Nursing Neuro Assessment
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The initial assessment should be a comprehensive exam covering several critical areas:

- Level of consciousness and mentation
- Movement
- Sensation
- Cerebellar function
- Reflexes
- Cranial nerves

This initial exam will establish baseline data with which to compare subsequent assessment findings.
The Single Most Important Assessment

Evaluation of level of consciousness (LOC) and mentation are the most important parts of the neuro exam. A change in either is usually the first clue to a deteriorating condition.

The following terms are commonly used to describe a decreased LOC, so it helps to be familiar with them:
The Single Most Important Assessment

**Full consciousness.** The patient is alert, attentive, and follows commands. If asleep, he responds promptly to external stimulation and, once awake, remains attentive.¹

**Lethargy.** The patient is drowsy but awakens—although not fully—to stimulation. He will answer questions and follow commands, but will do so slowly and inattentively.¹

**Obtundation.** The patient is difficult to arouse and needs constant stimulation in order to follow a simple command. He may respond verbally with one or two words, but will drift back to sleep between stimulation.

**Stupor.** The patient arouses to vigorous and continuous stimulation; typically, a painful stimulus is required.¹ He may moan briefly but does not follow commands. His only response may be an attempt to withdraw from or remove the painful stimulus.

**Coma.** The patient does not respond to continuous or painful stimulation. He does not move—except, possibly, reflexively—and does not make any verbal sounds.
The Single Most Important Assessment

Since these and other terms used to categorize LOC are frequently used imprecisely, you'd be wise to avoid using them in your documentation.¹² Instead, describe how the patient responds to a given stimulus. For example, write: “Mr. Smith moans briefly when sternum is gently rubbed, but does not follow commands.”⁷

Remember that recognizing and describing a change in LOC is more important than appropriately naming it.³
The Single Most Important Assessment

When assessing LOC, there are several tools you can choose from. With stroke patients, you may want to use the National Institutes of Health (NIH) Stroke Scale. ([www.strokecenter.org/trials/scales/nihss.pdf](http://www.strokecenter.org/trials/scales/nihss.pdf))

Typically, though, it is the Glasgow Coma Scale (GCS) that is used in assessing LOC. It's especially useful for evaluating patients during the acute stages of head injury.
The Single Most Important Assessment

A GCS score is based on three patient responses: eye opening, motor response, and verbal response. The patient receives a score for his best response in each of these areas, and the three scores are added together. The total score will range from 3 to 15; the higher the number, the better. A score of 8 or lower usually indicates coma.\textsuperscript{1,2}

If the patient is alert or awake enough to answer questions, you'll also assess mentation. Determine if he is oriented to person, place, and time by asking questions like: What is your name? Where are you right now? Why are you here? What year is it? Who is the president?
The Single Most Important Assessment

Pupils are another important component of the neuro exam. Assessing them is especially important in a patient with impaired LOC. Like a change in LOC, a change in pupil size, shape, or reactivity can indicate increasing intracranial pressure (ICP) from a mass or fluid. We’ll cover pupils as part of the cranial nerve assessment.
Assessing for Signs of Motor Dysfunction

The patient must be awake, willing to cooperate, and able to understand what you are asking him.

With the patient in bed, assess motor strength bilaterally. Have the patient:

- Flex and extend his arm against your hand.
- Squeeze your fingers.
- Lift his leg while you press down on his thigh.
- Hold his leg straight and lift it against gravity.
- Flex and extend his foot against your hand.
Assessing for Signs of Motor Dysfunction

Grade each extremity using a motor scale like the one below. 4
+5 - full ROM, full strength
+4 - full ROM, less than normal strength
+3 - can raise extremity but not against resistance
+2 - can move extremity but not lift it
+1 - slight movement
0 - no movement

Also, check for arm pronation or drift. Have the patient hold his arms out in front of him with his palms facing the ceiling. If you observe pronation—a turning inward—of the palm or the arm, or the arm drifts downward, it means the limb is weak. 7
Assessing for Signs of Motor Dysfunction - Unconscious Patient

Assess motor response in an unconscious patient by applying a noxious stimulus and observing the patient's response to it.

Another approach is central stimulation, such as sternal pressure. Central stimulation produces an overall body response and is more reliable than peripheral stimulation.

The reason: In an unconscious patient, peripheral stimulation, such as nail bed pressure, can elicit a reflex response, which is not a true indicator of motor activity.\(^7\)
Evaluating Sensation and Cerebellar Function

The patient must be able to cooperate with the exam. He'll need to tell you whether he feels the sensation and whether both sides of his body feel it equally.

- Begin with the feet and move up the body to the face, comparing one side with the other. Assess sensation to light touch using your fingertips or cotton.
- Test superficial pain sensation with a clean, unused safety pin. Also, test sensation using a dull object. The patient should be able to distinguish sharp from dull.
- Test proprioception, or position sense, by moving the patient's toes and fingers up or down. Grasp the digit by its sides and have the patient tell you which way it's pointing.
Evaluating Sensation and Cerebellar Function

Test cerebellar function, if indicated. It may not be necessary in a problem-focused exam, and it can't be done if the patient can’t or won’t follow commands.

If the patient is in bed, hold up your finger and have the patient quickly and repeatedly move his finger back and forth from your finger to his nose. Then have him alternately touch his nose with his right and left index fingers. Finally, have him repeat these tasks with his eyes closed. The movements should be precise and smooth.
Evaluating Sensation and Cerebellar Function

To assess the lower extremities, have the patient bend his leg and slide that heel along the opposite shin, from the knee to the ankle. This movement, too, should be accurate, smooth, and without tremors.

