

Continuous Passive Motion (CPM) Devices

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Introduction

Continuous Passive Motion (CPM) devices are addressed by this guideline.

Health Equity Consideration

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

Criteria

Continuous Passive Motion Device (Knee)

A **Continuous Passive Motion (CPM) device** (HCPCS E0935) is medically necessary when **all** of the following apply:

- There is documentation the individual had surgery on the knee(s) and the device will be used to improve range of motion due to **one** of the following:
 - The individual is unable to do active physical therapy because it is not safe, could cause problems, or is not possible.
 - The individual has a medical or surgical complication that does not allow for early mobilization or rehabilitation.
- The individual will start using the passive motion device no more than two days after the surgery.
- The individual will use the passive motion device for a maximum of 21 days.

Continuous Passive Motion Device (Joint other than the knee)

A **Continuous Passive Motion device** (HCPCS E0936) is medically necessary when **all** of the following apply:

- There is documentation the individual had surgery on a joint in the upper extremity and the device will be used to improve range of motion due to **one** of the following:
 - The individual is unable to do active physical therapy because it is not safe, could cause problems, or is not possible.
 - The individual has a medical or surgical complication that does not allow for early mobilization or rehabilitation.
- The individual will start using the passive motion device no more than two days after the surgery.
- The individual will use the passive motion device for a maximum of 21 days.

Not Covered

- Continuous passive motion (CPM) devices are considered not medically necessary for all other indications.
- An accessory bluetooth device used to augment physical therapy sessions in the home does not meet the definition of durable medical equipment (DME). Examples of such devices include: ROMTech PortableConnect[®] and ROMTech AccuAngle[®].

Definitions

Continuous Passive Motion (CPM) is a motorized device designed to passively flex and extend a joint along a prescribed plane of movement to aid in recovery following surgery or injury.

Total Knee Replacement (also known as Total Knee Arthroscopy) is an orthopedic surgery during which the articular surfaces of the knee (distal femoral condyles and proximal tibial plateau) are replaced with metal and/or plastic parts.

Arthrofibrosis of the knee is a post-operative limitation of range of motion (stiffness) resulting from inflammation and scar tissue formation following TKR, anterior cruciate ligament (ACL) reconstruction, other surgical procedure, or traumatic injury of the knee (Reddy et al., 2024). Treatments include manipulation under anesthesia, arthroscopic lysis of adhesions, and revision knee replacement.

Evidence Discussion

Medical background

In the late 1970s and early 1980s, animal and human studies began to assess the effectiveness of using continuous passive motion (CPM) devices after surgical procedures to help patients achieve earlier redevelopment of range of motion, decreased post-operative pain, and decreased post-operative complications (Mangine et al., 2006).

The United States Food and Drug Administration (FDA) considers continuous passive motion machines to be exempt Class I devices. As such, it is not required for manufacturers to submit clinical efficacy data. Manufacturers must only notify the FDA prior to marketing (FDA, 2024). Most manufacturers offer CPMs for the knee, elbow, shoulder, and hand. In the United States, CPMs are available from many manufacturers, including Chattanooga®, Furniss, Kinetec®, and Kinex.

Literature review

CPM use following Total Knee Replacement (TKR):

- Yang et al. (2021) conducted a systematic review and meta-analysis of 10 randomized controlled trials and evaluated the effectiveness of CPM compared with standard rehabilitation for clinical outcomes after TKR. The authors concluded that, although there was a statistically significant difference in one- and twelve-week post-operative passive knee extension in the CPM group compared with the standard rehabilitation group, the improvements were not considered clinically relevant. Thus, the authors noted a limited role for CPM in individuals after TKR as standard post-operative care.
- A systematic review by Liao et al. (2019) including 77 randomized controlled trials evaluated the clinical efficacy of CPM following TKR. The authors reported moderate evidence indicating that post-operative CPM therapy exerted significant short-term effects on treatment success rate, pain, and knee range of motion (ROM), and a long-term effect on functional recovery in individuals with arthritis. The study found that early CPM initiation with rapid progress over a long duration of CPM application predicts higher treatment effect on knee ROM and function.
- A systematic review and meta-analysis of 39 randomized studies evaluated drug-free interventions to reduce pain and/or opioid consumption after TKR. Nineteen studies were identified which evaluated the use of CPM. The authors found low certainty to very low certainty evidence that CPM had no significant effect upon either post-operative pain or opioid consumption (Tedesco et al., 2017).
- A Cochrane systematic review (Harvey et al., 2014) including 24 randomized controlled trials with 1,445 participants evaluated CPM following TKR in individuals with arthritis. The authors concluded that there is low- to moderate-quality evidence

