

Dynamic Joint Extension and Flexion Orthoses

DME.MU.202.A

v1.0.2025

Introduction

- Dynamic upper extremity orthoses covered in this guideline include: shoulder, shoulder-elbow, shoulder-elbow-wrist-hand, elbow, elbow-wrist-hand, elbow-wrist-hand-finger, wrist-hand-finger, wrist-hand, hand-finger, finger, and lower extremity.

Criteria

A **dynamic upper or lower extremity orthosis** is indicated for **both** of the following:

- The individual has limited joint range of motion or joint stiffness due to **any** of the following indications:
 - Injury or surgery.
 - Compression of peripheral nerves in the limb.
 - Arthritis.
 - Inflammation of the tendons around the joint.
 - Muscle weakness in the limb.
 - Contracture of a joint.
 - Spasticity.
- The dynamic brace will be used along with exercise and the brace will be adjusted to support changes in the joint range of motion.

Replacement Criteria

- Same or Similar Durable Medical Equipment
 - Duplication of the same or similar orthoses within the same case is not medically necessary
- A Replacement orthosis is indicated when **all** of the following apply:
 - The individual has been seen recently by their provider and has a documented care plan that includes the use of the brace.
 - There is clinical documentation of any of the following:
 - The individual is no longer able to wear the brace because of growth or a change in physical condition.
 - The brace has been lost or stolen.

- The brace is broken, unable to be repaired, and no longer under warranty.

Definitions

- An **orthosis** (brace) is a rigid or semi-rigid device used for the purpose of supporting a weak or deformed body member or restricting an eliminating motion in a diseased or injured part of the body. An orthosis can be classified as either prefabricated (off-the-shelf), custom-fitted, or custom-fabricated.
- **Dynamic joint extension and flexion devices** are adjustable-tension splints that provide constant stretching to an affected joint while at rest. The devices allow both resisted active and passive motion within a fixed range of motion.
- The **Modified Ashworth Scale (MAS)** is used to assess the severity of spasticity. The grading is defined as:
 - Grade 0 = No increase in muscle tone
 - Grade 1 = Slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion (ROM) when the affected part(s) is moved in flexion or extension
 - Grade 1+ = Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM
 - Grade 2 = More marked increase in muscle tone through most of the ROM, but affected part(s) easily moved
 - Grade 3 = Considerable increase in muscle tone, passive movement difficult
 - Grade 4 = Affected part(s) rigid in flexion or extension

Evidence Discussion

Medical background

The United States Food and Drug Administration (FDA) considers dynamic joint extension and flexion orthoses to be Class I devices. As such, they are considered to be low to moderate risk, and manufacturers are not required to complete premarket notification or seek premarket approval for these items (FDA, 2024).

Literature review

- Veltman et al. (2015) conducted a systematic review including eight studies (one randomized trial and seven cohort studies) involving 232 individuals to evaluate non-operative treatment options for posttraumatic elbow stiffness. Static progressive splinting was evaluated in 160 individuals with an average improvement of 36°. Dynamic splinting was evaluated in 72 individuals with an average improvement of 37°. The investigators concluded that both dynamic

orthoses and static progressive splinting demonstrated good results for the treatment of elbow stiffness regardless of etiology. The authors recommended to continue non-operative treatment with dynamic or static bracing for 12 months or until lack of progression in range of elbow motion.

