Functional Electrical Stimulation (FES) and Neuromuscular Electrical Stimulation (NMES)

DME.ST.113.A
v1.0.2025

Health Equity Considerations

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

NMES for the Treatment of Disuse Muscle Atrophy

A **NMES device** (HCPCS E0745) and related supplies (HCPCS A4595, A4556, A4557, A4558) are indicated as part of a treatment plan for disuse atrophy when the nerve to the atrophied muscle is intact.

FES for use with Spinal Cord Injury (SCI)

A **FES device** (HCPCS E0764, E0770) and related supplies (HCPCS A4595, A4556, A4557, A4558) are indicated as part of a treatment plan to enable individuals with spinal cord injury (SCI) to ambulate when **all** the following criteria apply:

- The individual has intact lower motor units (L1 and below).
- The individual demonstrates brisk muscle contraction to NMES and has sensory perception of electrical stimulation for muscle contraction.
- The individual can transfer independently.
- The individual demonstrates the ability to stand independently for at least three minutes.

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- The individual is at least six months post recovery spinal cord injury and restorative surgery.
- The individual does not have severe hip or knee degenerative disease.
- The individual does not have a history of long bone fracture secondary to osteoporosis.
- The individual has completed a physical therapy program over a three month period.
- The individual is able to control the device.
- The individual does not have any contraindications to device use.

FES for walking (Parastep I™ System) is contraindicated for individuals with SCI with **any** of the following:

- Cardiac pacemakers.
- Severe scoliosis or severe osteoporosis.
- Skin disease or cancer at area of stimulation.
- Irreversible contracture.
- Autonomic dysreflexia

FES for Foot Drop

A **FES device** (HCPCS E0764, E0770) and related supplies (HCPCS A4595, A4556, A4557, A4558) are indicated to achieve ambulation for individuals with a history of stroke with hemiplegia or hemiparesis and passive foot drop when **all** of the following criteria apply:

- The individual has the passive ankle range of motion to achieve a normal gait.
- The individual is able to safely use the device.
- The individual does not have any contraindications to device use.

FES for Heart Failure

A **FES device** (HCPCS E0764, E0770) and related supplies (HCPCS A4595, A4556, A4557, A4558) are indicated for individuals with New York Heart Association grade III or IV heart failure when **both** of the following criteria apply:

- The individual is able to safely use the device.
- The individual does not have any contraindications to device use.

Conductive Garment

A **conductive garment** (HCPCS E0731) for use with a NMES or FES device is indicated if **all** of the following conditions are met:

- The garment has been prescribed by the treating practitioner for use in delivering covered NMES or FES treatment.

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- There is a medical indication that precludes application of conventional electrodes, adhesive tapes, and lead wires including **any** of the following:
  - There is a large treatment area or many sites to be stimulated.
  - The individual has a documented medical condition, such as a skin condition.
  - The individual requires electrical stimulation beneath a cast to treat chronic intractable pain.

Special Considerations and Safety

NMES/FES should not be used in individuals with any of the following contraindications and clinical scenarios, including, but not limited to:

- Electronic implants (e.g., cardiac pacemakers, electronic implants, or an implantable cardioverter defibrillator).
- Severe scoliosis or severe osteoporosis.
- Skin disease or cancer at area of stimulation.
- Irreversible contracture.
- Autonomic dysreflexia.
- Individuals who are pregnant.
- Individuals who have epilepsy.

Electrodes should not be placed over the eyes, transcerebrally, on the front of the neck,internally, over tumors, directly over the spine, or on damaged or infected skin.

FES and NMES are considered experimental, investigational, or unproven for all other indications other than those listed in the criteria, including, but not limited to, **any** of the following:

- General muscle strengthening in healthy individuals.
- Treatment of knee osteoarthritis.
- Treatment of Upper extremity hemiplegia.
- Treatment of Oropharyngeal Dysphagia

Not Medically Necessary Indications

- Implanted Neurostimulators are not considered durable medical equipment (DME).
- A disposable, replacement NMES (HCPCS A4560) is not considered DME.

Supplies

- During the rental of a NMES/FES unit, supplies for the unit are included in the rental allowance; there is no additional allowance for items such as electrodes, lead wires, and batteries.

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- If a NMES/FES unit is purchased, separate allowance will be made for replacement supplies (HCPCS A4595) when they are reasonable and necessary and are used with a covered NMES/FES.

