**An Introductory Guide to Electrodiagnostic Billing Part 2: Case Studies**

Matthew Grierson, MD, FAAPMR; Carlo Milan, MD, FAAPMR; Kevin Fitzpatrick, MD, FAAPMR; Earl Craig, MD, FAAPMR; Carrie Winter, RRT, AANEM Health Policy Manager; Carolyn Milliet, AAPM&R Senior Manager of Reimbursement & Regulatory Affairs

This is the second article in a three-article electrodiagnostic (EDx) testing series. For a detailed introduction to EDx coding, see the companion article in the September issue of The Physiatrist. This portion of the series offers 2 sample case studies to demonstrate how to put the coding guidance into practice.

**Case Study 1**

A 62-year-old man with history of cervical fusion is referred for electrodiagnostic testing with 2 months of symptoms that started without inciting event. He reports pins and needles weakness of the left distal toes. Over the past 2 months, he has had progressive difficulty walking and describes a left foot slap with intermittent tripping. His primary care physician referred the patient for further evaluation with electrodiagnostic testing.

On examination, the patient has 4/5 weakness with left ankle dorsiflexion. Upper limbs are notable for mild weakness and atrophy of the right deltoid muscle. Sensory exam is intact. Deep tendon reflexes are 3+ symmetric in the upper limbs, 2+ symmetric in the lower limbs, with up-going plantar response and clonus on the right. Dural tension signs are absent in the lower limbs. The following electrodiagnostic studies were performed:

**Sensory NCS**

1. Left sural sensory
2. Left superficial fibular sensory

**Motor NCS**

3. Left fibular motor to EDB (including F-wave)
4. Left tibial motor to AT
5. Bilateral tibial H-reflexes

**Left lower leg EMG**

The left lower limb was initially examined with needle electromyography, evaluating the following:

1. Tibialis anterior (TA)
2. Fibularis longus
3. Gastrocnemius
4. Tibialis posterior
5. Extensor hallucis longus (EHL)
6. Vastus medialis (VM)
7. Adductor longus
8. Lumbar paraspinals

All of the muscles examined in the left leg showed increased insertional activity with prominent positive sharp waves and fibrillation potentials and also fasciculations. In addition, they all demonstrated chronic motor unit changes, including polyphasia, increased duration, and increased amplitude.

**Right upper limb, right lower limb, and non-extremity EMG**

Based on the results from the left leg, along with a history and examination that suggested a more global process, additional testing was performed on the right upper and lower limbs.

**Case Study 2**

A 32-year-old woman presents for electrodiagnostic evaluation on referral from her family physician. Her symptoms started mildly 6 months ago without inciting event and have been getting progressively worse the past 2 months. She reports pain and numbness in the left arm and hand with radiation to the ring and little fingers. She denies weakness.

Examination reveals no swelling, atrophy, skin changes. Neurovascular exam is fully intact throughout the bilateral upper limbs. Ulnar entrapment neuropathy, C8 radiculopathy, and thoracic outlet syndrome are highest on the differential diagnosis for pain and numbness in the ring and little finger.

The electrodiagnostic evaluation is focused to evaluate the patient for the most likely possibilities as an extension of the history and physical examination but can be expanded if abnormalities suggest other issues.

**Sensory NCS**

1. Left median from palm to index finger
2. Left median from wrist to index finger
3. Left ulnar from wrist to the short finger
4. Right median from palm to index finger (comparison)
5. Right median from wrist to index finger (comparison)
6. Right ulnar from wrist to the short finger (comparison)

**Motor NCS**

1. Left median motor to APB
2. Left ulnar motor to ADL

NCS are notable for conduction block of the ulnar nerve at the elbow.

**Left upper limb EMG**

The left upper limb was examined with needle electromyography evaluating the following:

1. First Dorsal Interosseus
2. Abductor Pollicis Brevis
3. Flexor Carpi Ulnaris
4. Biceps

**Right upper limb EMG**

The results revealed similar involvement in the right arm and leg, bilateral thoracic paraspinals, and the genioglossus muscle confirming the suspicion for motor neuron disease.

**CASE STUDY 1: CORRECT BILLING**

<table>
<thead>
<tr>
<th>Procedure/Code</th>
<th>Billable Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve conduction studies</td>
<td>5-6 studies</td>
</tr>
<tr>
<td>Needle electromyography, each extremity, with related paraspinal areas</td>
<td>2-3 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography, each extremity, with related paraspinal areas, when performed</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography, each extremity, with related paraspinal areas, when performed</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
</tbody>
</table>

**CASE STUDY 2: CORRECT BILLING**

<table>
<thead>
<tr>
<th>Procedure/Code</th>
<th>Billable Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve conduction studies</td>
<td>4-5 studies</td>
</tr>
<tr>
<td>Needle electromyography, each extremity with related paraspinal areas</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
</tbody>
</table>

**Case 2**

A 32-year-old woman presents for electrodiagnostic evaluation on referral from her family physician. Her symptoms started mildly 6 months ago without inciting event and have been getting progressively worse the past 2 months. She reports pain and numbness in the left arm and hand with radiation to the ring and little fingers. She denies weakness.

