

ESSENTIALS OF THE NEUROSURGICAL NEUROLOGIC ASSESSMENT

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GOLDEN RULE

The neurologic examination is the single most important component of pre and postoperative neurosurgical care

A patient's surgical outcome is most closely correlated to preoperative neurologic condition

Early intervention is of utmost importance

If you THINK you should call about a patient's change in condition, you SHOULD call.

TRUST YOUR GUT

LISTEN TO THE FAMILY

WHAT CAN CAUSE A CHANGE IN NEUROLOGIC EXAMINATION?

- Brain swelling
- Brain bleeding
- Hydrocephalus
- Cerebral ischemia (vasospasm)
- Seizure (convulsive and non-convulsive)
- Hyponatremia (especially less than 130 ng/ml)
- Fever
- Hypoglycemia
- Dehydration
- Hospital psychosis
- Drug withdrawal (illicit, prescription ie. Benzos)
- ETOH withdrawal
- Anesthesia especially in a previously neurologically compromised patient
- Medications (try to avoid opiates, benzos)

WHAT TO BE CONCERNED ABOUT?

- New weakness compared to baseline
- Diplopia
- Pupillary changes (sluggish pupils, irregular pupils, dilated pupils)
- New facial asymmetry
- New sensory changes compared to baseline
- Changes in speech (receptive and expressive)
- Decline in level of consciousness
- New or worsening headache
- Headache that is not relieved by Tylenol
- Nausea
- Emesis
- Bradycardia with hypertension or other dysrhythmias in the face of potential increased ICP (Cushing Response)

EXAMINATION FREQUENCY

FLOOR PATIENT	Q8h
ICU PATIENT	Q1h
IMMEDIATE POST OP PATIENT IN PACU	Q30 min x 4 then Q1h, Q8h or other
IMMEDIATE POST ANGIO PATIENT	Q30 min x 6

NEUROLOGIC ASSESSMENT TOOLS

GLASGOW COMA SCALE

EYE OPENING	VERBAL RESPONSE	MOTOR RESPONSE	#
		Obeys	6
	Oriented	Localizes	5
Spontaneously	Confused	Withdraws	4
To Voice	Inappropriate	Decorticate	3
To Pain	Incomprehensible	Decerebrate	2
None	None	None	1
---/4	---/5	---/6	---/15

NEUROLOGIC ASSESSMENT TOOLS

THE FOUR SCORE (Full Outline of UnResponsiveness)

- Eye Response

- 4 eyelids open or opened, tracking, or blinking to command
- 3 eyelids open but not tracking
- 2 eyelids closed but open to loud voice
- 1 eyelids closed but open to pain
- 0 eyelids remain closed to pain

- Motor Response

- 4 thumbs up, fist or peace sign
- 3 localizing to pain
- 2 flexion response to pain
- 1 extension response to pain
- 0 no response to pain OR generalized myoclonus status

NEUROLOGIC ASSESSMENT TOOLS

FOUR SCORE (Continued)

- Brainstem Reflexes

- 4 pupil and corneal reflexes present
- 3 one pupil dilated and fixed
- 2 pupil or corneal reflexes absent
- 1 pupil and corneal reflex absent
- 0 pupil, corneal and cough/gag reflexes absent

- Respirations

- 4 not intubated, regular breathing pattern
- 3 not intubated, Cheynes-Stokes pattern
- 2 not intubated, irregular breathing
- 1 intubated and breathing above ventilator rate
- 0 intubated breathing at intubator rate or apnea

FOUR SCORE vs GCS

FOUR SCORE

- Permits for evaluation and grading of an intubated patient as opposed to simply giving a score of T in the GCS system
- Permits for evaluation of brainstem reflexes and breathing patterns
- Detects some subtle changes in neurologic examination
- Provides a grade for the myoclonic patient after resuscitation

MOTOR SCORING FOR EACH MUSCLE OR MAJOR MOTOR GROUP

Motor Scoring Scale

- Score Function
- 5 Able to overcome strong resistance (normal strength)
- 4 Able to overcome mild resistance (mild weakness)
- 3 Supports limb against gravity but not resistance
- 2 Moves but not against gravity
- 1 Muscle flicker but no range of motion
- 0 No muscle movement

- ---/5 **SCORE**

NIH Stroke Scale (NIHSS)

- Scale 0-42

Evaluation is based on complete motor, sensory, visual, speech, comprehension examination

0	No stroke symptoms
1-4	Minor stroke
5-15	Moderate stroke
16-20	Moderate to severe
21-42	Severe stroke

IF WE COULD ONLY DO ONE NEUROLOGIC TEST WHAT WOULD IT BE?

PRONATOR DRIFT

- Assesses level of alertness
- Assesses ability to follow commands
- Assesses motor strength and is very sensitive to small changes in power
- Assesses cerebellar function
- Assesses parietal lobe function

ICP MONITORING

Generally used for patients with GCS \leq 8

Two options

- Electronic:
 - “Bolt”
- Ventriculostomy catheter

Normal ICP 7-15 mm Hg in a supine individual

Concerns when ICP $>$ 20-25 mm Hg (20 mm Hg = 27 cm water; 25 mm Hg = 34 cm water)

ICP is trending upwards

ICP fails to return to normal quickly after a Valsalva maneuver

CLOSING THOUGHTS

THE NEUROLOGIC EXAMINATION IS THE SINGLE MOST IMPORTANT ITEM TO PERFORM AND DOCUMENT BEFORE AND AFTER SURGERY

THE NEUROLOGIC EXAMINATION IS THE SINGLE MOST IMPORTANT ITEM TO PERFORM AND DOCUMENT IN THE NON-SURGICAL PATIENT UNDER OBSERVATION

IF YOU THINK THERE IS A PROBLEM, THERE IS A PROBLEM UNTIL PROVEN OTHERWISE

NEVER BE AFRAID TO CALL ABOUT A NEUROLOGIC CHANGE OR SUSPECTED CHANGE

PATIENTS DIE WHEN THE NEUROLOGIC EXAMINATION IS IGNORED