Performing Neurological Assessment.

Understanding Neuroassessment and nursing responsibilities.

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The Nervous System

Peripheral Nervous System
(the major Somatic (sensory and motor pathways to the extremities are labeled below)

- Cervical
- Brachial plexus
- Musculocutaneous
- Radial
- Median
- Ulnar
- Sciatic
- Femoral
- Common peroneal
- Tibial
- Saphenous
- Superficial peroneal
- Deep peroneal

Central Nervous System

- Cerebrum
- Cerebellum
- Cervical vertebrae
- Thoraic vertebrae
- Lumbar vertebrae
- Sacrum

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**Introduction**

A neuroassessment is a part of all nursing assessment. However, a focused neuroassessment will be performed on patients with a known or suspected nervous system disorders or dysfunction such as cerebrovascular accident (CVA), altered mental status, concussion etc. Neurological assessment includes: Mental status; Cognitive assessment; Cranial nerves; Motor Functions & Muscle tone; Sensory Function; Cerebellar Function; Deep tendon reflexes (DTR), and superficial cutaneous reflexes.

**Structures of the Neurologic System**

Central nervous system

- Brain and spinal cord

Peripheral nervous system

- Includes cranial and spinal nerves
- Autonomic and somatic systems

**Meninges**

The meninges are the protective coverings of the central nervous system (CNS). They consist of three layers: the dura mater, arachnoid mater, and pia mater.

**Cerebrospinal Fluid**

The space surrounding the organs of the CNS is filled with a clear fluid known as cerebrospinal fluid (CSF). CSF is formed from blood plasma by special structures called choroid plexuses. CSF also flows through the subarachnoid space around the outside of the brain and spinal cord.

**Neuron: Basic functional unit**

There are 3 basic classes of neurons: efferent neurons, afferent neurons, and interneurons.

i. Efferent neurons. Also known as motor neurons, efferent neurons transmit signals from the central nervous system to effectors in the body such as muscles and glands.

ii. Afferent neurons. Also known as sensory neurons, afferent neurons transmit sensory signals to the central nervous system from receptors in the body.
iii. Interneurons. Interneurons form complex networks within the central nervous system to integrate the information received from afferent neurons and to direct the function of the body through efferent neurons.

**The autonomic nervous system**

The autonomic nervous system is the part of the nervous system that supplies the internal organs, including the blood vessels, stomach, intestine, liver, kidneys, bladder, genitals, lungs, pupils, heart, and sweat, salivary, and digestive glands. This system works automatically (autonomously), without a person’s conscious effort. The autonomic nervous system has two main divisions:

- **Sympathetic:** stimulates
- **Parasympathetic:** Inhibits

After the autonomic nervous system receives information about the body and external environment, it responds by stimulating body processes, usually through the sympathetic division, or inhibiting them, usually through the parasympathetic division. The autonomic nervous system controls internal body processes such as:

- Blood pressure;
- Heart and breathing rates;
- Body temperature;
- Digestion;
- Metabolism (thus affecting body weight);
- The balance of water and electrolytes (such as sodium and calcium);
- The production of body fluids (saliva, sweat, and tears);
- Urination;
- Defecation;
- Sexual response. The sympathetic and parasympathetic system work together to ensure that the body responds appropriately to different situations.

Generally, the sympathetic division prepares the body for stressful or emergency situations—fight or flight. The sympathetic division increases heart rate and the force of heart contractions and widens (dilates) the airways to make breathing easier. It causes the body to release stored energy. Muscular strength is increased. This division also causes palms to sweat, pupils to dilate, and hair to stand on end. It slows body processes that are less important in emergencies, such as digestion and urination.

The parasympathetic division controls body process during ordinary situations. The parasympathetic division conserves and restores. It slows the heart rate and decreases blood pressure. It stimulates the digestive tract to process food and eliminate wastes. Energy from the processed food is used to restore and build tissues.
Both the sympathetic and parasympathetic divisions are involved in sexual activity, as are the parts of the nervous system that control voluntary actions and transmit sensation from the skin (somatic nervous system).

Two chemical messengers (neurotransmitters) are used to communicate within the autonomic nervous system:

- Acetylcholine - Cholinergic fibers - parasympathetic (inhibiting)
- Norepinephrine - Adrenergic fibers - sympathetic (stimulating) effects

Cholinergic fibers secrete acetylcholine while adrenergic fibers secrete norepinephrine. Generally, acetylcholine has parasympathetic (inhibiting) effects and norepinephrine has sympathetic (stimulating) effects. However, acetylcholine has some sympathetic effects. For example, it sometimes stimulates sweating or makes the hair stand on end.

Assessing mental status

Evaluation of level of consciousness (LOC) and mentation are the most important parts of the neurologic examination. A change in either is usually the first clue to CNS dysfunction. Evaluating a patient’s mental status includes level of consciousness (LOC), orientation, and memory.

