



Neuro Exams, Alternative Stroke Scales & More!

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Objectives

1. Identify various tools used to assess and treat stroke patients.
2. Provide explanation of the significance of the results of stroke tools.
3. Utilize various stroke tools with an actual patient case.



Evaluation of
neurological status-
imperative to patient
assessment



Level of
consciousness- most
sensitive indicator of
neurological change

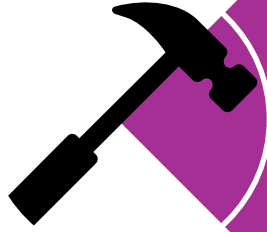


Comprehensive
exam- pupils, motor,
sensory, cranial
nerves, cerebellar



Neuro Exam

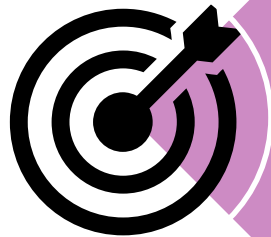
Neuro Exam & Assessment Tools



Multiple assessment tools exist to assess, diagnose & report



Standardize neuro assessments & provider communication



Improve accuracy, validity & parity in assessment & scoring

Pre-Hospital Stroke Scales

- EMS detection of acute ischemic stroke (AIS)
- Numerous scales exist!
 - Cincinnati Pre-Hospital Stroke Scale
 - Face Arm Speech Test (FAST); BE-FAST
 - MEND
 - LAMS
- Evolution of pre-hospital scales
 - Identify Large Vessel Occlusion (LVO)
 - Expanding evidence



RACE Overview

- Pre-hospital simple & rapid neurological scale
- Simplified NIHSS & uses items with higher ability to detect LVO
- If score = 5 or greater, patient may have LVO
- Hospital destination
 - Stroke Ready, PSC, CSC

Facial palsy	
Absent	0
Mild	1
Moderate to severe	2
Arm motor function	
Normal to mild	0
Moderate	1
Severe	2
Leg motor function	
Normal to mild	0
Moderate	1
Severe	2
Head and gaze deviation	
Absent	0
Present	1
Aphasia (if right hemiparesis) <i>Ask the patient to "Close your eyes" and "Make a fist."</i>	
Performs both tasks correctly	0
Performs one task correctly	1
Performs neither task	2
Agnosia (if left hemiparesis)	
Patient recognizes his/her arm and the impairment	0
Does not recognize his/her arm or the impairment	1
Does not recognize his/her arm and the impairment	2
Score total	
	0-9

Patient Case- Pre-Hospital

- Mrs. Crosby- 71 year old female presents as Level 1 stroke- new onset dysarthria, left facial droop, left arm & leg weakness, gaze deviation noted
- **LSW:** 13:30- pt was napping; spouse noted R hand twitching around 16:00
- **PMH:** MVR (2 weeks ago), EF 45%, TIA, L ICA stenosis, L MCA stroke, hypothyroidism, HLD, lymphoma, bone marrow & stem cell transplants, HTN, A-Fib
- **Home Meds:** Coumadin, Synthroid, Metoprolol, Lipitor

Rapid Arterial Occlusion Evaluation (RACE) Scale

- www.menti.com
- Code 82 88 75

Mrs. Crosby- Presents to the ED

- 71 year old female presents as Level 1 stroke with new onset dysarthria, left facial droop, left arm & leg weakness, gaze deviation
- **LSW:** 13:30 (pt was napping; spouse noted R hand twitching around 16:00)
- **PMH:** MVR, EF 45%, TIA, L ICA stenosis, TIA, L MCA stroke, hypothyroidism, HLD, lymphoma, bone marrow and stem cell transplants, HTN, atrial fibrillation
- **Home Medications:** Coumadin, Synthroid, Metoprolol, Lipitor
- **16:55:** presents to CSC
- AA&O; follows commands
- **Labs:** INR 1.5
- **RACE Scale:** 7

GCS Overview

BEHAVIOR	RESPONSE	SCORE
Eye opening response	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
Best verbal response	Oriented to time, place, and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Best motor response	Obeys commands	6
	Moves to localized pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	2
	No response	1
Total score:	<i>Best response</i>	15
	<i>Comatose client</i>	8 or less
	<i>Totally unresponsive</i>	3

- Developed 1974
- Practical method for assessment of altered LOC
- Peripheral & central stimulation
- Gold standard for assessing neurological function

Glasgow Coma Scale (GCS)

- www.menti.com
- Code 82 88 75

Neurological Exam

Level of Consciousness: Alert

Loss of Consciousness: No

Chemically Paralyzed: No

Stroke Scale RACE Score: 7

Facial Palsy: 2, Arm Motor Function: 2, Leg Motor Function: 2, Head & Gaze Deviation: 1, Aphasia (R side): 0, Agnosia (L side): 0

Neurological Present: Facial Droop, Speech Slurring, Weakness-Left Sided, Hemiparesis-Left

Mental Present: Oriented-Person, Oriented-Place, Oriented-Time, Alert

Glasgow Coma Scale			
E	V	M	Tot
Int: 4	5	6	= 15

Pupils

	<u>Left</u>	<u>Right</u>
Size:	Normal	Normal
React:	Reactive	Reactive
React:		

Motor Sensory

LA:	Flaccid
RA:	Normal
LL:	Flaccid
RL:	Normal

Four Score Overview

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 with 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

