Neuro Assessment

Disclosure

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Purpose
- Identify the presence of nervous system dysfunction
- Detect life threatening situations
- Establish a neurological database - Baseline
- Identify changes from baseline

Neuro Assessment Findings
Documentation of what is observed
- Consistent amongst clinicians
- Systematic approach
- Succinct and to the point
- Organized manner

Tools for the assessment
- Penlight (All patients)
- Glasgow Coma Scale (All patients)
- Pupil Gauge (All patients)
- Paperclip (for stroke and spinal cord patients)
- NIH Stroke Scale (Stroke patients)
- Dermatome Sheet (Spinal cord patients)

Parameters
- Mental status
- Pupillary assessment
- Motor function
- Sensory exam
- Cranial nerve evaluation
- Speech assessment
- Cerebellar examination
- Pathologic reflexes
- Respiratory patterns
Subsequent Assessments
Determined by diagnosis and acuity of illness
- Problem-focused
- Zeroed-in on affect parts of nervous system
- Frequency varies

A Phrase you never want to hear from a doctor...
- “How long has my patient been like this?”

Questions to ask yourself...
- What do I see?
- What does it mean?
- How does it relate to the previous assessment?
- How am I going to proceed?

Your initial assessment is the most important assessment!!!

Mental Status
- Arousal - state of awakeness
- Cognition - state of awareness

Reticular Activating System
RAS = dimmer switch for the brain
Level of Consciousness – Arousal
- Lethargic
  - Requires light stimulus to arouse but maintains
- Obtunded
  - Requires noxious and continuous stimulus to remain aroused
- Stuporous
  - Requires vigorous noxious stimulus to obtain arousal and cannot be maintained
- Coma
  - No response to the environment

Description ... better than labeling

Language
- Dominant hemisphere
  - Usually the left
- Aphasia
  - Ranges from difficulty remembering words to being completely unable to speak, read, or write.

Speech Assessment
Aphasia
- Fluent-receptive (Wernicke's)
- Non fluent-expressive (Broca's)
- Global—all language functions are impaired

Speech Center
- Wernicke's (receptive) speech
  - Located on dominant hemisphere
- Broca's (motor) speech

Motor
Pronator drift
- The earliest sign of weakness

Strength Scale
- 0 - Flaccid
- 1 - Muscle contraction
- 2 - Lateral only
- 3 - Raise against gravity-unable to sustain
- 4 - Sustain against gravity-not against resistance
- 5 - Normal
Motor Exam

May see it written as...

3/5 5/5
2/5 5/5

Noxious Stimuli

Central
- Earlobe
- Trapezius squeeze
- Supraorbital pressure
- Suctioning
- Sternal rub

Peripheral
- Nailbed pressure
- Pinching

Stimulus Used

- Central Noxious Stimuli
  - Earlobe
  - Trapezius squeeze (shoulder)
  - Mastoid pressure
  - Supra-orbital pressure
  - Suctioning

Peripheral Stimuli

- Spinal Reflex Arc
  - Nailbed pressure
  - Pinching

Glasgow Coma Scale (GCS) - 3-15

- Eye Opening (1 - 4)
  - Opens eyes spontaneously (4)
  - Opens eyes to verbal (3)
  - Opens eyes to pain (2)
  - No eye opening (1)

- Best Verbal (1 - 5)
  - Oriented (5)
  - Confused (disoriented) (4)
  - Inappropriate [swearing, yelling] (3)
  - Incomprehensible sounds [moans] (2)
  - None (1)
Glasgow Coma Scale (GCS)- 3-15

Motor (1 - 6)
- Follows commands (6)
- Localizes to pain [purposeful] (5)
- Normal flexion [withdrawal] (4)
- Abnormal flexion [decortication] (3)
- Extension [decerebration] (2)
- None (1)

Modified from Critical Care Nursing: A Holistic Approach, Lippincott Williams & Wilkins, 2005

Traumatic Brain Injury
- Mild: GCS 13-15
- Moderate: GCS 9-12
- Severe: GCS 3-8

Pupillary Assessment
- Size
  - 2-6mm normal
- Shape
  - round vs round
- Reaction to light
  - brisk
  - sluggish
  - non reactive (absent light reflex)
  - direct and consensual
Direct vs Consensual

Accommodation
- Hold your finger about 10cm from the patient’s nose.
- Ask them to alternate looking into the distance and at your finger.
- Observe the pupillary response in each eye.