Assessing level of consciousness and orientation

Level of consciousness should also be assessed upon initial contact with the patient and continuously monitored for changes throughout your contact with the patient. The AVPU scale is a rapid method of assessing LOC.

- A - Alert and oriented.
- V - Verbal stimulus (Responds to verbal stimulus).
- P - Responds to pain.
- U - Unresponsive.
A - Alert and oriented: Signifies orientation to person, place, time, and event. To determine orientation, ask detailed questions about your patient’s name, where he is, and the date. If the patient is alert, you can report your results as a patient oriented score from 1 (lowest) to 4 (highest), noting any areas not oriented to. For example, you can state the patient is “A and O X 4” (fully alert and oriented) or “A and O x 2 and does not know time and place.”

V: Responds to verbal stimulus: This indicates that your patient only responds when verbally prompted. It is also important to note if the patient makes appropriate or inappropriate responses. Begin with speaking your patient’s name in a normal tone. If he doesn’t respond, say his name again in a louder tone. (If your patient is hearing-impaired, you’ll need to document this; it shouldn’t change his score.) Be sure to document appropriate and inappropriate response to verbal stimulation. (a) Response to normal voice stimuli. (b) Response to loud voice stimuli.

P - Responds to pain: Use if patient does not respond to verbal stimuli. The nurse can use one the following techniques for painful stimulation.

- Pinching the skin: Gently but firmly pinch patient’s skin.
- Trapezius squeeze: Grasp and twist the muscle that runs from the back of the neck to the shoulder.
- Sternal rub: Make a fist, then push the broad side of your fist into the sternum and press hard enough to leave a mark on your patient’s skin.
- Supraorbital pressure: Along the bone beneath the eyebrow is an indentation near the nose. Press it with your thumbs.

Note if patient moans or withdraws from the stimulus.

U - Unresponsive: If the patient does not respond to painful stimulus on one side, try the other side. A patient who remains flaccid without moving or making a sound is unresponsive.

Note: Anything below alert and oriented is altered level of consciousness and should be documented and further investigated.

To assess LOC the nurse can use the Glasgow Coma Scale (GCS)

**Glasgow Coma Scale:** The Glasgow Coma Scale assesses how the brain functions as a whole and not as individual parts. The scale assesses three major brain functions: eye opening, motor response, and verbal response. A person without any neurological deficit will score 15 on the scale overall, the best possible score. Whereas flaccid
patients, who neither open their eyes nor verbalize, score the minimum of 3 points. A GCS score of 8 or less is the generally accepted definition of coma. (See table 1: Glasgow Coma Scale). Those with a GCS of 8 or less are classified as severe, while those with a GCS score of 9 to 12 are categorized as moderate and those with a GCS score of 13 to 15 are mild.

<table>
<thead>
<tr>
<th>Table 1. Glasgow Coma Scale</th>
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<tbody>
<tr>
<td><strong>Test</strong></td>
</tr>
<tr>
<td><strong>Eye opening</strong></td>
</tr>
<tr>
<td>Spontaneously</td>
</tr>
<tr>
<td>To speech</td>
</tr>
<tr>
<td>To pain</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td><strong>Motor Response</strong></td>
</tr>
<tr>
<td>Obey</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Localizes</td>
</tr>
<tr>
<td>Withdraws</td>
</tr>
<tr>
<td>Abnormal flexion</td>
</tr>
<tr>
<td>Abnormal extension</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td><strong>Verbal Response</strong></td>
</tr>
<tr>
<td>Oriented</td>
</tr>
<tr>
<td>Confused</td>
</tr>
<tr>
<td>Inappropriate words</td>
</tr>
<tr>
<td>Incomprehensible</td>
</tr>
<tr>
<td>None</td>
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</tbody>
</table>

The GCS is the most widely used instrument for quantifying neurologic impairment. Patients with GCS scores less than 8 have a severe coma and typically require endotracheal intubation.
Decerebrate posture (extensor posturing or decerebrate rigidity): Decerebrate posture is an abnormal body posture that involves the arms and legs being held straight out, the toes being pointed downward, and the head and neck being arched backward. The muscles are tightened and held rigidly. This type of posturing usually means there has been severe damage to the brain.

Coma grades 3 to 5 indicate potentially fatal damage, especially if accompanied by fixed pupils or absent oculovestibular responses. Conversely, scores of 9 and above correlate with good recovery.

