
Neurological Assessment of the Adult Hospitalized Patient

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Introduction

Timely and accurate assessment of a patient's neurological status is an important aspect of nursing care. All patients have the potential for a neurological event, whether they have a neurological primary diagnosis or not. Nurses are instrumental in preventing irreversible damage by identifying in patients subtle changes from baseline that could signal deterioration. It is within the scope of nursing practice to perform independent patient assessments. Currently, there is no standard of care for the neurological assessment of the hospitalized adult.

According to the 3rd edition of *Neuroscience Nursing: Scope and Standards of Practice* from the American Association of Neuroscience Nurses (AANN), standards of practice describe a competent level of nursing care, as demonstrated by the nursing process. The first of these standards is assessment. As the leader in neuroscience nursing, AANN recognized the importance of having a consistent standard assessment and appointed a task force to develop this white paper delineating that standard.

The purpose of this document is to describe the essential components of the neurological assessment of the hospitalized adult, enabling the nurse to recognize early neurological changes so that interventions can be implemented in a timely manner to prevent injury.

Significance

Performing a neurological assessment can be challenging because there is a perceived complexity about what components to include. Lack of agreement among those in the field about the correct terminology to use—neurological assessment, neurological examination, or neurological check—contributes to the confusion. These terms have overlapping definitions and can be used interchangeably. However, failure to agree on the components of a standardized assessment may prevent nurses from identifying subtle neurological changes and accurately documenting them in the electronic health record (EHR). Inconsistent documentation in the EHR can contribute to communication errors and result in an inadequate representation of the patient's ongoing neurological status.

Considerations

The nurse should carefully and thoroughly collect and prioritize comprehensive data about the patient's medical condition to uncover evidence of neurological dysfunction. The assessment should include evidence-based techniques and nursing knowledge relevant to the situation. The patient's age; baseline mental status, vision, and hearing; and underlying medical conditions, such as musculoskeletal disorders, pain, and delirium, should be considered when noting neurological changes. The nurse should note patient complaints that may indicate a neurological problem, such as headache, nausea, dizziness, numbness, or vision changes. The onset of symptoms such as fever, seizures, or changes in the level of consciousness (LOC) can give clues about the underlying pathology of neurological changes. Subtle changes in memory, affect, mood, attention, and personality may be easily overlooked until the disorder has progressed.

Knowledge of pathophysiology and neurological anatomy enables the nurse to focus on aspects of the neurological assessment and its relationship to the underlying medical illness. Many pre-existing

medical conditions, such as diabetes mellitus, hypertension, cardiopulmonary or renal disease, cancer and cancer treatment, immunologic or vasculitic disorders, or infection/inflammation, are significant risk factors for neurologic illness. A history of cigarette smoking, alcohol abuse, recreational drug use, concurrent use of numerous medications, and certain occupations can affect the nervous system and cause neurologic disorders. Alterations in the sleep-wake cycle, especially in the elderly, may be a potential cause of an altered mental state or neurological change. The nurse should note any recent history of falling, the use of anesthetics, or changes in the underlying medical condition(s). The nurse may need to involve the patient's loved ones or other medical providers in the assessment process to collect pertinent data. Focused neurological assessments and observations are vital in ensuring early recognition of deterioration. Serial assessments should be performed to document changes over time so that appropriate interventions can be implemented. New findings or deviations in the assessment should be validated with the baseline examination and previous assessment. Changes may require verification with the patient and family.

Timing of Assessment

A patient assessment should be performed when a shift or nurse change occurs and following certain procedures, tests, or medications. Nurses should ideally perform assessments together during hand-offs to establish a baseline exam for the oncoming nurse as well as to identify and validate changes. Assessments may need to be performed more frequently if neurological changes are noted or anticipated. Each patient encounter is an opportunity to assess for any changes.

Intervention and Documentation

The nurse should notify the appropriate healthcare providers of any changes or abnormal findings in a timely fashion. Depending on the acuity of the situation, orders may be given for new medications, lab work, imaging, or procedures. Consultants from additional specialties may be required. All findings and interventions should be documented in the EHR. The nurse should communicate changes in neurological status and the treatment plan with the patient's loved ones, as appropriate.

Neurological Assessment Components

There are five components of the baseline focused assessment for the awake and alert hospitalized adult: LOC, language and speech, cranial nerve (CN) status (vision, pupils, facial symmetry, swallow), motor movement/sensation, and vital signs (**Table 1**). A more detailed assessment may be performed if deficits are identified.

