

Introduction

There's a hidden problem in workers' compensation that drives up the costs and robs employers of care for their injured workers. The culprit is an improperly administered and interpreted Electromyography (EMG) & Nerve Conduction Study (NCS), which we will call a medically not useful EMG/NCS.

EMG and NCS are performed to assist the treating physicians in making a diagnosis that would direct the patient's treatment. In order for the results of the study to be utilized, the EMG & NCS must be considered “medically useful”. The failure for an exam to satisfy medical usefulness is determined by a number of factors including, but not limited to:

1. Lack of adherence to the American Association of Neuromuscular & Electrodiagnostic (AANEM) guidelines governing the performance of EMG and NCS
2. Incompleteness of the examination
3. Inconsistency and un-reliability of data.

When a study is not considered to be medically useful, several actions are possible. In some cases, if the study is considered to be deficient because the examiner fails to adhere to certain standards, only a small portion of the examination may need to be repeated. An example is a study with borderline abnormalities utilized to diagnose Carpal Tunnel Syndrome (CTS) where limb temperature monitoring has not been documented. A recommendation in this case would be to repeat the median sensory NCS under limb temperature control.

Another example of an examination which might not be considered medically useful would be a needle EMG where insufficient muscles were studied to make an accurate diagnosis. In this case, it would be requested that the patient go back to the initial examining physician who would perform testing of the additional requested muscles that would be required to complete the needle EMG.

In some cases, the study might be considered to be not medically useful and it might be concluded that a return visit to the same physician would not remedy the situation. Examples of this include unacceptable variation of motor amplitudes, poor quality waveforms, or conclusions which are not supported by the data presented. Recommendation in this situation would be to repeat the entire study by a different physician who is known to perform medically useful EMG & NCS studies.

The clinical concern is clear. From a general clinical perspective, the evidence presented by Dr. John Robinton (One Call Medical's [OCM] medical director) and others is compelling and indicates a significant quality variation among EMG providers. One contributory factor is the low financial barrier to entry, resulting in a wide variety of physician and non-physician providers who offer EMG services. Vertical integration in the workers' compensation (WC) provider market has further increased the number and variety of treating providers who offer the “convenience” of EMG services.



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The difficulty that an untrained adjuster has in judging the quality of the test from the report amplifies and sustains the underlying quality variation. Unable to objectively assess the quality of the outcome, the adjuster’s perspective shifts to process. Did the provider respond rapidly with an appointment? Did the report arrive quickly? Was the injured worker pleased with the experience at the provider’s office? Can I move the paperwork off my desk quickly? Discussions with adjusters suggest that these issues are top of mind when selecting an EMG provider, much more so than whether the EMG findings are clinically credible.

The evidence is especially compelling to NCMs and higher level managers: When presented with the quality variance information, anecdotal evidence suggests that adjusters, NCMs and higher level managers become concerned about the quality of the EMGs upon which they rely. Clients reference formal presentations by Dr. John Robinton, OCM providers, and other OCM staff on the issues surrounding EMG quality. The information appears to be well-understood and compelling, although the call to action seems to be strongest for the higher level managers and NCMs, and diminishes at the adjuster level. These presentations are especially effective with clinical and higher level professionals in generating concern about the costs of unwarranted surgery and/or avoidable lost time, but could be even more effective if supported with a formal return on investment analysis.

One Call Medical, the nation’s leader in diagnostic management solutions since 1993, is taking the leadership role in establishing standards and delivering the level of accuracy that is needed to make these tests useful. One Call Medical utilizes the national guidelines approved by the American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM) as a tool to establish EMG & NCS Medical Report Standards and thereby achieve medically useful reports. One Call Medical is the first company to develop a network of credentialed neurologists and physiatrists, combined with a continuing quality improvement program where these physicians must adhere to the OCM Standards.

These initiatives have been successful in achieving measurable improvements in the quality of these tests and their value to payers and injured workers. One Call Medical is actively working with many national payers to help them realize substantial cost savings, medically useful EMG & NCS, and faster return to work outcomes.

This paper informs workers’ compensation professionals about the problems with EMG and NCS testing, and the solutions that will ensure that they receive the value they need from these tests.