Decorticate position (flexor response or mummy pose): Decorticate posture is an abnormal posturing in which a person is stiff with bent arms, clenched fists, and legs held out straight. The arms are bent in toward the body and the wrists and fingers are bent and held on the chest. Decorticate posture is a sign of damage to the nerve pathway between the brain and spinal cord.
Levels of Consciousness

Table 2: Levels of Consciousness

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>Full consciousness</td>
<td>The patient is alert, attentive, follows commands, responds promptly to external stimulation if asleep, and once awake, remains attentive</td>
</tr>
<tr>
<td>Lethargy</td>
<td>The patient is drowsy but partially awakens to stimulation; patient will answer questions and follow commands but will do so slowly and inattentively.</td>
</tr>
<tr>
<td>Obtundation</td>
<td>The patient is difficult to arouse and needs constant stimulation to follow a simple command. Although there may be verbal response with one or two words, the patient will drift back to sleep between stimulation. Obtundation is often seen with substance abuse in the form of narcotic or alcohol overdosage, hepatic encephalopathy, diabetic acidosis and uremia.</td>
</tr>
<tr>
<td>Stupor</td>
<td>The patient arouses to vigorous and continuous stimulation; typically, a painful stimulus is required. The only response may be an attempt to withdraw from or remove the painful stimulus. Opens eyes to deep pain</td>
</tr>
<tr>
<td>Coma</td>
<td>The patient does not respond to continuous or painful stimulation. There are no verbal sounds and no movement, except possibly by reflex. Does not open eyes to deep pain</td>
</tr>
</tbody>
</table>

Drift test

In a conscious patient, the single best test to quickly identify motor weakness is the pronator drift test. Have the patient hold their arms outward at 90 degrees from the body. With palms up, have the patient close their eyes and hold the arms for a couple of minutes. “Drifting” will occur if one side is weak.
The cranial nerves

There are twelve pairs of cranial nerves that arise directly from the central nervous system. Some cranial nerves have only a sensory component (CN I, II, & VIII), some only a motor component (III, IV, VI, XI, & XII) and some have both sensory and motor component (V, VII, IX, & X). The Sensory components of the cranial nerves transmit nerve impulses from sensory organs to the brain. The motor components of cranial nerves transmit nerve impulses from the brain to target tissue outside of the brain. See Table 3: for assessment of cranial nerves.

<table>
<thead>
<tr>
<th>12 Cranial nerves</th>
<th>Function</th>
<th>How to test</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN1</td>
<td>Olfactory</td>
<td>Evaluate the patency of the nasal passages bilaterally by asking the patient to breathe in through their nose while the examiner occludes one nostril at a time. Then ask the patient to close their eyes and smell something familiar with eyes closed. Ask what it is. Switch nostrils and repeat. Compare the strength of the smell in each nostril.</td>
</tr>
<tr>
<td>CN2</td>
<td>Optic</td>
<td>Sensory (sight; acuity and field of vision, Pupil reactivity to light and accommodation)</td>
</tr>
<tr>
<td>-----</td>
<td>-------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>CN3</td>
<td>Oculomotor</td>
<td>Motor (eye movements; Eyelid elevation Pupil size and reactivity)</td>
</tr>
<tr>
<td>CN4</td>
<td>Trochlear</td>
<td>Motor (eye movements; (turns eye downward and laterally)</td>
</tr>
<tr>
<td>CN5</td>
<td>Trigeminal</td>
<td>Motor &amp; sensory (chewing and pain sensations of face Chewing Facial and mouth sensation Corneal reflex)</td>
</tr>
<tr>
<td>CN6</td>
<td>Abducens</td>
<td>Motor(eye movements, turns eye laterally)</td>
</tr>
<tr>
<td>CN7</td>
<td>Facial</td>
<td>Motor (facial expressions, Secretion of tears and</td>
</tr>
</tbody>
</table>
To test sensory function, have your patient taste a portion of your patient’s tongue, for example, sweet, sour, and bitter. To test motor function, observe his face for symmetry at rest and while he smiles, frowns, and raises his eyebrows. Then have him close both eyes tightly. Test muscle strength by attempting to open his eyes.

| CN8 | Vestibulocochlear (acoustic) | Sensory (hearing and equilibrium) | To assess this nerve, use Weber’s test—strike a tuning fork lightly against your hand and place the vibrating fork on your patient’s forehead at the midline or on the top of his head—and the Rinne test—strike the tuning fork against your hand and place the vibrating fork over his mastoid process.

| CN9 | Glossopharyngeal | Sensory & Motor (Taste, swallowing, pharyngeal muscle, Senses carotid blood pressure, Gagging and swallowing) | Test these nerves together because their innervation overlaps in the pharynx. Listen to your patient’s voice. Then check his gag reflex by touching the tip of a tongue blade against his posterior pharynx and asking him to open wide and say “ah.” Watch for symmetrical upward movement of the soft palate and uvula and for the midline position of the uvula. (This tests for CN 9 and 10).

| CN10 | Vagus | Sensory & Motor (muscles of the pharynx, larynx, soft palate; sensation in the external ear and pharynx, larynx, abdominal and thoracic visceral organs, parasympathetic innervation of the abdominal and thoracic organs, aortic blood pressure Slows heart rate Stimulates digestive organs (Gagging and swallowing) | (See above test)

| CN11 | Spinal Accessory | Sensory & Motor (trapezius, sternomastoid muscles, shoulder movement, Head rotation) | Assess this nerve by testing the strength of the sternocleidomastoid muscles and the upper portion |
of the trapezius muscle

| CN12 | Hypoglossal | Motor (Tongue; Tongue movement, Speech) | Observe your patient’s tongue for symmetry. His tongue should be midline without tremors or muscle twitching. Test tongue strength by asking him to push his tongue against his cheek as you apply resistance |

The gag reflex (CN IX and X), the pupillary reflex (CN II and III), and the corneal reflex (CN V and VII) depend on more than one CN.