Distant = dilation
Closeness = constriction

Eye Deviation
- Conjugate vs disconjugate
- Gaze preference

Disconjugate gaze
Also called "vergence" - involves simultaneous movement of both eyes in opposite directions.

Amaurosis (Fugax)

Pathologic pupils
- Bilateral fixed & dilated pupils
- Unilateral dilated pupils
- Poincane pupils
Life Art, www.lifeart.com
Pontine Stroke

Midbrain

Pinpoint pupils

3rd Cranial Nerve Palsy

Anisocoria

Horner's Syndrome

• Ptosis
• Miosis
• Anhidrosis

Sensory Response

- Start assessment at lower extremities
  - Pain and temp - spinothalamic
  - Dull versus sharp
  - Position sense and vibration - dorsal columns

Pain and temp - spinothalamic

Dull versus sharp

Position sense and vibration - dorsal columns
Cranial Nerves

12 pairs -
Motor
Sensory
Both

- CN I - Olfactory
- CN II - Optic
- CN III - Oculomotor
- CN IV - Trochlear
- CN V - Trigeminal
- CN VI - Abducens
- CN VII - Facial
- CN VIII - Vestibulocochlear (Acoustic-old term)
- CN IX - Glossopharyngeal
- CN X - Vagus
- CN XI - Spinal Accessory
- CN XII - Hypoglossal

Cranial Nerve I - Olfactory
Test sense of smell...
not routinely tested in ICU
With TBI, first to lose-
last to return
Lies beneath frontal lobes

Cranial Nerve II - Optic
Visual acuity, Visual fields
Snellen Chart -
(pocket card)
Have patient read
from ~6 inches away
Hold up fingers...inches away from patient

Test both eyes

Assess for Visual Fields

Have patient look straight...test all 4 quadrants

Vision Pathway

Visual Fields (Intact)

CN II deficits

Amaurosis (Fugax)
Bitemporal Hemianopia

Homonymous Hemianopia

Right Homonymous Hemianopsia

Left Homonymous Hemianopsia
Quadrantanopia

- Known as "pie in the sky"
- A loss of 1/4 of the visual field (of one or both eyes)
- Due to partial lesion of the optic radiation
- Involves only a part of the nerve fiber

**CN III, IV, VI (EOM'S)**

Eye movement, eyelid elevation, pupillary function

- CN III - Oculomotor
  - Eye lid movement
  - Pupillary function

- CN IV - Trochlear
  - Eye movement inward and downward
  - Supplies the superior oblique muscle

= 4
**CN VI - Abducens**

Eye movement toward the ear
Supplies the lateral rectus

= 6

**Cranial Nerve V - Trigeminal**

- Facial sensation
- Corneal sensation,
- Masseter muscle strength

**Cranial Nerve V (Trigeminal)**

3 Large Branches

- Ophthalmic - V₁ (sensory)
- Maxillary - V₂ (sensory)
- Mandibular - V₃ (sensory/motor)

**Cranial Nerve V (Trigeminal)**

Test-motor  Test-sensory

**Cranial Nerve VII - Facial**

Taste, facial symmetry at rest and during movements
Cranial Nerve VII (Facial)

Taste - anterior 2/3rds of the tongue

Cranial Nerve VII (Facial)

Corneal Reflex (CN V & VII)

- Use a cotton tip applicator that has been frayed on the end...approaching laterally, touch the cornea...not the sclera. Observe for a blink.