This report includes the following sections:

- Introduction
- EMG & NCS Overview
- Quality issues
- Product Vision
 - 5 Step Approach

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- Quality Reviews
- Clinical Research
 - Radiculopathy
 - CTS
 - QA
- EMG Tests Critical for Carpal Tunnel Syndrome, Which Tops Lost Work Days
- Why do 50 percent of workers’ compensation patients fail to improve following carpal tunnel surgery?

EMG and NCS Overview

EMG and NCS are utilized when there is suspicion of generalized or focal nerve and/or muscle pathology. They provide information about the site, type, severity and age of pathology, and are considered an extension of the clinical neurological evaluation. The history and examination is completed to determine the nerves and muscles to be tested.

Per the national guidelines, EMG and NCS should be performed only by a neurologist or physiatrist. However, due to the absence of regulations or quality indicators in this area, the tests are often administered by primary care doctors or other specialties that do not possess the appropriate training and qualifications.

Electromyography (EMG) is a study of a muscle using a needle electrode. The physician inserts a small needle into the muscles to assess general health of the muscle and to test if the nerve supplied to that muscle is intact. Muscle activity is evaluated both while the muscle is at rest and during voluntary contraction of the muscle.

Nerve Conduction Studies (NCS) are essentially a quantitative measurement of nerve function which compares values obtained during the examination to accepted norms established by each laboratory. A mild electrical stimulation is applied ***directly*** over the nerve(s) in increasing strength to elicit a response from motor and sensory nerves.

Why would a physician order an EMG or NCS? There are several reasons:

- To correlate or objectify findings with a clinical exam.
- To quantify the prognosis and provide a means of measurement to follow-up an injury.
- To differentiate between organic and non-organic illness (physical versus emotional).
- To provide assistance for certain surgical decisions.

EMG and NCS tests are used for a number of conditions, especially repetitive motion injuries. These conditions include:

- Carpal tunnel syndrome.
- Lumbar radiculopathy.
- Cervical radiculopathy.
- Ulnar neuropathy.

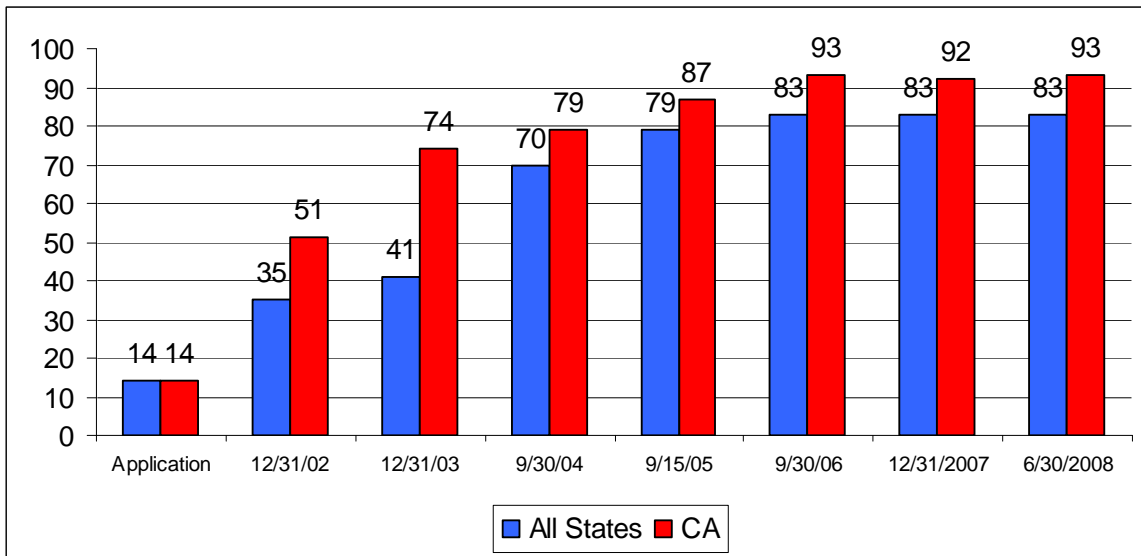
- Disturbances of skin sensation.
- Pain in limb.
- Tarsal tunnel syndrome.
- Entrapment.

