

09-E0000-54

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Reviewed: 06/27/24

Revised: 07/15/24

Subject: Functional Neuromuscular Stimulation

THIS MEDICAL COVERAGE GUIDELINE IS NOT AN AUTHORIZATION, CERTIFICATION, EXPLANATION OF BENEFITS, OR A GUARANTEE OF PAYMENT, NOR DOES IT SUBSTITUTE FOR OR CONSTITUTE MEDICAL ADVICE. ALL MEDICAL DECISIONS ARE SOLELY THE RESPONSIBILITY OF THE PATIENT AND PHYSICIAN. BENEFITS ARE DETERMINED BY THE GROUP CONTRACT, MEMBER BENEFIT BOOKLET, AND/OR INDIVIDUAL SUBSCRIBER CERTIFICATE IN EFFECT AT THE TIME SERVICES WERE RENDERED. THIS MEDICAL COVERAGE GUIDELINE APPLIES TO ALL LINES OF BUSINESS UNLESS OTHERWISE NOTED IN THE PROGRAM EXCEPTIONS SECTION.

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DESCRIPTION:

Functional neuromuscular stimulation is designed to stimulate muscles and thus restore the function of the extremity. Functional neuromuscular stimulation attempts to replace stimuli from damaged or destroyed nerve pathways with sequential electrical stimulation of muscles to enable spinal cord injured patients to stand or walk independently or maintain muscle tone and strength and gait training in (e.g., post-stroke, multiple sclerosis, cerebral palsy). Electrodes are placed; implanted, transcutaneously, or percutaneously. A stimulator unit worn externally produces the pulses. The pulses are delivered via the skin surface or via implanted electrodes. Electrical impulses are delivered that stimulate the nerves to produce muscle contractions of paralyzed muscles or injured nerves.

The U.S. Food and Drug Administration (FDA) have approved several functional electrical stimulation devices (e.g., Parastep® Ambulation System, WalkAide, Bioness L300™, FES Motorized CycleErgometer).

POSITION STATEMENT:

NOTE: For neuromuscular electrical stimulation, refer to Neuromuscular Electrical Stimulation, 09-E0000-25. For diaphragmatic-phrenic nerve stimulation, refer to Diaphragmatic-Phrenic Nerve Stimulation (i.e., Electrophrenic Pacemaker), 02-61000-33.

Functional neuromuscular stimulation (including the functional electrical stimulation devices) is considered **experimental or investigational** as a technique to restore function following nerve damage or nerve injury for any indication, including, but not limited to the following:

- As a technique to provide ambulation in members with spinal cord injury; **OR**
- As an aid for ambulation in post-stroke members; **OR**

- To provide upper extremity function in members with nerve damage (e.g., spinal cord injury, post-stroke); **OR**
- To improve ambulation in members with foot drop caused by congenital disorder (e.g., cerebral palsy) or by nerve damage (e.g., post-stroke, multiple sclerosis); **OR**
- To restore muscular function and treatment of all other conditions and indications; **OR**
- For exercise in members with spinal cord injury.

The evidence is insufficient to determine that functional neuromuscular electrical stimulation (including the functional electrical stimulation devices) results in an improvement in health outcomes.

BILLING/CODING INFORMATION:

HCPCS Coding:

E0764	Functional neuromuscular stimulation, transcutaneous stimulation of sequential muscle groups of ambulation with computer control, used for walking by spinal cord injured, entire system, after completion of training program (investigational).
E0770	Functional electrical stimulator, transcutaneous stimulation of nerve and/or muscle groups, any type, complete system, not otherwise specified

REIMBURSEMENT INFORMATION:

Refer to sections entitled [POSITION STATEMENT](#) and [PROGRAM EXCEPTIONS](#).

PROGRAM EXCEPTIONS:

Federal Employee Program (FEP): Follow FEP guidelines.

State Account Organization (SAO): Follow SAO guidelines.

Medicare Advantage products:

The following National Local Coverage Determination (NCD) was reviewed on the last guideline reviewed date: Neuromuscular Electrical Stimulator (NMES) (160.12), located at cms.gov.

No Local Coverage Determination (LCD) was found at the time of the last guideline reviewed date.

DEFINITIONS:

No guideline specific definitions apply.