Assessing motor function

Focus on arm and leg movement. The nurse should consider the following: 1. Muscle size; 2. Muscle tone; 3. Muscle strength; 4. involuntary movements; and 5. posture, gait. Look at both sides of your patient’s body simultaneously when assessing motor function. On inspection, note any asymmetry of muscle; unilateral atrophy will often indicate weakness. To assess the upper extremities, have your patient raise his arms parallel to the floor or bed, and then have him resist when you
Cerebellar Function

The cerebellum is responsible for muscle coordination, gait, and balance on the same side. To test cerebellar function use the following tests:

i. **Finger to finger test**: have the patient touch their index finger to your index finger (repeat several times).

ii. **Finger to nose test**: perform with eyes open and then eyes closed.

iii. **Tandem walking**: heel to toe on a straight line. Is the gait shuffling/waddling/scissoring/swinging?

iv. **Romberg test**: stand with feet together and arms at their sides. Have patient close his/her eyes and maintain this position for 10 seconds. If the patient begins to sway, have them open their eyes. If swaying continues, the test is “positive” or suggestive of cerebellum problems.

v. **Heel-to-shin test**: Have the patient lying down for this and get them to run the heel of one foot down the shin of the other leg, and then to bring the heel back up to the knee and start again.

• Romberg's test by asking the patient to stand unaided with their eyes.

• If the patient sways or loses balance then this test is positive. Stand near the patient in case they fall.
Assessing pupillary response (Pupillary Reflex)

Pupillary light reflexes provide information regarding the status of the brain and the sympathetic and parasympathetic nervous systems. Pupillary response is controlled by cranial nerves III, IV, and VI. When assessing pupils (eyes) it is important to assess the following: size, shape, reactivity to light, and comparison of one pupil to the other.

P: Pupils. Are they both present? What is their general condition?

E: Equal. Are both pupils the same size? Unequal pupils can indicate a head injury causing pressure on the optic nerve. Normal pupils are of the same size bilaterally, about 2 to 6 mm and round. Anisocoria is a normal variant of up to 1 mm smaller than the other; about 15% of people have this variation. See the pupil size chart.
A: And.
R: Round. Pupils should be round.
R: Regular in size.
L: React to light. Both eyes should be assessed twice for reaction to light. Do they both react to light? The normal response is for both pupils to react equally and briskly.

Eye motion extraocular movement (EOM) is tested by asking the patient to follow your finger as you trace the letter H in front of him. Document any inability to follow your finger.

The acronym PERRLA refers to normal pupils that are equal, round, and reactive to light and accommodation. Pupillary function is controlled by the midbrain and evaluates cranial nerves II and III.

Medications, surgery, and blindness can affect pupil size, shape, and reactivity.

The hallmark sign of severe neurologic injury is a change in pupil size and reactivity.
Vital Signs

Changes in vital signs are not consistent early warning signals. Vitals are more useful in detecting progression to late symptoms. Both respiratory and cardiac centers are located in the brainstem. Therefore, compression of the brainstem will cause changes in vital signs. This is usually a late sign and impending herniation/death will occur if the problem is not resolved. The respiratory centers in the brainstem control rate, rhythm, and inspiration/expiration. The cardiac centers also play a part in cardiac acceleration/inhibition e.g. controlling heart rate and rhythm as well as hemodynamic stability/instability.

Respiratory

The role of the Nurse is to:

- Ensure patent airway is maintained
- Assess rate, rhythm, and characteristics of inspiration/expiration
- Assess gas exchange, tissue perfusion, airway clearance, and risk for aspiration
- Assess for causes of respiratory disturbances or secondary conditions that can cause respiratory complications
- Assess for actual respiratory complication/insufficiency and intervene appropriately

Pulse

- Assess rate, rhythm, and quality of pulse
- Assess tissue perfusion, cardiac output, activity intolerance
- Assess for causes of cardiac instability and intervene appropriately

Bradycardia

Bradycardia is seen in the later stages of increased intracranial pressure. As BP rises to overcome the increased ICP, reflex inhibition causes a slowing of the HR.

Blood Pressure

- Assess for hypertension, hypotension, and pulse pressure
- Assess tissue perfusion, cardiac output

Hypertension: Increases in blood pressure are usually associated with rising ICP. An increased systolic pressure, widening pulse pressure, bradycardia and apnea are advanced stages of increased ICP and are known as Cushing's response.
Temperature

The hypothalamus is the regulatory center for temperature. Regulation of heat is monitored by blood temperature and is controlled through impulses to sweat glands, dilation of peripheral vessels and shivering of skeletal muscles.