Why Are There Problems Getting Accurate Tests?

There are many variables affecting EMG outcomes that would impact the quality and accuracy of the test results. These variables include:

- The test can be performed too early. Unless a patient’s symptoms began prior to the date of injury (DOI), it should not take place until 17 days after the date an injury occurred.
- The person administering the test may lack proper training.
- The wrong nerve may be studied.
- The wrong muscle may be studied.
- The test results can be interpreted incorrectly.
- Electrodes may be incorrectly placed.
- The test administrator may fail to monitor limb temperature. Limb temperature must be greater than 32 degrees centigrade for an upper extremity, and greater than 30 degrees centigrade for a lower extremity. Cold extremities result in slowing of nerve conduction and as a result if not recognized and corrected can lead to misdiagnosis and unnecessary surgeries.

Encouragingly, compliance problems with this last step can be improved through education.



For example, in 1999, only 14 percent of reports submitted by physicians applying to join OCM’s network showed documented limb temperature. However, following consistent



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educational efforts, 83 percent of reports done nationally and 93 percent of reports done in California during the first half of 2008, had documentation of limb temperature monitoring.

Significant Quality Problems Exist with EMG Tests

Studies conducted by One Call Medical determined that 40 percent of all non-OCM EMG tests performed contain errors and were not medically useful.

To further understand the scope and depth of these problems, consider OCM’s audit of the EMG and NCS tests for three companies, and the percent that were deficient in various categories according to OCM’s standards. Not surprising, these claims received a high percentage of disallowed codes – from 20 to more than 50 percent. Fortunately, Corrective Action Plans (CAP) produced costs savings, as well as more medically useful reports. Savings obtained for these companies ranged from 13% to 55% of the original cost of the tests.

This data illustrates the three main problems with EMG tests:

- Inaccuracy of the tests themselves.
- Payers pay too much for the tests.
- Payers pay for tests that do not deliver medically useful, quality information for treating the injured workers.

Figure 1: OCM Analysis of EMG and NCS Tests for Three Payers

Audit Items	Payer A	Payer B	Payer C
Repeat Study Recommended	47%	31%	19%
Incomplete Data	44%	55%	40%
Limb Temperature Monitored	< 1%	< 1%	0%
Inaccurate Interpretation	38%	28%	31%
No EMG Performed	31%	14%	8%
Interpretation Out of State	16%	0%	2%
Unnecessary Somatosensory Evoked Potential (SSEP)	29%	1%	0%
% Codes Denied	54%	44%	20%
% Savings	55%	21%	13%

The Impact of Poor Quality EMG Tests

Poor quality tests lead to an extension of disability, unnecessary surgery, and delayed return to work outcomes. They can also result in unhappy a claimant – which often leads to costly litigation.

In particular, poor quality EMGs negatively impact the treatment of repetitive motion injuries. According to the U.S. Department of Labor, Bureau of Labor Statistics, “repetitive motion, such as grasping tools, scanning groceries and typing, result in the longest absences from work...a median of 27 days.” For an in-depth look at how this issue impacts carpal tunnel syndrome cases, see the sidebar, “EMG Tests Critical for Carpal Tunnel Syndrome, Which Tops Lost Work Days.”

Solving the Problem

To improve the management of EMG tests, One Call Medical has developed a five-pronged approach that is working successfully for the benefit of injured workers and for payers.

The Five-Step Approach to Improving Quality of EMG and NCS Tests

1. **Adherence to quality guidelines and development of Standards.** The AANEM is leading the drive to establish quality guidelines for the provision of EMG tests. One Call Medical supports the efforts of the AANEM to improve the quality of patient care through education, research and performance improvement. OCM has established a Neurodiagnostic Medical Advisory Board that includes four past presidents of the AANEM.

The Board has developed and adopted EMG and NCS Medical Report Standards using the AANEM Recommended Policy for Electrodiagnostic Medicine as a guideline. The Standards are included in the Neurodiagnostic Provider Agreement and are utilized as quality indicators, measurements of the physicians’ compliance to the Standards.

