

Continuous Passive Motion (CPM) Devices in the Home Setting



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DESCRIPTION

Continuous passive motion (CPM) devices are used to keep a joint in motion without patient assistance. CPM is being evaluated for treatment and postsurgical rehabilitation of the upper- and lower-limb joints and for a variety of musculoskeletal conditions.

The device moves the joint (e.g., flexion/extension), without patient assistance, continuously for extended periods of time (i.e., up to 24 hours/day). An electrical power unit is used to set the variable range of motion (ROM) and speed. The initial settings for ROM are based on a patient's level of comfort and other factors that are assessed intraoperatively. The ROM is increased by 3 to 5 degrees per day, as tolerated. The speed and ROM can be varied, depending on joint stability. The use of the devices may be initiated in the immediate postoperative period and then continued at home for a variable period of time.

Over time, hospital lengths of stay have progressively shortened and in some cases, surgical repair is done as an outpatient or with a length of stay of one to two days. As a result, there has been a considerable shift in the rehabilitation regimen, moving range of motion an intensive in-hospital program to a less intensive outpatient program. Some providers may want patients to continue continuous passive motion in the home setting as a means of duplicating services offered with a longer (7-day) hospital stay.

Physical therapy (PT) of joints following surgery focuses both on passive motion to restore mobility and active exercises to restore strength. While passive motion can be administered by a therapist, CPM devices have also been used. Continuous passive motion (CPM) is thought to improve recovery by stimulating the healing of articular tissues and circulation of synovial fluid; reducing local edema; and preventing adhesions, joint stiffness or contractures, or cartilage degeneration. CPM has been most thoroughly investigated in the knee, particularly after total knee arthroplasty (TKA) or ligamentous or cartilage repair. Acceptance of its use in the knee joint has created interest in continuous passive motion use for other weight-bearing joints (i.e., hip, ankle, metatarsals) and non-weight-bearing joints (i.e., shoulder, elbow, metacarpals, interphalangeal joints). Use of CPM in stroke and burn patients is also being explored.

Continuous Passive Motion (CPM) for the Knee

Clinical Context and Therapy Purpose

The purpose of continuous passive motion (CPM) in the home setting in individuals with total knee arthroplasty or articular cartilage repair of the knee is to provide a treatment option that is an alternative to or an improvement on existing therapies.

Populations

The relevant population(s) of interest are individuals with total knee arthroplasty or an articular cartilage repair of the knee.

Interventions

The therapy being considered is continuous passive motion (CPM).

Comparators

The following therapies are currently being used for total knee arthroplasty: Physical therapy alone or standard of care, if unable to tolerate physical therapy.

Outcomes

The general outcomes of interest are symptoms and functional outcomes.

Evidence Review

Most research on continuous passive motion (CPM) has been as a postoperative treatment for total knee arthroplasty (TKA). Numerous randomized controlled trials (RCTs) have been performed comparing CPM as an adjunct to physical therapy (PT) for patients undergoing TKA. Early trials generally used CPM in the inpatient setting and are less relevant to today's practice patterns of short hospital stays followed by outpatient

rehabilitation or outpatient surgery followed by outpatient rehabilitation. Current postoperative rehabilitation protocols are considerably different than when the largest body of evidence was collected, making it difficult to apply the available evidence to the present situation.

Based on review of the evidence on total knee replacement that includes several RCTs and a large Cochrane review with a body of evidence extending back to the 1980's. The systematic reviews identified described limited clinical usefulness for CPM in rehabilitation after knee surgery and described the quality of the evidence as low. The Cochrane review by Harvey et. al. 2014 included 24 RCTs with 1,445 patients and described the effects of CPM on outcomes after total knee replacement such as range of motion, function, pain, and quality of life as “not clinically important.”

With respect to reducing deep-venous thrombosis after total knee replacement, the systemic review by He et. al. concluded the evidence is insufficient to determine a benefit from using CPM. This review included 11 RCTs with 808 patients. The results of the meta-analysis showed no evidence that CPM had any effect on preventing venous thrombosis after total knee replacement.

