Assessment of the Nervous System
NR 23
Lecture Outline

1. Central Nervous System (CNS)
   a. Brain and brain stem
   b. Spinal cord

2. The Peripheral Nervous System (PNS)
   a. Cranial and Spinal nerves
   b. Autonomic Nervous System
      i. Sympathetic nervous system
      ii. Parasympathetic nervous system

The Brain

Cerebrum

Right and Left Hemisphere- divided into Four Lobes:

Frontal Lobe

Temporal Lobe

Parietal Lobe

Occipital Lobe

Cerebellum

Brainstem
   Midbrain
   Pons
   Medulla
The Spinal Cord

1. Sensory Pathways

   Spinothalamic tract

   Posterior column

2. Motor Pathways

   The PNS

   Cranial Nerves

   Spinal Nerves

   The ANS

   Sympathetic Nervous System

   o Vasoconstriction
   o Increased heart rate and contractibility, blood pressure, blood flow to the skeletal muscles, respiratory rate, smooth muscle relaxation of the bronchioles, GI tract, urinary tract and sphincter contraction, sweat gland production

   Parasympathetic Nervous System

   o Decreased heart rate, contractility and conduction
   o Bronchial smooth muscle constriction
Reflexes

1. Deep tendon reflexes (DTR’s)
2. Superficial
3. Visceral
4. Pathologic

PHYSICAL ASSESSMENT OF THE NERVOUS SYSTEM

Equipment:
Assessment Techniques:

Subjective data:
1. Headache
2. Head Injury
3. Dizziness
4. Seizure history
5. Tremors
6. Weakness
7. Incoordination
8. Numbness
9. Difficulty swallowing
10. Difficulty speaking
11. Past neuro history
12. Environmental hazards

Cerebral Function

LOC
Alert
Lethargic
Obtundec
Semi comatose
Comatose
Communication-level of verbal responsiveness

Quality of speech

Understand and follow commands

Mental Status
Mini-mental exam

Cranial Nerve Testing (sensory or motor function)

1. CN1 (olfactory nerve )
   Test: eyes closed, occlude one nare and ask patient to smell a familiar scent available on the unit (coffee grinds, toothpaste)
   Abnormal: Anosmia-

2. CNII (optic nerve )
   Test: visual acuity (snellen eye chart) and visual fields (confrontation test)
   Abnormal:

3. CN III, IV, VI
   (Oculomotor, ____ Trochlear, ____ Abducens ____)
   Test: 6 cardinal points of gaze
   Consensual papillary response to light
   Convergence and accomodation
   Abnormal:
   Nystagmus-
   Strabismus-
   Diplopia-
   Ptosis-

4. CNV (Trigeminal nerve )
   Sensory test: close eyes, touch face with wisp of cotton, ask patient to indicate when feels the cotton
   Motor test: place your fingers on temporal and masseter muscles, ask patient to clench teeth, and try to separate jaws by pushing chin down
   Abnormal:
5. CNVII (facial nerve)
   *Motor test:* Ask patient to smile, show teeth, close both eyes puff cheeks, frown, raise eyebrows
   *Sensory test:* sense of taste by applying solutions of sugar, salt, bitter and sour to tongue with cotton swab
   *Abnormal:*

6. CNVIII (Vestibulocochlear nerve)
   *Test:* Weber and Rinne tests, whisper and normal conversation
   *Abnormal:*

7. CN IX and X (Glossopharyngeal and Vagus)
   *Motor test:* ask patient to say ‘ah” and depress tongue with blade-uvula and soft palpate should remain midline. Test gag reflex, give patient a small amt of water, note swallowing
   *Abnormal:*

8. CN XI (spinal accessory nerve)
   *Test:* Have patient shrug shoulders and then apply resistance and shrug, turn head left and right, touch ear to each shoulder against resistance
   *Abnormal:*

9. CN XII (Hypoglossal nerve)
   *Test:* have patient protrude and retract tongue, move to left and right. Check strength by pushing against inside of cheek with tip of tongue, provide resistance
   *Abnormal:*

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**Motor Function (Cerebellar)**