Level of Consciousness

When a patient is awake and alert, the nurse is able to perform several components of the neurological assessment, such as evaluating arm and leg movements, facial expressions, mentation, intellect, affect, and speech, even before beginning a focused assessment. The nurse can engage the patient in a brief conversation to assess LOC. A fully conscious patient can comprehend questions, process, and respond coherently and appropriately. A patient can be deceptively alert and fluent but still have

deficits. A change in the patient's LOC is the most sensitive indicator of a neurological problem. The Glasgow Coma Scale (GCS) and Full Outline of UnResponsiveness (FOUR) Score are useful tools to evaluate a patient's LOC.

Alertness. Evaluate the patient's response to voice (calling their name), gentle touch (tapping a shoulder), or painful stimuli. Painful stimuli should only be used with a patient with decreased LOC.

Awareness. Assess the patient's ability to answer orientation questions (person, place, time, situation) appropriately. Ask the patient to follow simple ("show me two fingers") or more complex ("close your eyes and stick out your tongue") commands. Short- and long-term memory, insight, and judgment may also be evaluated. The patient's age, literacy level, vision, and hearing need to be considered because they can have an impact on the patient's responses.

Language and Speech

Language function focuses on the patient's expression and comprehension of spoken language. Evaluate the patient's ability to engage in sensible conversation. Do they speak coherently? Note any inappropriate or nonsensical words. Ask the patient to name objects or repeat simple sentences to evaluate their ability to understand.

Cranial Nerves

CN dysfunction can be the result of various underlying neurogenic or non-neurogenic diseases. Damage (e.g., trauma or stroke) or malfunction (e.g., metabolic disturbances) of the brain or brainstem might cause either unilateral or bilateral CN dysfunction. Early detection of CN palsy via CN examination may help identify neurological involvement in certain disease states and improve outcomes through proper treatment. The CN examination is often embedded in the routine neurological assessment, and the neurological deficits might relate to CN dysfunction.

Although mental status and motor exams are used to evaluate the function of the cerebrum and cerebellum, CN exams assess the function of the cerebrum and brainstem (**Table 2**). The first two CNs emerge from the cerebrum, whereas the remaining 10 nerves emerge from the brainstem. CNs work in pairs, and groups of them may be assessed simultaneously. The pupillary exam is one of the essential elements of CN evaluation. Opioids and many other medications may affect pupil size and reactivity, but both should return to normal after the drug's effects have diminished. In an alert patient, the baseline CN exam should include evaluation of vision, visual fields, and pupil reaction (CNs II, III); facial symmetry (CN VII); swallow (CNs IX, X); and extraocular movements (EOMs) (CNs III, IV, VI) (**Table 3**).

Special Considerations Related to Cranial Nerves

CN assessment should be combined with other neurological exams to identify the underlying etiology of symptoms. CN palsy usually presents as same side injury, but might not present with motor and sensory deficits of extremities or homonymous peripheral visual loss. On the other hand, brainstem dysfunction may lead not only to CN impairment, but also altered consciousness, vertigo, dizziness, imbalance, motor and sensory deficits, and respiratory failure. The broad spectrum of deficits can be difficult to diagnose without thorough physical examinations. The lesion location may affect the selection of treatment, intervention in the acute phase, and clinical outcomes. When nurses communicate clinical presentations accurately, it will facilitate treatment and minimize potential safety risks.

CN impairment refers to dysfunction of one or more of the CNs and may occur as a result of infection, tumor, head trauma, autoimmune disorders, uncontrolled hypertension, or diabetes. A patient with underlying hypertension or diabetes or a history of smoking may experience microvascular CN impairment, which often affects CNs III, IV, and VI. The patient may present with diplopia (double vision) and abnormal extraocular eye movement (e.g., strabismus, impaired lateral gaze) as a result of a dysfunction of CNs III, IV, and VI. The nurse should provide safety measures for patients with neurological deficits, including CN deficits, such as eye care, swallow screen, fall prevention, and oral care, to prevent complications and optimize clinical outcomes (**Table 4**).

