Neurological Assessment: General Considerations

What is Assessment of Neurological Status?

› Assessment of neurological status involves the evaluation of the patient to accurately establish a level of neurologic function based on the sensory and motor functions of the 12 cranial nerves (Figure 1).

Figure 1: The twelve cranial nerves are a combination of sensory and motor fibers: 3 are sensory, 5 are motor, and 4 have mixed sensory and motor functions. Copyright © Patrick J. Lynch, 2006. Licensed under Creative Commons Attribution-Share Alike 2.5 Generic License.

- **What**: A brief neurological assessment is performed as part of a routine head-to-toe assessment of patients with no known neurological symptoms. A more detailed, focused assessment is appropriate for those with a recent diagnosis or known history of neurological deficits, and/or who demonstrate abnormal findings during the brief assessment.

- **How**: A brief neurological exam is performed by evaluating the patient’s responses to physical assessment measures designed to test the patient’s mental status, motor and sensory function, and reflexes. Patients who demonstrate abnormalities during the brief examination undergo a more detailed neurological examination so the clinician can gather more information and help pinpoint the cause of the abnormality. Focused exams assess one or more of the following: general mental status, cranial nerves, motor function, sensory function, reflexes, gait, and balance. For detailed information about these portions of the neurological assessment, see Nursing Practice & Skill ... Neurological Assessment: Assessing the Cranial Nerves and other Nursing Practice & Skill papers in the series on neurological assessment.

- **Where**: Assessment of a patient’s neurological status may take place in any health care or home setting.

- **Who**: Both the abbreviated and more detailed neurological examinations may be performed by registered nurses, nurse practitioners, physicians, and emergency care clinicians. These duties should not be delegated to assistive healthcare staff. It is appropriate for family members to be present during neurological assessment under most circumstances.
What is the Desired Outcome of Assessment of Neurological Status?
› Neurological status is assessed to detect the presence of neurological abnormalities and/or to screen for changes in a patient’s neurological function over time

Why is Assessment of Neurological Status Important?
› Abnormal findings during neurological assessment may indicate nervous system abnormalities. These may be the first clinical signs of problems inherent to the nervous system or other condition such as the compression of a nerve by a tumor mass
  • Certain types of abnormal findings noted in the neurological examination are associated with abnormalities in specific parts of the brain. For example, impaired balance or loss of coordination may be due to lesions in the cerebellum
› Specific findings from patient history plus visual observation, percussion, and palpation help the examiner pinpoint areas of nervous system dysfunction

Facts and Figures
› The Glasgow Coma Scale (see What You Need to Know Before Assessment of Neurological Status, below) has been used in clinical practice for over 40 years, and is often considered the gold standard for assessing level of consciousness. Despite its popularity, inconsistencies exist in how the scale is used. In a recent literature review, researchers reported that the motor response component is a common source of confusion for clinicians, and that further research and instruction are needed to clarify how and where to apply painful stimuli (Braine et al., 2017)
› Videoconferencing as a means of neurological consultation (also called teleneurology) allows for patient consultation when an in-person evaluation by a neurologist is not possible. Particularly useful in rural areas that lack continual availability of neurology specialists, teleneurology allows for remote assessment of patients with stroke, movement disorders, multiple sclerosis, and dementia. Barriers include financial costs—insurance companies might only reimburse for in-person care—technical issues like video or audio failures, and a burdensome licensing process for clinicians to provide out-of-state teleneurology care (Wechsler., 2015)

What You Need to Know Before Assessment of Neurological Status
› The most common causes of neurological changes include acute illness/injury, depression, malnutrition, hypotension, and the adverse effects of medications
  • Some diminishing of neurological function occurs with advancing age in normal healthy individuals. It is important, however, not to attribute all abnormalities or changes in neurological function to aging without appropriate investigation
› The Glasgow Coma Scale is an objective tool that is widely used for rapid, generalized assessment of the neurological status of acutely ill adult patients. Pediatric Glasgow Coma Scales are used for assessing children, especially those below the age of 36 months of age
› The Glasgow Coma Scale assigns a numeric score to the patient’s response in three categories: eye opening, motor response, and verbal response. For example, in the eye-opening category, spontaneous eye opening is assigned a 4, eye opening to sound is scored as 3, eye opening to pain/pressure is assigned a 2, and absence of eye opening is given a score of 1. The lowest possible cumulative score on the scale is 3, and the highest is 15. A score ≤ 7 indicates coma
› Preliminary steps that should be performed before initiating assessment of neurological status include the following:
  • Review facility/unit specific protocol for completing a neurological assessment, if one is available
  • Review the treating clinician’s orders, if any, related to the assessment
  • Verify completion of facility informed consent documents, as appropriate
    – The general consent for treatment that is executed by patients on admission to a healthcare facility includes standard provisions that encompass neurological assessment
  • Review the patient’s medical history/medical record for allergies (e.g., to latex, medications, or other); use alternative materials, as appropriate
› Gather supplies, which typically include the following:
  • Nonsterile gloves; additional personal protective equipment (PPE; e.g., gown, cap, mask, eye protection) may be necessary depending on facility/unit specific protocol and the potential for exposure to body fluids
  • Vital signs monitoring equipment
  • Glasgow Coma Scale
  • Facility-approved pain assessment tool
  • Reflex hammer
How to Perform a Brief Neurological Examination

