

Intraoperative Neurophysiologic Monitoring (IONM)

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Developed By: Medical Necessity Criteria Committee

I. Description

Intraoperative neurophysiologic monitoring includes a number of procedures performed to monitor the integrity of the nerve function during high-risk neurosurgical, orthopedic, or vascular surgeries.

For intraoperative monitoring during carotid endarterectomy, evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care. (RG A2) A retrospective study of 600 patients who underwent carotid endarterectomy utilizing intraoperative transcranial electrical stimulation and median nerve somatosensory evoked potentials to determine the need for intra-arterial shunt during cross clamping found that of the 29 patients who had shunt placement, 2 showed motor deficits after surgery that disappeared after 2 hours, and one suffered permanent hemiplegia. Overall failure rates were 1.0% for transcranial electrical stimulation and 1.2% for median nerve somatosensory evoked potentials.

For intraoperative monitoring during central nervous system tumor surgery, evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care. (RG A2) Evoked potentials are used for intraoperative monitoring of resection of supratentorial brain tumors, brainstem tumors, skull base tumors, cervicomedullary junction tumors, and spinal tumors. Speech mapping is used in cases where the tumor is near or within presumed speech areas. In a study of 150 consecutive patients with dominant hemisphere grade II gliomas, only 2% had long term residual speech deficits when using intraoperative speech mapping.

For intraoperative monitoring during intracranial aneurysm surgery, evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care. An observational study of 47 patients who underwent somatosensory and motor evoked potentials during intracranial aneurysm surgery found that all intracerebral ischemia could be detected by one of the monitoring techniques. Of the entire cohort, 8 patients developed postoperative new infarctions or motor impairment deficits, with ischemic event risk being related to increased time for the resumption of blood flow. There was no postoperative motor paresis in those patients who had normal evoked potentials.

For intraoperative monitoring during spinal surgery, evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care. Somatosensory evoked potentials and motor evoked potentials are typically used intraoperative to monitor the integrity of the sensory and motor pathways. However, a systematic review determined that for routine surgical treatment of cervical spondylotic myelopathy or cervical radiculopathy, although intraoperative evoked potentials may serve as a sensitive means of diagnosing potential neurologic injury, evoked potential worsening is not specific and may not represent clinical worsening; also, its recognition does not necessarily prevent neurologic injury, and it has not been shown to date to result in improved outcomes.

II. Criteria: CWQI HCS-0153

- A. Intraoperative neurophysiologic monitoring (IONM) is considered medically necessary and eligible for separate reimbursement for **ALL** of the following:
- a. It is performed by either a licensed physician trained in neurophysiology or a trained technologist who is practicing within the scope of his/her license/certification as defined by state law or appropriate authorities and is working under the direct supervision of a physician trained in neurophysiology.
 - b. Intraoperative neurophysiologic monitoring is interpreted by a licensed physician trained in clinical neurophysiology, other than the operating surgeon, who is either in attendance in the operating suite or present by means of a real-time remote mechanism for neurophysiologic monitoring situations and is immediately available.
 - c. Monitoring is conducted and interpreted real-time (either on –site or at a remote location) and continuously communicated to the surgical team.
 - d. Intraoperative neurophysiologic monitoring is considered medically necessary and eligible for separate reimbursement for **One or more** of the following:
 - i. Intraoperative neurophysiologic monitoring (IONM) using somatosensory evoked potential (SSEP) and/or motor evoked potential (MEP) for **One or more** of the following indications.
 1. Aortic or thoracic aneurysm repair
 2. Aortic cross-clamping
 3. Brachial plexus surgery
 4. Cerebral vascular surgery including **One or more** of the following:
 - a. Carotid Endarterectomy
 - b. Cerebral Aneurysm
 - c. Intracranial arteriovenous malformation
 - d. Hypothermic coronary bypass procedure
 5. Central nervous system tumor surgery
 6. Intracranial aneurysm clipping
 7. Intracranial surgeries
 8. Spinal surgery for **One or more** of the following indications:
 - a. Arteriovenous malformation of the spinal cord
 - b. Resection of spinal cord tumors or cysts
 - c. Scoliosis/Kyphosis correction