2. **Develop a quality provider network.** Using stringent criteria even higher than those developed by the AANEM for selecting neurologists and physiatrists, One Call Medical has credentialed a national preferred network of over 1,250 EMG providers. One Call Medical’s credentialing requirements include the submission of abnormal sample tests for clinical review prior to acceptance in OCM’s network. The samples are reviewed by board certified electromyographers and must adhere to the Standards.

One Call Medical’s credentialing also requires:

- Board certification in neurology or physical medicine rehabilitation or a certificate of completion from an accredited residency program in the same.
- Current unrestricted medical license in the state in which he/she practices.
- A current unrestricted Federal DEA and state CDS certificate, as well as a valid workers’ compensation certificate.



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“Challenges in the Workers Compensation Market”

- No history of Medicare/Medicaid sanction activity.
 - Reports and details of any malpractice claims filed within the past five years.
3. **Maintaining a quality provider network through ongoing quality improvement.** One Call Medical’s Medical Director oversees the proprietary report review that is based on the EMG and NCS Medical Report Standards. Quality indicators have been established to monitor ongoing physician compliance.

Each report at OCM is reviewed by the clinical staff. If a network physician is non-compliant, the assigned Nurse Reviewer determines the appropriate CAP, sends a Quality Improvement letter with educational information and does follow-up with the physician. This on-going Quality Improvement program assists adjusters and nurse case managers in obtaining the most accurate testing and medically useful reporting available. This stringent review helps to ensure that providers perform quality EMG & NCS, which reduces the need for unnecessary surgeries and lost time from work payments.

4. **Bill review to capture savings.** One Call Medical’s innovative electronic communication technology provides a means to deliver immediate and substantial costs savings discounts on EMG services by performing stringent bill reviews. OCM often uncovers additional costs savings derived from disallowed codes. In addition, OCM can assure the avoidance of over-billing and unnecessary surgeries due to studies that may not be medically useful. The savings are identified as both hard and soft savings.

Hard savings include:

- Fee/UCR (reduction of physician’s charges to “State Fee” or “UCR”).
- OCM Discount (additional savings from the “Fee/UCR”).
- Disallowed Codes (denial of services per OCM policies and procedures which utilize AANEM guidelines).

Soft savings include avoiding surgical costs (when surgery was recommended based on a test deemed medically not useful), extended PT/OT (better care planning based upon medically useful information) and getting back to work earlier (saves employer down time costs).

This clinical bill review process is provided at no charge. Consequently, fee discounts are only the beginning of cost savings. Should the review present a need to disallow a CPT code (or multiple codes), those procedures are deducted from the bill, thereby resulting in additional savings.

5. **The use of technology to streamline the claims cycle.** One Call Medical’s technology fast-tracks services from the referral to the medical report, again facilitating faster return to work for injured employees and appropriate treatment for injuries.



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Cost Savings from One Call Medical’s EMG Solutions

In addition to improved diagnosis for better care for injured workers, the savings delivered from a quality-driven EMG and NCS program are substantial: as much as 18-25%.

A quality-driven EMG program saved one company more than \$130,000 for 1,446 EMG referrals in just three months.

The following chart illustrates the savings from one company in just one quarter.

Figure 2: Actual Savings from an EMG program over Three months.

OCM Charge		Number of Procedures/ Cases	Provider Charge	OCM Provider Charge Savings	PC % Saved	State Fee/ UCR	SF/UCR Savings	SF/ UCR % Saved
January	\$105,321.64	552	\$132,984.45	\$27,662.81	26%	\$133,076.74	\$27,755.10	21%
February	\$ 80,469.13	457	\$ 97,834.67	\$17,365.54	22%	\$ 97,233.59	\$16,764.46	18%
March	\$ 81,466.67	437	\$102,264.87	\$20,798.20	26%	\$103,812.33	\$22,345.66	22%

<p>Total savings \$132,691.77 (OCM Provider & SF/UCR savings)</p>
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Quality Review Can Determine Specific Payer Benefits

OCM’s “Quality Review” product can ensure the proper allocation of resources and an accurate diagnosis in workers’ compensation claims that are not scheduled by OCM. If there is a question regarding the quality or interpretation of an exam, an NCS performed without a needle, use of a handheld device to obtain an EMG/NCS or an EMG/NCS not performed or interpreted by a licensed physician, a Quality Review can be the difference in misdiagnosis and unwarranted surgery.