If the patient is able to stand, you can assess his balance using the Romberg test. Have him stand with his feet together, arms at his sides, and eyes open; he should be able to stand upright with no swaying. If he can do that, have him close his eyes and stand the same way. If he falls or breaks his stance after closing his eyes, the Romberg test is positive, indicating proprioceptive or vestibular dysfunction.²
Assessing Deep Tendon, Superficial, and Brain Stem Reflexes

Deep tendon reflexes include the triceps, biceps, brachioradialis, patellar, and the Achilles tendon. Although deep tendon reflexes aren't routinely assessed, they should be tested in any patient with a spinal cord injury.⁷

Deep tendon reflexes are tested with a reflex hammer. Test each of the following, grading them from 0 to 5+, with 0 being no reflex, 2+ being normal, and 5+ being hyperreflexia with clonus (repeated rhythmic contractions).
Assessing Deep Tendon, Superficial, and Brain Stem Reflexes

**Biceps.** The patient's arm should be flexed slightly with the palm facing up. Hold the arm with your thumb in the antecubital space over the biceps tendon. Strike your thumb with the hammer; the arm should flex slightly.

**Triceps.** The patient's arm should be flexed 90 degrees. Support the arm and strike it just above the elbow, between the epicondyles; the arm should extend at the elbow.

**Brachioradialis.** The patient's arm should be flexed slightly and resting on the lap with the palm facing down. Strike the outer forearm about two inches above the wrist; the palm should turn upward as the forearm rotates laterally.

**Patellar.** With the patient's legs dangling (if possible), place your hand on one thigh and strike the leg just below the kneecap; the leg should extend at the knee.

**Achilles tendon.** With the patient's foot in slight dorsiflexion, lightly strike the back of the ankle, just above the heel; the foot should plantar flex.
Assessing Deep Tendon, Superficial, and Brain Stem Reflexes

The plantar reflex is the only superficial reflex that's commonly assessed and should be tested in comatose patients and in those with suspected injury to the lumbar 4–5 or sacral 1–2 areas of the spinal cord. Stimulate the sole of the foot with a tongue blade or the handle of a reflex hammer. Begin at the heel and move up the foot, in a continuous motion, along the outer aspect of the sole and then across the ball to the base of the big toe.7

The normal response is plantar flexion (curling under) of the toes. Extension of the big toe—Babinski's sign—is abnormal, except in children younger than 2 years.1,2,5
Assessing Deep Tendon, Superficial, and Brain Stem Reflexes

Assess brain stem reflexes in stuporous or comatose patients to determine if the brain stem is intact. (You'll check for the protective reflexes—coughing, gagging, and the corneal response—as part of the cranial nerve assessment.)

- To test the oculocephalic, or doll's eye, reflex, turn the patient's head briskly from side to side; the eyes should move to the left while the head is turned to the right, and vice versa. If this reflex is absent, there will be no eye movement.
- To test the oculovestibular reflex, also known as the ice caloric or cold caloric reflex, a physician will instill at least 20 ml of ice water into the patient's ear. In patients with an intact brain stem, the eyes will move laterally toward the affected ear. In patients with severe brain stem injury, the gaze will remain at midline.
Assessing the Cranial Nerves

There are 12 pairs of cranial nerves—some sensory, some motor, and some both. Whether you assess all 12 will depend upon the patient's diagnosis. Because many of the nerves cannot be tested without the patient's cooperation, you won't be able to do a complete assessment on a comatose patient.

Extraocular movements (EOMs) are controlled by cranial nerves III, IV, and VI, which you'll test together. Other functions that are dependent on more than one cranial nerve are: pupillary response (CN II and III); the corneal reflex (CN V and VII); and the gag reflex (CN IX and X).
Cranial Nerve II - Visual Fields
Cranial Nerve II and III - Pupillary Light Reflex
Cranial Nerve III, IV, and VI - Inspection and Ocular Alignment
Cranial Nerve III, IV, and VI - Versions
Cranial Nerve III, IV, and VI - Ductions
Cranial Nerve V - Sensory
Cranial Nerve V and VII - Corneal Reflex
Cranial Nerve VII - Motor
Cranial Nerve IX and X - Motor
Cranial Nerve IX and X - Sensory and Motor (Gag Reflex)
Cranial Nerve XI - Motor
Cranial Nerve XII - Motor
What Vital Signs Reveal About Neuro Status

Because the brain stem and Vagus nerve (CN X) play an important role in vasomotor tone, conditions affecting these areas can cause vital signs to change.

ICP produces a specific set of changes known as Cushing's triad. Present in herniation syndromes, Cushing's triad consists of: increasing systolic blood pressure with a widening pulse pressure, bradycardia, and bradypnea.\(^6\)

Cushing's triad is a late sign of increased ICP. Once this pattern of vital signs occurs, brain stem herniation is already in progress and it may be too late to reverse it. To detect increasing ICP before it reaches this point, be alert for earlier signs: a subtle change in LOC or pupils, for example.
Accurate and consistent documentation helps ensure that subtle changes in neuro status are caught early on. Whether the unit you're working on uses computerized charting, flow sheets, or hand-written notes, it's essential that you compare your findings to those of previous exams. Through comparison, you'll be able to spot changes and trends and, when necessary, intervene quickly and appropriately.

Verbal communication is important, too. In many Neuro departments, a bedside neuro exam is done as part of the change-of-shift report, so that the off-going and oncoming nurses can assess the patient together.

No matter how brief or extensive your neuro assessments are, comparing your findings to those of previous exams is essential.
REFERENCES
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