

Neurologic Exam Structure and Sequence

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Below is a sequence and list for performing the neurological exam. Emphasis is placed on order so that the exam proceeds in a smooth and logical manner. The tests represent a screening exam, and more detailed testing may be appropriate depending upon symptoms and other exam findings.

The list below consists of:

SECTION

Test

What to do.

What to say.

What to observe.

[Video link, if available. Paste directly into browser if link doesn't work.](#)

MENTAL STATUS

"I'm first going to ask some standard questions to check your attention and memory."

Orientation

"First, please tell me the complete date and day of week. Where are we right now? Which floor? Can you tell me the street and city?"

Recall

"Please repeat these 3 objects back to me: _____, _____, _____."

Attention

"Starting with the current month, please go through the months backwards for an entire year."

Time them, noting any perseveration, impersistence, or getting stuck-in-set. Redirect and encourage if stuck for several seconds.

Long-term memory

"Please tell me the current president. Now, can you recite the presidents backwards until I say stop."

Calculations

"I'm going to have you add-up some change. What does two quarters, a nickel, and two pennies equal? How about one quarter, one dime, one nickel, and one penny?"

Short-term memory

"Please tell me those 3 objects I asked you to remember earlier."

POSITIONING TIPS

Best position is sitting-up, patient seated slightly higher. If they have truncal stability, they can sit on the edge of the bed with feet hanging over.

You can sit for testing reflexes, sensation, and muscles lower than the iliopsoas. You shouldn't need to bend, crouch, or kneel too often.

CRANIAL NERVES

Visual acuity

Best acuity with good light, glasses or pinhole if not 20/20, each eye individually, 14 inch Snellen card.

"Please read the numbers on this line. And the next..."

Have them read until 2 errors on a line, encourage 'guessing' if they won't try. Be sure card is below bifocal line.

Scotoma screen

Check ~3 feet in front, at same level.

"Cover your left eye, keep both eyes open. While looking at my nose, are all other parts of my face and head clear to you? Now let's check the other eye."

Visual fields

Check ~3 feet in front, at same level. Depending upon alertness, introduce colored tip, wiggling finger, count fingers in each quadrant, etc. Test compared to self.

“Cover your left eye, keep both eyes open. Tell me as soon as you can see ____.”

<http://www.youtube.com/watch?v=Gh1jGh1dcsA&feature=related>

Fundi

“I am going to look in the back of your eye with this scope.” Darken room. “Please fix your gaze over at the ____.” Check disc color, border, cup size, and venous pulsations. Follow upper and lower vessels to macula for caliber and hemorrhages.

Pupils

Very bright point light in a darkened room, looking into distance. Compare pupil size with indirect light from below the chin. Check right and allow to re-dilate, then left and re-dilate, then swing side-to-side.

“I am going to check your pupil reaction with this bright light. Please keep looking over at the ____.”

Look for anisocoria, roundness, note dilated size. Check constriction speed and size. Look for convincing and reproducible dilation with swinging-flashlight test. Don't mistake hippus (an undulating pupil due to variances in sympathetic/parasympathetic tone) for an APD.

EOM

Starting at about 3 feet from center, move in a big 'H', pausing at center and lateral gaze, and finishing with convergence.

Watch for nystagmus in primary and lateral gaze, smooth pursuits, and pupillary constriction with convergence.

Saccades

Have them alternate gaze between your nose and a laterally positioned finger, first to the left, then to the right.

“I'm now going to check how your eyes move between two objects. First, look at my nose...now my finger...nose...finger... Now let's check the other side. Nose...finger...nose...finger...nose.”

After 1-2 practice runs, see if eyes hit the target in one movement. Check that eyes movements are conjugate.

Facial Sensation

Quick screen: Lightly touch above the eye brows, on the cheeks, and below the lateral corners of the mouth. “Does everything feel normal? Any diminished or altered sensations?”

Detailed testing: Use a pin very lightly to check any areas of reported numbness. Can perform now, or later during sensory testing. A corneal reflex can help corroborate facial numbness in unclear cases or when cooperation is not ideal.

“I am going to touch you very lightly with a pin. Do these 6 areas all feel sharp?”

Have them quantify by a reference of 100% or one dollar of sharpness. You can also have them close their eyes, tell them to report whenever they feel sharp/dull, and randomly flip the safety pin for the blunt or sharp part. Determine whether pin is intact but reduced, cannot discriminate sharp/dull, or touch is not perceived.