The most typical diagnoses that should be considered candidates for submittal to Quality Review include, but should not be limited to:

- **354.0** Carpal tunnel syndrome.
- **723.4** Cervical radiculopathy.
- **724.4** Lumbar radiculopathy.
- **354.2** Ulnar neuropathy.



One Call Medical EMG & NCS

“Challenges in the Workers Compensation Market”

- **782.0** Disturbance of skin sensation.
- **729.5** Pain in limb.

The Real Improvements Have Just Begun

Implementing a quality-driven managed approach to EMG diagnostic services promises immediate and substantial improvements in return to work, cost reduction, and improved quality of care.

However, this is only the beginning. For most companies and most insurers, less than half of EMGs are currently managed in any way. The majority are scheduled out of network and without benefit of any oversight or discounted fees. Capturing this unmanaged component represented the greatest benefit in EMG management.

One Call Medical offers the only comprehensive quality delivery model for EMG diagnostic services for workers' compensation. One Call Medical also manages the lifecycle of a referral with innovative technologies that help claims professionals efficiently reduce workers' compensation claims costs and eliminate administrative burdens by quickly channeling patients into the quality national provider network. Payers receive immediate and substantial cost savings benefits on EMG and NCS exams.

One Call Medical's EMG service offers the industry's **ONLY** quality credentialed network and full clinical review and bill review assessments, to provide a total solution unmatched in today's marketplace. With proprietary analytic tools and a consultative approach, OCM is the best partner to manage the EMG and NCS test process to improve patient care and lower costs.

For more information, contact:

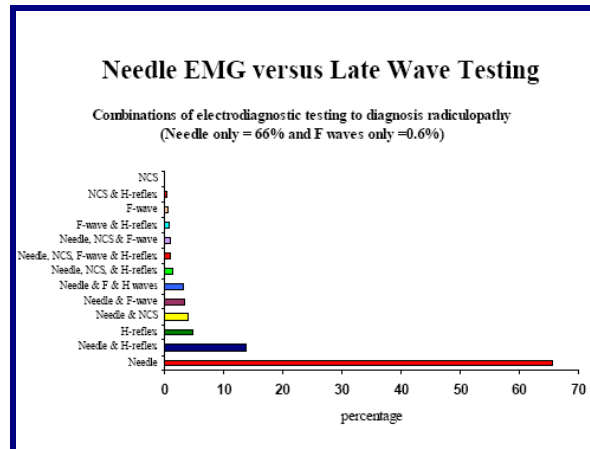
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First Sidebar: Research Studies by OCM on EMG Testing

2006 Study “Diagnosis of Lumbar Radiculopathy by EMG, Nerve Conduction and Late Wave Testing”

Authors: J.E. Robinton, MD; J.M. Pearson, RN, MA, BC; Mary Jane Malloy, RN, BS, CPHQ; Veronica Richards, RN; Jeremy Zamora, RN, BSN

This study documented the importance of needle EMG in the correct diagnosis of radiculopathy. The most frequent category used for diagnoses of lumbosacral radiculopathy was abnormal needle EMG which was used in 65.66 percent of cases.



Conclusions: In a review of 1,116 reports from One Call Medical’s Neurodiagnostic Network physician electromyographers, researchers found that needle EMG is imperative for the diagnosis of radiculopathy. Despite articles suggesting the importance of F-wave testing, the utilization of F-wave was of limited assistance in the diagnosis of radiculopathy.

