Advanced Neurologic Exam Workshop: A Cranial Nerve Exam is Just the Beginning

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Alternate Title:
Nurse Practitioners – (Still) Keeping it Real

No Disclosures
Before we begin...

* All patients have given permission for our team to video them for teaching purposes.
* In order to stay in this workshop, you must agree that IF YOU SEE ANYONE YOU KNOW, you will not mention or discuss the patient by name or other identifying factors with anyone.
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Neurologic Exam Workshop Objectives

1. Demonstrate the head to toe neurologic exam
2. Understand the importance of an accurate history as a precursor to the physical exam
3. Discuss and demonstrate components of evaluating cognition/dementia and identify screening tools used
4. Be able to identify, assess, and describe gait abnormalities.
5. Be able to describe different types of abnormal movements

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Begin with the end in mind

Objective: Understand the importance of an accurate history as a precursor to the physical exam

* OLD CART
  * Onset
  * Location
  * Duration
  * Characteristics
  * Aggravating
  * Relieving
  * Treatment
How I feel on most days...

And on other days...

Tools of the Trade

-Flashlight
-Reflex Hammer
-Tuning Fork
-Safety pins and paper clips
-NIH Stroke Scale App (www.ninds.nih.gov)
-Dermatome Map
-Scales (MOCA, MMSE)
-Checklists – cranial nerve exam
Mental Status Exam and Screening Tools

Video
Mental Status

The Neurologic Exam
Michael Halvorsen, DO
and
Johanna Harris, APN
University of Louisville Neurology Department

MoCA

Assesses:
- Memory
- Attention and Information
- Executive Function
- Verbal fluency
- Complex Attention
- Orientation

Translated into several languages

Don't forget to add a point for people with 12 years of education or less.
**MMSE**

Assesses:
- orientation
- memory
- attention (assessed uniformly in this study as spelling WORLD backwards)
- language
- visuospatial abilities
- 30 possible points

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**MoCA versus MMSE**

<table>
<thead>
<tr>
<th>Cognition Status</th>
<th>MMSE</th>
<th>MoCA</th>
<th>Abbreviated MoCA</th>
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</thead>
<tbody>
<tr>
<td>Normal</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>MCI</td>
<td>4.7</td>
<td>4.8</td>
<td>4.7</td>
</tr>
<tr>
<td>MCI</td>
<td>4.3</td>
<td>4.7</td>
<td>4.3</td>
</tr>
<tr>
<td>Dementia</td>
<td>4.7</td>
<td>4.8</td>
<td>4.6</td>
</tr>
</tbody>
</table>

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**MoCA versus MMSE Scores**

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A Few Words About a Speech Evaluation

Speech and Language are two separate things!

Examples:
- Dysarthria—slurred, “thick tongued”
- Scanning speech - Causes enunciation of individual syllables: “the British parliament” becomes “the Brit-ish Par-la-ment.”
- Hypophonic - soft
- Tremulous speech—usually indicates vocal cord tremor /dystonia

Is this a speech problem or a language problem?

Practice with a Purpose

- Evaluate your exam partner
- Administer a MoCA or MMSE
Definitions that will help: Cortex = “gray matter”

- The Cerebral Cortex is made up of tightly packed neurons and is the wrinkly, outermost layer that surrounds the brain.
- It is responsible for higher thought processes including speech and decision making.
- The cortex is divided into four different lobes, the frontal, parietal, temporal, and occipital, which are each responsible for processing different types of sensory information.

Location:
- Outermost layer of the brain
- In the brain, the gray matter is the cortex

Function:
- Responsible for thinking and processing information from the five senses.
- The cortex is the place where all the higher mental processing takes place.

Definitions that will help: white matter

- The white matter in the brain connects the various parts of the cortex so that information can be transported for further processing and integrated.

Other:
- White matter is found in the deeper tissues of the brain (subcortical).
- It contains nerve fibers (axons), which are extensions of nerve cells (neurons).
- Nerve fibers are surrounded by a sheath called myelin. Myelin gives the white matter its color.
- AN INJURY TO THE MYELIN CAUSES THE AXONS TO DIE, WHICH CAN RESULT IN IMPAIRMENT OR LOSS OF NERVE FUNCTION.

Definitions that will help: Neurons = nerve cells

- Neurons (also called neurones or nerve cells) are the fundamental units of the brain and nervous system, the cells responsible for receiving sensory inputs from the external world, for sending motor commands to our muscles, and for transforming and relaying the electrical signals at every step in between.