Facial Strength

Quick screen: “Show me a big, toothy smile. Squeeze your eyes shut, as tightly as you can. Lift both eyebrows”

Observe nasolabial fold, facial movements, number of teeth on each side with smile. Make sure they bury their eyelashes when squeezing eyes shut.

Detailed testing: “Hold your lips very tight together, don't let me pull them apart”, “Puff out your cheeks and hold your lips tight, don't let me push the air out”, “I'm going to see if your eyelids close tight. Squeeze your eyes shut and don't let pull them open”, “Put your chin to your chest, hold it strong, and don't let me push your head back. Now, bring your head back and hold it strong. Don't let me push your head forward.”

Neck flexors and extensors can be weak with bifacial weakness from peripheral nerve disorders.

Hearing

Quick screen: Hold your hand out of view, 3 feet from each ear. Alternately gently rub a finger and ask which side.

“Which side do you hear the finger rub?”

Palate

“Open your mouth real wide and say ahh.”

Ensure that both sides of palate elevate symmetrically and with good excursion. Can do gag if they are uncooperative, complain of dysphagia, or palate doesn't seem to move.

Tongue Movements

“Stick out your tongue. Wiggle it side-to-side real fast (demonstrate)”.

Look for symmetry of movements, good speed, and lack of tongue/jaw synkinesis.

UPPER EXTREMITIES CEREBELLUM AND MOTOR

Tremor

Have them rest their arms and hands on their lap, with hands open, slightly supinated, and fingers a little apart for rest tremor. Raise arms in front for postural tremor and myoclonus.

“Please rest your hands in your lap, with your hands open, relaxed, and thumbs on top. Now raise both arms so your hands are outstretched in front.”

Pronator drift

Determine whether there is asymmetric pronation of the outstretched hand.

“With your arms still in front, turn your hand over so the palm faces up. Keep your hands that way, like you are hold a tray steady and close your eyes.”

Look to see if the thumb turns-up (pronator drift), or the arm float about (parietal or proprioceptive drift).

Fine finger movements

Have them hold their hand in front of them with elbow unsupported. Do one hand at a time. Look for big, fast, fluid movements. Note any pain, contractures, or structural limitations. Compare symmetry (dominant likely faster). If Parkinsonism suspected, have them completely open and close their hand fast, and turn wrist back and forth with maximal amplitude movement.

“With your right hand, touch each finger to your thumb repeatedly, with big and fast movements. Now your left hand.”

Toe tapping

“Now with your left foot, tap with big and fast movements. And your right foot.”

Encourage big movements, compare for symmetry.

Rapid-alternating movements

Arms in front, elbows unsupported. Have them do big and fast movements onto their palm with clapping sound.

“Hold your arms out in front. Keep your left hand steady, and alternate the front and back of your right hand onto the left palm (demonstrate), with big movements.

Watch and listen to the rhythm and speed. Compare for symmetry (dominant likely better).

Finger-to-nose

Hold your finger so they need to reach and lean. Start near center, and move finger slowly so they reach across their body. Make sure they alternate finger and nose at a good speed – encourage them to go faster if self-selected speed is overly cautious.

“With your right index finger, touch my finger...now touch your nose...finger...nose...finger...go back and forth quickly. Now, same thing with your left index finger...nose...”

Watch for intention tremor (oscillation increases when approaching target), past-pointing (does not hit the target, and dyssynergia (reach is not smooth).

<http://www.youtube.com/watch?v=-dFMisBl1aM>

Tone

Check with slow, rotating movements at the wrist, elbow, and shoulder. Start on right, then left. Then, check with quick arm extension and flexion using full excursion.

“I’m going to see how relaxed you can make your muscles. Keep real loose while I slowly move your wrist and arm.”,

“Now, I am going to move your arm more quickly...please stay relaxed.”

Check for leaden rigidity and cogwheeling. Then, assess for a ‘catch’ with quick movements.

Strength

Use clear and concise instruction with good volume and eye contact for encouragement. Test each muscle through the point of failure to detect subtle asymmetry.

Deltoids

Stand over top, so you can press directly down on the elbows with up to your full body weight. Note pain or limited movement.

“Bend your elbows and raise them up at your side. Be real strong and don’t let me push them down.”

This one can be done bilaterally, but specifically check that each side begins to give at the same pressure.

Biceps

Start with the arm extended to 90 degrees. Pull at the wrists or hands for maximal leverage. Check each side individually. Place one hand on bicep to assess bulk and effort.

“Hold both arms at right angles in front of you (demonstrate). Pull toward you with the right arm.”, “Pull with the left arm.”

Triceps

Start with the arm totally flexed. Pull at the wrists or hands for maximal leverage. Check each side individually. Place one hand on tricep to assess bulk and effort.