RELATED GUIDELINES:

[Diaphragmatic-Phrenic Nerve Stimulation \(i.e., Electrophrenic Pacemaker\), 02-61000-33](#)

[Neuromuscular Electrical Stimulator \(NMES\), 09-E0000-25](#)

OTHER:

Other names used to report functional neuromuscular stimulation:

Electrical Stimulation
Functional Electrical Stimulation
Neuromuscular Stimulation

REFERENCES:

1. Alon G, McBride K, Ring H. Improving selected hand functions using a noninvasive neuroprosthesis in persons with chronic stroke. *Journal of Stroke and Cardiovascular Diseases* 2002; 11(2): 99-106.
2. Audu ML, Odle BM, Triolo RJ. Control of standing balance at leaning postures with functional neuromuscular stimulation following spinal cord injury. *Medical and Biological Engineering Computing* 2018 Feb;56(2):317-330.
3. Barrett CL, Mann GE, Taylor PN et al. A randomized trial to investigate the effects of functional electrical stimulation and therapeutic exercise on walking performance for people with multiple sclerosis. *Multiple Sclerosis* 2009 Apr; 15(4): 493-504.
4. Blue Cross and Blue Shield Association Evidence Positioning System®. 8.03.01 Functional Neuromuscular Electrical Stimulation, 04/24.
5. Brissot R, Gallien P, Le Bot MP et al. Clinical experience with functional electrical stimulation-assisted gait with Parastep in spinal cord-injured patients. *Spine* 2000; 25(4): 501-508.
6. Daly JJ, Roenigk K, Holcomb J, Rogers JM, Butler K, Gansen J, McCabe J, Fredrickson E, Marsolais EB, Ruff RL. A randomized controlled trial of functional neuromuscular stimulation in chronic stroke subjects. *Stroke*. 2006 Jan; 37(1): 172-8.
7. Graupe D, Bazo. Thoracic Level Complete Paraplegia Walking Performance, Training and Medical Benefits with the PARASTEP FES System. *International Journal of Physical Medicine & Rehabilitation* 2015; 3:5.
8. Hachisuka K, Ochi M, Kikuchi T, et al. Clinical effectiveness of peroneal nerve functional electrical stimulation in chronic stroke patients with hemiplegia (PLEASURE): A multicentre, prospective, randomised controlled trial. *Clin Rehabil*. 2021 Mar;35(3):367-377. [Abstract].
9. Hausdorff JM, Ring H. Effects of a new radio frequency-controlled neuroprosthesis on gait symmetry and rhythmicity in patients with chronic hemiparesis. *American Journal of Physical Medicine & Rehabilitation* 2008; 87(1): 4-13.
10. Ho CH, Triolo RJ, Elias AL et al. Functional electrical stimulation and spinal cord injury. *Phys Med Rehabil Clin N Am*. 2014 Aug; 25(3):631-54.
11. Jaqueline da Cunha M, Rech KD, Salazar AP, Pagnussat AS. Functional electrical stimulation of the peroneal nerve improves post-stroke gait speed when combined with physiotherapy. A systematic review and meta-analysis. *Ann Phys Rehabil Med*. 2021 Jan;64(1):101388. [Abstract]
12. Kottink AI, Hermens HJ, Nene AV et al. Therapeutic effect of an implantable peroneal nerve stimulator in subjects with chronic stroke and footdrop: A randomized controlled trial. *Physical Therapy* 2008; 88(4): 437-448.
13. Laufer Y, Hausdorff JM, Ring H. Effects of a foot drop neuroprosthesis on functional abilities, social participation, and gait velocity. *American Journal of Physical Medicine & Rehabilitation* 2009; 88(1): 14-20.
14. Morawietz C, Moffat F. Effects of locomotor training after incomplete spinal cord injury: a systematic review. *Archives of Physical Medicine and Rehabilitation* 2013 Nov; 94(11):2297-308.
15. Nascimento LR, da Silva LA, Araújo Barcellos JVM, et al. Ankle-foot orthoses and continuous functional electrical stimulation improve walking speed after stroke: a systematic review and meta-analyses of randomized controlled trials. *Physiotherapy*. 2020 Dec; 109:43-53. [Abstract]

