GEHA
The Benefits of Better Health

Corporate Medical Policy

Intraoperative Neurophysiologic Monitoring (IONM)

Description of Procedure or Service

Intraoperative neurophysiologic monitoring (IONM) describes a variety of procedures that have been used to monitor the integrity of neural pathways during high-risk neurosurgical, orthopedic, and vascular surgeries. It involves the detection of electrical signals produced by the nervous system in response to sensory or electrical stimuli to provide information about the functional integrity of neuronal structures.

Evoked potential monitoring includes somatosensory evoked potentials (SSEP), brainstem auditory evoked potentials (BAEP), motor evoked potentials (MEP), and visual evoked potentials (VEP). Electromyography (EMG) also is used extensively during operative cases. Scalp electroencephalography (EEG) provides data for analysis in SSEP, BAEP, and VEP. Scalp EEG also can be used to monitor cerebral function during carotid or other vascular surgery. In addition, EEG recorded directly from the pial surface, or electrocorticography (ECoG), is used to help determine resection margins for epilepsy surgery, and to monitor for seizures during electrical stimulation of the brain carried out while mapping cortical function.

Background

The principal goal of intraoperative neurophysiologic monitoring (IONM) is the identification of nervous system impairment on the assumption that prompt intervention will prevent permanent deficits. Correctable factors at surgery include circulatory disturbance, excess compression from retraction, bony structures, hematomas, or mechanical stretching.

Sensory-evoked potential describes the responses of the sensory pathways to sensory or electrical stimuli. Intraoperative monitoring of sensory-evoked potentials is used to assess the functional integrity of central nervous system (CNS) pathways during surgeries that put the spinal cord or brain at risk for significant ischemia or traumatic injury. The basic principles of sensory-evoked potential monitoring involve identification of a neurological region at risk, selection and stimulation of a nerve that carries a signal through the at-risk region, and recording and interpretation of the signal at certain standardized points along the pathway. Sensory-evoked potentials can be further categorized by the type of stimulation used:

- Somatosensory-evoked potentials (SSEP)
- Brainstem auditory-evoked potentials (BAER)
- Visual-evoked potentials (VEP)

Motor-evoked potentials (MEPs) are recorded from muscles following direct or transcranial electrical stimulation of motor cortex or by pulsed magnetic stimulation provided by a coil placed over the head.

Peripheral motor responses (muscle activity) are recorded by electrodes placed on the skin at prescribed points along the motor pathways. Motor evoked potentials, especially when induced by magnetic stimulation, can be affected by anesthesia.

Electromyogram (EMG) monitoring and nerve conduction velocity measurements can be performed in the operating room and may be used to assess the status of the cranial or peripheral nerves, e.g., to identify the extent of nerve damage prior to nerve grafting or during resection of tumors. In addition, such techniques may be used during procedures around nerve roots and/or peripheral nerves to assess for excessive traction or other impairment. In these procedures, monitoring is done in the direction opposite that of sensory-evoked potentials, but this still supports verification that the neural pathway is intact.

Electroencephalogram (EEG) monitoring is also employed as a mode of monitoring neural function during certain types of surgery. This includes use of intraoperative scalp monitoring of electroencephalogram activity, as well as grid monitoring or electrocorticography (ECoG). ECoG is recording of the EEG directly from a surgically exposed cerebral cortex and is primarily used to assess the sensory cortex and map areas for surgical resection.

Spinal surgery is associated with a risk of injury to the spinal cord. Methods to intra-operatively monitor spinal function have been employed to minimize such risks. These neurophysiological techniques include SSEP, dermatosensory evoked potentials (DSEP), and motor evoked potentials (MEP). The main objective of intra-operative neurophysiological monitoring of spinal cord or nerve root function is to identify induced neurophysiological alterations so that they can be detected as they occur and corrected during surgery; thus avoiding post-surgical complications such as myelopathy or radiculopathy, as well as permanent injury.

