Clinical Policy: Intraoperative Neurophysiologic Monitoring

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Public Statement

Effective Date:

a) This policy will apply to all services performed on or after the above revision date which will become the new effective date.

b) For all services referred to in this policy that were performed before the revision date, contact customer service for the rules that would apply.

Intraoperative neurophysiologic monitoring (IOM) describes a variety of procedures that are used to monitor the integrity of neural pathways during high-risk neurosurgical, orthopedic, vascular and other surgeries that may place the nervous system at risk for injury. While it is clear that IOM can identify nervous system damage, there is little or no evidence that IOM can prevent damage in most situations. All requests for on-site IOM require pre-authorization.

The principal goal of intraoperative monitoring is the identification of nervous system impairment in the hope that prompt intervention will prevent permanent deficits. IOM techniques include use of somatosensory evoked potentials (SSEPs), electromyography (EMG), brainstem auditory evoked potentials (BAEPs), visual evoked potentials (VEPs), motor evoked potentials (MEP), or electroencephalogram (EEG). Each technique may appropriately be used in certain limited surgical situations. The situations in which QualChoice covers these techniques are detailed below.

The technical components of this testing are part of the facility fee, just as are the technical components of radiological testing. When continuous intraoperative neurophysiological monitoring is provided for the indications noted below by a physician other than the surgical team, and that physician is in personal attendance in the operating room, for the entire duration of monitoring, that component may be separately billed with the appropriate code.

Remote IOM (from an off-site location) and any associated monitoring services are not covered. This coverage exclusion is based on not meeting the standard of care for patients having high-risk procedures due to quality/safety concerns. This is not comparable to a readily available on-site physician who is dedicated to monitoring a specific patient in the operating room without distractions from other patients (which is a covered service subject to prior authorization to confirm medical necessity). You should check with your hospital and surgeon to avoid being surprised by a large, unexpected bill for remote IOM that is not covered.

Medical Statement

1) The professional component of intraoperative neurophysiological monitoring may be considered reimbursable as a separate service by QualChoice only when a licensed physician trained in clinical neurophysiology (e.g., neurologist, physiatrist), who is not a member of the surgical team performs the dedicated/exclusive monitoring while in attendance in the operating room (or on-site) throughout the pertinent portions of the procedure. Pre-authorization is required for intraoperative neurophysiologic monitoring to ensure the appropriate criteria are met.

2) Services involving the use of remote IOM (95941 or G0453) are not covered. This coverage exclusion is based on not meeting the standard of care for patients having high-risk procedures due to quality/safety concerns. This is not comparable to a readily available on-site physician who is dedicated to monitoring a specific patient in the operating room without distractions from other patients (which is a covered service subject to prior authorization to confirm medical necessity).

3) The technical components of these services are considered to be included in the facility fee, just as the technical components of intraoperative radiological testing are.

4) Intraoperative somatosensory evoked potentials (SSEPs) with or without motor evoked potentials (MEPs) may be appropriate for:
   a) Spinal surgeries at levels C1-L2, where there is documentation of significant risk of injury to the spinal cord, such as correction of scoliosis, removal of spinal tumors, or surgery as a result of traumatic injury to the spinal cord;
   b) Intracranial surgical procedures, such as surgery for intracranial AV malformations, cerebral aneurysms, or surgery as a result of traumatic brain injury;
   c) Vascular surgeries that put the central nervous system at risk, such as surgery of the aortic arch or carotids where there is risk of cerebral ischemia, or distal aortic procedures where there is risk of spinal cord ischemia.

5) Intraoperative electroencephalography (EEG) is considered medically necessary for monitoring cerebral function during carotid artery surgery or intracranial vascular surgical procedures.

6) Intraoperative visual evoked potentials (VEPs) are considered medically necessary for any surgical procedure performed on or near the optic nerve, cortex, or chiasm.

7) Intraoperative brainstem auditory evoked potentials (BAEPs) are considered medically necessary for any surgical procedure performed on or near the auditory nerve, inner ear, or brainstem.