Continuous passive motion (CPM) is also commonly used postoperatively following articular cartilage repair surgery. Unfortunately, the clinical evidence to support the use of CPM is lacking (only 4 clinical studies) and despite the overwhelming abundance of basic science support and the common clinical practice of the use of CPM postoperatively the study results were heterogeneous and were considered low-quality evidence of any benefit from CPM when used after these procedures. Further randomized controlled trials are needed comparing the use of CPM in patients undergoing the same cartilage restoration procedure with patients treated without CPM and only active ROM which would provide high-quality clinical outcome research on which to base postoperative decisions. Also, based on the literature changes in clinical practice have occurred over time which is allowing weight bearing as tolerated immediately following cartilage repair with a gradual increase to full weight bearing at 8 weeks which has been reported to safely improve pain, function, and activity compared to more conservative progression with no increase of complications as of 3 months post operation. Studies also support the need for some degree of compressive loading in addition to joint motion for successful cartilage healing.

The literature suggests that institutional and home use of CPM has minimal benefit alone or when combined with standard PT after TKA, TKA revision or intra-articular cartilage repair. For patients who are unable to participate in standard PT regimens (due to low postoperative mobility or inability to comply with rehabilitation exercises), CPM remains as an alternative PT modality.

A Hayes Technology Assessment published March 2018, and last updated and reviewed March 2022 on continuous passive motion for knee indications found the following:

- For total knee arthroplasty (TKA) the evidence review is moderate for outcomes related to range of motion (ROM), function and quality of life (QOL) with the finding that there is no significant benefit with the use of continuous passive motion (CPM) compared with physical therapy alone.
- For the use of continuous passive motion (CPM) after ACL repair the quality of evidence is low and suggests there is no benefit related to range of motion (ROM), function, swelling and quality of life (QOL).

The American Physical Therapy Association (APTA) issued guidelines in 2014 but are proprietary and cannot be accessed. The APTA released a Choosing Wisely initiative in 2014 and was last reviewed 2021 that states “Don’t use continuous passive motion machines for the postoperative management of patients following uncomplicated total knee replacement.”

Summary of Evidence

Based on review of the peer reviewed medical literature while it may report an improvement in range of motion (ROM) for individuals receiving continuous passive motion (CPM), these improvements are short term, of small magnitude, and of uncertain clinical significance. No randomized controlled trials (RCTs) have reported clinically meaningful improvements in important clinical outcomes such as range of motion (ROM), functional status and/or quality of life (QOL) for those who used CPM in adjunct to physical therapy following TKA, TKA revision, or articular cartilage repair surgery. A Hayes Technology Assessment last completed March 2022 on continuous passive motion (CPM) for knee indications which includes TKA and ACL repair, provides that the quality of evidence is moderate regarding the use of CPM post TKA in which there is no significant benefit with the use of CPM compared with physical therapy alone and the quality of evidence is low regarding CPM post ACL repair in showing there is no benefit to range of motion, function, swelling and quality of life. Continuous passive motion (CPM) has not been proven to provide equivalent or superior benefit compared to conventional physical therapy.

The literature suggests that institutional and home use of CPM has minimal benefit alone or when combined with standard physical therapy (PT) after TKA, TKA revision or intra-articular cartilage repair. For individuals who are unable to participate in standard PT regimens (due to low postoperative mobility or inability to comply with rehabilitation exercises), CPM remains as an alternative PT modality.

Continuous Passive Motion (CPM) for Other Musculoskeletal Conditions

Clinical Context and Therapy Purpose

The purpose of continuous passive motion in the home setting in individuals with musculoskeletal conditions other than total knee arthroplasty or knee cartilage repair requiring physical therapy is to provide a treatment option that is an alternative to or an improvement on existing therapies.

Populations

The relevant population(s) of interest are patients with musculoskeletal conditions other than total knee arthroplasty or knee cartilage repair requiring physical therapy.

Interventions

The therapy being considered is continuous passive motion.

Comparators

The following therapies are currently being used for musculoskeletal conditions other than total knee arthroplasty or knee cartilage repair requiring physical therapy: standard of care.

Outcomes

The general outcomes of interest are symptoms and functional outcomes.

Rotator Cuff Repair

Two randomized controlled trials (RCTs) (2010 and 2011) of continuous passive motion (CPM) following rotator cuff surgery were identified. These trials reported short-term improvements in range of motion (ROM) for patients undergoing CPM, and one reported a short-term reduction in pain. Neither reported long-term improvements or benefits of functional status. Therefore, the clinical significance of the short-term improvements reported is uncertain. In addition, there is uncertainty about the optimal PT (physical therapy) after shoulder surgery, and so the optimal comparator for CPM is not clear. The available published peer reviewed literature does not support the use of CPM postoperatively following rotator cuff repair.