1. Gait and Balance
   - Walk across room and return
   - Walk heel-to-toe
   - Walk on toes, then on heels
   *Abnormal:*
2. **Coordination and Equilibrium**

**Rhomberg test**
Stand with feet together, arms at side, eyes open-observe for sway
Close both eyes without changing position-observe for swaying
*Abnormal:*

**Finger-to-nose test**
Extend both arms from side of body
Close eyes-touch tip of nose with right index finger, then return right arm to extended position
Touch nose with left index finger and return the left arm to the extended position
Repeat several times, and then with eyes closed
*Abnormal:*

**Rapid Alternation testing**
Ask patient to place hands palm down on thighs
Instruct to then turn palms up
Return palms down
Alternate at faster pace
*Abnormal:*
Dysdiadochokinsia-

**Heel-to-shin test**
Place patient in supine position
Have patient place heel of right foot below left knee and slide along shin bone to ankle
Repeat with opposite leg
*Abnormal:*

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**Sensory Function**

1. **Spinothalamic tract**
   - **Pain** use a pin and lightly apply sharp then dull points to random body areas while asking patient to identify “sharp” or “dull” sensation
   - Let at least 2 seconds lapse between each stimulus
   *Abnormal:*
   Hypargesia
   Analgesia
   Hyperalgesia
Temperature if pain sensation is abnormal then fill 2 test tubes with cool water and hot water place bottom of tubes on patient’s skin in random areas. Ask patient to differentiate temperature

Light touch- apply a wisp of cotton to various parts of the body in random order ask patient to say “now” when feels it

Abnormal:
Hypoesthesia-
Anesthesia-
Hyperesthesia-

2. Posterior Column tract
Vibration touch vibrating tuning fork to patient’s bony prominences, fingers and great toe
Patient should feel vibrations and indicate when they start and stop
Abnormal:

Position (Kinesthesia)- Assess the patient’s ability to perceive passive movements. Ask patient to close their eyes, move their great toe or finger up and down, ask patient to tell you direction toe or finger is moved

Abnormal:

Tactile Discrimination (fine touch)
Tests patients ability to recognize objects. Have patient close their eyes and place a object (key, coin) in their hands. Test each hand with different object

Abnormal:

Graphesthesia Assess patient’s ability to “read” a number by having it traced on the palm surface. Ask patient to close their eyes, and trace a single digit with the back of a pen. Have patient tell you what it is

Abnormal:

Two point discrimination
Test the patient’s ability to distinguish the separation of 2 simultaneous pin pricks on the skin. Apply a pin or opened paper clip in two points on skin and continue to bring them closer ask patient to indicate when it feels like one. Abnormal:
**Extinction**
Touch both sides of the body at the same point and ask patient to state how many sensations felt and where.
*Abnormal:*

**Point location**
Touch skin with your finger and take it away promptly. Ask patient to put their finger where you touched them
*Abnormal:*

**Reflexes**

**DTR (Deep Tendon Reflexes)**
- 4+ very brisk, hyperactive
- 3+ brisker than average
- 2+ average, normal
- 1+ diminished, low normal
- 0 no response

Clonus:

1. **Biceps Reflex (C5-C6)**
   Place your thumbs on the biceps tendon and strike your thumb. Look for contraction of the biceps and flexion of the arm

2. **Triceps Reflex (C7-C8)**
   Suspend patient’s arm “let is hang dead” and strike the triceps tendon above the elbow. Look for extension of the arm

3. **Brachioradialis Reflex (C5-C6)**
   Hold the patient’s thumb to suspend the forearms in relaxation and strike forearm directly 2-3 cm above the radial styloid process. Look for flexion and supination of arm

4. **Quadriceps Reflex (L2-L4)**
   Have patient sit with flexed knee and let leg dangle
   Strike tendon directly below patella
   Look for extension (knee jerk)
5. Achilles Reflex (L5-S2)
   Position patient with knee flexed and hip externally rotated
   Hold foot in dorsiflexion and strike Achilles tendon directly
   Look for plantarflexion

Neuro Check

1. LOC
2. Pupil Size and response
3. Verbal responsiveness
4. Extremity strength and movement
5. Vital Signs