8) Intraoperative electromyography (EMG) may be appropriate for monitoring the facial nerve during any of the following intracranial surgeries:
   a) Decompression of the facial nerve
   b) Surgery for acoustic neuroma, congenital auricular lesions, or cranial based lesions
   c) Excision of facial neuromas
   d) Vestibular neurectomy for Meniere's disease

Codes Used In This BI:

92585	Auditory evoked potentials for evoked response audiometry and/or testing of the central nervous system; comprehensive (*code deleted eff 01-01-2021*)
92586	Auditory evoked potentials for evoked response; Limited (for intraoperative monitoring or for newborn screening) (*code deleted eff 01-01-2021*)
95822	Electroencephalogram (EEG); recording in coma or sleep only
95829	Electrocardiogram at surgery (separate procedure)
95860	Needle electromyography; one extremity with or without related paraspinal areas
95861	Needle electromyography; two extremities with or without related paraspinal areas
95863	Needle electromyography; three extremities with or without related paraspinal areas
95864	Needle electromyography; four extremities with or without related paraspinal areas
95867	Needle electromyography; cranial nerve supplied muscle(s), unilateral
95868	Needle electromyography; cranial nerve supplied muscles, bilateral
95870	Needle electromyography; limited study of muscles in one extremity or non-limb (axial) muscles (unilateral or bilateral), other than thoracic paraspinal, cranial nerve supplied muscles, or sphincters
95905	Nerve conduction studies, using preconfigured array
95907	Nerve conduction studies; 1-2 studies
95908	Nerve conduction studies; 3-4 studies
95909	Nerve conduction studies; 5-6 studies
95910	Nerve conduction studies; 7-8 studies
95911	Nerve conduction studies; 9-10 studies
95912	Nerve conduction studies; 11-12 studies
95913	Nerve conduction studies; 13 or more studies
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
95928	Central motor evoked potential study (transcranial motor stimulation); upper limbs

95929	Central motor evoked potential study (transcranial motor stimulation); lower limbs
95930	Visual evoked potential (VEP) testing central nervous system, checkerboard or flash
95933	Orbicularis oculi (blink) reflex, by electro diagnostic testing
95937	Neuromuscular junction testing (repetitive stimulation, paired stimuli), each nerve, any one method
95938	Short-latency somatosensory evoked potential study, in upper and lower limbs
95939	Central motor evoked potential study, in upper and lower limbs
95940	Intraoperative neurophysiological monitoring in the OR
95941	Intraoperative neurophysiological monitoring remotely, > 1 patient, each hour
95955	Electroencephalogram (EEG) during nonintracranial surgery (eg, carotid surgery)
G0453	Intraoperative neurophysiologic monitoring remotely, one patient, each 15 mins 92650 Auditory evoked potentials; screening of auditory potential with broadband stimuli, automated analysis (*new code eff 01-01-2021*)
92651	Auditory evoked potentials; for hearing status determination, broadband stimuli, with interpretation and report (*new code eff 01-01-2021*)
92652	Auditory evoked potentials; for threshold estimation at multiple frequencies, with interpretation and report (*new code eff 01-01-2021*)
92653	Auditory evoked potentials; neurodiagnostic, with interpretation and report (*new code eff 01-01-2021*)

Limits

1) Except for the combined use of MEP and SSEP in spinal surgery, QualChoice does not consider it to be medically necessary to use multiple intraoperative neurophysiological monitoring modalities during a single operative procedure, e.g., use of EEG along with SSEP during a carotid endarterectomy.

2) QualChoice considers intra-operative neuromonitoring during thyroid and parathyroid surgery experimental and investigational because its clinical value has not been established.

3) QualChoice considers intra-operative EMG monitoring during hip replacement

4) surgery experimental and investigational because its clinical value has not been established.

5) QualChoice considers intra-operative EMG monitoring during lumbar fusion, discectomy, laminectomy, or laminotomy not medically necessary.

6) Any other use of intraoperative neurophysiological monitoring is not considered medically necessary.

Background
While it is clear that IOM can identify nervous system damage, there is less evidence that IOM can prevent damage in most situations.