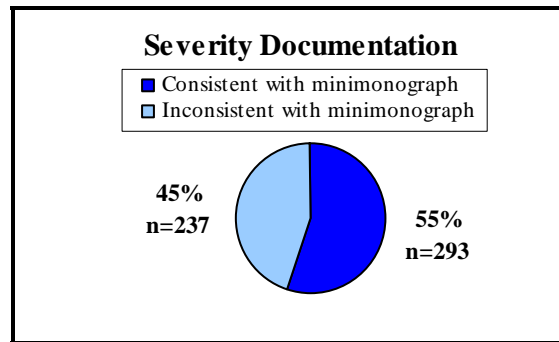
2005 Study: “Severity Assessment of Carpal Tunnel Syndrome”

Authors: J.E. Robinton, MD; J.M. Pearson, RN, MA, BC; M.J. Malloy, RN, BS, CPHQ

A retrospective review of testing of 530 hands with carpal tunnel syndrome was performed. Each report was reviewed for correlation to Minimonograph #16 severity grading, from the American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM) published guidelines.

Of the 530 hands studies, 293 had documented severity consistent with indicators in Minimonograph #26. However, findings of 237 reports inconsistent with the rating system showed discrepancies in all categories. For example, the 43 reports given severe ratings, when graded using the Minimonograph ratings, reveals two as mild, 41 as moderate, and none as severe. The 13 reports the Minimonograph criteria would have rated severe were instead rated by the practitioners as moderate (5), moderate to severe (3), moderately severe (3) and advanced (2). No source references for severity were documented by any of the 171 physician electromyographers, many of whom were board-certified by AANEM.

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Conclusion: Results indicate a lack of utilization of severity documentation and non-uniformity in classifications, suggesting a need for increased education and reporting standardization.

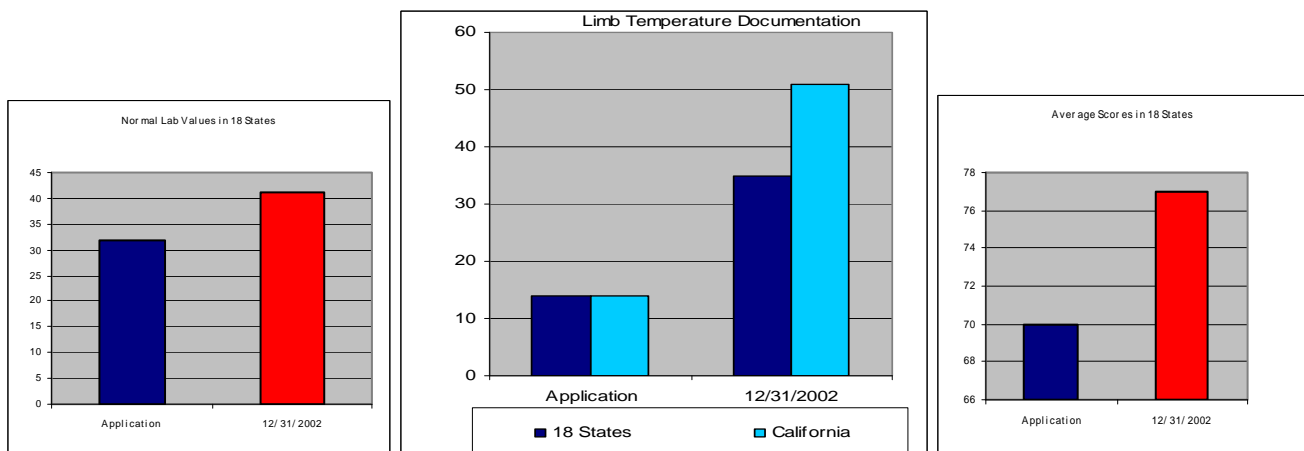
2003 Study: “Quality Assessment and Improvement in Electrodiagnostic Studies”

Authors: J.E. Robinton, MD; J. Kelly, MD

More than 1,000 physician electromyographers who applied for network admission to One Call Medical, the nation’s leading diagnostic provider network for MRI/CT and EMG for the workers’ compensation industry were selected. Quality indicators were identified, including content, format, and temperature, to measure adherence to AANEM documentation standards for EMG and NCS reports. Each report was graded by a group of board certified physician electromyographers, receiving a score of 0 to 100.

Findings:

- The average score of electromyographers reviewed on application during this period was 70. Following admission to the network, physician scores rose to 77.
- Only 14 percent of applicants originally documented limb temperature during NCS. Through educational communication, this number rose to 35 percent overall, and to 51 percent in California.
- A smaller improvement was identified for the inclusion of normal NCS values in the report, from 32 percent to 41 percent.



