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Kaiser Foundation Health Plan of Washington

Clinical Review Criteria
Intraoperative Neurophysiological Monitoring (IONM)

Criteria

For Medicare Members

Source	Policy
CMS Coverage Manuals	None
National Coverage Determinations (NCD)	None
Local Coverage Determinations (LCD)	Sensory Evoked Potentials & Intraoperative Neurophysiology Monitoring (L34072)
Local Coverage Article	None

For Non-Medicare Members

Intraoperative neurophysiological monitoring is indicated for all of the following:
- Spinal deformity
- Intradural spinal lesions
- Anterior thoracic lesions/discs
- Anterior lumbar interbody fusions
- Extreme lateral interbody fusions
- Acoustics neuromas
- Intraparenchemal tumors in or near eloquent cortex
- Anterior cervical discectomy and fusion
- Microvascular decompression
- Cerebral aneurysms
- Chiari malformation

The following may be appropriate on a case by case basis and will require Medical Director Review:
- Cervical decompressive laminectomies with myelopathy
- Minimally invasive lumbar fusions
- Re-operative lumbar fusions

Intraoperative neurophysiological monitoring is not indicated for all of the following:
- Cervical foraminotomies
- Thoracic laminectomies for decompression/edh/infection
- Lumbar laminectomies/discectomies
- Open lumbar fusions (PLIF/TLIF)

The following information was used in the development of this document and is provided as background only. It is provided for historical purposes and does not necessarily reflect the most current published literature. When significant new articles are published that impact treatment option, KPWA will review as needed. This information is not to be used as coverage criteria. Please only refer to the criteria listed above for coverage determinations.

Background

Intraoperative neurophysiologic monitoring (IONM) describes a variety of procedures that are used to monitor the integrity of neural pathways during high-risk surgery. Involving the detection of electrical signals produced by the nervous system, the overall goal of IONM is to promptly identify and correct nervous system impairment prior to causing irreversible damage (Fehlings, Brodke et al. 2010). More specifically, IONM might employ a variety of different techniques of monitoring including electroencephalogram (EEG), somatosensory evoked potentials (SSEP), electromyography (EMG), and motor-evoked potentials (MEP). Signals are continuously monitored and interpreted by a neurophysiologist to detect adverse changes, thus enabling corrective action.

Conventionally, IONM has been practiced locally, or on-site, with the physician neurophysiologist present in the operating room. Advances in technology, however, have allowed for remote monitoring. Remote IONM is substantially different from the traditional on-site monitoring with communications between the neurophysiologist and physicians in the operating room (OR) limited to text message or telephone. Currently in the United States (US), almost half of all IONM performed is remote (Greiner, Mess et al. 2012; Emerson and Husain 2013; Nuwer, Cohen et al. 2013). In any case, there is substantial controversy regarding the current evidence base leaving the choice to utilize IONM up to the discretion of the surgical team.

The IONM field is not regulated by the US Food and Drug Administration (FDA). Instead, standards of practice and education are provided by a number of professional societies (AAN 1990; Nuwer, Emerson et al. 2012; ACNS 2013). IONM has not previously been reviewed by the Medical Technology and Assessment Committee (MTAC) and is currently under consideration due to support a coverage decision.

Medical Technology Assessment Committee (MTAC)

Intraoperative Neurophysiologic Monitoring (IONM)

08/17/2015: MTAC REVIEW

Evidence Conclusion: The selected studies offer a small sample of the extensive literature currently available relating to IONM. For the most part, the available evidence is descriptive and details the experience of IONM in various surgical settings. In the selected studies, IONM is use to support surgeries in various specialties including neurosurgery (brain and spine), cardiac, and vascular. Population sizes range from 62 to 119 and assessed pre- and post- surgical outcomes such as neurophysiologic alerts during surgery and post-operative neurological deficits. Conclusions from the selected studies conflict with some asserting the utility of IONM technology and others finding minimal utility due to the inability to predict post-operative complications (Schramm, Koht et al. 1990; Linstedt, Maier et al. 1998; Ghariani, Liard et al. 1999; Bose, Sestokas et al. 2004). Surgical procedures and interventions are not always based on scientific evidence and instead, tend to evolve over time. Today, IONM is considered to be a standard of care limiting the ability to carry out methodologically sound comparative studies due to equipoise. Beyond that, the existing literature base is extremely heterogeneous addressing various surgical procedures in different populations with varying and conflicting conclusions. As a result, the evidence is insufficient to be able to determine if IONM is truly effective at detecting and preventing neurologic complications. *Conclusions:* There is insufficient evidence to establish that IONM, either on-site or remote, reduces the risk of neurologic injuries during surgical procedures. There is insufficient evidence to support the safety of IONM.

Articles: The literature search revealed a large number of publications relating to IONM. There were no randomized controlled trials (RCTs) comparing the outcomes of surgeries that employed the use of IONM (either remote or on-site) with those not utilizing the monitoring technique nor where there any studies making a comparison between remote and onsite monitoring. The search yielded a wide variety of observational studies the majority of which had no comparison group. Due to the extensive amount of literature identified, the following studies are a small sample of the available evidence: Bose B, Sestokas AK, Schwartz DM. Neurophysiological monitoring of spinal cord function during instrumented anterior cervical fusion. *The Spine Journal*. 2004;4(2):202-207. See Evidence Table 1. Schramm J, Koht A, Schmidt G, et al. Surgical and electrophysiological observations during clipping of 134 aneurysms with evoked potential monitoring. *Neurosurgery*. 1990;26(1):61-70. See Evidence Table 1. Ghariani S, Liard L, Spaey J, et al. Retrospective study of somatosensory evoked potential monitoring in deep hypothermic circulatory arrest. *The Society of Thoracic Surgeons*. 1999;67:1915-1918. See Evidence Table 1. Linstedt U, Maier C, Petry A. Intraoperative monitoring with somatosensory evoked potentials in carotid artery surgery – less reliable in patients with preoperative neurologic deficiency? *Acta Anaesthesiol Scand*. 1998;42(1):13-16. See Evidence Table 1.

The use of Intraoperative Neurophysiologic Monitoring (IONM) does not meet *Kaiser Permanente Medical Technology Assessment Criteria.*

Date Created	Date Reviewed	Date Last Revised
08/27/2015	07/05/2016[MPC], 05/02/2017[MPC], 03/06/2018[MPC]	08/27/2015

[MDCRPC] Medical Director Clinical Review and Policy Committee
[MPC] Medical Policy Committee

Revision History	Description

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