- Mills et al. (2016) performed a systematic review including 17 randomized controlled trials to determine the efficacy of adjunctive therapies following botulinum toxin injections for limb spasticity. The authors concluded that casting and dynamic splinting improved spasticity (as defined by an improvement of Modified Ashworth Scale scores) by at least one grade when used concurrently with Botulinum neurotoxin injections.
- Müller et al. (2013) conducted a systematic review including 13 studies involving 247 individuals with elbow stiffness of traumatic or postoperative origin and without evidence of ossification to compare the effectiveness of dynamic, static, or static-progressive bracing. The study defined static splints by the use of a constant force, usually worn for long periods of time, potentially up to 12 hours or more daily. Dynamic splints typically use springs or rubber bands with variable force but displacement is constant. Static-progressive splinting (SPS) is an extension of dynamic splinting which uses the same device as dynamic splinting but with constant tension instead of a dynamic force (e.g., a rubber band). All three types of bracing led to significant improvements in range of motion. The authors concluded that the current evidence strongly supports the use of static-progressive stretching as a first line of treatment in individuals with post-traumatic and postsurgical elbow stiffness.
- A Cochrane review including 26 randomized trials performed by Handoll and Elliott (2015) examined the effectiveness of rehabilitation interventions in adults with conservatively or surgically treated distal radius fractures. The authors reported one trial including 40 participants with a wrist contracture within the last 10 weeks from a surgically or conservatively treated distal radius fracture. The intervention group received routine care (exercise and education) plus dynamic wrist extension splints, worn up to six hours at home on a daily basis for eight weeks compared with a control group who received routine care only. There were no clinically or statistically between-group differences in active wrist flexion or extension, radial or ulnar deviation, or patient-perceived performance and satisfaction scores of the Canadian Occupational Performance Measure (COPM) at eight or 12 weeks. Moreover, there were two adverse events, which resolved after modification/repair of the splint, and compliance with the splint regimen was poor. The authors concluded there is very low quality evidence available for dynamic extension splinting for individuals with wrist contracture.
- Sameem et al. (2011) conducted a systematic review including 17 articles to understand the efficacy of postoperative rehabilitation protocols (static splinting, dynamic splinting, and early active motion rehabilitation) for individuals who underwent surgical repair of extensor (Verdan) zones V to VIII of the hand

(corresponding to the regions including the metacarpophalangeal joints to the distal one-third of the hand). The authors reported that dynamic splinting outperformed static splinting with regard to grip strength and range of motion compared to static splinting. However, the authors noted that static splinting may be the preferred rehabilitation regimen in individuals who are unable to be compliant with the increased demands of a dynamic splinting regimen.

- Kerr et al. (2020) performed a systematic review including 11 articles to examine the evidence for the effectiveness of stretching interventions, including splinting, on reducing upper extremity spasticity, increasing hand function, and improving functional tasks for adults with post-stroke spasticity. The authors found low strength of evidence to support the use of dynamic splinting for reducing upper extremity spasticity. For increasing hand function and improving functional tasks, moderate strength of evidence was found to support the use of dynamic splinting. The authors also noted that additional research is needed that focuses on defining protocols and dosage recommendations for splinting interventions.
- Hammon et al. (2012) conducted a systematic review to determine the optimal postoperative protocol following extensor tendon repair. Of the 19 studies included, eight studies used static splinting (437 tendons), 12 used dynamic splinting (600 tendons), and five used active motion (240 tendons) for the postoperative protocols. Of note, the authors found that dynamic splinting following finger extensor tendon repair achieved a complication rate of 4.3%, an extensor lag rate of 3.2%, and a tendon rupture rate of 0.2%. Moreover, early active motion protocols following extensor tendon repair provided a relatively lower complication rate than other postoperative regimens. The authors concluded that dynamic splinting, static splinting, and early active range of motion all had similar generally favorable functional results.
- Furia et al. (2013) performed a systematic review to evaluate the safety and efficacy of dynamic splinting used to treat joint contracture in lower extremities. The review identified two studies with 109 individuals with toe contractures and found that dynamic splinting improved the mean active range of motion by 16° to 28°. In addition, the review identified three studies with 116 individuals with ankle contractures and found that dynamic splinting improved the mean active range of motion by 7° to 31°. Moreover, the review identified three studies with 245 individuals with knee contractures and found that dynamic splinting improved the mean active range of motion by 8° to 78°. Thus, the authors concluded that dynamic splinting is a safe and efficacious treatment for lower extremity joint contractures.
- A retrospective case series (Pace et al., 2018) investigated the indications and outcomes of dynamic splinting of the arthrofibrotic knee in the pediatric population. The study included 74 children with postoperative fibrosis. Demographics, index surgery procedure, preoperative and postoperative knee range of motion (ROM) measurements, treatment length and subsequent need for manipulation

under anesthesia (MUA), and surgical lysis of adhesions (LOA) were evaluated. The authors found that use of dynamic splinting was associated with improved knee range of motion. Children with flexion deficits demonstrated a median improvement of 30° in flexion and those with extension deficits demonstrated a median improvement of 7° in extension. Moreover, the authors concluded that postoperative dynamic splinting may lead to a reduced need for surgical MUA or LOA.

