE following TKA (and other procedures associated with physical immobility) has led to routine use of post-operative anticoagulant therapy and ambitious post-operative rehabilitation as prophylaxis against such outcome.

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

Another SR (He, 2012) found CPM has 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 of the review noted that there were 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 (Hayes, 2013) was unable to make a conclusive remark about DVT prophylaxis with CPM postoperative TKA or rotator cuff repair. 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 post-operative care of patients undergoing TKA (Hegmann, 2011). ACOEM suggested it may be useful in physically inactive patients.

A narrative review from the Orthopedic Section of the American Physical Therapist Association (Logerstedt, 2010) states that CPM may be beneficial in the control of post-operative pain for ligamentous knee reconstructive procedures (e.g., repair of anterior cruciate ligament).

The Agency for Healthcare Quality and Research (AHRQ) issued a statement on the effectiveness of CPM combined with physical therapy (PT) postoperatively in TKA versus postoperative PT alone (Seida, 2010). There was evidence of a modest benefit of CPM with regard to earlier return to work in patients receiving CPM.

An SR of 9 RCTs inclusive of 724 patients postoperative TKA showed short-term benefit in ROM was conferred by CPM, but longer-term outcomes of ROM and functionality of the knee joint were unimpacted (Viswanatha, 2010).
Cosgarea, et. al. (1994) suggest in a narrative review on knee surgery that continuous passive motion (CPM) can improve range of motion (ROM) in those patients undergoing surgical release of arthrofibrosis of the knee or manipulation of the knee under anesthesia. In these settings, CPM provides for early post-operative motion and is considered a substitute for active PT. These observations may be extended to other joints, such as the elbow, where arthrofibrosis is a common complication of trauma (Michlovitz, 2004). Unfortunately, in the latter SR, the data was insufficient to make statements of benefit and the investigators summarized by saying that "[t]he quality and quantity of evidence in this area is moderate to low."

Handoll et. al. (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.

One RCT of only 22 patients (Massy-Westropp, 2008) compared the effectiveness of post-operative therapeutic regimens for increasing hand function following metacarpophalangeal (MCP) arthroplasty in adults with rheumatoid arthritis. Results suggested that the use of CPM is not effective in increasing motion or strength after MCP arthroplasty.

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 are hamstrung by insufficient or suspect data.

Based on the available evidence, it appears 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.

### Summary of Clinical Evidence

<table>
<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
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| Harvey, 2014 | Key points:  
|             | • SR of 24 RCTs inclusive of 1,445 patients evaluated CPM application postoperative TKA  
|             | • CPM does not materially impact outcomes (i.e., range of motion, pain control, functionality, or quality of life)  
|             | • CPM reduces risk of adverse event (i.e., deep venous thrombosis) to very modest degree  
|             | • Authors concluded CPM does not have clinically important effects on active knee flexion ROM, pain, function or quality of life to justify its routine use. |
| He, 2014 | Key points:  
|             | • SR of 11 RCTs inclusive of 808 patients evaluated CPM as prophylaxis against DVT postoperative TKA  
<p>|             | • The results of meta-analysis showed no evidence that CPM had any effect on preventing DVT after TKA |</p>
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Key points:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hayes, 2013</td>
<td></td>
<td>• The available evidence is insufficient to conclude that CPM reduces DVT after TKA</td>
</tr>
<tr>
<td>Du Plessis, 2011</td>
<td></td>
<td>• SR of three RCT of unstated number of patients</td>
</tr>
<tr>
<td>Hegmann, 2011</td>
<td></td>
<td>• Routine use of CPM postoperative TKA is not recommended</td>
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<tr>
<td>Legerstedt, 2010</td>
<td></td>
<td>• With specific regard to knee laxity and arthroplasty: CPM may benefit pain control post-operative ACL repair</td>
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<tr>
<td>Seida, 2010</td>
<td></td>
<td>• SR of 11 RCTs compared CPM with physical therapy versus physical therapy alone</td>
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<tr>
<td>Viswanatha, 2010</td>
<td></td>
<td>• SR of 9 RCTs inclusive of 724 patients found modest short-term improvements of ROM</td>
</tr>
<tr>
<td>Massy-Westropp, 2008</td>
<td></td>
<td>• One RCT of only 22 patients found hand function post CPM in MCP arthroplasty unimproved</td>
</tr>
<tr>
<td>Handoll, 2006</td>
<td></td>
<td>• SR of 15 RCTs, 756 patients, found CPM confers improved hand function at one month</td>
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<tr>
<td>Michlovitz, 2004</td>
<td></td>
<td>• SR of 24 RCTs, 1034 patients, found improved ROM in elbow following arthrofibrosis release</td>
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<tr>
<td>Cosgarea, 1994</td>
<td></td>
<td>• CPM permits early post-operative motion</td>
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**Glossary**

**Adjunctive** – "In addition to"
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 joint disease of advancing age or traumatic cause, typically improved with movement of the involved joint(s)

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/others:

Hayes Inc., Hayes Medical Technology Report. Continuous passive motion for the treatment of joint contractures of the extremities. Lansdale, Pa. Hayes Inc.; August, 2013. https://www.hayesinc.com/subscribers/displaySubscriberArticle.do?articleId=12674&searchStore=%24search_type%3Dall%24icd%3D24keyword%3Dpassive%24motion%24treatment%24status%24Dall%24page%3D1%24from_date%3D24to_date%3D24report_type_options%3D24technology_type_options%3D24organ_system_options%3D24specialty_options%3D24order%3D24searchRelevance&sectionSelector=ExecutiveSummary#ExecutiveSummary Accessed June 21, 2015.


**Peer-reviewed references:**


**Clinical Trials:**

Searched clinicaltrials.gov on July 7, 2015 using terms factor continuous passive motion | Open Studies. 15 studies found, 1 relevant.


**Centers for Medicare and Medicaid Services (CMS) National Coverage Determination (NCD)**

No results returned with search

**Local Coverage Determinations (LCD)**

**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 in accordance with those manuals.

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