Cranial nerves (CNs) can be damaged during various neurosurgical procedures. Intra-operative monitoring of the function of CNs by means of electromyography (EMG), compound nerve and muscle action potentials (MAP), and auditory evoked potentials (AEP) has been used to reduce the risk of injuries to these nerves. Intra-operative EMG monitoring of CNs entails electrical stimulation of the proximal (brain) end of the nerve and recording via EMG in the facial or neck muscles. Thus, the monitoring of CNs is done in the direction opposite to that of sensory-evoked potentials, but the purpose is similar to verify the integrity of the neural pathway.

Electromyographic monitoring of the facial nerve (7th CN) is used to predict post-operative facial function after skull base surgery, which is associated with considerable risk to the functioning of the cerebral hemispheres, the brain stem and the CNs. This risk is due to problems associated with maintaining an adequate blood flow while exposing and removing the tumor, as well as direct or indirect trauma to the brain, perineural tissues and CNs.

In 2009 the American Clinical Neurophysiology Society published recommended standards for intraoperative neurophysiologic monitoring. Guideline 11A includes the following statement:

"The monitoring team should be under the direct supervision of a physician with training and experience in NIOM (Neurophysiologic Intraoperative Monitoring). The monitoring physician should be licensed in the state and privileged to interpret neurophysiologic testing in the hospital in which the surgery is being performed. He/she is responsible for real-time interpretation of NIOM data. The monitoring physician should be present in the operating room or have access to NIOM data in real-time from a remote location and be in communication with the staff in the operating room. There are many methods of remote monitoring however any method used must conform to local and national protected health information guidelines. The monitoring physician must be available to be in the operating room, and the specifics of this availability (i.e., types of surgeries) should be decided by the hospital credentialing committee. In order to devote the needed attention, it is recommended that the monitoring physician interpret no more than three cases concurrently."

Benefit Application

This medical policy relates only to the services or supplies described herein. Please refer to the Member's Benefit Booklet for availability of benefits. Guidance on other uses of evoked potentials and/or electromyography is not found in this policy; this document is limited to the use of such procedures for the purpose of intraoperative monitoring.

Note: These policy statements refer only to use of these techniques as part of intraoperative monitoring. Other clinical applications of these techniques, such as visual-evoked potentials and EMG, are not considered in this policy.

Policy Statement

GEHA will provide coverage for intraoperative neurophysiologic monitoring when it is determined to be medically necessary because the medical criteria and guidelines within this policy have been demonstrated.

When Intraoperative Neurophysiologic Monitoring is covered

Intraoperative neurophysiologic monitoring, by any covered modality, will only be covered for the specific indications identified in this policy when EACH of the following tenants of clinical management have been demonstrated:

• A specially trained physician or a certified professional practicing within the scope of their license, who is not a member of the surgical team contemporaneously interprets the intraoperative evoked potentials during the operation; and

• The evoked potential monitoring is performed in the operating room by dedicated trained technician; and

• The clinician who performs the interpretation is monitoring no more than 3 surgical procedures at the same time; and

• The clinician who performs the interpretation may do so remotely, but must provide direct, immediate communication of intraoperative evoked potential results to the technician and surgeon during the operation.

Note: If any of the above are not demonstrated in the available medical records, coverage will not be granted.

<u>GEHA considers intra-operative EMG monitoring medically necessary for the following indications when the required tenants of clinical management have been demonstrated:</u>

- Surgical excision of neuromas of the facial nerve
- Surgery for cholesteatoma, including mastoidotomy or mastoidectomy
- Surgery for acoustic neuroma, congenital auricular lesions, or cranial base lesions
- Vestibular neurectomy for Meniere's disease
- Microvascular decompression of the facial nerve for hemifacial spasm
- During selective dorsal rhizotomy
- Excision of neuromas of:
- Abducens nerve
- Glossopharyngeal nerve
- Hypoglossal nerve
- Oculomotor nerve
- Recurrent laryngeal nerve
- Spinal accessory
- Superior laryngeal nerve
- Trochlear nerve