16. Nataraj R, Audu ML, Triolo RJ. Restoring standing capabilities with feedback control of functional neuromuscular stimulation following spinal cord injury. *Medical Engineering Physics* 2017 Apr; 42: 13-25.
17. National Institute for Health & Clinical Excellence (NHS) Functional Electrical Stimulation for Drop Foot of Central Neurological Origin, January 2009.
18. Prenton S, Hollands KL, Kenney LP. Functional electrical stimulation versus ankle foot orthoses for foot-drop: A meta-analysis of orthotic effects. *Journal of Rehabilitation* 2016 Oct; 48(8): 646-656.
19. Prokopiuseva T, Pavlikova M, Markova M, et al. Randomized comparison of functional electric stimulation in posturally corrected position and motor program activating therapy: treating foot drop in people with multiple sclerosis. *Eur J Phys Rehabil Med*. Aug 2020; 56(4): 394-402.
20. Robbins SM, Houghton PE, Woodbury MG et al. The therapeutic effect of functional and transcutaneous electric stimulation on improving gait speed in stroke patients: a meta-analysis. *Archives of Physical Medicine and Rehabilitation* 2006 Jun; 87(6): 853-859.
21. Sheffler LR, Hennessey MT, Knutson JS et al. Neuroprosthetic effect of peroneal nerve stimulation in multiple sclerosis: a preliminary study. *Archives of Physical Medicine and Rehabilitation* 2009; 90(2):362-365.
22. Snoek GJ, IJzerman MJ, Groen FACC in't et al. Use of the NESS handmaster to restore handfunction in tetraplegia: clinical experiences in ten patients. *Spinal Cord* 2000; 38(4): 244-249.
23. Southwestern Allied Health Sciences School, The University of Texas Southwestern Medical Center at Dallas-Department of Physical Therapy Mobility research and Assessment Lab.
24. Triolo RJ, Bailey SN, Miller ME et al. Longitudinal performance of a surgically implanted neuroprosthesis for lower-extremity exercise, standing, and transfers after spinal cord injury. *Archives of Physical Medicine and Rehabilitation* 2012 May; 93 (5):896-904.
25. Vafadar AK, Côté JN, Archambault PS. Effectiveness of functional electrical stimulation in improving clinical outcomes in the upper arm following stroke: a systematic review and meta-analysis. *BioMed Research International* 2015; 2015:729768.
26. Yan T, Hui-Chan CW, Li LS. Functional electrical stimulation improves motor recovery of the lower extremity and walking ability of subjects with first acute stroke. *Stroke* 2005; 36; 80-85.

COMMITTEE APPROVAL:

This Medical Coverage Guideline (MCG) was approved by the BCBSF Medical Policy and Coverage Committee on 06/27/24.

GUIDELINE UPDATE INFORMATION:

04/15/02	New Medical Coverage Guideline.
04/15/03	Reviewed; Program Exception added for Medicare & More.
04/15/04	Review and revision of guideline; consisting of updated references and no change in coverage statement.
01/15/05	Review and revision of guideline; consisting of updated references.
01/01/06	Review and revision of guideline; consisting of updated references. Annual HCPCS coding update: consisting of the deletion of K0600 and the addition of E0764.
11/15/06	Review and revision of guideline consisting of updated references.
07/15/07	Review and revision of guideline consisting of updated references and reformatted guideline.
11/15/08	Review and revision of guideline consisting of updated references.

01/01/09	Annual HCPCS coding update: revised descriptor for code E0764.
01/15/10	Annual review; updated position statement (added restore muscular function and other conditions and indications). Updated Medicare Advantage products program exception. Updated references.
12/15/10	Annual review: Revised descriptor. Revised position statement to include upper extremity function in patients with nerve damage (e.g., spinal cord injury, post stroke) and to improve ambulation in patients with foot drop caused by nerve damage (e.g., post-stroke, multiple sclerosis). Reformatted Medicare Advantage program exception. Updated references.
01/15/13	Annual review; no change to position statement. Added Medical Coverage Guideline reference and link for Diaphragmatic-Phrenic Nerve Stimulation (i.e., Electrophrenic Pacemaker), 02-61000-33 and updated references.
03/15/13	Code update; added E0770.
05/11/14	Revision: Program Exceptions section updated.
11/01/15	Revision: ICD-9 Codes deleted.
09/15/18	Review; no change in position statement. Updated references.
07/15/19	Revision; added for exercise in members with spinal cord injury. Updated references.
09/15/21	Review; revised position statement. Updated program exceptions and references.
11/15/22	Review; no change in position statement. Updated references.
05/15/24	Position statements maintained.
07/15/24	Review; no change in position statement. Updated references.