Definitions

- **Neuromuscular electrical stimulation** (NMES) involves the use of a device to generate a functional muscle contraction and increase muscle strength. NMES may be used after a period of muscle disuse, such as after surgery, when the nerve to the muscle is intact, and is most effective if combined with exercise. NMES can be grouped into two categories:
  - Stimulation of muscles while in a resting state to treat muscle atrophy.
  - Enhancement of functional activity in neurologically impaired individuals.
- **Functional electrical stimulation (FES)** involves the use of a NMES device to restore function to a paralyzed muscle(s) after neurologic injury, typically during a functional task. The terms FES and NMES are often used interchangeably in the literature. FES may be used during a walking on treadmill (e.g., The Parastep I System), pedaling a stationary bicycle ergometer, or during voluntary rowing movements of the upper limbs.
- **Heart failure (HF)** is a common clinical syndrome with symptoms caused by impaired ability of one or both ventricles to pump at a normal pressure due to a structural or functional cardiac disorder. It is characterized by specific symptoms (e.g., dyspnea, fatigue) and signs (e.g., fluid retention).
- The New York Heart Association (NYHA) has established a functional classification system for heart failure based on the timing of symptom onset for an individual.
  - **Class I heart failure** is characterized by symptom onset with strenuous activity.
  - **Class II heart failure** is characterized by symptom onset with an ordinary level of activity.
  - **Class III heart failure** is defined as symptom onset with minimal activity, and is further broken down into:
    - **Class IIIa**, in which an individual has no shortness of breath at rest, or
    - **Class IIIb**, in which an individual has recent onset of shortness of breath at rest.
  - **Class IV heart failure** is characterized by symptom onset at rest.

Evidence Discussion

Functional electrical stimulation (FES) and neuromuscular electrical stimulation (NMES) devices are effective at treating a range of neurological and musculoskeletal conditions including spinal cord injury, stroke with foot drop, cerebral palsy, multiple sclerosis, heart failure, spasticity control, and upper extremity rehabilitation.[1] Research demonstrates that FES significantly improves walking ability in individuals with incomplete spinal cord injury, with studies showing FES had the highest probability of being the best intervention for velocity and distance compared to conventional therapy, treadmill training, and robot-assisted gait training. In stroke patients with foot drop, FES has been shown to produce clinically important gains in comfortable gait speed, while also demonstrating equivalence to ankle-foot orthoses for increasing gait speed but with superior outcomes for reducing physiologic cost and individual preference.[2][3]

NMES demonstrates effectiveness for muscle strengthening and spasticity reduction, particularly in spinal cord injury populations.[4][5] In individuals with heart failure, FES serves as an effective alternative to traditional exercise training for those unable to participate in conventional programs, producing significant improvements in peak oxygen uptake and six-minute walk distance compared to sedentary care.[6] The American Academy of Orthopaedic Surgeons (AAOS) provided a strong recommendation that NMES should be used in conjunction with standard treatment to improve function in musculoskeletal conditions.[7]

Codes

HCPCS Code	Description
A4556	Electrodes (e.g., apnea monitor), per pair
A4557	Lead wires (e.g., apnea monitor), per pair
A4558	Conductive gel or paste, for use with electrical device (e.g., TENS, NMES), per oz.

1 Patathong T, Klaewkasikum K, Woratanarat P, et al. The efficacy of gait rehabilitations for the treatment of incomplete spinal cord injury: a systematic review and network meta-analysis. J Orthop Surg Res. 2023;18(1):60. Published 2023 Jan 23. doi:10.1186/s13018-022-03459-w
2 O'Dell MW, Dunning K, Kluding P, et al. Response and prediction of improvement in gait speed from functional electrical stimulation in persons with poststroke drop foot [published correction appears in PM R. 2014 Oct;6(10):967]. PM R. 2014;6(7):587-601. doi:10.1016/j.pmrj.2014.01.001
3 Dunning K, O'Dell MW, Kluding P, McBride K. Peroneal stimulation for foot drop after stroke: a systematic review. Am J Phys Med Rehabil. 2015;94(8):649-664. doi:10.1097/PHM.0000000000000308
4 Bekhet AH, Jahan AM, Bochkezanian V, Musselman KE, Elsareih AA, Gorgey AS. Effects of electrical stimulation training on body composition parameters after spinal cord injury: a systematic review. Arch Phys Med Rehabil. 2022;103(6):1168-1178. doi:10.1016/j.apmr.2021.09.004
5 Massey S, Vanhoestenberghe A, Duffell L. Neurophysiological and clinical outcome measures of the impact of electrical stimulation on spasticity in spinal cord injury: Systematic review and meta-analysis. Front Rehabil Sci. 2022;3:1058663. Published 2022 Dec 16. doi:10.3389/fresc.2022.1058663
6 Smart NA, Dieberg G, Giallauria F. Functional electrical stimulation for chronic heart failure: a meta-analysis. Int J Cardiol. 2013;167(1):80-86. doi:10.1016/j.ijcard.2011.12.019
7 American Academy of Orthopaedic Surgeons Evidence-Based Clinical Practice Guideline for Pharmacologic, Physical, and Cognitive Pain Alleviation for Musculoskeletal Extremity/Pelvis Surgery.

HCPCS Code	Description
A4560	Neuromuscular electrical stimulator (nmes), disposable, replacement only
A4595	Electrical stimulator supplies, 2 lead, per month, (e.g. TENS, NMES)
E0731	Form-hyphenfitting conductive garment for delivery of TENS or NMES (with conductive fibers separated from the patient's skin by layers of fabric)
E0745	Neuromuscular stimulator, electronic shock unit
E0762	Transcutaneous electrical joint stimulation device system, includes all accessories
E0764	Functional neuromuscular stimulator, transcutaneous stimulation of muscles of ambulation with computer control, used for walking by spinal cord injured, entire system, after completion of training program
E0770	Functional electrical stimulator, transcutaneous stimulation of nerve and / or muscle groups, any type, complete system, not otherwise specified

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