Adhesive Capsulitis of the Shoulder

Dundar et. al. compared continuous passive motion (CPM) with physical therapy (PT) in a randomized trial of 57 patients with adhesive capsulitis (frozen shoulder). CPM or PT was provided for 1 hour a day (5 days/week) for 4 weeks. Pain and function levels were similar in the 2 groups at baseline, with VAS (visual analog) scores for pain ranging from 5.44 (at rest) to 6.34 (with movement). Assessments at baseline, 4, and 12 weeks showed reductions in pain and improvements in function levels for both groups. However, CPM resulted in greater pain reduction than PT (at rest, 47% vs 25%; with movement, 35% vs 21%; at night, 36% vs 19%, all respectively). There were no differences between groups in ROM (range of motion) or function. This trial provided modest support for the inclusion of CPM in a PT regimen for this patient population.

A randomized controlled trial (RCT) by Ekim et. al. (2016) compared continuous passive motion (CPM) (n=20) with physical therapy (PT) (n=21) for the treatment of adhesive capsulitis in patients who had diabetes. CPM or PT was provided for 1 hour a day (5 days/week) for 4 weeks. All patients received electrotherapy and, after the 4-week initial treatment phase, were instructed to continue with an 8-week at home exercise program. Outcome measures were pain (at rest, in motion, at night) and range of motion (ROM) (active and passive). Pain decreased significantly in both treatment groups, though

patients in the CPM group reported a larger improvement in pain scores than those in the PT group. ROM improved significantly in both treatment groups as well. Patients in the CPM group reported larger improvements in abduction and flexion measures than patients in the CPM group, while external and internal rotation improvements were similar across groups.

In a Hayes Technology Assessment completed in May 2018 and last updated and reviewed May 2022 on continuous passive motion devices for the shoulder that included individuals using continuous passive motion (CPM) after rotator cuff repair and for adhesive capsulitis. The CPM was used in addition to standard physical therapy (PT). It is unclear whether CPM provides any benefit over immobilization, manual passive mobilization and/or other rehabilitative protocols. The optimal frequency and duration of CPM for these indications is also not clear.

- A small-sized body of evidence may suggest that CPM following rotator cuff repair is safe and may provide improvement in range of motion (ROM) and pain over conventional physical therapy (PT), however the quality of evidence is low and additional randomized controlled trials (RCTs) studies with sufficient size, design and duration are warranted to prove the clinically significant benefits of CPM when added to PT. Without these additional well-designed studies, it is difficult to draw definitive conclusions.
- The body of evidence on the use of CPM as an adjunct treatment to physical therapy for the treatment of adhesive capsulitis is small and the quality of evidence is very low.
- No randomized controlled trials (RCTs) were found for other conditions such as shoulder arthroplasty. Additional well-designed studies are required to determine if CPM is valuable in decreasing the prevention or treatment of contracture for shoulder indications.

Hip Osteoarthritis

Continuous passive motion (CPM) is often used in the early post-operative rehabilitation following hip surgery (total hip arthroplasty) or hip arthroscopy. Per review of the peer reviewed medical literature no prospective, controlled data currently exists about whether CPM provides a measurable benefit to patients following hip surgery (total hip arthroplasty) or hip arthroscopy. Randomized controlled trials (RCTs) comparing CPM to conventional physical therapy (PT) to include large patient populations with long term follow-up are needed to determine whether the use of CPM for the hip following hip surgery or hip arthroscopy shows clinically meaningful improvements in net health outcomes. The American Academy of Orthopaedic Surgeons (AAOS) guidelines do not mention or indicate the use of CPM in the treatment of osteoarthritis of the hip or as a preventative measure in preventing venous thromboembolic disease in patients undergoing elective hip arthroplasty. The available published peer reviewed literature does not support the use of CPM postoperatively for the hip for any indication.

Elbow Contracture

Postoperative management of open elbow contracture release with continuous passive motion (CPM) was assessed in a matched cohort study by Lindenhovius et. al. Sixteen patients who had used CPM after open contracture release and 16 patients who had not were matched by age, sex, diagnosis, range of motion (ROM) and radiographic appearance. Improvements in ROM did not differ between groups at the early range of 4-10 months and the final range of 11–56-month evaluation. The authors concluded the matched retrospective data did not demonstrate a benefit of CPM in the postoperative management of elbow contracture release.