Types of Neurons:
- Neurons that receive stimuli from the outside environment and transmit them toward the brain are called afferent or sensory neurons.
- Those that carry impulses in the opposite direction, away from the brain and other nerve centers to muscles, are called efferent neurons or motor neurons.
- Another type, the interneuron, found in the brain and spinal cord, conducts impulses from afferent to efferent neurons.
Video
Cranial Nerve Exam

The Neurologic Exam
Michael Habovick, DO
and
Johanna Harris, APRN
University of Louisville Neurologists Extraordinaire

Some thoughts about pupils

Video
Brainstem Reflex Exam

The Neurologic Exam
Michael Habovick, DO
and
Johanna Harris, APRN
University of Louisville Neurologists Extraordinaire

Don’t worry… we are NOT going to practice this.
Practice with a Purpose

- Practice makes perfect!
- Use your Cranial Nerve Exam Checklist

Motor Exam:
Strength, Bulk, Tone

Video
Bulk and Strength

The Neurologic Exam
Michael Inabnitz, DO
and
Johnna Harris, MEN, APHN
University of Louisville Neurologists Extravaganza
and
Laura Dixon, DNS, APHN
**Bulk**

- Hypertrophy – can be seen in weightlifters, dystonia
- Atrophy – neuromuscular disease such as ALS

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**Strength**

Graded 0-5

- 0/5: no contraction
- 1/5: muscle flicker, but no movement
- 2/5: movement possible, but not against gravity (test the joint in its horizontal plane)
- 3/5: movement possible against gravity, but not against resistance by the examiner
- 4/5: movement possible against some resistance by the examiner
  (sometimes this category is subdivided further into 4 1/5, 4 2/5, and 4 3/5)
- 5/5: normal strength

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**Tone**

- Spasticity versus Rigidity
- Examples of increased tone:
  - Cervical dystonia
  - Cogwheel rigidity in a patient with Parkinson's

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Practice with a Purpose

- Strength—rate on a scale
- Bulk—atrophy versus hypertrophy versus neither
- Tone—rigidity versus spasticity versus neither

Movements—normal and abnormal—so many choices!

- Phenomenology
  - Hyperkinesia
  - Tardive dyskinesia
  - Akathisia
  - Bruxism

- Tremor
- Dystonia
- Myoclonus
- TIC
- Dyskinesia
- Chorea
- Tardive dyskinesia
- Fasciculations

Video(s)
Evaluation of Movement

Laura Olson, DNP, APRN
Tremor Descriptors

• At rest
• With intention
• Kinetic (with movement)
• With posture
• Amplitude
• Velocity
• Dystonic tremor
• Physiologic tremor

Tremor

Writing Tremor in Essential Tremor (both kinetic and intention)
Chorea

- unwanted, rapid, non-goal-directed movements, often involving a very large number of muscles in the body. Its basic phenomenological features are: (1) random and erratic amplitude of movements with no encompassing of inner urge or restlessness (as opposed to tics and akathisia); (2) non-stereotyped jerks, with high inter- and intra-individual variability; and (3) absence of suppressibility by volition.

- Examples of Causes
  - Huntington’s
  - Cancer
  - Illlicit Drugs – “tossch dancing”

Myoclonus

- The faster and shorter of all hypokinetc disorders.
- Shock-like movements may be caused by sudden muscle contractions (positive myokinesia).
- May cause a sense in muscle tone (negative myokinesia).
- Can often lead to a movement whose amplitude can elicit both fingers and even limbs.

Tic

- Sudden, rapid, arrhythmic, recurrent, involuntary movements and/or sounds
- Suppresible
- Sense of relief once movement is allowed/completed
Tardive Dyskinesia and Dystonia

- Tardive dyskinesia (TD) is an involuntary neurological movement disorder caused by the use of dopamine receptor blocking drugs that are prescribed to treat certain psychiatric or gastrointestinal conditions.
  - Movements can include:
  - Abnormal tongue movements
  - Rocking
  - Abnormal movements of the diaphragm
- Tardive dystonia is a more severe form of tardive dyskinesia in which slower twisting movements of the neck and trunk muscles are prominent.

Practice with a Purpose

- Movement examination
**Sensation**

- Temperature
- Pain
- Vibration
- Proprioception

**TIP: THE ROMBERG TEST IS NOT A SIGN OF CEREBELLAR DISEASE**.

It is a sign of a disturbance of proprioception, either from neuropathy or posterior column disease. The patient does not know where their joint is in space and so uses their eyes. in the dark or with eyes closed they have problems.

