APPENDIX to Surface Electromyography Policy

Prior Authorization Requirements

This service (or procedure) is considered **investigational** in all instances. If you would like to submit additional information please forward to the Prior Authorization Department.

Within five days before the actual date of service, the Provider MUST confirm with Blue Shield that the member's health plan coverage is still in effect. Blue Shield reserves the right to revoke an authorization prior to services being rendered based on cancellation of the member's eligibility. Final determination of benefits will be made after review of the claim for limitations or exclusions.

Questions regarding the applicability of this policy should also be directed to the Prior Authorization Department. Please call 1-800-541-6652 or visit the Provider Portal www.blueshieldca.com/provider.

Evidence Basis for the Policy

Rationale

Surface electromyography (SEMG) is a non-invasive procedure which uses a scanner with surface electrodes applied to the skin to record a specific muscle or group of muscles' electrical potential. In contrast, conventional needle EMG (NEMG) is an invasive procedure in which needles are inserted into the skin or muscles to monitor and record the electrical activity of individual muscle fibers.

The field of SEMG is only at the beginning of understanding the characteristics of the SEMG signal and its relationship to impairment. Surface electromyography has been investigated as a technique to evaluate physiological functioning of the back, as well as other muscle groups. The rationale for the use of SEMG, including paraspinal SEMG, in the evaluation of low back pain and other thoracolumbar segmental abnormalities, appears to be based on the theory there is a direct relationship between muscular pain and elevated myoelectrical behaviors.

Multidisciplinary health care providers have investigated SEMG for a vast array of uses. Physical therapists have used SEMG to address movement dysfunction. Psychologists employ SEMG to intervene with problems attributed to psychophysiological arousal. Occupational therapists have incorporated SEMG into functional job analyses. Rehabilitation nurses and therapists have treated incontinence related to dysfunction of the pelvic floor muscles with SEMG feedback. Physiatrists, orthopedists, and neurologists may be interested in SEMG procedures to enhance the diagnosis of movement disorders and monitor the effects of medicines and surgical interventions designed to impact muscle activity. Since SEMG provides quantitative data, chiropractic care may use SEMG information to determine the care plan, monitor and

evaluate chiropractic progress, and evaluate the relative levels of electrical activity associated with vertebral subluxations. Despite the various uses, the clinical utility of surface EMG testing outside of the investigative setting has not been proven in peer reviewed scientific literature.

The limited data available have not demonstrated SEMG to be comparable to or of superior diagnostic value as that of NEMG for the evaluation of patients with neuromuscular disorders nor allow strong conclusions regarding improved health outcomes. Surface EMG has been proposed as a technique to differentiate muscle spasm from muscle contracture, with muscle spasm treated with relaxation therapy, and contracture treated with stretching exercises. There are no data to validate such treatment suggested by SEMG results in improved outcomes. In terms of the use of SEMG to monitor response to treatment, there are no data to demonstrate how the results of SEMG compare to clinical assessment, such as determining recommended activity levels or ability to return to work.

A technology review evaluating SEMG was published by Haig et al., (1999) for the American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM). They concluded:

> There are no clinical indications for the use of SEMG in the diagnosis and treatment of disorders of nerve or muscle. With further development, SEMG with specialized computer signal processing may prove clinically useful in the noninvasive monitoring of a nerve or muscle disorder. It may also become a complementary test in the primary diagnosis of such disorders, but is unlikely to be useful without needle examination in this regard without substantial scientific breakthroughs and validating clinical research.

In their technology assessment subcommittee report published in 2000, the American Academy of Neurology (AAN) concluded SEMG was unacceptable as a clinical tool in the diagnosis of neuromuscular disease and low back pain (Pullman et al., 2000). Based on conclusions from evidence provided by expert opinion and non-randomized historical controls or observation from case series, the authors, however, reported there were some applications in which SEMG was utilized rather than NEMG, specifically for the neurophysiologic analysis of movement disorders such as tremor, myoclonus, dystonia, and dyskinesia and may be useful for evaluating gait and posture.

Hayes, Inc., (2005) preformed a review evaluating SEMG for the diagnosis of low back pain. The evidence reviewed included one retrospective and 12 prospective studies in addition to one meta-analysis of SEMG in patients with low back pain and healthy controls. The authors concluded SEMG had some ability to distinguish between individuals with back pain and those without back pain. The most promising results were seen with large-array/high-spatial resolution SEMG. They reported the evidence was insufficient to support that the use of SEMG lead to improved patient or clinical outcomes. In addition, there was considerable variation in SEMG instrumentation, testing protocols, diagnostic algorithms and methodology. Consequently, they reported the evidence suggested the diagnostic performance of SEMG was not sufficient to recommend its use as a diagnostic tool for the evaluation of back pain.

Surface EMG has also been proposed to diagnose and monitor nocturnal bruxism. Bruxism (the grinding and clenching of teeth) causes abnormal wear of the teeth, sounds associated with bruxism, and jaw muscle discomfort. Portable SEMG units are available for home use and involve placement of electrodes over the muscle being studied (i.e., masseter muscle). Self-

monitoring recordings can be imprecise due to inconsistent and improper electrode placement and the collection of muscle activity not associated with occlusal pressure (e.g., oral activity such as yawning and swallowing). According to the Academy of General Dentistry (2001), the diagnosis of bruxism can be observed clinically during a regular dental examination.