Based on a review by Viveen et.al. (2017) to date there have been no prospective randomized trials comparing rehabilitation protocols after surgery release of stiff elbow. Based upon current scientific literature, there is no clear preference for one of the treatments over the other (CPM or PT) regarding the increase of ROM after surgery. CPM in elbow surgery may be redundant as well as in other joints, the use of CPM as a post treatment seems ineffective and unnecessary.

Wrist and Ankle Repair

There is a scarcity of peer reviewed evidence on the use of continuous passive motion (CPM) postoperatively for the wrist and ankle. Randomized controlled trials (RCTs) comparing the use of CPM to physical therapy (PT) to improve range of motion are needed to determine whether the use of CPM provides clinically meaningful improvements in net health outcomes. The available published peer reviewed literature does not support the use of CPM postoperatively.

Summary of Evidence

Based on review of the peer reviewed medical literature, there is limited published high-quality evidence for use of continuous passive motion (CPM) in joints other than the knee including but not limited to the hip, ankle, shoulder, elbow, wrist. The evidence includes a few randomized controlled trials (RCTs) for some conditions and case series for others. Based on review of the literature there may be some evidence that use of CPM may improve short term pain and range of motion (ROM), however, these improvements are short term, of small magnitude, and of uncertain clinical significance. Larger randomized controlled trials (RCTs) comparing the use of CPM to physical therapy (PT) to include longer follow-up are required to determine whether the use of CPM in joints other than the knee shows clinically meaningful improvements in net health outcomes. A Hayes Technology Assessment last updated and reviewed May 2022 on continuous passive motion devices for the shoulder states additional randomized controlled trials (RCTs) studies with sufficient size, design and duration are warranted to prove the clinically significant benefits of CPM when added to PT. Without these additional well-designed studies, it is difficult to draw definitive conclusions. The available published peer reviewed literature does not support the use of CPM postoperatively.

Practice Guidelines and Position Statements

American Academy of Orthopaedic Surgeons (AAOS)

In 2020, the American Academy of Orthopaedic Surgeons (AAOS) updated their evidence based clinical practice guideline for the management of rotator cuff injuries this guideline does not mention or indicate the use of continuous passive motion (CPM) postoperatively.

Supervised Exercise versus Unsupervised Exercise

In the absence of reliable evidence, it is the opinion of the work group that supervised physical therapy is more appropriate than unsupervised home exercise for some patients following rotator cuff repair. (Consensus Recommendation)

In 2017, the American Academy of Orthopaedic Surgeons (AAOS) evidence based clinical practice guideline on the management of osteoarthritis of the hip does not mention or indicate the use of continuous passive motion postoperatively. The guideline states the following: “moderate evidence supports the use of post-operative physical therapy because it could improve early function to a greater extent than no physical therapy management for patients with symptomatic osteoarthritis of the hip who have undergone total hip arthroplasty.”

In 2016, the American Academy of Orthopaedic Surgeons (AAOS) issued an evidence based clinical practice guideline for the management of carpal tunnel syndrome. This guideline does not mention or indicate the use of continuous passive motion (CPM) postoperatively.

In 2016, the American Academy of Orthopaedic Surgeons (AAOS) issued an evidence based clinical practice guideline for the surgical management of osteoarthritis of the knee which states: “Continuous Passive Motion: Strong evidence supports that CPM after knee arthroplasty (KA) does not improve outcomes. Strength of recommendation: Strong Recommendation.”

In 2015, the American Academy of Orthopaedic Surgeons (AAOS) issued an evidence based clinical practice guideline on the management of glenohumeral joint osteoarthritis. This guideline does not mention or indicate the use of continuous passive motion (CPM) postoperatively.

In 2015, the American Academy of Orthopaedic Surgeons (AAOS) issued an evidence based clinical practice guideline on the management of anterior cruciate ligament injuries. This guideline states the following regarding post-op physical therapy: “For those undergoing post-operative rehabilitation after ACL reconstruction, moderate evidence supports early, accelerated, and non-accelerated protocols because they have similar outcomes.” This guideline does not mention or indicate the use of continuous passive motion (CPM) postoperatively.

