

Medical Coverage Policy | Paraspinal Surface
Electromyography (SEMG) to Evaluate and Monitor Back Pain



EFFECTIVE DATE: 10|01|2016
POLICY LAST UPDATED: 08|03|2022

OVERVIEW

Surface electromyography (SEMG), a noninvasive procedure that records the summation of muscle electrical activity, has been investigated as a technique to evaluate the physiologic functioning of the back. Additionally, this procedure has been studied as a technique to evaluate abnormal patterns of electrical activity in the paraspinal muscles in patients with back pain symptoms, such as spasm, tenderness, limited range of motion, or postural disorders.

MEDICAL CRITERIA

Not Applicable

PRIOR AUTHORIZATION

Not Applicable

POLICY STATEMENT

Medicare Advantage Plans

Paraspinal surface electromyography to evaluate and monitor back pain is considered not covered as the evidence is insufficient to determine the effects of the technology on health outcomes.

Commercial Products

Paraspinal surface electromyography to evaluate and monitor back pain is considered not medically necessary as the evidence is insufficient to determine the effects of the technology on health outcomes.

COVERAGE

Medicare Advantage Plans and Commercial Products

Benefits vary between groups and contracts. Please refer to the appropriate Benefit Booklet, Evidence of Coverage or Subscriber Agreement for applicable not medically necessary/not covered benefits/coverage.

BACKGROUND

Back pain is a common condition that affects most individuals at some point in their lives. Identifying the pathogenesis of back pain is challenging, in part due to the complex anatomy of the back, which includes vertebrae, intervertebral discs, facet joints, spinal nerve roots, and numerous muscles. Back pain may be related to osteoarthritis, disc disease, spondylosis, or muscular pathologies, such as muscle strain or spasm. Moreover, due to referred pain patterns, the location of the pain may not be anatomically related to the pathogenesis of the pain. For example, buttock or leg pain may be related to pathology in the spine. In addition to the diagnostic challenges of back pain is the natural history of acute back pain.

Aside from physical examination, diagnostic testing includes imaging technologies, such as magnetic resonance imaging, designed to identify pathology (e.g., bulging discs), or tests such as discography to localize the abnormality by reproducing the pain syndrome. However, these tests lack specificity and must be carefully interpreted in the context of the clinical picture. For example, magnetic resonance imaging identifies 5% of asymptomatic patients as having bulging discs. However, the presence of a bulging disc may only be clinically significant if correlated with other symptoms. Assessment of the musculature may focus on a range of motion or strength exercises.

In contrast to anatomic imaging, surface electromyography (SEMG), which records the summation of muscle activity from groups of muscles, has been investigated as a technique to evaluate the physiologic functioning of the back. A noninvasive procedure, SEMG differs from needle electromyography, an invasive procedure in which the electrical activity of individual muscles is recorded. Paraspinal SEMG has been explored to evaluate abnormal patterns of electrical activity in the paraspinal muscles in patients with back pain symptoms such as spasm, tenderness, limited range of motion, or postural disorders. The technique is performed using a single or an array of electrodes placed on the skin surface, with recordings made at rest, in various positions, or after a series of exercises. Recordings can also be made by using a handheld device, which is applied to the skin at different sites. Electrical activity is assessed by computer analysis of the frequency spectrum (ie, spectral analysis), amplitude, or root mean square of the electrical action potentials. In particular, a spectral analysis that focuses on the median frequency has been used to assess paraspinal muscle fatigue during isometric endurance exercises. Paraspinal SEMG has been researched as a technique to establish the etiology of back pain and has been used to monitor the response to therapy and establish physical activity limits, such as assessing capacity to lift heavy objects or ability to return to work.

Paraspinal SEMG is an office-based procedure. The following clinical applications of the paraspinal SEMG have been proposed:

- clarification of diagnosis (ie, muscle, joint, or disc disease)
- selection of a course of medical therapy
- selection of a type of physical therapy
- preoperative evaluation
- postoperative rehabilitation
- follow-up of acute low back pain
- evaluation of exacerbation of chronic low back pain
- evaluation of pain management treatment techniques.

Most cases of acute low back pain resolve with conservative therapy (e.g., physical therapy) while continuing normal activities within limits permitted by the pain. Therefore, initial imaging or other diagnostic testing is generally not recommended unless “red flag” warning signs are present or the pain persists for more than 4 to 6 weeks. Red flag findings include significant trauma, history of cancer, unrelenting night pain, fevers or chills, and progressive motor or sensory deficits.

For individuals who have back pain who receive paraspinal SEMG for evaluation and monitoring, the evidence includes several nonrandomized studies on using findings to classify back pain. Relevant outcomes are test accuracy and validity, symptoms, functional outcomes, quality of life, and resource utilization. There have been no studies directly comparing SEMG with other noninvasive techniques for evaluating back pain, and standard criteria for normal and abnormal SEMG measurements have not been determined. Surface electromyography has been proposed as a noninvasive technique providing objective measurements that would inform treatment decisions in patients with back pain. While studies have shown that SEMG results have detected different pathologies in patients with back pain, none of the studies reported health outcomes. There are also no data on the impact of SEMG for managing patients. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

CODING

Medicare Advantage Plans

The following HCPCS code is specific to a surface EMG and is not covered

S3900: Surface electromyography (EMG).