EMG Monitoring of Facial Nerve:
Harner and associates (1987) compared the results of patients who underwent acoustic neuroma resection with (n = 48) or without (n = 48) intraoperative monitoring of facial nerve. They reported that anatomical preservation of the facial nerve in patients with large tumors was substantially improved in the monitored patients (67 %) when compared with those without monitoring (33 %). Although no difference was noted in facial nerve function in the two groups of patients immediately post-operatively, the degree of improvement in the monitored group exceeded that observed for those who were not monitored at 3 months, particularly in those with medium-sized and large tumors.

Kwartler and colleagues (1991) compared a group of monitored trans-labyrinthine acoustic tumor removals (n = 89) to a similar un-monitored group (n = 155) in regard to facial nerve function. Function was assessed immediately postoperatively, at time of discharge, and at 1 year post-operatively using the House six-point scale. Results were grouped as satisfactory, intermediate, or poor, and were analyzed by tumor size. Facial nerve results were better at all-time intervals in the monitored groups, although the difference was not statistically significant at the 1-year interval. There was no difference between monitored and un-monitored patients in the subgroups with tumors smaller than 2.5 cm in diameter. The findings of this study supported the usefulness of intra-operative facial nerve monitoring in improving facial nerve results, especially in larger tumors.

Olds et al (1997) stated that “routine facial nerve monitoring is not considered the standard of care in most communities; however risk of facial nerve injury appears to be greatly reduced when this adjunctive technique is employed”.

Fabregas and Gomar (2001) noted that facial nerve monitoring for surgery of acoustic neuromas should be considered an absolute standard of care in neurosurgery. This is in agreement with the observation of Ingelmo et al (2003) who stated that intra-operative EMG monitoring of the facial nerve should be used routinely in acoustic neuroma surgery to reduce the degree of post-operative neurological impairment.

Wilson et al (2003) assessed the cost-effectiveness of intra-operative facial nerve monitoring during middle ear or mastoid surgery. The authors concluded that facial nerve monitoring is cost-effective, and its routine use should be adopted to reduce the risk of iatrogenic facial nerve injury during otologic surgery.

The American Academy of Otolaryngology-Head and Neck Surgery (1998) recognized the proven effectiveness of neurophysiologic monitoring of the facial nerve (7th CN), which may minimize the risk of injury to the nerve during surgical procedures in which the nerve is vulnerable due to site of lesion or extent of disease.

The American Academy of Neurology (1990; Lopez, 2004) stated that brainstem AEPs and cranial nerve EMG monitoring is safe and effective during surgeries performed in the region of the brainstem or inner ear. Nevertheless, clinical situations need to be chosen carefully, avoiding those in which the nervous system is only at low risk.

The facial nerve is often embedded by fibrous tissues in recurrent tumor of the Parotid gland. Studies have suggested that facial nerve-monitored patients undergoing parotidectomy for recurrent tumors has a 0 to 4 % risk of permanent Facial paralysis. Dulguerov et al (1999) analyzed the incidence and factors responsible for post-parotidectomy facial nerve paralysis when the surgery is performed with the routine use of facial nerve monitoring (n = 70). The authors concluded that despite a stringent accounting of post-operative facial nerve deficits, the data compared favorably to the literature with or without the use of monitoring. An overall incidence of 27 % for temporary facial paralysis and 4 % for permanent facial paralysis was found. Although the lack of a control group precluded definitive conclusions on the role of EMG-based facial nerve monitoring in routine parotidectomy, the authors found its use very helpful. Brennan et al (2001) studied the effectiveness of continuous intra-operative EMG monitoring in patients who underwent parotidectomies, thyroidectomies, and parathyroidectomies (44 facial nerves, and 96 recurrent laryngeal nerves). These investigators concluded that continuous intra-operative nerve monitoring was associated with extremely low rates of temporary and permanent nerve paralysis. However, these reports were not randomized, controlled studies. Therefore, it remains unclear whether facial nerve monitoring significantly lowers the risk of facial nerve injury.