Hyperthermia

Temperature elevation in the neurological patient can be caused by direct damage to the hypothalamus or traction on the hypothalamus as a result of increased ICP, CNS infection, subarachnoid hemorrhage etc. Temperature elevations may become very high, very rapidly. They need to be treated aggressively as fever will cause an increase in cerebral oxygen requirements, increased metabolic rate, and increased carbon dioxide production. Increased carbon dioxide production can lead to cerebral vasodilation. Cerebral vasodilation can increase the ICP, leading to more cerebral ischemia.

Note: Be sure to compare findings to previous assessment.

Lumber puncture (Spinal Tap)

The spinal cord is a bundle of nerves that run from the base of the brain all the way down the back. They are responsible for controlling muscles and movement as well as the sense of touch. It is protected by the bones of the spine, and a layer of fluid which surrounds it, called the cerebrospinal fluid (CSF). (Click the link to watch video http://www.merckmanuals.com/home/brain,-spinal-cord,-and-nerve-disorders/autonomic-nervous-system-disorders/overview-of-the-autonomic-nervous-system). The CSF is a clear, colorless liquid that delivers nutrients and "cushions" the brain and spinal cord. Lumber puncture involves taking a small sample of cerebrospinal fluid (CSF) for examination. CSF is usually analyzed for white blood cell count, glucose levels, protein, and bacteria.

Indication

- Meningitis
- Hemorrhage
- Guillain-Barre syndrome
- Multiple sclerosis
- Chemotherapeutic medication administration

LP is contraindicated in patients with a suspected spinal epidural abscess.
Anticoagulation therapy is generally suspended, when possible, prior to elective LP.

**Positions for spinal tap**

- Lie on her side, with the knees drawn up to the chest.
  - Fetal position with the neck, back, and limbs held in flexion.
  - Pillows placed under the head and between the knees may improve patient comfort.
- Bend over while sitting

**Before procedure**

- Explain procedure to the client
- Obtain informed consent
- Answer all of the patient’s questions and clear any misconceptions.
- Instruct client to void before the procedure.
  - Find out about thrombocytopenia or other bleeding diathesis (including ongoing anticoagulant therapy) caution should be taken with these patients.
  - Recommendations on whether Aspirin should be held before and after lumbar puncture is controversial. Recent literatures indicated that Aspirin does not increase risk of bleeding after lumbar puncture.

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**Correct position for lumbar puncture**

- In the lateral position with the patient’s back to the edge of the bed, head and neck flexed and knees drawn up to the chest. Support the patient in this position by holding him/her behind the shoulders.
- This ensures maximum widening of the intervertebral spaces, allowing easier access to the subarachnoid space.
Perform a baseline neurological assessment and review all the laboratory test results especially coagulation studies.

**During the procedure**

- Help position the client. Turn the patient to the lateral position and move his/her back closed to edge of bed, draw his/her knees toward his/her chest as tight as possible. Also flex his/her chin onto the chest.
- Encourage client to breath normally
- Insertion site is cleansed with an antiseptic and a sterile area is maintained
- Local anesthetic is used to minimize pain

**After procedure**

- A bandage is placed at the injection site.
- Label collected samples and send to a lab for analysis and testing
- Instruct client to lie in a prone positon.
- Watch for any signs of neurological complications such as sensory and motor dysfunction, and voiding problem. These complications are usually transient. However, if these problems persist, nerve damage or hematoma is suspected and emergency interventions may be required.
- Monitor the puncture site for any swelling, bleeding, or CSF leak.
- Assess for any headache and administer analgesia as ordered. Encourage patient to drink fluids
- Patient should not to bathe for 24 hours.

**Complications pf lumbar puncture**

- Post lumbar puncture headache: Up to 25 percent of people who have undergone a lumbar puncture develop a headache afterward due to a leak of fluid into nearby tissues. The headache typically starts several hours up to two days after the procedure and may be accompanied by nausea, vomiting, dizziness, tinnitus, and visual changes. The headaches are usually present when sitting or standing and resolve after lying down. Post-lumbar puncture headaches can last from a few hours to a week or more.
  - Relieved by bed rest, analgesics, and hydration.
- Herniation of intracranial contents
- Spinal epidural abscess
- Spinal epidural hematoma
- Meningitis.
- Temporary inability to void
- Slight elevation in temperature
- Backache or spasms: may radiate to the lower extremities
- Neck stiffness.

Caring for patients with altered level of consciousness

Level of consciousness has been described as the degree of arousal and awareness. It can present in a variety of different ways including confusion, drowsiness, vagueness and aggressive behavior. The onset of altered level of consciousness may be sudden, for example, following an acute head injury, or it may be gradual as a consequence of medical problems such as hypoxia or hypoglycemia.