- d. Cervical or thoracic posterior instrumentation for placement of screws or implants
- e. Surgical stabilization of spine fracture or traumatic spine injury with or without spinal cord decompression
- f. Decompression of the cervical or thoracic spinal cord for symptoms of myelopathy with 1 or more of the following:
 - i. Numbness/tingling in hands/fingers
 - ii. Reduced fine motor skills, decreased grip strength
 - iii. Reduced strength in arms, shoulders, hands or legs
 - iv. Imbalance and coordination problems
 - v. Neck pain or stiffness
- g. Decompression of the spinal cord where function of the spinal cord is at risk and **ALL of the following**:
 - i. The IONM is requested for the lumbar spine at or above L1-L2 level.
 - ii. The requested IONM is NOT for the decompression of the cervical spine for radiculopathy as evidence does not support improved outcomes or prevent nerve injury.
- 9. Stereotactic surgery of the brain or brainstem, thalamus, or cerebral cortex
- 10. Thalamus tumor resection/thalamotomy
- 11. Thyroid surgery
- ii. Intraoperative neurophysiologic monitoring using brainstem auditory evoked potential (BAEP) is medically necessary for **One or more** of the following:
 - 1. Acoustic neuroma
 - 2. Vestibular nerve section
 - 3. Vascular loop decompression
 - 4. Glomus tumor
 - 5. Auditory brainstem implant
 - 6. Posterior fossa procedures
 - 7. Functional localization of the cortex with direct cortical stimulation
 - 8. Assess auditory pathways within the brainstem
 - 9. Possible ischemia at the cochlea and eighth nerve
- iii. Visual evoked potentials or response (VEP, VER) (CPT 95930) monitoring is medically necessary for monitoring the visual system during optic nerve (or related) surgery.
- iv. Intraoperative electromyography (EMG) monitoring is medically necessary for **One or more** of the following indications:
 - a. Microvascular decompression of the facial nerve for hemifacial spasm
 - b. Surgery for acoustic neuroma congenital auricular lesions, or cranial base lesions
 - c. Vestibular neurectomy for Meniere's disease
 - d. Surgical excision of neuromas of **1 or more** of the following cranial nerves:
 - 1. Abducens nerve
 - 2. Glossopharyngeal nerve
 - 3. Oculomotor nerve
 - 4. Recurrent laryngeal nerve
 - 5. Spinal accessory

- 6. Superior laryngeal
- 7. Trochlear nerve
- 8. Facial nerve
- v. Intraoperative neurophysiologic monitoring using EMG for an indication NOT included in section II.A.d.iv.a-d, is considered experimental and investigational. This includes but not limited to:
 - 1. Celiac plexus block
 - 2. Epidural injections
 - 3. Facet joint injections
- vi. Intraoperative neurophysiologic monitoring using EMG combined with Somatosensory Evoked Potential (SEP) is considered NOT medically necessary.
- vii. Intraoperative neurophysiologic monitoring using EMG for routine spinal surgery. This is considered experimental and investigational due to insufficient evidence that it improves outcomes.

Please Note: If one or more of the above criteria are not met, the intraoperative neurophysiologic monitoring is not considered medically necessary. Professional charges will not be covered and the associated facility charges are not considered eligible for separate reimbursement.

III. Information Submitted with the Prior Authorization Request:

1. Chart notes and imaging studies with documentation of patient’s diagnosis
2. Operative Report
3. Intraoperative Neurophysiologic Monitoring records

IV. CPT or HCPC codes covered

Codes	Description
92585	Auditory evoked potentials for evoked response audiometry and/or testing of the central nervous system; comprehensive
92586	Auditory evoked potentials for evoked response audiometry and/or testing of the central nervous system; limited
95867	Needle electromyography; cranial nerve supplied muscle(s), unilateral
95868	Needle electromyography; cranial nerve supplied muscles, bilateral
95887	Needle electromyography, non-extremity (cranial nerve supplied or axial) muscle(s) done with nerve conduction, amplitude and latency/velocity study (List separately in addition to code for primary procedure)
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
95930	Visual evoked potential (VEP) testing central nervous system, checkerboard or flash short-latency somatosensory evoked potential study, stimulation of any/all peripheral
95938	Nerves or skin sites, recording from the central nervous system; in upper and lower limbs

95939	Central motor evoked potential study (Transcranial motor stimulation); 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)

V. Annual Review History

Review Date	Revisions	Effective Date
04/2015	New criteria	08/2015
08/2016	Annual Review: No changes	08/2016
05/2018	Annual Review: Updated to new template; reformatted – added exclusions for spine surgery to section II.A.d.i.7.a.v	05/23/2018
05/2019	Annual Review: No changes	06/01/2019
08/2019	Update: corrected statement “INM using EMG combined with Somatosensory Evoked Potential (SEP) is considered NOT medically necessary”. Corrected the numbering for clarity.	08/05/2019
05/2020	Annual Review: No content changes	06/01/2020
05/2021	Annual Review: Added ‘Kyphosis correction’ under indications for spinal surgery	06/01/2021
04/2022	Annual Review: no changes	05/01/2022