In 2011, the American Academy of Orthopaedic Surgeons (AAOS) issued an evidence based clinical practice guideline on preventing venous thromboembolic disease in patients undergoing elective hip and knee arthroplasty, this guideline does not mention or indicate the use of continuous passive motion (CPM) postoperatively.

Regulatory Status

CPM devices are considered class I devices by the FDA and are exempt from 510(k) requirements. This classification does not require submission of clinical data regarding efficacy but only notification of the FDA before marketing.

PRIOR APPROVAL

Not applicable.

POLICY

Note: If the continuous passive motion (CPM) device is determined to be medically necessary, the continuous passive motion (CPM) device is payable only as rental equipment for 30 days following surgery.

Continuous Passive Motion (CPM) Device for the Knee (E0935)

The use of continuous passive motion (CPM) device in the home setting may be considered **medically necessary** in the below situations as an alternative to physical therapy (PT) when the individual has low postoperative mobility or inability to comply with rehabilitation exercises (this may include individuals with complex regional pain syndrome (reflex sympathetic dystrophy); extensive arthrofibrosis or tendon fibrosis; or physical, mental, or behavioral inability to participate in active physical therapy):

- Following total knee arthroplasty (TKA) (replacement or revision) or following partial knee replacement; **or**
- Following intra-articular cartilage repair procedures of the knee (e.g., microfracture, osteochondral grafting, autologous chondrocyte implantation, treatment of osteochondritis dissecans, repair of tibial plateau fractures, ACL reconstruction)

Note: The literature suggests that institutional and home use of continuous passive motion (CPM) has minimal benefit alone or when combined with standard physical therapy (PT) after total knee arthroplasty (TKA), total knee arthroplasty (TKA) revision or intra-articular cartilage repair. For patients who are unable to participate in standard physical therapy (PT) regimens (due to low post-operative mobility or inability to comply with rehabilitation exercises), continuous passive motion (CPM) remains as an alternative physical therapy (PT) modality.

All other uses for continuous passive motion (CPM) device in the home setting for any condition of the knee other than described above is considered **not medically necessary**,

because the available published peer reviewed literature does not support the use of continuous passive motion (CPM) postoperatively as continuous passive motion (CPM) has not been proven to provide equivalent or superior benefit compared to conventional physical therapy.

Duplicate Rehabilitative Therapy

Duplicate rehabilitative therapy is considered **not medically necessary**. When individuals are receiving physical therapy, the therapist should provide different treatments and not duplicate the same treatment (i.e., continuous passive motion (CPM) provides ROM (range of motion) and physical therapy (PT) protocols also typically provide range of motion (ROM) treatment/services).

Continuous Passive Motion (CPM) Device for Other than the Knee (E0936)

The use of continuous passive motion (CPM) device in the home setting for any joint other than the knee including but not limited to the hip, ankle, shoulder, elbow and wrist is considered **not medically necessary**, because the available published peer reviewed literature does not support the use of continuous passive motion (CPM) postoperatively as continuous passive motion (CPM) has not been proven to provide equivalent or superior benefit compared to conventional physical therapy (PT).

PROCEDURE CODES AND BILLING GUIDELINES

To report provider services, use appropriate CPT* codes, Alpha Numeric (HCPCS level 2) codes, Revenue codes, and/or ICD diagnosis codes.

- E0935 Continuous passive motion exercise device for use on knee only
- E0936 Continuous passive motion exercise device for use other than knee

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POLICY HISTORY

Date	Reason	Action
July 2022	Annual Review	Policy Renewed
July 2021	Annual Review	Policy Renewed
July 2020	Annual Review	Policy Renewed
July 2019	Annual Review	Policy Revised
August 2018	Annual Review	Policy Revised
August 2017	Annual Review	Policy Renewed
August 2016	Annual Review	Policy Renewed

March 2016	Interim Review	Policy Revised
September 2015	Annual Review	Policy Revised
October 2014	Annual Review	Policy Revised
October 2013	Annual Review	Policy Renewed
December 2012	Annual Review	Policy Renewed
December 2011	Annual Review	Policy Renewed
December 2010	Annual Review	Policy Renewed

New information or technology that would be relevant for Wellmark to consider when this policy is next reviewed may be submitted to:

Wellmark Blue Cross and Blue Shield
 Medical Policy Analyst
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