Cranial Nerve VIII - Vestibular Cochlear (Acoustic)

Hearing + Vestibular function
Cranial Nerve IX and X
Glossopharyngeal, Vagus
Upward movements and sensation of soft palate and uvula, voice quality, gag reflex

Cranial XI - Spinal Accessory
Trapezius strength, sternocleidomastoid strength

Cranial XII - Hypoglossal
Tongue symmetry and strength

CN XI (Spinal Accessory)
Head movement side to side
Shoulder shrug

Babinski Reflex
- Children <2 y/o - normal response
- Adult - abnormal response
- Dorsiflexion of the great toe with or without fanning on the toes

Meningeal Signs
Kernig’s
Inability to extend the leg when the thigh is flexed onto the abdomen.
Pt will complain of hamstring pain

Brudzinski’s
Involuntary flexion of the hips and legs with passive flexion of the head

Involuntary flexion of the hips and legs with passive flexion of the head
**Brain Stem Reflexes**

- **Oculovestibular** (cold calorics)
- **Oculocephalic** (dolls eyes)

"COWS"

**Oculocephalic Reflex**

Document present or absent, not positive or negative

**Brainstem Reflexes**

- **Cough/ gag**

**Vital Signs**

- **Respirations - rate & rhythm**
  - Cheyne-Stokes respirations
  - Central neurogenic hyperventilation

**Vital Signs**

- **Heart rate**
  - Sinus tachycardia
  - Bradycardia

- **Blood pressure**
  - Hypertension
  - Hypotension

- **Heart rate**
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  - Hypertension
  - Hypotension
**Neuro Assessment is the KEY to reducing disability!**

- Perform serial neurological exams
  - Pupils
  - Glasgow Coma Scale (GCS)
  - Initial and serial NIHSS
  - Document trends in neurological exams
  - Report deterioration of GCS of 2 or more
  - Always double-check questionable assessments with a buddy...no one is perfect!

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**The 2 Minute Neuro Assessment**

**Your first look…**

Your first few seconds with a patient can usually give you a good indication of what the neuro status is…

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The 2 Minute Neuro Assessment

- Assess the LOC
  - Alert? Arousable? Obtunded?
  - Responsive to pain only?

Know what kind of medications your patient has received…

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The 2 Minute Neuro Assessment

- The GCS is a common tool used for quick neuro assessments.
- The GCS does have limitations.

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The 2 Minute Neuro Assessment

- Check the pupils for roundness and reactivity.
- Do the pupils react briskly or sluggishly.

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The 2 Minute Neuro Assessment

- Assess the gaze, eyes should be centered and midline.
- Assess eye movement using the H method.
  - This is a 6th Cranial nerve palsy.
The Cranial Nerves

Cranial Nerve Assessment (1-6)
- I – Olfactory – Smell
- II – Optic – Vision
- III – Oculomotor – Pupil constriction
- IV – Trochlear – Eyes down and in
- V – Trigeminal – Clench jaw
- VI – Abducens – Eyes move lateral

Cranial Nerve Assessment (7-12)
- VII – Facial – Smile, elevate eyebrows
- VIII – Acoustic – Hearing
- IX – Glossopharyngeal – Swallow & Gag
- X – Vagus – Swallow & speaking
- XI – Spinal Accessory – Shrug shoulders
- XII – Hypoglossal – Stick out tongue

Are cranial nerve checks difficult?
- If your patient can pass the H test (eye movement in all fields) and has reactive pupils – (2, 3, 4, and 6 are done)
- If you ask the patient to open their mouth, stick tongue out and then close their mouth while showing you their teeth and then swallow 5, 7, 8, 9, 10 and 12 are done.
- Shrug shoulders? Then 11 is done.

Assessing the upper extremities…
- Assess equal strength in their grips.
- Observe muscle tone and look for tremors.
- Check for pronator drift if patient is able to hold both arms up.

Assessing the lower extremities…
- Assess dorsi-flexion. Ask the patient to pull their toes toward their head while you apply resistance, then ask them to push their toes toward you.
- Always inquire about any loss or changes in sensation.
The 2 Minute Neuro Assessment Overview…

- Assess the Level of Consciousness, alertness and verbalizations.
- Cranial nerve checks – Pupils, gaze, proper movement of the facial muscles, mouth, tongue, swallowing and shoulders.
- Assess extremities for equal strengths bilaterally in the arms (include pronator drift) and legs.
- Always ask about sensory changes.

Charting your assessment…

- Chart what you Observed!
  - your actions and the response.

Remember…
“WNL” means We Never Looked

Questions?

| Image of a dog |