Assessing level of consciousness is very important using any variety of scales previously discussed (See early discussion)

During the initial rapid assessment of critically ill patients it is helpful to use the AVPU scale, together with an examination of the pupils, to determine the level of consciousness.

Nurses should:

- Assess patients following the ABCDE approach to ascertain whether they are critically ill;
- Ensure they have a clear airway and assess whether breathing is adequate (normal rate, depth and rhythm). The most common cause of airway obstruction in hospital is altered level of consciousness, leading to structures in the mouth (for example, the tongue and epiglottis) blocking the airway.
- For those who are critically ill, administer oxygen as prescribed.
- Monitor vital signs and complete the early warning scores (EWS) chart following local protocols and call for help if necessary. It is important to adjust the frequency of EWS observations as appropriate for each patient following local protocols;
- Review airway, breathing and circulation. A compromised airway, inadequate breathing or inadequate circulation can lead to altered level of consciousness. Exclude or treat hypoxia, hypercapnia and hypotension.
- If the patient has altered level of consciousness, consider placing them in the lateral (recovery) position. This will protect the airway from occlusion by the tongue, regurgitation of gastric contents or debris in the mouth.
- If the patient is unconscious an oropharyngeal airway may be inserted. Tracheal intubation could be required;
- If the patient is semi-conscious and is having difficulty maintaining a patent airway, a nasopharyngeal airway may be inserted;
- NPO
- Avoid restraint
- Do not leave patient alone.
- Use foot board to prevent foot drop in unconscious patients.

**Selected nursing diagnosis**

- Ineffective airway clearance related to altered LOC
- Risk of injury related to decreased LOC
- Deficient fluid volume related to inability to take fluids by mouth
- Impaired oral mucous membrane related to mouth breathing, absence of pharyngeal reflex and altered fluid intake
- Risk for impaired skin integrity related to prolonged immobility
- Impaired tissue integrity of cornea related to diminished or absent corneal reflex
- Ineffective thermoregulation related to damage to hypothalamic center
- Impaired urinary elimination related to impairment in neurologic sensing and control
- Bowel incontinence related to impairment in neurologic sensing and control and also related to changes in nutritional delivery methods
- Interrupted family processes related to health crisis
References


NCLEX Style Review Questions

1. The nurse documented in a client’s medical record that the client is in a decorticate position. Which of these illustration accurately depict the client’s position?

   a. A
   b. B
   c. C
   d. D

Scenario: During a neurological assessment the nurse asked the client; “what did you have for breakfast today?” and the client stated “I have to go to church later today.” (Use this to answer questions 2 and 3).

2. Which of these is the nurse assessing the client for on the Glasgow Coma Scale?

   a. Eye opening
   b. Verbal response
c. Autonomic response  
d. Verbal response.

3. The nurse will correctly assign the client this rating on the Glasgow Coma Scale being assessed.  
a. 5  
b. 4  
c. 3  
d. 2  
e. 1

4. The nursing instructor asked a group of students to list the cranial nerves according to their functions. The students will correctly list the following as sensory functions only.  
a. Acoustic, Olfactory, and trigeminal nerves  
b. Olfactory, Optic, and Acoustic nerves  
c. Olfactory, facial, and glossopharyngeal nerves  
d. Glossopharyngeal, hypoglossal, and Optic nerves

5. The nurse asked the client to close her eyes and touched the in the areas indicated in by circles in the image below. What cranial nerve is the nurse assessing?
a. CN XI (spinal accessory).
b. CN VII (facial).
c. CN V (trigeminal).
d. CN IX (glossopharyngeal)
e. CN VIII (acoustic).

6. The nurse is assessing client level of alertness and orientation to events. The best question to ask the client is

a. “Do you know where you right now?”
b. “Where are you right now?”
c. “Do you know you are in the hospital?”
d. “Who is the president of United States?”
e. “Did you have breakfast today?”

7. A client scored an 8 on the Glasgow coma scale score. What will be the priority nursing intervention?

a. Place client in a prone position.
b. Establish and air way
c. Monitor for increased ICP.
d. Monitor for decreased level of consciousness.
e. Notify physician of the client’s condition.

8. The nurse reviewing a client’s record noticed that the doctor documented \textit{anisocoria} under pupillary response. The nurse will correctly interpret this as.

a. The client has a major brain stem damage.
b. The client has damage to cranial nerve III.
c. The client has a normal variant in pupil size where one pupil is up to 1 mm smaller than the other.
d. The client has a normal deviation that causes one pupil to respond more briskly to light than the other.
9. The nurse is caring for a client admitted with head trauma with suspected increased intracranial pressure. Which of these findings on assessment requires immediate report to the attending physician?

a. Blood pressure from 110/66 to 100/56
b. Respiratory rate from 18/min to 12/min.
c. Full bounding pulse rate of 90b/min.
d. Temperature change from 99.1 to 100.4

10. During a neurological assessment the nurse asked the client to perform the activity depicted in the image below. This test is used to assess

a. Cerebellar function.
b. Motor function
c. Cranial nerve XI
d. Cognitive function