Examination reveals no swelling, atrophy, skin changes. Neurovascular exam is fully intact throughout the bilateral upper limbs. Ulnar entrapment neuropathy, C8 radiculopathy, and thoracic outlet syndrome are highest on the differential diagnosis for pain and numbness in the ring and little finger.

The electrodiagnostic evaluation is focused to evaluate the patient for the most likely possibilities as an extension of the history and physical examination but can be expanded if abnormalities suggest other issues.

**Sensory NCS**

1. Left median from palm to index finger
2. Left median from wrist to index finger
3. Left ulnar from wrist to the short finger
4. Right median from palm to index finger (comparison)
5. Right median from wrist to index finger (comparison)
6. Right ulnar from wrist to the short finger (comparison)

**Motor NCS**

1. Left median motor to APB
2. Left ulnar motor to ADL

NCS are notable for conduction block of the ulnar nerve at the elbow.

**Left upper limb EMG**

The left upper limb was examined with needle electromyography evaluating the following:

1. First Dorsal Interosseus
2. Abductor Pollicis Brevis
3. Flexor Carpi Ulnaris
4. Biceps

**Right upper limb EMG**

The results revealed similar involvement in the right arm and leg, bilateral thoracic paraspinals, and the genioglossus muscle confirming the suspicion for motor neuron disease.

**CASE STUDY 1: CORRECT BILLING**

<table>
<thead>
<tr>
<th>Procedure/Code</th>
<th>Billable Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve conduction studies</td>
<td>5-6 studies</td>
</tr>
<tr>
<td>Needle electromyography, each extremity, with related paraspinal areas</td>
<td>2-3 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography, each extremity, with related paraspinal areas, when performed</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
</tbody>
</table>

**CASE STUDY 2: CORRECT BILLING**

<table>
<thead>
<tr>
<th>Procedure/Code</th>
<th>Billable Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve conduction studies</td>
<td>4-5 studies</td>
</tr>
<tr>
<td>Needle electromyography, each extremity with related paraspinal areas</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
</tbody>
</table>

**Case 2**

A 32-year-old woman presents for electrodiagnostic evaluation on referral from her family physician. Her symptoms started mildly 6 months ago without inciting event and have been getting progressively worse the past 2 months. She reports pain and numbness in the left arm and hand with radiation to the ring and little fingers. She denies weakness.

Examination reveals no swelling, atrophy, skin changes. Neurovascular exam is fully intact throughout the bilateral upper limbs. Ulnar entrapment neuropathy, C8 radiculopathy, and thoracic outlet syndrome are highest on the differential diagnosis for pain and numbness in the ring and little finger.

The electrodiagnostic evaluation is focused to evaluate the patient for the most likely possibilities as an extension of the history and physical examination but can be expanded if abnormalities suggest other issues.

**Sensory NCS**

1. Left median from palm to index finger
2. Left median from wrist to index finger
3. Left ulnar from wrist to the short finger
4. Right median from palm to index finger (comparison)
5. Right median from wrist to index finger (comparison)
6. Right ulnar from wrist to the short finger (comparison)

**Motor NCS**

1. Left median motor to APB
2. Left ulnar motor to ADL

NCS are notable for conduction block of the ulnar nerve at the elbow.

**Left upper limb EMG**

The left upper limb was examined with needle electromyography evaluating the following:

1. First Dorsal Interosseus
2. Abductor Pollicis Brevis
3. Flexor Carpi Ulnaris
4. Biceps

**Right upper limb EMG**

The results revealed similar involvement in the right arm and leg, bilateral thoracic paraspinals, and the genioglossus muscle confirming the suspicion for motor neuron disease.

**CASE STUDY 1: CORRECT BILLING**

<table>
<thead>
<tr>
<th>Procedure/Code</th>
<th>Billable Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve conduction studies</td>
<td>5-6 studies</td>
</tr>
<tr>
<td>Needle electromyography, each extremity, with related paraspinal areas</td>
<td>2-3 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography, each extremity, with related paraspinal areas, when performed</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
</tbody>
</table>

**CASE STUDY 2: CORRECT BILLING**

<table>
<thead>
<tr>
<th>Procedure/Code</th>
<th>Billable Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve conduction studies</td>
<td>4-5 studies</td>
</tr>
<tr>
<td>Needle electromyography, each extremity with related paraspinal areas</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
<tr>
<td>Needle electromyography</td>
<td>2 units</td>
</tr>
</tbody>
</table>