that CPM does not have clinically important short-term effects on active knee flexion ROM, pain, function, or quality of life to justify its routine use following TKR.

- A Cochrane review and meta-analysis conducted by He et al. (2014) including 11 randomized controlled trials and 808 participants evaluated the effectiveness of CPM to prevent venous thromboembolism (VTE) after TKR. Five studies with a total of 405 individuals reported the incidence of deep vein thrombosis (DVT). In the CPM group, 36 out of 205 participants developed DVT (18%), compared to 29 out of 200 individuals (15%) in the control group. One trial did not find pulmonary embolism (PE) in any of the participants during hospitalization or in the subsequent three months. PE was not reported in the other included studies. The authors concluded that CPM does not have a significant effect on preventing VTE after TKR. In addition, the authors noted that these results are supported by only a small number of studies, most of which are of low- to moderate-quality.
- Wirries et al. (2020) reported on a randomized controlled trial assessing the impact of CPM on early rehabilitation and long-term effects. Following TKR, 40 post-operative patients were randomized to receive standard manual therapy alone or standard manual therapy with CPM. At the time of discharge and two years post-operatively, passive range of movement (PROM), patient satisfaction, and knee function were evaluated using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and the Knee Society Score (KSS). At the time of discharge, the patients with CPM reached a significantly higher flexion and PROM. At two-year follow-up, no significant difference was observed between groups. The authors concluded that the addition of CPM significantly improved knee flexion in the early post-operative stage; however, the addition of CPM did not result in clinically meaningful long-term anatomical and functional effects following TKR.
- Gil-Gonzalez et al. (2022) randomized 210 patients after TKR to assess whether the use of CPM could improve ROM, affect surgical wound healing, and influence pain management. Variables such as knee ROM and pain were measured before surgery; on the 1st, 2nd, and 3rd post-operative day; and in the 2nd, 6th, 12th, and 24th post-operative weeks following TKR. No significant differences between groups were found in knee ROM, wound healing parameters, or pain. Although the study did not find significant clinical improvement in ROM, knee flexion, surgical wound appearance, or pain level when CPM was added to the post-operative treatment of TKR, the authors noted the group that received CPM had a decreased risk of post-operative hematoma.
- Yang et al. (2021) conducted a systematic review including 10 randomized controlled trials to identify the effect of CPM application on clinical outcomes after TKR. The authors noted that most of the studies demonstrated similar outcomes between CPM and noncontinuous passive motion groups. The active knee extension at one week, passive knee extension at one week, and passive knee extension at three

months were shown to be slightly different between the two groups. The investigators concluded that there is limited role of CPM in patients after TKR.

CPM use following Intra-Articular Repair of the knee:

- CPM devices may be used post-operatively for individuals undergoing knee cartilage surgery. Early animal studies demonstrated that CPM use prevented adhesions, significantly reduced the incidence of late posttraumatic arthritis, and significantly increased the strength of medial collateral ligament repair at six and 12 weeks (Salter et al., 1984).
- Karnes et al. (2013) conducted a systematic review to examine the use of CPM as part of post-operative protocols for cartilage repair and restoration surgery of the knee. Sixty-three studies reported the use of CPM following autologous chondrocyte implantation; 28 reported the use of CPM following microfracture; 13 reported the use of CPM following osteochondral autograft; and 15 reported the use of CPM following osteochondral allograft. The majority of studies did not report standardized post-operative CPM protocols or common variables such as the duration of CPM therapy, the initiation of CPM therapy, and the initial range of motion used. The authors concluded that consistent protocols, variables, and parameters for CPM use following cartilage restoration procedures were not clearly established.
- D'Amore et al. (2021) conducted a systematic review of 12 studies and examined the application of CPM after anterior cruciate ligament reconstruction (ACLR) with respect to knee ROM, knee swelling, post-operative pain, and post-operative complications. There was no evidence of CPM improving knee stability, final post-operative ROM, or subjective pain scores. Additionally, CPM did not lead to decreased muscle atrophy or improved International Knee Documentation Committee scores. Regarding pain medication intake during post-operative hospitalization, two studies found that the CPM group used less pain medication, one study found that the CPM group used more pain medication, and one study found that there was no difference between the two groups. The authors noted a number of studies that suggested CPM use may be associated with lower usage of pain medication in hospitalized patients; however, the authors noted that future studies with larger sample sizes are needed to validate these findings. The authors concluded that routine CPM use after ACLR was not supported by this systematic review.
- Wright et al. (2015) conducted a systematic review to guide development of a rehabilitation protocol after ACLR. The Multicenter Orthopaedic Outcomes Network (MOON) is a collection of orthopedic surgeons who have developed a prospective longitudinal cohort of ACLR patients. The authors identified six randomized controlled trials that evaluated the use of CPM. The authors concluded that no long-term benefits for range of motion were determined for CPM after ACLR.

- Andrade et al. (2020) conducted a systematic review evaluating six clinical practice guidelines (CPGs) for rehabilitation after ACLR. Two CPGs reviewed the use of CPM. One guideline recommended against CPM, and the other stated that CPM may be used in the immediate post-operative period. The authors concluded that early full weight-bearing exercises, early open and closed kinetic-chain exercises, cryotherapy, and neuromuscular electrostimulation may be used according to individual circumstances.
- Bram et al. (2019) conducted a retrospective cohort study including 163 pediatric individuals (ages less than 20 years old) who underwent primary ACLR. Clinically significant arthrofibrosis was defined as reduced knee flexion requiring manipulation under anesthesia (MUA) within six months of surgery. There was no significant difference between cohorts in ROM, or pain scores at the one-week, one-month, three-month, and six-month time points. At three and six months, neither quadriceps nor hamstrings strength differed significantly between cohorts. Four individuals in the no-CPM cohort required MUA for arthrofibrosis within six months of surgery, while no individuals in the CPM cohort required MUA. The authors concluded that CPM use may reduce arthrofibrosis requiring MUA in pediatric individuals after ACLR. The authors noted that future research may more clearly explain the clinical utility and cost-effectiveness of CPM in rehabilitation after ACLR.

CPM use for joints other than the knee:

- Jain & Sharma (2014) conducted a systematic review to evaluate the evidence for physical therapy interventions in the treatment of frozen shoulder/adhesive capsulitis. In one randomized prospective study for adhesive capsulitis of the shoulder, the intervention group received one hour of CPM, and the control group received one hour of conventional physical therapy. After 20 treatments over four weeks, the intervention group had less pain. This outcome did not translate to improved function or ROM. The authors concluded that CPM is recommended for short-term pain relief, but not for improving ROM or function.
- A systematic review by Massy-Westropp et al. (2008) compared the efficacy of different therapeutic programs following metacarpophalangeal arthroplasty. Most evidence consisted of case studies and case series. The lone controlled clinical trial identified was of poor quality and suggested that CPM alone is not recommended for increasing motion or strength after metacarpophalangeal arthroplasty.
- Thomson et al. (2016) conducted a systematic review to evaluate the optimal postsurgical options for rehabilitation following surgical repair of the rotator cuff. The review included three randomized controlled trials that examined the use of CPM for rehabilitation after rotator cuff repair. One study reported a short term improvement in ROM and pain levels using a CPM for two hours per day compared to passive, self-assisted exercises alone. However, two studies did not

find any long term benefits with CPM use. The authors concluded that, compared with passive ROM exercises, CPM offered no long-term benefits.