VI. References

1. Noridian Local Coverage Determination: Sensory Evoked Potentials and Intraoperative Neurophysiology Monitoring (L34072) Accessed on: 12/05/2017, <https://med.noridianmedicare.com/documents/10534/5321625/Local+Coverage+Determination+for+Sensory+Evoked+Potentials+%26+Intraoperative+Neurophysiology+Monitoring+%28L34072%29/6bf4542a-7655-4ba8-894e-7cf1851ff22f>
2. Pennekamp CW, Moll FL, de Borst GJ. The potential benefits and the role of cerebral monitoring in carotid endarterectomy. *Current Opinion in Anesthesiology* 2011;24(6):693-7. DOI: 10.1097/ACO.0b013e32834c7aa1.
3. Malcharek MJ, et al. Intraoperative monitoring of carotid endarterectomy by transcranial motor evoked potential: a multicenter study of 600 patients. *Clinical Neurophysiology* 2013;124(5):1025-30. DOI: 10.1016/j.clinph.2012.10.014.
4. Kang D, Yao P, Wu Z, Yu L. Ischemia changes and tolerance ratio of evoked potential monitoring in intracranial aneurysm surgery. *Clinical Neurology and Neurosurgery* 2013;115(5):552-6. DOI: 10.1016/j.clineuro.2012.06.029.

5. Bacigaluppi S, Fontanella M, Manninen P, Ducati A, Tredici G, Gentili F. Monitoring techniques for prevention of procedure-related ischemic damage in aneurysm surgery. *World Neurosurgery* 2012;78(3-4):276-88. DOI: 10.1016/j.wneu.2011.11.034.
6. McDonald DB, Skinner S, Shils J, Yingling C, Intraoperative motor evoked potential monitoring – A position statement by the American Society of Neurophysiologic Monitoring
7. American Academy of Neurology; Principles of coding for Intraoperative Neurophysiologic Monitoring (IOM) and Testing; Model coverage policy; February 2010
8. Duffau, Hugues, et al. "Intraoperative subcortical stimulation mapping of language pathways in a consecutive series of 115 patients with Grade II glioma in the left dominant hemisphere." (2008).
9. Calancie, B., Donohue, M. L., Harris, C. B., Canute, G. W., Singla, A., Wilcoxon, K. G., & Moquin, R. R. (2014). Neuromonitoring with pulse-train stimulation for implantation of thoracic pedicle screws: a blinded and randomized clinical study. Part 1. Methods and alarm criteria. *Journal of Neurosurgery: Spine*, 20(6), 675-691.
10. Calancie, B., Donohue, M. L., & Moquin, R. R. (2014). Neuromonitoring with pulse-train stimulation for implantation of thoracic pedicle screws: a blinded and randomized clinical study. Part 2. The role of feedback. *Journal of Neurosurgery: Spine*, 20(6), 692-704.
11. Donohue, M. L., Murtagh-Schaffer, C., Basta, J., Moquin, R. R., Bashir, A., & Calancie, B. (2008). Pulse-train stimulation for detecting medial malpositioning of thoracic pedicle screws. *Spine*, 33(12), E378-E385.
12. Physician Advisors

Appendix 1 – Centers for Medicare and Medicaid Services (CMS)

Medicare coverage for outpatient (Part B) drugs is outlined in the Medicare Benefit Policy Manual (Pub. 100-2), Chapter 15, §50 Drugs and Biologicals. In addition, National Coverage Determination (NCD) and Local Coverage Determinations (LCDs) may exist and compliance with these policies is required where applicable. They can be found at: <http://www.cms.gov/medicare-coverage-database/search/advanced-search.aspx>. Additional indications may be covered at the discretion of the health plan.

Medicare Part B Covered Diagnosis Codes (applicable to existing NCD/LCD):

Jurisdiction(s): 5, 8	NCD/LCD Document (s):
Noridian Local Coverage Determination (LCD) Sensory Evoked Potentials and Intraoperative Neurophysiologic Monitoring (L34072)	
	https://med.noridianmedicare.com/documents/10534/5321625/Local+Coverage+Determination+for+Sensory+Evoked+Potentials+%26+Intraoperative+Neurophysiology+Monitoring+%28L34072%29/6bf4542a-7655-4ba8-894e-7cf1851ff22f

NCD/LCD Document (s):

Medicare Part B Administrative Contractor (MAC) Jurisdictions		
Jurisdiction	Applicable State/US Territory	Contractor
F (2 & 3)	AK, WA, OR, ID, ND, SD, MT, WY, UT, AZ	Noridian Healthcare Solutions, LLC