“Now, keep your arms up and bent. Push out towards me.”, “ Now with the other side, push out towards me.”

Finger extensors

“Keep your fingers straight and strong, don’t let me push them down.”

Finger abductors

Check 1st and 5th digit. If hand weakness is a concern, check 5th finger flexion, APB, 5th finger and thumb opponens.

“Spread your fingers apart. Don’t let me push them together.”

Also, assess for atrophy or wasting in the hands at this time, at interossei, APB, and ulnar palm.

LOWER EXTREMITIES MOTOR AND CEREBELLUM

Strength

Iliopsoas

Place hand on the back, to support trunk and isolate iliopsoas from compensatory trunk muscles.

“Put both hands on the table to brace yourself. Raise your right knee off the table, keep your leg bent. Don’t let me push you down.”, “Now, with the other leg.”

Hamstrings

Place one hand on muscle, pull at the ankle with the other.

“Pull your leg in, towards the tablet.”, “Now, the other side.”

Quadriceps

Start with the leg bent, to put muscle at disadvantage. Be sure to apply your weight at the ankle.

“Now, straighten your right knee, slow and strong.”, “And your left, again, slow and strong.”

Plantar extensors

“Raise your foot and toes. Don’t let me push them down.”, “Now, the other side.”

Tone

First, extend and flex the knee, with quick and full movements. For the hips, straighten the leg and give a quick movement outward and inward . Finish with ankle clonus. If they are in bed, can hold behind the knee with both hands, and see if their heel rises off the bed when a quick upward movement is applied.

“I’m going to check that your legs are able to relax. Keep your hands on the table for support, and stay loose. First, I’m going to move the knee back and forth.”, “Now, I am going to move the entire leg at the hip.”, “Keep your ankles loose, while I push on the bottom of your foot.”

Check for increased tone or a “catch”.

Heel-knee-shin

“First, raise the right leg and tap your heel 5 times onto the left knee.”, “As steady and accurate as you can, run the heel up-and-down your left shin.”, “Now with the left leg, tap the right knee 5 times....and run the heel up-and-down the shin.”

Watch for tremor and dysmetria.

<http://www.youtube.com/user/onlinemedicalvideo#p/c/70A9056D04D0FF7B/7/aSgq3fvPzlc>

REFLEXES

Reflexes are best obtained with the person sitting in front of you, arms and hands relaxed on lap with palm up and fingers held loosely. Always move side-to-side for each reflex. Let the weight of the hammer fall or use a flick of the wrist to accelerate the hammer – do not peck with small movements.

Biceps

Apply a little tension onto the biceps tendon with your thumb. Let the hammer fall onto your thumb. Check several times on the right, several on the left, and repeat if not clear.

“Now, I am going to check your reflexes. This is a part of the exam where you can just relax and stay loose.”

Feel the reflex under your thumb while watching the biceps contract.

Brachioradialis

Tap on the radial side of the anterior forearm, where the brachioradialis tendon inserts to mediate radial wrist flexion. Watch for hand to twist and fingers to curl gently. Watch for spread into other parts of the arm or excessive finger flexion.

Triceps

While you are still seated, reach around with the patient's arms in the lap. Tap on the broad insertion of the triceps. If it is not apparent, you can suspend the arm at a right angle by holding the upper arm and having the patient relax.

Knee

Feel where you need to hit. Hold the ankle and keep your chair back a little in case the reflex is very prominent. Let the hammer fall like a pendulum.

Ankle

A little downward pressure can help accentuate a reticent ankle jerk. A flick of the wrist gets the hammer moving. "Give a little pressure on my hand with your foot. Like you are driving just 5-10 mph."

SENSORY

Vibration

Use a 128 hz fork applied firmly but not forcibly to the distal joint of the index fingers and toes. Place your other finger underneath to assess vibration. If asymmetry is found, confirm by starting on the more abnormal side, and quickly moving to compare to the other side. Start in the hands.

"Please take your shoes and socks off. What type of sensation do you feel on your finger? Please pay close attention, and tell me as soon as it is no longer humming."

If vibration is important or attention is not perfect, perform several trials to determine consistency. Grade approximately as normal or decreased minimally, mildly, moderately, or severely/absent.

Babinski sign

The leg, ankle, and toes need to be very relaxed. This can be done lying down or with the leg supported on your leg. Hold the foot slightly in plantar extension. Use the tines of the tuning fork, placing one underneath the foot, the other along the lateral aspect of the foot. With light pressure, give a steady stroke from the heel, coming across and below the toes. Use more pressure if no response. If abnormal, make sure it is reproducible.