› Perform hand hygiene and don PPE as appropriate
› Identify the patient according to facility protocol
› Establish privacy by closing the door to the patient’s room and/or drawing the curtain surrounding the patient’s bed
› Introduce yourself to the patient and family member(s), if present and explain the procedure; explain your clinical role; assess coping ability of the patient and the family and for knowledge deficits and anxiety regarding neurological assessment
› Determine if the patient/family requires special considerations regarding communication (e.g., due to illiteracy, language barriers, or deafness); make arrangements to meet these needs if they are present
   – Follow facility protocols for using a professional certified medical interpreter, either in person or via phone, when a language barrier exists
› Assess level of consciousness using the Glasgow Coma Scale
› Follow facility protocol for scoring under special circumstances (e.g., correct procedure for scoring verbal response in a patient unable to communicate due to intubation)
› Assess orientation to person, place, time, and situation
› Ask the patient to state his/her full name (first explain that all patients are asked for this information as part of standard assessment)
› If the correct name is given, ask the patient to state where he/she is
› Then, ask what day, season, and year it is
› Conclude by asking the patient to briefly describe his/her current situation
› Perform the neurological assessment as part of a routine head-to-toe assessment. Perform the examination in a symmetrical fashion with each area of the body compared bilaterally to detect asymmetricalities
› Observe the patient’s extremities for symmetry of movement, muscle tone, and any abnormal posturing
› Perform the following as simple tests of motor function:
   – Ask the patient to squeeze your fingers with their hands and then let go. Hold the patient’s hands or wrists and provide some resistance while the patient tries to push their arms toward you and then to pull them away. The above maneuvers evaluate the degree and symmetry of strength of the upper extremities
   – Ask the patient to dorsiflex and plantarflex the feet against the palms of your hands while you provide resistance. Then ask the patient to perform straight leg raises in the prone position, with and without resistance. This evaluates the degree and symmetry of strength in the lower extremities
› Use a penlight to assess pupil size, symmetry, reaction to light, and presence of a consensual light reflex (Figure 2)
   – Normal pupils are round, 2–6 mm in size, and the same size bilaterally
   – Test for pupil reactivity to light by shining a penlight in from the outer canthus of one eye. Repeat the procedure with the other eye. Reactivity should be brisk and equal bilaterally
**Figure 2:** A penlight is used to assess for pupil size, symmetry (equal bilaterally) and shape (roundness), reactivity to light and accommodation (PERRLA). Copyright© 2014, EBSCO Information Services.