11. The nurse is assessing a client admitted with hemorrhage stroke. Which of these new assessment findings requires further investigation? (Select all that apply).

a. Right sided weakness
b. Inability to state her name correctly.
c. Slowing of speech
d. Inability to swallow
e. Delay in response to verbal commands
12. To complete cranial nerve assessment on a client on the neurology unit the nurse should do which of the following. Select all that apply.

   a. Gather all the supplies needed for the assessment such as tuning fork, flash light.
   b. Wash your hands, introduce yourself to the patient and clarify the client’s identity.
   c. Perform finger to nose test.
   d. Explain the procedure and obtain consent.
   e. Document your findings.
   f. Ask client to bend at the waist and touch the fingers to the toes.

13. The nurse is planning to complete a cranial nerve assessment on a client on the head trauma unit. In what order will the nurse perform the following?

   a. Document your findings. - 6
   b. Perform handwashing - 1
   c. Explain the procedure and obtain consent.-4
   d. Wash your hands, introduce yourself to the patient and clarify the client’s identity. - 3
   e. Gather all the supplies needed for the assessment. - 2
   f. Perform the assessment.- 5
   g. Thank the client and wash your hands. – 7)

During a neurological examination the nurse asked the client to stick their tongue out. The tongue deviated to the left side. (Use this to answer question 14 and 15).

14. What cranial nerve is being tested?

   a. Cranial nerve II
   b. Cranial nerve IV
   c. Cranial nerve X
   d. Cranial nerve XII
15. The nurse should document this as.
   a. Suggests a weakening of the muscles on the right side.
   b. Suggests a weakening of the muscles on the left side.
   c. The deviation suggests a tumor in the midbrain.
   d. The deviation suggests a stroke with bleeding to the right hemisphere.

16. A client is admitted after a motor vehicle accident. Which of these assessment findings by the nurse indicates a possible cerebrospinal fluid leak? (Select all that apply)
   a. Patient complains of a salty taste in the mouth
   b. Patient complains of postnasal drip
   c. Clear fluid draining from nose
   d. Altered level of consciousness

17. Thee client is admitted with CSF leak due to head trauma. Which of these should the nurse include in the client's plan of care?
   a. Instruct patient to avoid coughing, sneezing, or nose blowing.
   b. Monitor intake and output.
   c. Weigh the client daily
   d. Monitor and record urine osmolality and urine specific gravity.

18. Which of the following statement by a client being discharged home after a lumbar puncture indicated understanding of the discharge instruction.
   a. I will call the HCP if I experience weakness or incontinence.
   b. I may have dizziness when I stand up, this is expected after LP.
   c. I will walk around if I get headaches to increase blood flow.
   d. I can take a warm bath to relieve muscle spasm after the procedure.
19. Which of these should the nurse include in the discharge instruction of a client after a lumbar puncture?

a. You cannot eat or drink for at least 8 hours after the procedure.
b. Avoid bending, straining or lifting greater than 10 pounds.
c. To help relieve a headache, lie down and drink extra fluids.
d. You can drive home after the procedure because sedation is not used.
e. To help relieve back discomfort, apply ice wrapped in a towel for 20 minutes.

20. Prior to a lumbar puncture the nurse instructed the client to empty his bladder. What is the rationale for this instruction?

a. To reduce the risk of infection and to maintain comfort
b. Prevent accidental puncture of the urinary bladder.
c. To maximize patient comfort during the procedure
d. To obtain baseline observations of urinary function.

21. The nurse is caring for a client who is progressing well following a craniotomy. Which of these will the nurse include in the bowel care for this client?

a. Daily checking for impaction caused by loss of bowel innervation.
b. Low residual diet to decrease stool formation and prevent constipation.
c. An enema or suppository every other day to avoid the Valsalva maneuver.
d. High fiber diet and stool softeners as ordered to prevent constipation.

22. The nurse assesses the level of consciousness on a client admitted with head injury. Using the Glasgow Coma Scale the nurse documented a score of 15 on the client’s medical record. Which of the following response did the nurse assess in this client? Select all that apply.

a. Spontaneous eye opening
b. Tachypnea, bradycardia, and hypotension
c. Unequal pupil size
d. Follows command
e. Pain location
f. Orientation to person, place, and time

23. The nurse documented positive Babinski’s signs on a client’s record after performing a neurological assessment. Which image below correctly illustrates this?