Conclusion: A substantial number of physician electromyographers applying for network admission in 18 states do not adhere to AANEM guidelines. Results indicate education through an EMG network using AANEM guidelines can complement the educational efforts of the AANEM to improve the quality of EMG and NCS, although there is clearly a need for further research in this important area.

Second Sidebar: EMG Tests Critical for Carpal Tunnel Syndrome, Which Tops Lost Work Days

Accounting for approximately four percent of workers’ compensation claims, carpal tunnel syndromes (CTS) is the leader in average days away from work – a median of 27 days. The National Council on Compensation Insurance, Inc., reports that “carpal tunnel syndrome is a leading lost-time diagnosis and ranked second in terms of total costs behind lumbar disc displacement.”

Studies have shown that each worker that develops CTS costs a company an average of \$37,000 in lost work time, medical treatment and rehabilitation. These costs do not include any medical or indemnity charges which could be significant as well. Management of CTS can make a significant impact on costs, and whether or not the worker receives the right type of treatment. In contrast, a well managed CTS claim typically costs about \$8,000, according to the National Council on Compensation Insurance, (Vol. 3 April, 2005).

Carpal tunnel syndrome claims costs are even higher than expected because claimants tend to be more highly paid and older employees than those with other common injuries such as back strain. Carpal tunnel syndrome’s medical severity rises with each age group, while indemnity severity rises until age 65 and older, probably due to offset provisions. Since CTS claimants tend to be older, CTS injuries could become even more prevalent as the workforce ages over the coming decades. Consequently, costs for their treatment will rise as well.

Proper diagnosis of CTS and other repetitive motion injuries with medically useful information is key to rapid treatment for an earlier return to the work and to diminish the costs associated with this injury. As the most utilized diagnostic choices for these injuries, NCS and EMG tests must be performed accurately in order for these cases to be effectively managed.

Because EMG tests are the examination of choice to accurately diagnose CTS, a poor EMG can derail the entire treatment plan, leading to unnecessary or inappropriate services, delays in recovering and returning to work, extended disability and even litigation.

Third Sidebar: Why do 50 percent of workers’ compensation patients fail to improve following carpal tunnel surgery?

The answer frequently lies with poorly conducted EMG tests. Consider these scenarios.

Example One:

On a cold February day, Mr. Jones sees Dr. X in his office to evaluate possible carpal tunnel syndrome. Prolonged distal latencies are seen in all nerves studies. The report states that the patient has bilateral carpal tunnel, and surgery is recommended. It is anticipated that the patient would miss one or two months from work for the surgery.

On another cold February day, the patient seeks a second opinion with Dr. Y. Prior to the examination; the patient’s skin temperature is taken, and is found to be quite low. This time, the patient was warmed before the test was administered. The results are normal.

Had the patient not sought the second opinion, he would have undergone a surgery that was unnecessary. Failure to check limb temperature is a major cause of inaccurate EMG tests, which can then lead to unwarranted surgery.

Example Two:

Mr. Smith is a 60-year-old dockworker who sustains a serious fall, badly lacerating his forearm. Following the accident, he experiences severe weakness in intrinsic hand muscles. He is sent to see Dr. X, who – although he has an excellent reputation - has not received appropriate training in administering electromyography (EMG) tests.

Dr. X performs EMG and nerve conduction studies three days following the accident. He states that the nerve conduction studies are all normal, though he does not appreciate any motor units under voluntary control in ulnar hand muscles. He tells the doctor that he doubts that the nerve is transected.

The patient undergoes physical therapy. After several months of treatment, there is still no response. On his own, the patient obtains a second opinion and sees Dr. Y, a neurologist with special training in EMG testing. Dr. Y’s repeat EMG and nerve conduction studies reveal no evidence of ulnar function.

In example two, a patient who should have received surgery does not. Instead he wastes months in therapy that produces no result, and misses a window of opportunity where prompt surgical intervention could have shortened his recovery time.

These two situations illustrate the dangers of poor EMG testing:

- An incorrect diagnosis based on an inaccurate EMG often leads to extended disability.
- Complications resulting from unnecessary surgery can result in unnecessary extended disability.