GEHA considers intra-operative somatosensory evoked potentials (SSEPs) performed either alone, or in combination with motor evoked potentials (MEPs) as medically necessary for monitoring the integrity of the spinal cord to detect adverse changes before they become irreversible during certain spinal, intracranial, or vascular procedures including the following:

Spinal Surgeries:

- Correction of scoliosis or deformity of the spinal cord involving traction on the cord
- Decompression of the spinal cord where function of the spinal cord is at risk
- Removal of spinal cord tumors
- Surgery as a result of traumatic injury to the spinal cord
- Surgery for arteriovenous (AV) malformation of the spinal cord

Intracranial Surgeries:

- Chiari malformation surgery
- Correction of cerebral vascular aneurysms (e.g., cerebral aneurysm clipping)
- Deep brain stimulation
- Endolymphatic shunt for Meniere's disease

• Microvascular decompression of cranial nerves (e.g., optic, trigeminal, facial, auditory nerves)

• Oval or round window graft

• Removal of cavernous sinus tumors

• Removal of tumors that affect cranial nerves

• Resection of brain tissue close to the primary motor cortex and requiring brain mapping

• Resection of epileptogenic brain tissue or tumor

• Surgery as a result of traumatic injury to the brain

• Surgery for intracranial AV malformations

• Surgery for intractable movement disorders

• Vestibular resection for vertigo

Vascular Surgeries:

• Arteriography, during which there is a test occlusion of the carotid artery

• Circulatory arrest with hypothermia (does not include surgeries performed under circulatory bypass such as CABG, and ventricular aneurysms)

• Distal aortic procedures, where there is risk of ischemia to the spinal cord

• Surgery of the aortic arch, its branch vessels, or thoracic aorta, including carotid artery surgery (e.g., carotid endarterectomy), when there is risk of cerebral ischemia

GEHA considers that intra-operative somatosensory evoked potentials (SSEPs) performed either alone, or in combination with motor evoked potentials (MEPs) may be medically necessary for monitoring the integrity of the recurrent laryngeal nerve in patients undergoing:

- High-risk thyroid or parathyroid surgery, including:
  - Total thyroidectomy
  - Repeat thyroid or parathyroid surgery
  - Surgery for cancer
  - Thyrotoxicosis
  - Retrosternal or giant goiter
  - Thyroiditis

- Anterior cervical spine surgery associated with any of the following increased risk situations:
  - Prior anterior cervical surgery, particularly revision anterior cervical discectomy and fusion, revision surgery through a scarred surgical field, reoperation for pseudarthrosis or revision for failed fusion
  - Multilevel anterior cervical discectomy and fusion

- Pre-existing recurrent laryngeal nerve pathology, when there is residual function of the recurrent laryngeal nerve.

When Intraoperative Neurophysiologic Monitoring is not covered

GEHA considers intra-operative EMG monitoring experimental/investigational for the following indications, including but not limited to:

- During spinal surgery (including for anterior cervical, except as noted above) because there is insufficient evidence that this technique provides useful information to the surgeon in terms of assessing the adequacy of nerve root decompression, detecting nerve root irritation, or improving the reliability of placement of pedicle screws at the time of surgery.
- During intra-cranial tumor resections experimental and investigational unless the resection involves a cranial nerve
- During laryngeal nerve monitoring during parathyroid and thyroid surgery, except as noted above
- During hip replacement surgery
- During decompression, neurectomy, radiosurgery or rhizotomy of the trigeminal nerve

GEHA considers intra-operative EEG monitoring experimental/investigational for the following indications, including but not limited to:

- Intraoperative EEG for open-heart surgery
- All other indications (e.g., prediction of post-operative delirium)

GEHA considers GEHA considers intra-operative SSEPs with or without MEPs experimental/investigational for indications not listed above including, but not limited to:

- Intraoperative BAER during stapedectomy, tympanoplasty and ossicle reconstruction;
- Intraoperative MEP during implantation of a spinal cord stimulator;
- Intraoperative neuromonitoring during adjustment of vertical expandable prosthetic titanium rib;
- Intraoperative saphenous nerve somatosensory evoked potential for monitoring the femoral nerve during trans-psoas lumbar lateral interbody fusion;
- Intraoperative SSEP of the facial nerve for submandibular gland excision or parotid gland surgery, during hip replacement surgery, implantation of a spinal cord stimulator, off-pump coronary artery bypass surgery, and for thyroid surgery and parathyroid surgery
- Intraoperative SSEP, with or without MEPs, for cochlear implantation, decompression of the trigeminal nerve, implantation of vagus nerve stimulator, monitoring spinal injections (e.g., epidural injections, facet joint, interlaminar and transforminal epidural), open reduction internal fixation (ORIF) of the finger, radiofrequency ablation of facet medial branch, rotator cuff repair, or wrist arthroscopy repair;
- Intraoperative visual evoked potentials (e.g., for pituitary surgery, during intra-cranial surgery for arterio-venous malformation);

GEHA considers intraoperative neurophysiologic monitoring of the recurrent laryngeal nerve during anterior cervical spine surgery not meeting the criteria above **or** during esophageal surgeries to be investigational**.**

GEHA has determined that intra-operative evoked potential studies have no proven value for lumbar surgery below (distal to) the end of the spinal cord; the spinal cord ends at L1-L2

GEHA considers intraoperative monitoring of motor-evoked potentials using transcranial magnetic stimulation investigational.

GEHA considers intraoperative EMG and nerve conduction velocity monitoring during surgery on the peripheral nerves not medically necessary**.**

Policy Guidelines

Intraoperative monitoring typically is done in the operating room by a technician, with a physician as a remote backup. In some operating rooms there is a central physician monitoring room, where a physician may simultaneously monitor several cases. Intraoperative monitoring is considered reimbursable as a separate service only when a licensed physician, other than the operating surgeon, performs the monitoring while in attendance in the operating room throughout the procedure. Constant communication between surgeon, neurophysiologist, and anesthetist is required for safe and effective intraoperative neurophysiologic monitoring.

IONM codes are reported based upon the time spent monitoring and not on the number of tests performed or parameters monitored. In addition, time spent monitoring excludes preparation, administration and interpretation times for baseline studies. Time spent performing or interpreting the baseline neurophysiologic studies should not be counted as intraoperative monitoring; these are separately reportable procedures.

Operating rooms typically have equipment that emits electromagnetic interference, which is greatest at the frequency of alternating current (60 Hz in the United States). It is recognized that such interference can impact the data obtained via neurophysiologic monitoring and appropriate steps by the responsible facility to mitigate the impact of this phenomenon on clinical outcomes are required.

Physician documentation

- The medical record must contain evidence that fully supports the medical necessity criteria listed within this policy for IONM. This documentation includes, but is not limited to, relevant medical history, physical examination, the anatomic location of the planned surgical procedure, the rationale for the location and modalities to be monitored, and results of pertinent diagnostic tests or procedures.
- Operative report (Post-procedure)
- Intraoperative neurophysiologic monitoring report (Post-procedure)
  Intraoperative neurophysiologic monitoring should not be reported by the physician performing an operative or anesthesia procedure since it is typically included in a global package.

Applicable codes include but are not limited to:

95925 Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in upper limbs

95926 Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in lower limbs

95927 Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in the trunk or head

95938 Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in upper and lower limbs

95940 Continuous intraoperative neurophysiology monitoring in the operating room, one on one monitoring requiring personal attendance, each 15 minutes (List separately in addition to code for primary procedure)

95941 Continuous intraoperative neurophysiology monitoring, from outside the operating room (remote or nearby) or for monitoring of more than one case while in the operating room, per hour (List separately in addition to code for primary procedure)

G0453 Continuous intraoperative neurophysiology monitoring, from outside the operating room (remote or nearby), per patient, (attention directed exclusively to one patient) each 15 minutes (list in addition to primary procedure)

Scientific references

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Policy implementation and updates

Sept 2018-Complete reformatting of content and update of policy guidance including expanded coverage.