**Dermatomes**

- A dermatome is the area of sensory nerves near the skin that are supplied by a specific spinal nerve root.
- The body can be divided into regions that are mainly supplied by a single spinal nerve.
- There are eight cervical (one for the head, and one for each cervical vertebra), twelve thoracic, five lumbar and five sacral spinal nerves. Dermatomes are useful for finding the site of damage to the spine. For example, leg pain from radiculopathy often indicates a problem to a specific nerve root in the lumbar spine.
Practice with a Purpose

- Sensation

Reflexes
Deep Tendon Reflexes

Deep tendon reflexes are graded as follows:
- 0 = no response; always abnormal but not always uncommon
- 1+ = a slight or trace response; may or may not be normal.
- 2+ = a brisk response; normal.
- 3+ = a very brisk response; may or may not be normal.
- 4+ = enhanced response; a tap elicits a repeating reflex (clonus); always abnormal.

Remember:
Neither absent nor exaggerated reflexes, by themselves, signify neurologic disease.
When do abnormal reflexes matter?

They matter when:
- the absent reflex is associated with other findings of lower motor neuron disease (weakness, atrophy, fasciculations) as in ALS
- the exaggerated reflex is associated with other findings of upper motor neuron disease (i.e., weakness, spasticity, abnormal plantar reflex)
- the reflex amplitude is asymmetric, which suggests either lower motor neuron disease of the side with the diminished reflex or upper motor neuron disease of the side with exaggerated reflex.
- the reflex is unusually brisk compared with reflexes from a higher spinal level, which raises the possibility of spinal cord disease at some level of the spinal cord between the segments with exaggerated reflexes and those with diminished ones.
- Reappearance of developmental reflexes after stroke generally indicate widespread cerebral dysfunction

Common Muscle Stretch Reflexes

<table>
<thead>
<tr>
<th>Reflex</th>
<th>Peripheral Nerve</th>
<th>Spinal Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biceps</td>
<td>Axillary</td>
<td>C5, 6</td>
</tr>
<tr>
<td>Patellar (Quadriceps)</td>
<td>Radial</td>
<td>C7, 8</td>
</tr>
<tr>
<td>Patellar (Quadriiceps)</td>
<td>Femoral</td>
<td>T12, L1</td>
</tr>
<tr>
<td>Achilles</td>
<td>Tibial</td>
<td>S1</td>
</tr>
</tbody>
</table>

Reflex Tips

- Watch for muscle movement not necessarily the “kick” or the “jerk”
- Your patient needs to relax the extremity where you are testing the reflex
Plantar Reflex
(the infamous Babinski response)
An abnormal plantar reflex occurs when scratching the sole of the foot causes an upward movement of the great toe, instead of the normal downward movement.

Down-going = normal
Up-going = abnormal (in adults)

What it may mean:
- Altered mental status with metabolic dysfunction
- Contralateral cerebral hemispheric lesion
- Destructive lesions of the pyramidal tract

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Primitive Reflexes

- Palmenegative
- Glabellar (blink)
- Snout
- Grasp

Primitive reflexes are common findings in:
- Frontal lobe disease/dementia
- Parkinsonism
- Advanced HIV infection

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Primitive Reflexes
Practice with a Purpose

- Practice the Deep Tendon and Plantar Reflexes

Cerebellar Exam – an exam of “coordination”

Video(s)
Cerebellar Exam

The Neurologic Exam
Michael Inaba, DO
and
Johanna Harris, APRN
University of Louisville Neurologists Network
and other willing participants
Practice with a Purpose

- Practice the Cerebellar Exam

Gait and Balance

- Descriptors
  - Wide/width of base
  - Steppage
  - Narrow
  - Short stepped/short or long stride length
  - Shuffling
  - Stopped
  - Asymmetric
  - Trendelenburg
  - Cautious

Pro Tip: GAIT and BALANCE are not the same thing!

Video(s)
Gait and Balance
Practice makes Perfect: Gait Evaluation

* Evaluate and describe your exam partner's gait and balance

Questions?

Thanks for your time!

Our Clinical Team:
- Dr. Kathryn LaFever, MD
- Victoria Holiday, MD
- Laura Dixon, DNP, APRN
- Shelly Oates, RN
- Kelly Bickett, RN
- Albertine Fabi, MA