Movement and Sensation

Motor and sensory assessments are both functional and neurological, and acute changes can reveal significant pathology. It is important that the initial assessment includes an evaluation of baseline motor and sensory deficits, such as muscle weakness, numbness and tingling, gait difficulties, dizziness, or history of falls. The use of assistive devices should also be noted. Age, pain (acute, chronic, or undertreated), and surgical and medical history should be considered because they may impact the assessment findings. Identifying such deficits during the initial assessment alerts the nurse and other providers that the patient may be a fall risk and allows for continued monitoring for changes during the patient's hospitalization.

Extremity movement and strength are easy and quick assessments that should be performed throughout the patient's hospital stay. Motor evaluation should focus on patterns and comparison of movement between the right and left sides. Use resistance testing and note whether the patient can move an extremity against gravity without pronator drift and with full strength. The nurse also may test grip strength. Note any resistance to passive movement of the extremities, such as spasticity or rigidity, and note if any flaccidity exists. The presence of any involuntary or abnormal movements such as tics or tremors, which can occur or worsen as a result of medication toxicities or infections, should be noted. These findings should be described by the extremity involved and whether the issue was noted while the patient was resting or during activity. The motor strength grading scale may be used to evaluate voluntary muscle movement.

If possible, observe the patient's balance and gait. An imbalance or gait impairment could suggest an underlying neurological deficit. Medical conditions such as hypertension, arrhythmias, or heart failure, when uncontrolled, may exacerbate underlying unsteady gait, potentially placing the patient's safety at risk. If the patient is unable to walk safely, balance can be evaluated by having the patient sit on the side of the bed unsupported with arms outstretched, noting any swaying or need for support to sit.

The sensory exam is subjective and dependent on the patient's cooperation. Sensation can be evaluated by using a light touch along with comparison between right and left and upper and lower extremities. The nurse should note any abnormally increased sensitivity to pain (hyperalgesia) or other unpleasant sensations. Complaints of saddle (perineum) numbness should be evaluated for bowel or bladder problems (constipation, incontinence, or urinary retention) and appropriate interventions should be instituted as needed.

Assessment of the Patient with Altered Consciousness

Altered consciousness may influence patient participation, but a number of functions can still be tested (**Table 5**). If possible, the nurse should obtain a history of premorbid neurological symptoms, such as headaches, vision changes, or focal weakness, from the patient's family or friends. The assessment will be unreliable if the patient is on intravenous sedating agents. If the patient's medical condition permits, the sedation should be titrated or held prior to performing the assessment.

Level of Consciousness

Assess the patient with impaired consciousness for depth of awareness. If the patient is unable to follow commands, tactile or noxious stimuli can be used. Proceed from central to peripheral stimuli and from light touch to painful stimuli to elicit the highest level of response. Painful stimuli can be triggered by squeezing the trapezius (central stimuli) or applying nail bed pressure (peripheral stimuli). The patient with a higher level of awareness will acknowledge the stimuli and purposefully try to remove the irritant by pulling away or reaching for the examiner's hand. The patient pulling away or withdrawing the extremity represents a lower-level reflex response. Observe any abnormal movements of the extremities to the stimuli and whether the patient displays any verbal (moaning) and nonverbal (grimacing) behaviors. Abnormal extension, flexion (posturing), or no response is seen only in comatose patients and indicates severe brain injury.

Cranial Nerves

Open the patient's eyes and determine the position of the eyes at rest and note any deviation or abnormal eye movements (nystagmus). Evaluate the size, shape, and reaction of the pupils to light (CN II and III) (**Table 6**). Pupillometry, if available, may be used to evaluate pupil response. Observe for lid droop and inability to close the eyes completely. The patient may resist the eyes being open; note if this response is symmetrical and observe for symmetrical EOMs.

It is important to establish the presence of protective reflexes in the patient with reduced consciousness (**Table 6**). To prevent aspiration, cough and gag (CNs IX and X) should be assessed before administering oral nutrition, fluids, or medications. Note if the patient is unable to handle secretions, in which case alternative routes for feeding may need to be considered. If the patient is comatose, evaluate for the presence of a corneal reflex (CN V and CN VII). The absence of a corneal reflex will warrant special attention to prevent corneal abrasions because the protective mechanism of eye closure may be lost. New onset of abnormal reflexes, such as asymmetrical pupillary light responses not induced by medication, the absence of the corneal reflex, or abnormal flexion or extension (posturing), may indicate brainstem injury, increased intracranial pressure, or the possibility of herniation.