- If time permits, perform the remaining tests below
  - Use the reflex hammer to check for the presence and strength of the patellar reflex
  - Test memory by asking the patient to remember three unrelated words such as pencil, grape, and car. Instruct the patient to repeat the words and to remember them. After five minutes ask the patient to repeat the words back to you
  - Test olfaction by asking the patient to differentiate between two distinct smells such as cinnamon and coffee
  - Test visual acuity using a Snellen chart
  - Test hearing using the Weber and Rinne tests
    - Weber test: strike a tuning fork and place the vibrating stem of the fork on the top of the patient’s head. Instruct the patient to indicate when he/she no longer hears the note
    - Rinne test: Strike a tuning fork and place the vibrating stem of the fork on the patient’s mastoid process. Instruct the patient to indicate when he/she no longer hears the note
  - Test the trigeminal nerve by
    - touching a wisp of cotton on the patient’s forehead, cheek, and jaw with the patient’s eyes closed. Instruct the patient to indicate when he/she is being touched
    - touching a safety pin to the patient’s forehead, cheek, and jaw with the patient’s eyes closed. Instruct the patient to indicate when he/she is being touched
  - Test the glossopharyngeal and vagus nerves by touching the tip of a tongue blade to the back of the patient’s throat. Ask the patient to say “ah” and watch for symmetrical upward movement of the uvula
  - Test the hypoglossal nerve by instructing the patient to push his/her tongue against his/her cheek while you apply resistance to the outside of the cheek
  - Testing the spinal accessory nerve by pushing down on the patient’s shoulders while instructing the patient to raise his/her shoulder up
- Older children can be evaluated according to the criteria above. Assessment of nonverbal patients and preverbal children requires special consideration. Some of the above measures can provide valuable information, and more information can be gathered by asking the parent or caretaker about the patient’s behavior and any concerns
  - To perform a brief examination of an infant’s neurological status:
    - Observe for abnormalities in muscle tone (e.g., rigidity, flaccidity)
    - Note any difficulties in feeding. Assess strength and effectiveness of suck and swallow
    - Assess the child’s developmental level. Delays in achieving developmental milestones may be due to neurological abnormalities
    - Assess the fontanels for swelling, which may indicate increased intracranial pressure
    - Assess for persistence of primitive reflexes, which normally disappear at specific ages in an infant. Persistence of these reflexes suggests neurological abnormality
    - Listen to the child’s cry, if possible. A high-pitched, piercing cry suggests neurological abnormality
  - Obtain vital signs
If not already documented, obtain a complete patient history
• Ask about a family history of genetic diseases since they may affect neurological status
• Ask about history of head injury, infection, exposure to neurotoxic substances, and inhalation of chemicals
• Ask about a history of chronic pain, including headaches, dizziness or syncope, seizures, and difficulty speaking or swallowing
• Ask about history of head trauma, delayed achievement of developmental milestones during childhood, and difficulties during birth as they may be related to cerebral ischemia
• Ask about suddenness of onset and/or progression of neurological signs and symptoms
Discard used procedure materials and PPE; perform hand hygiene
Update the plan of care, if appropriate, and document the following information in the patient’s medical record:
• Date and time of neurological assessment
• Vital signs
• Level of consciousness; include Glasgow Coma Score, if used
• Orientation
• Pupillary reflexes
• Motor and sensory function
• Any unexpected patient events or outcomes, interventions performed, and whether the treating clinician was notified
• Patient/family education, including topics presented, response to education provided/discussed, plan for follow-up education, and details regarding any barriers to communication and/or techniques that promoted successful communication

Other Tests, Treatments, or Procedures That May Be Necessary Before or After Assessment of Neurological Status
Patients in whom abnormalities are detected will undergo further testing such as imaging studies to provide detailed information about the cause of the neurological abnormality

What to Expect After Assessment of Neurological Status
The patient may return to previous activity levels
Neurological examination will be performed at regular intervals in patients with previous neurological abnormalities to allow for rapid detection of changes in the patient’s neurological status
The initial assessment can describe the condition at baseline for patients with known neurological abnormalities. The assessment can be repeated at regular intervals to monitor for changes in the patient’s neurological condition

Red Flags
Abnormalities in the brief neurological assessment indicate that more detailed evaluation is necessary
Difficulties in movement and/or changes in level of consciousness may indicate increased intracranial pressure or a recent cerebrovascular event in an older adult. This and any other rapid change in neurological status should be reported immediately to the treating clinician, who will order further evaluation
Postures that warn of central nervous system deterioration include decorticate (abnormal flexion) and decerebrate (extended) posturing. Decorticate posturing may indicate a lesion in the frontal lobe, internal capsule, or cerebral peduncles. Decerebrate posturing may indicate lesions in the upper brain. Either case should be reported immediately to the treating clinician, who will order further evaluation

What Do I Need to Tell the Patient/Patient’s Family?
Educate the patient/family about the purpose of the examination and what to expect as you conduct it. Encourage questions
If further testing is required, explain to the patient/family the purpose of the testing, what information will be obtained, and when the results will likely become available
Educate the patient/family about clinical signs and symptoms that may indicate that neurological problems are worsening, which should be reported immediately to the treating clinician. These signs and symptoms vary according to type of abnormality
If the neurological examination is conducted in a home or outpatient setting, provide the family with contact information and explain how they may contact the treating clinician if questions or problems arise
References