"I'm going to check a reflex by rubbing on the bottom of your foot. Please keep your leg, foot, and toes very loose and relaxed."

Look for fanning of the little toes, a slow and reproducible upward movement of the big toe, and contraction of the tensor fascia lata. A quick movement is due to withdrawal.

Proprioception

Start with very small movements. In the hands, use 0.5-1 degree movements, in the feet start with 2-3 degree movements. Hold the sides of the finger and toe between your thumb and index finger. Make larger movements or move to the next more proximal joint if they cannot feel it. Do about 8 trials on each extremity.

"I'm going to move your finger either upward or downward (demonstrate). Now close your eyes, and tell me which direction every time you feel it move."

Pin

Roll sleeves above elbow and pants above knees. Open the safety pin to 90 degrees to form a handle. Touch at a rate of about 1 per second. For each leg and arm, Start distal medial on right, and work your way proximal. Then, distal medial on left, working proximal. Then lateral, distal to proximal, first right then left. If myelopathy is a consideration, check spinal level by marching up paraspinal muscles on sides from L2 through C2 on right, then left. Some may do facial sensation with pin at this time.

"I'm going to check your sensation by carefully touching you with this safety pin. First, I'll need your sleeves and pants rolled-up. Please tell me if all the points feel sharp and normal. Are there any difference as we move up the arm? How about right vs. left? How about on the lateral side of the arms? And now the legs: all sharp, even in the feet?"

Have them quantify by a reference of 100% or one dollar. You can also have them close their eyes and have them report whenever they feel sharp/dull, as you randomly flip the safety pin for the blunt or sharp side. Determine whether pin is intact but reduced, cannot discriminate sharp/dull, or pin is not felt.

STATION AND GAIT

Rise and Stance

See if they can stand without assistance. Make sure feet are touching together. Have them stand with eyes open for about 10 seconds, then with eyes closed for 10 seconds. Keep your arms out in case they start to fall. Keep pants rolled up to above knees for the rest of the exam.

“Now, stand-up, and put your feet touching together...next, close your eyes.”

Observe the patient rising from the table or bed. Watch the toes for small movements which represent normal proprioceptive adjustments. Most people with proprioceptive loss do not know they are falling until it is too late.

Gait

Watch them walk for about 10-20 feet. Have them turn several times to assess for ataxia and Parkinsonism. Pants are still rolled-up.

“Please walk down the hallway until I tell you to turn around.”

Observe the width of support, the length of excursion for each leg, excessive lateral or upward movement in the hips, stiffness of one or both legs, difficulty lifting leg both proximally and distally, knee hyperextension as they step through, veering, arm movements, and stability/steps through turns.

Truncal ataxia with wide base, titubation, unsteadiness worse on turns, dyssynergic movements.

http://www.youtube.com/user/onlinemedicalvideo#p/c/70A9056D04D0FF7B/9/vka_GwXd1os

Hemiplegic gait.

<http://www.youtube.com/user/onlinemedicalvideo#p/c/D74972DCFB2D58C8/0/y160w4sAQNW>

Spastic diplegic gait.

<http://www.youtube.com/user/onlinemedicalvideo#p/c/D74972DCFB2D58C8/0/y160w4sAQNW>

Neuropathic gait.

http://www.youtube.com/user/onlinemedicalvideo#p/c/D74972DCFB2D58C8/2/F_F7DdAD7yU

Myopathic gait.

<http://www.youtube.com/user/onlinemedicalvideo#p/c/D74972DCFB2D58C8/3/b5rIEx9SsCo>

Parkinsonian gait.

<http://www.youtube.com/user/onlinemedicalvideo#p/c/D74972DCFB2D58C8/4/7SyTpEdhBLw>

Ataxic gait.

<http://www.youtube.com/user/onlinemedicalvideo#p/c/D74972DCFB2D58C8/6/FpiEprzObIU>

Tandem walk

“Looking at your feet, walk 8 steps with one foot touching in front of the next (demonstrate).”

Count how many steps before stepping-out.

Walk on heels and toes

Pants are still rolled-up. If they are unsteady, they can hold onto your hands for balance for this strength test, with reference in your note.

“Walk a couple steps on your tip toes...now your heels.”

Watch for sinking with each step.

Hop on each foot

Excellent test for subtle asymmetry or progression over time. If weakness is detected, start with the more normal leg. If they are young, ask them to hop fast and high.

“Finally, hop 10 times on your right leg (demonstrate). Now on your left leg (demonstrate).”

If they need to hold on for balance, mention in your note.