Motor Response

An important aim of the assessment is to determine whether there are any asymmetries or differences between the patient's right and left sides. While observing the patient's posture at rest, note any awkward or abnormal positions of the head, extremities, or trunk and assess for any abnormal motor movements. Note if there is spontaneous movement of the extremities and whether one side moves more than the other. If there is no spontaneous movement, the patient's arms can be lifted, one at a

time, and allowed to drop to the bed. A weaker or paralyzed extremity will fall freely, compared with an extremity with intact motor innervation, which will fall sluggishly. Evaluate the legs by flexing them at the knees and noting whether they fall outward or they exhibit strength in maintaining the position. Palpation of the muscles may reveal loss of normal muscle bulk. In a patient with decreased consciousness, the sensory assessment is limited to a response from noxious stimuli.

Vital Signs

Cerebral autoregulation maintains cerebral blood flow across wide ranges of arterial blood pressure and perfusion pressures. The regulation of blood pressure, heart rate, and breathing happens in the brainstem. The Cushing reflex is a physiological nervous system response to elevated intracranial pressure that causes hypertension/widened pulse pressure, bradycardia, and irregular respiration (e.g., Cheyne-Stokes or central neurogenic hyperventilation). The Cushing reflex is usually a late sign of neurological deterioration, appearing just prior to or at the time of herniation. Changes in a patient's vital signs may provide clues about other medical problems. Fever, hypotension, or hypoxia may influence a patient's LOC and cause secondary brain injury.

Conclusion

Although there are challenges to performing a neurological assessment of the adult hospitalized patient, using a standardized approach can help the nurse identify changes that may affect outcomes. A list of assessment components guides the nurse, creating structure around the identification of neurological changes in the patient. Reflecting those components in the EHR allows the nurse to document findings consistently. A standardized approach can assist with rapid identification of neurological changes so interventions can be initiated promptly.

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Additional Assessment Scales

- Manual Motor Muscle Grading
- Glasgow Coma Scale (GCS)
- Full Outline of UnResponsiveness (FOUR) Score
- National Institutes of Health (NIH) Stroke Scale

Appendix

TABLE 1
Checklist of Baseline Focused Neurological Assessment for the Awake Patient with Altered Consciousness

<input type="checkbox"/>	Level of consciousness (LOC)
<input type="checkbox"/>	Language and speech
<input type="checkbox"/>	Cranial nerves (vision, pupils, facial symmetry, dysarthria, swallow)
<input type="checkbox"/>	Motor movement/sensation
<input type="checkbox"/>	Vital signs

TABLE 2
Cranial Nerves by Brain Region and Associated Function

Cranial Nerve	Brain Region	Function
I (Olfactory)	Cerebrum	Smell
II (Optic)		Vision
III (Oculomotor)	Midbrain	Pupil response, eyelid opening, eye movement
IV (Trochlear)		Eye movement
V (Trigeminal)	Pons	Facial sensation, chewing
VI (Abducens)		Eye movement
VII (Facial)		Facial movement, eyelid closure, taste
VIII (Vestibulocochlear)		Hearing, balance
IX (Glossopharyngeal)	Medulla	Swallowing, taste
X (Vagus)		Abdominal organs, digestion, heart rate
XI (Spinal Accessory)		Shoulder shrug, neck movement
XII (Hypoglossal)		Tongue movement

TABLE 3
Cranial Nerve Assessment—Awake and Alert

Assessment	Cranial Nerve
Vision, visual fields, pupil reaction	II, III
Extraocular movements	III, IV, VI
Facial symmetry	VII
Swallow	IX, X

TABLE 4
Nursing Interventions Related to Neurological Deficits

Neurological Deficit	Nursing Intervention
Ptosis (inability to completely close eyelids)	Eye care (i.e., artificial tears, lubricant)
Dysphagia	Swallow screen, speech evaluation
Facial droop	Reinforce oral care
Imbalance	Fall prevention
Visual deficits	Fall prevention

TABLE 5
Checklist of Baseline Focused Neurological Assessment for the Patient with Altered Consciousness

<input type="checkbox"/> Level of consciousness (LOC)
<input type="checkbox"/> Cranial nerves (pupil response and eye movement, corneal reflex, cough/gag reflex)
<input type="checkbox"/> Motor response
<input type="checkbox"/> Vital signs

TABLE 6
Cranial Nerve Assessment—Altered Consciousness

Assessment	Cranial Nerve
Pupil reaction, size, shape	II, III
Corneal reflex	V, VII
Gag/cough reflex	IX, X