In a retrospective, case-controlled study, Terrell et al (1997) evaluated whether continuous facial nerve monitoring during parotidectomy is associated with a lower incidence of facial nerve paresis or paralysis compared with parotidectomy without monitoring (n = 117). The authors found that continuous EMG monitoring of facial muscle during primary parotidectomy reduced the incidence of short-term postoperative facial paresis, but did not change the incidence of permanent paralysis. Furthermore, Witt (1998) compared post-operative facial nerve function after monitored (n = 20) and unmonitored (n = 33) parotid surgical procedures. No patient showed permanent facial paralysis. In 9 patients (17 %), transient nerve paralysis developed: 5 (15 %) of the 33 patients who underwent lateral Parotidectomy without the use of a nerve-integrity monitor and 4 (20 %) of the 20 patients who underwent lateral parotidectomy with the use of a nerve-integrity monitor. Therefore, the clinical value of facial nerve monitoring during Parotidectomy is still in question and its routine use in clinical setting awaits findings of well-designed randomized controlled studies.

Laryngeal nerve monitoring:
During thyroidectomy, the RLN is visually identified and dissected away from the

Thyroid gland. It has been advocated that intra-operative knowledge of the status of the nerve after dissection could potentially provide the surgeon with important decision-making information. However, it has not been established that intraoperative

EMG monitoring of the RLN reduces the incidence of RLN injury during

Thyroidectomy. There are studies that have calculated the positive and negative predictive values of RLN monitoring during thyroid surgery. Most recently, Beldi and co-workers (2004) reported that the negative predictive value of intraoperative

RLN monitoring was 99 %, but the positive predictive value was only 33%. These results are similar to those of Otto and Cochran (2002) who reported a negative predictive value of 98.6 % and a positive predictive value of 33.3 %. Beldi et al (2004) concluded that although an intact nerve can be verified by RLN monitoring, the loss of nerve function cannot be reliably identified, and that the incidence of RLN lesions was not lowered by intra-operative monitoring. This is in agreement with the findings of Robertson et al (2004) who reported that there were no statistically significant differences in RLN paralysis, paresis, or total injury rates between control and continuous laryngeal nerve integrity monitoring among patients who underwent thyroidectomy (n = 165). In a prospective study (n = 328 patients with 502 nerves at risk), Hermann et al (2004) examined the ability of neuromonitoring to predict post-operative outcome in patients undergoing thyroid surgery for different indications. These authors concluded that neuromonitoring is useful for identifying the RLN, in particular if the anatomical situation is complicated by prior surgery, large tissue masses, aberrant nerve course. However, neuromonitoring does not reliably predict post-operative outcome. Thus, the value of intra-operative EMG monitoring of the RLN has not been established. The NICE (2008) assessment reported that four non-randomized studies of 16,448, 684, 639 and 136 patients (29,998, 1043, 1000 and 190 nerves) reported permanent rates of vocal cord paralysis ranging from 0% to 2% in the intraoperative nerve monitoring groups, compared with 0% to 1% in the control groups (visual recurrent laryngeal nerve identification or no recurrent laryngeal nerve identification). No statistically significant differences were seen between procedures undertaken with or without intraoperative nerve monitoring. The NICE assessment also found that three case series of 328, 288 and 171 patients reported rates of permanent vocal cord paralysis using intraoperative nerve monitoring in 3% (15/502), 1% (6/429) and 1% (2/271) of recurrent laryngeal nerves, respectively. The NICE (2008) assessment also indicated that four non-randomized studies of 684, 639, 165 and 136 patients (1043, 1000, 236 and 190 nerves) reported rates of transient vocal cord paralysis ranging from 3% to 5% in the intraoperative nerve monitoring groups, compared with 3% to 4% in the control groups (none were statistically significant). The NICE assessment stated that another non-randomized study reported that vocal cord immobility was detected at 3-month follow-up in 6% (6/104) of patients when intraoperative nerve monitoring was used and 5% (5/100) of patients when intraoperative nerve monitoring was not used (p = 0.55). The three case series of 328, 288 and 171 patients reported rates of transient recurrent Laryngeal nerve palsy as 9% (43/502), 9% (37/429) and 5% (13/271), respectively.

