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

EFFECTIVE DATE: 10|01|2016
POLICY LAST UPDATED: 07|02|2019

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. In addition, 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

BlueCHiP for Medicare

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

BlueCHiP for Medicare 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, subluxation, 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 (eg, 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 that may be most commonly used by physiatrists or chiropractors. 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 (eg, 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.

There is inadequate data on the technical and diagnostic performance of paraspinal surface electromyography (SEMG) compared with a criterion standard reference test. Moreover, there is insufficient evidence regarding how findings from paraspinal SEMG impact patient management and/or how use of the test improves health outcomes. Thus, paraspinal surface electromyography for diagnosing and monitoring back pain is considered not medically necessary.

CODING

BlueCHiP for Medicare

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

Provider Update, September 2019

Provider Update, November 2018
Provider Update, September 2017
Provider Update, January 2017
Provider Update, October 2015

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. American College of Occupational and Environmental Medicine. Low back disorders, evaluation and management of common health problems and functional recovery in workers. 3rd ed. Elk Grove Village, IL: ACOEM; 2011.

20. Chou R, Huffman LH. Clinical Guideline for the Evaluation and Management of Low Back Pain: Evidence
Review. Glenview, IL: American Pain Society; 2009.