Commercial Products:

The following HCPCS code is specific to a surface EMG and is not medically necessary

S3900: Surface electromyography (EMG).

RELATED POLICIES

None

PUBLISHED

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REFERENCES:

1. Cram JR, Lloyd J, Cahn TS. The reliability of EMG muscle scanning. *Int J Psychosom.* 1994;41(1-4):41-45. PMID 7843866
2. De Luca CJ. Use of the surface EMG signal for performance evaluation of back muscles. *Muscle Nerve.* Feb 1993;16(2):210-216. PMID 8429847
3. Jones SL, Hitt JR, Desarno MJ, et al. Individuals with non-specific low back pain in an active episode demonstrate temporally altered torque responses and direction-specific enhanced muscle activity following unexpected balance perturbations. *Exp Brain Res.* Sep 2012;221(4):413-426. PMID 22875027
4. Sheeran L, Sparkes V, Caterson B, et al. Spinal position sense and trunk muscle activity during sitting and standing in nonspecific chronic low back pain: classification analysis. *Spine (Phila Pa 1976).* Apr 15 2012;37(8):E486-495. PMID 22024899
5. Hanada EY, Johnson M, Hubley-Kozey C. A comparison of trunk muscle activation amplitudes during gait in older adults with and without chronic low back pain. *PM R.* Oct 2011;3(10):920-928. PMID 22024323
6. Neblett R, Brede E, Mayer TG, et al. What is the best surface EMG measure of lumbar flexion-relaxation for distinguishing chronic low back pain patients from pain-free controls? *Clin J Pain.* Apr 2013;29(4):334-340. PMID 23328325
7. du Rose A, Breen A. Relationships between paraspinal muscle activity and lumbar inter-vertebral range of motion. *Healthcare (Basel).* Jan 05 2016;4(1). PMID 27417592
8. Hu Y, Siu SH, Mak JN, et al. Lumbar muscle electromyographic dynamic topography during flexion-extension. *J Electromyogr Kinesiol.* Apr 2010;20(2):246-255. PMID 19540776
9. Hu Y, Kwok JW, Tse JY, et al. Time-varying surface electromyography topography as a prognostic tool for chronic low back pain rehabilitation. *Spine J.* Jun 1 2014;14(6):1049-1056. PMID 24530438
10. Hung CC, Shen TW, Liang CC, et al. Using surface electromyography (SEMG) to classify low back pain based on lifting capacity evaluation with principal component analysis neural network method. *Conf Proc IEEE Eng Med Biol Soc.* Jan 2014;2014:18-21. PMID 25569886
11. Humphrey AR, Nargol AV, Jones AP, et al. The value of electromyography of the lumbar paraspinal muscles in discriminating between chronic-low-back-pain sufferers and normal subjects. *Eur Spine J.* Mar 2005;14(2):175-184. PMID 15549487
12. Peach JP, McGill SM. Classification of low back pain with the use of spectral electromyogram parameters. *Spine (Phila Pa 1976).* May 15 1998;23(10):1117-1123. PMID 9615362
13. Roy SH, Oddsson LI. Classification of paraspinal muscle impairments by surface electromyography. *Phys Ther.* Aug 1998;78(8):838-851. PMID 9711209
14. Van Damme B, Stevens V, Perneel C, et al. A surface electromyography based objective method to identify patients with nonspecific chronic low back pain, presenting a flexion related movement control impairment. *J Electromyogr Kinesiol.* Dec 2014;24(6):954-964. PMID 25304196
15. Kienbacher T, Fehrmann E, Habenicht R, et al. Age and gender related neuromuscular pattern during trunk flexion-extension in chronic low back pain patients. *J Neuroeng Rehabil.* Feb 19 2016; 13: 16. PMID 26896325
16. Schabrun SM, Elgueta-Cancino EL, Hodges PW. Smudging of the Motor Cortex Is Related to the Severity of Low Back Pain. *Spine (Phila Pa 1976).* Aug 1 2017; 42(15): 1172-1178. PMID 25893342

17. Ellestad SM, Nagle RV, Boesler DR, et al. Electromyographic and skin resistance responses to osteopathic manipulative treatment for low-back pain. J Am Osteopath Assoc. Aug 1988;88(8):991-997. PMID 2975645
18. Bittman B, Cram JR. Surface electromyography: an electrophysiological alternative in pain management. Paper presented at: Presented at the American Pain Society; Oct 22-25 1992; San Diego, CA.
19. Hegmann KT, Travis R, Belcourt RM, et al. Diagnostic Tests for Low Back Disorders. J Occup Environ Med. Apr2019; 61(4): e155-e168. PMID 30694882
20. Kreiner DS, Matz P, Bono CM, et al. Guideline summary review: an evidence-based clinical guideline for the diagnosis and treatment of low back pain. Spine J. Jul 2020; 20(7): 998-1024. PMID 32333996

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