EMG Monitoring of Other Cranial Nerves:
Schlake et al (2001) reported that EMG is effective as a mapping tool for intraoperative localization and identification of ocular motor nerves -- the oculomotor nerve (3rd CN) and the abduces nerve (6th CN) in skull base surgery. However, the predictive value of conventional neurophysiological parameters for clinical outcomes appears to be rather poor. Further investigations on a larger number of patients are thus needed to develop new quantification techniques which enable an intra-operative prediction of ocular motor nerve deficits. More studies are also needed to extend this technique to the trochlear nerve (4th CN). Furthermore, in a review on the electrophysiological examination of CNs, Vial and Bouhour (2004) stated that intra-operative monitoring of various CNs can be useful but techniques still need to be validated.

There are no controlled studies that examined whether EMG monitoring of the

Oculomotor, trochlear, and abduces nerves during surgery in the middle cranial

Fossa reduces the risk of post-operative ophthalmoplegia. Moreover, although there are reports of monitoring, either alone or in combination, of Glossopharyngeal, laryngeal branches of the vagus (e.g., the superior laryngeal nerve and the recurrent laryngeal nerve), spinal accessory, and hypoglossal nerves during skull base surgeries such as surgical resection of tumors in the region of the foramen magnum, jugular foramen, hypoglossal foramen, and clivus, there are no controlled data to indicate that the risk of CN injury is reduced by monitoring (Harper, 2004). Thus, the clinical value of intra-operative monitoring of the oculomotor, trochlear, abduces, glossopharyngeal, laryngeal branches of the Vagus, spinal accessory, and hypoglossal nerves has not been established.

EMG in spinal surgery:
In a review on intra-operative EMG monitoring during thoracolumbar spinal surgery, Holland (1998) stated that this approach has a number of potential limitations, including: (i) EMG is sensitive to blunt lumbosacral nerve root irritation or injury, but may provide misleading results with “clean” nerve root transaction, (ii) EMG must be recorded from muscles belonging to myotomes appropriate for the nerve roots considered at risk from surgery, (iii) EMG can be effective only with careful monitoring and titration of pharmacological neuromuscular junction blockade, (iv) when transpedicular instrumentation is stimulated, an exposed nerve root should be stimulated directly as a positive control whenever possible, (v) Pedicle holes and screws should be stimulated with single shocks at low stimulus intensities when pharmacological neuromuscular blockade is excessive, and (vi) chronically compressed nerve roots that have undergone axonotmesis (Wallerian degeneration) have higher thresholds for activation from

electrical and mechanical stimulation. Hence, whenever axonotmetic nerve root injury is suspected, the stimulus thresholds for transpedicular holes and screws must be specifically compared with those required for the direct activation of the adjacent nerve root (and not published guideline threshold values).

Krassioukov, et al. (2004) examined the neurological outcomes after complex Lumbosacral surgery in patients undergoing multi-modality neurophysiological monitoring. A total of 61 patients were consecutively enrolled in this study. These subjects underwent complex intra- and extra-dural lumbosacral procedures with concomitant intra-operative EMG monitoring of the lower-limb muscles, external anal and urethral sphincters (EAS and EUS), and lower-limb SSEP. Long-term (minimum of 2 years) clinical follow-up data were obtained in all cases. Most subjects were treated for spinal/spinal cord tumors (61 %) or adult tethered cord syndrome (25 %). Recordable lower-extremity SSEP were reported in 54 patients (89 %). New post-operative neurological deficits occurred in only 3 patients (4.9%), and remained persistent in only 1 patient (1.6 %) at long-term follow-up examination. In only 1 of these cases was a significant decrease in SSEP amplitude detected. Spontaneous EMG activity was observed in the lower extremity muscles and/or EAS and EUS in 51 cases (84 %). Intra-operatively, EMG demonstrated activity only in the EUS in 5 % of patients and only in the EAS in 28 %. In 7 patients (11 %) spontaneous intra-operative EMG activity was observed in both the EAS and the EUS; however, in only 3 of these cases was EMG activity recorded in both sphincters simultaneously. In addition to spontaneously recorded EMG activity, electrically evoked EMG activity was also used as an intra-operative adjunct. A bipolar stimulating electrode was used to identify functional neural tissue before undertaking microsurgical dissection in 58 individuals (95 %). In the majority of these patients, evoked EMG activity occurred either in one (33 %) or in two muscles (9 %) simultaneously. The presence of electrically evoked EMG activity in structures encountered during micro dissection altered the plan of treatment in 24 cases (42 %). The investigators concluded that the combined SSEP and EMG monitoring of lower-limb muscles, EAS, and EUS is a practical and reliable method for obtaining optimal electrophysiological feedback during complex neurosurgical procedures involving the conus medullaris and cauda equina. Analysis of the results indicates that these intra-operative adjunctive modalities positively influence decision making with regard to microsurgery and reduce the risk of peri-operative neurological complications. Moreover, the authors noted that validation of the clinical value of these approaches, however, will require further assessment in a larger prospective cohort of patients.