- John et al. (2011) conducted a randomized controlled trial to determine the efficacy of dynamic splinting in individuals with postoperative hallux limitus (HL). HL is a pathology of degenerative arthritis in the first metatarsophalangeal joint (MTJ) of the great toe. Fifty individuals with diagnosis of HL following surgery were included in the study. All study participants received nonsteroidal anti-inflammatory drugs, orthotics, and instructions for a home exercise program for a duration of eight weeks. In addition, the experimental group was also treated with dynamic splinting for first MTJ extension (60 minutes, three times per day). The main variable studied was change in active range of motion (AROM). The results of the study demonstrated that the addition of dynamic splinting to standard postoperative care for HL was associated with a 250% improvement in active range of motion. Thus, the authors concluded that dynamic splinting should be considered for standard of care in the treatment of postoperative HL.

Codes included

HCPCS	Description
E1800	Dynamic adjustable elbow extension and flexion device, includes soft interface material
E1801	Static progressive stretch/patient actualized serial stretch elbow device, extension and/or flexion, with or without range of motion adjustment, includes all components and accessories
E1802	Dynamic adjustable forearm pronation/supination device, includes soft interface material
E1803	Dynamic adjustable elbow extension only device, includes soft interface material
E1804	Dynamic adjustable elbow flexion only device, includes soft interface material

HCPCS	Description
E1805	Dynamic adjustable wrist extension and flexion device, includes soft interface material
E1806	Static progressive stretch wrist device, flexion and/or extension, with or without range of motion adjustment, includes all components and accessories
E1807	Dynamic adjustable wrist extension only device, includes soft interface material
E1808	Dynamic adjustable wrist flexion only device, includes soft interface material
E1810	Dynamic adjustable knee extension and flexion device, includes soft interface material
E1811	Static progressive stretch/patient actualized serial stretch knee device, extension and/or flexion, with or without range of motion adjustment, includes all components and accessories
E1812	Dynamic knee, extension/flexion device with active resistance control
E1813	Dynamic adjustable knee extension only device, includes soft interface material
E1814	Dynamic adjustable knee flexion only device, includes soft interface material
E1815	Dynamic adjustable ankle extension and flexion device, includes soft interface material
E1816	Static progressive stretch/patient actualized serial stretch ankle device, flexion and/or extension, with or without range of motion adjustment, includes all components and accessories
E1818	Static progressive stretch/patient actualized serial stretch forearm pronation / supination device, with or without range of motion adjustment, includes all components and accessories
E1820	Replacement soft interface material, dynamic adjustable extension/flexion device

HCPCS	Description
E1821	Replacement soft interface material/cuffs for bidirectional static progressive stretch device
E1822	Dynamic adjustable ankle extension only device, includes soft interface material
E1823	Dynamic adjustable ankle flexion only device, includes soft interface material
E1825	Dynamic adjustable finger extension and flexion device, includes soft interface material
E1826	Dynamic adjustable finger extension only device, includes soft interface material
E1827	Dynamic adjustable finger flexion only device, includes soft interface material
E1828	Dynamic adjustable toe extension only device, includes soft interface material
E1829	Dynamic adjustable toe flexion only device, includes soft interface material
E1830	Dynamic adjustable toe extension and flexion device, includes soft interface material
E1831	Static progressive stretch toe device, extension and/or flexion, with or without range of motion adjustment, includes all components and accessories
E1840	Dynamic adjustable shoulder flexion/abduction/rotation device, includes soft interface material
E1841	Static progressive stretch/patient actualized serial stretch shoulder device, with or without range of motion adjustment, includes all components and accessories
E1832	Static progressive stretch finger device, extension and/or flexion, with or without range of motion adjustment, includes all components and accessories

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