Macro EMG is less selective when compared to standard NEMG or single-fiber EMG and is primarily used in investigational settings. Limited studies have been done, but some literature indicated the sensitivity of the macro EMG is similar to that of conventional NEMG to detect involvement of groups of muscles. A surface electrode is used for reference while motor unit action potentials (MUAP) are measured from a macro needle. Macro EMG evaluates a large recording area compared to other needle electrodes and is considered representative of the entire MUAP area. Fuglsang-Frederiksen (2006) evaluated several EMG methods in the diagnosis of myopathy. These include manual analysis of individual motor unit potentials and multi-motor unit potential analysis sampled at weak effort. The EMG can seldom be used to differentiate between different types of myopathy. Macro EMG, single-fiber EMG and muscle fiber conduction velocity analysis have a limited role in myopathy, but provide information about the changes seen. Analysis of multi-channel surface EMG may have diagnostic potential in the future. Electromyography is of great importance in the diagnosing of patients with myopathy; preferably a needle electrode and quantitative analyses should be used.

Paraspinal SEMG has been explored as a technique to evaluate abnormal patterns of electrical activity in the paraspinal muscles in patients with back pain symptoms including, but not limited to, spasm, tenderness, limited range of motion, or postural disorders. This technique is performed using a single electrode 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 can be assessed by computer analysis of the frequency spectrum (i.e., spectral analysis), amplitude, or root mean square of the electrical action potentials. In particular, spectral analysis focusing 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. It has also 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.

A recent review of the MEDLINE database regarding spinal muscle evaluation in low-back pain patients indicated the validity of SEMG remains controversial. Demoulin et al., (2007) noted although many studies showed increased fatigability of the paraspinal muscles in patients with low back pain, it was not known whether these changes were causes or consequences of the low back pain. In addition, "the considerable inter-individual variability and the absence of normative data complicated the description of normal or abnormal profiles, thereby limiting the diagnostic usefulness of SEMG."

Based on these findings, paraspinal SEMG is considered investigational. Further research is required before this technology can be proven successful.

Spinoscopy is intended for the evaluation of back problems by simultaneously recording vertebral movement and corresponding electrical muscle activity. Spinoscopy uses technology

that combines the use of SEMG and video recordings in an integrated computer system called the Spinex Spinoscope System® (Spinex International, Inc., Boulder, CO). The value of spinoscopy evaluation in patients with back problems have not been demonstrated in peer reviewed published medical literature.

2011 Update

Sanger (2008) published the findings of a pilot study on the use of a portable SEMG device for the evaluation of childhood hypertonia. Seven children with hypertonia due to cerebral palsy were examined with and without the use of SEMG. The authors concluded the results supported the importance of further testing of SEMG as an adjunct to the clinical examination of childhood hypertonia.

In a 2008 the AANEM re-evaluated the use of SEMG in the diagnosis and study of neuromuscular disorders in a systematic literature search through 2006 (Meekins et al., 2008). They concluded further research is necessary to determine the clinical utility of SEMG in the diagnosis of neuromuscular diseases and in the differentiation of primary myopathic and neuropathic conditions. In addition, future studies should be adequately blinded, the size of the cohorts should be sufficient to detect meaningful differences, and studies should include comprehensive methodological and data presentation to facilitate duplication and corroboration of results.

A study from Hong Kong used a different type of analysis of SEMG findings called dynamic topography (Hu et al., 2010). Using SEMG, the authors evaluated 20 healthy men and 15 men with low-back pain and found different dynamic topography, (e.g., a more symmetric pattern, in healthy controls). After physical therapy, the dynamic topography images of back pain patients were more similar to the healthy controls on some of the parameters that were assessed. However, there were no data that analyzed how changes in the SEMG correlated to clinical response, whether a clinical response in the face of persisting SEMG abnormalities suggested ongoing pathology, or whether persistent symptoms in the face of a normal SEMG represented malingering.

There is insufficient evidence to support the use of these technologies and their role in patient management has not been established.

Benefit Application

Benefit determinations should be based in all cases on the applicable contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

Some state or federal mandates (e.g., Federal Employee Program (FEP)) prohibit Plans from denying Food and Drug Administration (FDA) - approved technologies as investigational. In these instances, plans may have to consider the coverage eligibility of FDA-approved technologies on the basis of medical necessity alone.

This Policy relates only to the services or supplies described herein. Benefits may vary according to benefit design; therefore, contract language should be reviewed before applying the terms of the Policy. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement Policy

Type	Number	Description
CPT	None	
HCPC	S3900	Surface electromyography (EMG)
ICD9 Procedure	None	
ICD9 Diagnosis	All Diagnoses	
Place of Service	All Places of Service	

Tables

N/A

Definitions

Definitions

Paraspinal - Adjacent to the spinal column.

Index / Cross Reference of Related BSC Medical Policies

The following Medical Policies share diagnoses and/or are equivalent BSC Medical Policies:

- Gait Analysis

Key / Related Searchable Words

N/A

References

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Policy History

This section provides a chronological history of the activities, updates and changes that have occurred with this Medical Policy.

Effective Date	Action	Reason

Effective Date	Action	Reason
9/12/2008	Adopted BCBSA policy MPP 2.01.35 on Paraspinal Surface EMG. Title and Scope broadened to include all Surface EMG's. Policy Statement, literature search, coding update, and rationale added.	Medical Policy Committee
10/7/2011	Policy revision without position change	Medical Policy Committee

The materials provided to you are guidelines used by this plan to authorize, modify, or deny care for persons with similar illness or conditions. Specific care and treatment may vary depending on individual need and the benefits covered under your contract. These Policies are subject to change as new information becomes available.

Click here to view the policy statement for this policy

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