In a review on electrophysiological intra-operative monitoring for spinal surgeries,

Slimp (2004) stated that the advent of equipment capable of performing SSEP, MEP, and EMG in a multi-plexed fashion, and in a timely manner brings a new level of monitoring that far exceeds the previous basic monitoring done with SSEP only. However, the author noted that whether this more comprehensive monitoring will result in greater protection of the nervous system awaits future analysis. It is also interesting to note that when Erickson and co-workers

(2005) from the technology assessment unit of the McGill University Health Center developed a report on the use of intra-operative neurophysiological monitoring during spinal surgery, they only examined the use of SSEP and MEP. These investigators recommended that combined SSEP/MEP should be available for all cases of spinal surgery for which there is a risk of injury to the spinal cord.

The American Association of Neurological Surgeons/Congress of Neurological Surgeons` guidelines for the performance of fusion procedures for degenerative disease of the lumbar spine (Resnick, et al., 2005) stated that there does not appear to be support for the hypothesis that any type of intra-operative monitoring improves patient outcomes after spinal surgery such as lumbar decompression or fusion procedures for degenerative spinal disease.

SSEPs and MEPs:
Magnetic stimulation of the brain and spine elicits so-called motor evoked potentials

(MEPs). The latency of the motor responses can be measured, and central conduction time can be estimated by comparing the latency of the responses elicited by cerebral and spinal stimulation. Abnormalities have been described in patients with a variety of central disorders including multiple sclerosis, amyotrophic lateral sclerosis, stroke, and certain degenerative disorders. An assessment by the McGill University Health Centre on use of intraoperative neurophysiological monitoring during spinal surgery stated that there is sufficient evidence to support the conclusion that intraoperative spinal monitoring using SSEPs and MEPs during surgical procedures that involve risk of spinal cord injury is an effective procedure that is capable of substantially diminishing this risk (Erickson et al, 2005). The report explained that intra-operative spinal cord injury during spinal surgery generally compromises both motor and somatosensory pathways; therefore the use of both of these independent techniques in parallel has been proposed and is seen as a safeguard should one of the monitoring techniques fail. Combination of SSEP monitoring with MEP monitoring is also proposed to reduce false-positive results, and eliminate the need for the wake-up test. The assessment identified 11 studies, all case series, of the combined use of SSEPs and MEPs in neurophysiological monitoring during spinal surgery. The assessment found that, in several reports, combined SSEP, and MEP monitoring was shown to have greater sensitivity than SSEP alone. The report also noted that the addition of MEP monitoring where SSEP monitoring is already being performed is considered to be relatively straightforward, adding little to the overall effort and resources employed in intraoperative neurophysiological monitoring.