- A comparative effectiveness review by Seida et al. (2010) identified three studies that evaluated the effect of CPM with physical therapy versus physical therapy alone for individuals undergoing rehabilitation following a rotator cuff repair. Results did not indicate a statistically significant difference in function. However, the authors reported moderate evidence that the use of a CPM device facilitated an earlier return to work. Thus, the authors concluded that CPM may improve recovery over the short term.
- Shirzadi et al. (2020) conducted a randomized clinical trial including 21 participants to examine whether applying CPM in addition to routine exercises is more effective than routine exercises alone in pain reduction, ROM, and functional improvement after distal radius fracture (DRF). The primary outcome measure was pain evaluated on a visual analog scale, and the secondary outcome measures were patient-rated wrist/hand disability and ROM (goniometry) at 4, 6, and 12 weeks. No significant differences were found between the two groups at the end of the follow-up period regarding pain, ROM, and function. The authors concluded that using a CPM had no additional effect on pain reduction, ROM, and function improvement compared with routine exercises in patients with DRF.
- A randomized controlled trial (O'Driscoll et al., 2022) examined the use of CPM compared with physical therapy (PT) for rehabilitation following arthroscopic release of elbow contracture. Fifty one participants were randomly assigned to a rehabilitation protocol involving either CPM or PT. The primary outcomes were the rate of recovery and the arc of elbow motion at one year. The rate of recovery was evaluated by measuring range of motion at six weeks, three months, and one year. The secondary outcomes included other ROM-related outcomes, patient-reported outcome measures, flexion strength and endurance, grip strength, and forearm circumference at multiple intervals. Notably, the CPM group had greater ROM compared to the PT group at six weeks, three months, and one year. The percentage of lost motion recovered at one year was higher in the CPM group (51%) than in the PT group (36%). The probability of restoring a functional ROM at one year was 62% higher in the CPM group than in the PT group. Patient-reported outcome measure scores were similar in the two groups at all intervals, except for a difference in the American Shoulder and Elbow Surgeons elbow function subscale, in favor of CPM, at six weeks. The use of CPM decreased swelling and reduced the loss of flexion strength, flexion endurance, and grip strength on day three, with no between-group differences thereafter. The authors concluded that patients may benefit from post-operative CPM after arthroscopic release of elbow

contracture to assist with recovery, restore function, and improve elbow ROM at one year.

Professional Organizations/Societies:

- In 2016, an American Academy of Orthopaedic Surgeons (AAOS) clinical practice guideline and case report outlined a post-operative management protocol after TKR (Weber et al., 2016). This case report described an uncomplicated post-operative course that included rehabilitation and supportive measures without use of a CPM device. An evidence-based AAOS clinical practice guideline reported moderate to strong evidence that CPM after TKR does not improve outcomes (McGrory et al., 2016). The 2022 AAOS clinical practice guideline update did not make a recommendation on the use of continuous passive motion after TKR.
- A national specialty society guideline from The American Physical Therapy Association (APTA) recommended that CPM not be used for the post-operative management of individuals following uncomplicated TKR. However, the review suggested that CPM may be helpful if an individual has medical or surgical complications that do not allow for either early mobilization or rehabilitation. In addition, it is noted that CPM may also be beneficial for individuals with an inability to fully participate in active rehabilitation, for example, if the individual has a traumatic brain injury or pain intolerance (White et al., 2015). The APTA published an updated guideline in 2020. The guideline presented moderate evidence that physical therapists should not use CPMs for individuals who have undergone primary, uncomplicated TKR (Jette et al., 2020).

Coding

The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.

CPT/HCPCS	Description
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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