![Images of neurological assessments]

a. A  
b. B  
c. C  
d. D  
e. E

24. The client has impairment of the cranial nerve II. Specific to this impairment the nurse would plan to do which of the following to ensure the clients safety.

a. Test the temperature of the shower water.  
b. Speak loudly to the client  
c. Check the temperature of the food on the dietary tray.  
d. Provide a clear path for ambulation without obstacles.
25. The nurse is planning to test the function of the trigeminal nerve (Cranial nerve V). The nurse would gather which of the following items to perform the test?

   a. Safety pin, hot and cold water in test tubes, cotton wisp.
   b. Flash light, pupil size chart, and ophthalmoscope.
   c. Tuning fork and audiometer.
   d. Snellen chart and ophthalmoscope.
**Rationale for NCLEX Style Questions**

1. **Rationale:** (A) Decorticate posture is an abnormal posturing in which a person is stiff with bent arms, clenched fists, and legs held out straight. The arms are bent in toward the body and the wrists and fingers are bent and held on the chest.

2. **Rationale:** (D) The Glasgow Coma Scale being assessed is Verbal response.

3. **Rationale:** (B). Patient is confused.

4. **Rationale:** (B). Olfactory, Optic, and Acoustic nerves are the Sensory only cranial nerves.

5. **Rationale:** (C.) CN V (trigeminal). To assess the sensory component of the trigeminal nerve, ask the patient to close his/her eyes and then touch her with a wisp of cotton on his forehead, cheek, and jaw on each side. Next, test pain perception by touching the tip of a safety pin to the same three areas. Ask him to describe and compare both sensations.

6. **Rationale:** (D.) To determine LOC the nurse should ask the patient simple open ended questions that cannot be answered with yes or no. For example, “Where are you right now?” and “What time is it?” Do not ask your patient, “Do you know where you are right now?” since this can be answered with a yes or no. To determine patients orientation to events d. “Who is the president of United States?” is the best question to ask. Where are you right now? Will determine client’s orientation to place.

7. **Rationale:** (B.) A Glasgow Coma Scale score of 8 or less is typically an indication for endotracheal intubation?

8. **Rationale:** (C.) Anisocoria is a normal variant of up to 1 mm smaller than the other; about 15% of people have this variation.

9. **Rationale:** (D). Temperature elevations may become very high, very rapidly. They need to be treated aggressively as fever will cause an increase in cerebral oxygen requirements, increased metabolic rate, and increased carbon dioxide production. Increased carbon dioxide production can lead to cerebral vasodilation. Cerebral vasodilation can increase the ICP, leading to more cerebral ischemia.

10. **Rationale:** (A) Cerebellar function.

11. **Rationale:** B, C, & E. are the earliest sign of increasing ICP and should be further investigated and reported to the provider.
12. Rationale: A, B, D, & E.


14. Rationale: (14 – D; 15 – B). The Hypoglossal nerve (CN XII) provides motor supply to the muscles of the tongue. Ask the patient to stick their tongue out. If the tongue deviates to either side, it suggests a weakening of the muscles on that side.

15. (see 14)

16. Rationale: (A, B, & C) Signs and symptoms of CSF leakage that the nurse should investigate further would include: patient complaints of salty taste in their mouth, postnasal drip or if the nurse observes clear fluid draining from nose or incision. Altered LOC is a sign of increased ICP but not a sign or symptom of CSF leakage.

17. Rationale: Instruct patient to avoid coughing, sneezing, or nose blowing, which may increase the risk of CSF leakage. Other interventions while necessary are not directly related to managing and preventing further CSF leakage.

18. Rationale: (A.) Patients who have persistent back pain or neurologic findings (eg, weakness, decreased sensation, or incontinence) after undergoing LP require urgent evaluation. This is may be a sign of pressure from spinal hematoma.

19. Rationale: (B, C, & E). After a LP patient can resume your normal diet and intake of fluids. Rest as much as possible and not participate in strenuous activities the day and evening of the procedure. Patient can take a shower but not soak in a bathtub or use whirlpool. A spinal headache is from a cerebrospinal fluid (CSF) leak. A spinal headache is a headache is experienced when patient sit up or walk, but goes away when he lie down. Lying down and drinking extra fluids helps relief headache.

20. Rationale: (C.) Encourage patients to empty the bladder prior to the procedure to maximize patient comfort during the procedure.

21. Rationale: (D).Straining at defecation or the use of Valsalva maneuver may exacerbate increased intracranial pressure. The nurse promotes normal bowel movements that prevent straining by encouraging a high fiber diet and stool softeners when needed. Enema are discouraged, and it is important to prevent constipation so the fecal impaction does not occur.

22. Rationale: (A, D, & F.) To achieve a perfect score of 15 on the Glasgow Coma Scale, the client would have to open eyes spontaneously (4), obey
verbal command (6), and be oriented to person, place and time (5). The rest will decrease the score.

23. Rationale: B

24. Rationale: (D.) cranial nerve II is the optic nerve which governs vision. The nurse can promote safety for visually impaired client by providing a clear path free of obstacle for ambulation.

25. Rationale: (A.) the trigeminal nerve (Cranial nerve V) has motor and sensory function. The motor component innervates the muscle of chewing (mastication). The sensory component innervates the entire face, scalp, cornea, nasal and oral cavities the sensation of pain, touch and temperature can be assessed using the items in option A.