In a systematic review, Fehlings et al (2010) examined if intra-operative monitoring (IOM) is able to sensitively and specifically detect intra-operative neurological injury during spine surgery and to assess whether IOM results in improved outcomes for patients during these procedures. Two independent reviewers assessed the level of evidence quality using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria, and disagreements were resolved by consensus. A total of 103 articles were initially screened and 32 ultimately met the pre-determined inclusion criteria. These researchers determined that there is a high level of evidence that multi-modal (SSEP and MEP) IOM is sensitive and specific for detecting intraoperative neurological injury during spine surgery. On the other hand, there is very low evidence from the literature that uni-modal SSEPS or MEPs are valid diagnostic tests for measuring intra-operative neurological injury. There is a low level of evidence that IOM reduces the rate of new or worsened peri-operative neurological deficits (a grade of "low" means that further research is very likely to have an important impact on the confidence in the estimate of effect and is likely to change the estimate). There is very low evidence that an intra-operative response to a neuromonitoring alert reduces the rate of peri-operative neurological deterioration (a grade of "very low" means that any estimate of effect is very uncertain). The authors concluded that based on strong evidence that multi-modality intra-operative neuromonitoring is sensitive and specific for detecting intra-operative neurological injury during spine surgery, it is recommended that the use of multi-modality intra-operative neuromonitoring be considered in spine surgery where the spinal cord or nerve roots are deemed to be at risk, including procedures involving deformity correction and procedures that require the placement of instrumentation. Furthermore, they stated that there is a need to develop evidence based protocols to deal with intra-operative changes in multi-modality intra-operative neuromonitoring and to validate these prospectively. Intra-operative EMG monitoring was not recommended as a means of neurophysiological monitoring during spinal surgery.

BAEP:
Polo and Fischer (2009) stated that BAEP monitoring is a useful tool to decrease the danger of hearing loss during pontocerebellar angle surgery, particularly in MVD.

Critical complications arising during MVD surgery are the stretching of the VIII nerve -- the main cause of hearing loss -- labyrinthine artery manipulation, direct trauma with instruments, or a nearby coagulation, and at end of the surgery neocompression of the cochlear nerve by the prosthesis positioned between the conflicting vessel(s) and the VIIth-VIIIth nerve complex. All these dangers warrant the use of BAEP monitoring during the surgical team`s training period. Based on delay in latency of peak V, these investigators established warning thresholds that can provide useful feedback to the surgeon to modify the surgical strategy: the initial signal at 0.4 ms is considered the safety limit. A second signal threshold at 0.6 ms (warning signal for risk) corresponds to the group of patients without resultant hearing loss. The third threshold characterized by the delay of peak V is at 1 ms (warning signal for a potentially critical situation). BAEP monitoring provides the surgeon with information on the functional state of the auditory pathways and should help avoid or correct maneuvers that can harm hearing function. BAEP monitoring during VIIth-VIIIth complex surgery, particularly in MVD of facial nerves for hemifacial spasm (HFS) is very useful during the learning period.

EEG:
EEG monitoring has been widely used to monitor cerebral ischemia secondary to carotid cross clamping during a carotid endarterectomy. EEG monitoring may identify those individuals who would benefit from the use of a vascular shunt during the procedure in order to restore adequate cerebral perfusion. Conversely, shunts, which have an associated risk of iatrogenic complications, may be avoided in those individuals in whom the EEG is normal. Carotid endarterectomy may be done under local anesthesia so that monitoring of cortical function can be directly assessed.

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Addendums:

1. **Effective 09/01/2017**: Added language clarifying why remote intraoperative neurophysiologic monitoring does not meet the standard of care and is not covered.

2. **Effective 02/01/2018**: PA requirement for intraoperative neurophysiologic monitoring.

3. **Effective 05/01/2018:** Language clarification that remote intraoperative monitoring, as a non-covered service, is not subject to medical necessity determinations.

4. **Effective 09/01/2018:** Configuration update for additional remote monitoring code and for dual purpose test (limited auditory evoked potentials)

5. **Effective 01/01/2021:** Deleted codes 92585 & 92586 and replaced with codes 92650, 92651, 92652 & 92653. Added replaced codes to the search box as well as their descriptions in the codes used in this BI.

Application to Products

This policy applies to all health plans administered by QualChoice, both those insured by QualChoice and those that are self-funded by the sponsoring employer, unless there is indication in this policy otherwise or a stated exclusion in your medical plan booklet. Consult the individual plan sponsor Summary Plan Description (SPD) for self-insured plans or the specific Evidence of Coverage (EOC) for those plans insured by QualChoice. In the event of a discrepancy between this policy and a self-insured customer's SPD or the specific QualChoice EOC, the SPD or EOC, as applicable, will prevail. State and federal mandates will be followed as they apply.

Changes: QualChoice reserves the right to alter, amend, change or supplement benefit interpretations as needed.