Brainstem Reflexes

- 4= pupillary and corneal reflexes present
- 3= one pupil wide and fixed
- 2= pupillary or corneal reflexes absent
- 1= pupillary and corneal reflexes absent
- 0= absent pupillary, corneal, and cough reflex

Respiration

- 4= not intubated, regular breathing pattern
- 3= not intubated, Cheyne-Stokes breathing pattern
- 2= not intubated, irregular breathing pattern
- 1= intubated, breathes above ventilator rate
- 0= intubated, breathes at ventilator rate or apnea

- Proposed in 2005 as alternative coma assessment
- More detailed assessment of depth of coma than GCS
 - Eye tracking
 - Response to pain
 - Ability to follow commands
 - Presence of myoclonus status
 - Brainstem reflexes

National Institute of Health Stroke Scale

- Systematic assessment tool to provide a quantitative measure of the patients status after a stroke
- Later became a clinical assessment tool for ischemic stroke
 - Validated
 - Efficient
 - Reliable



NIHSS

- LOC
- Vision and eye movement
- Movement and coordination
- Sensation and neglect
- Speech and language



Let's score NIHSS

- 1. a LOC
- 1. b questions
- 1. c commands
- 2. Gaze
- 3. Visual Fields
- 4. Facial palsy
- 5. Arms motor
- 6. legs motor
- 7. ataxia
- 8. sensation
- 9. language
- 10. dysarthria
- 11. Neglect

Mrs. Crosby's Neuro Exam Findings

NEURO: MS: Alert and oriented to person, place, and date. Speech fluent and appropriate. Repetition and naming intact. Cognition and memory grossly intact.

CN: No BTT on L; LHH vs visual neglect. PERRL. R gaze preference, not crossing midline. L FD. Hearing intact to finger rub bilaterally. Uvula midline with symmetric palatal elevation.

MOTOR: Normal bulk and tone. RUE strength 5/5 with hand grip, no drift. RLE with drift. LUE without movement to noxious stimuli. LLE without movement to noxious stimuli.

SENSORY: Not intact to LT or noxious stimuli on L side

COORDINATION: unable to assess

GAIT: deferred.

NIHSS

- www.menti.com
- Code 82 88 75

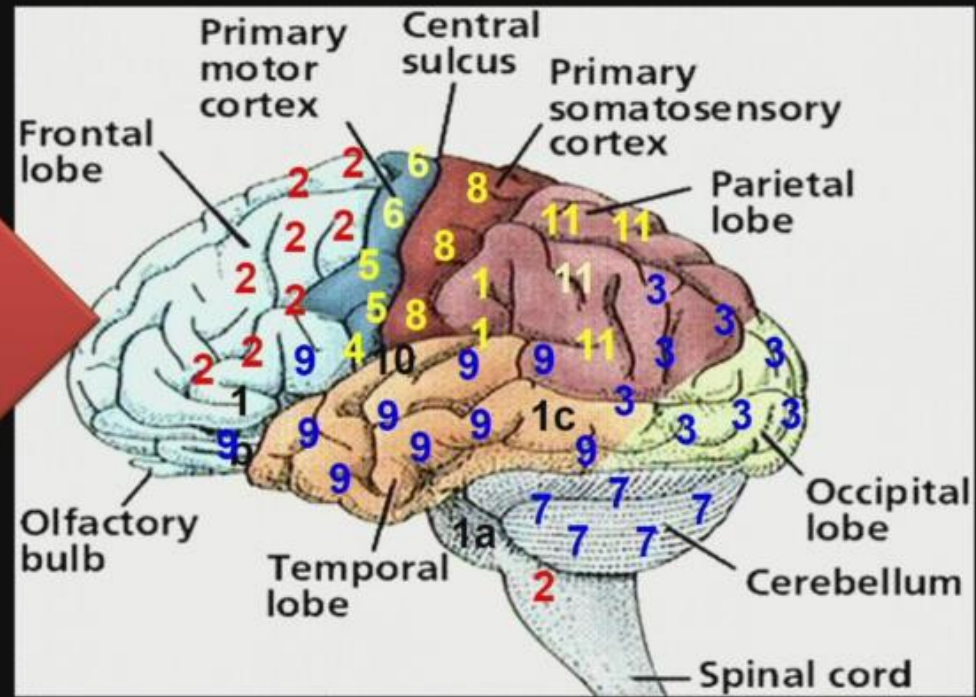
Let's score Mrs. Crosby with NIHSS

- 1. a LOC
- 1. b questions
- 1. c commands
- 2. Gaze
- 3. Visual Fields
- 4. Facial palsy
- 5. Arms motor
- 6. legs motor
- 7. ataxia
- 8. sensation
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NIHSS

NIHSS by brain localization

- Level of Consciousness – 1
- Vision & Eye Movement- 2 & 3
- Movement & Coordination- 4,5,6 & 7
- Sensation & Neglect- 8 & 11
- Speech & Language Function – 9 & 10



Courtesy of Dr. Jim Gebel

NIHSS Pearls

1. Score what you see not what you think
2. #7 Ataxia and #11 extinction/neglect should only be scored if definitely seen. Don't confuse weakness for ataxia
3. In poorly responsive patients, score symmetry of grimace in response to noxious stimuli
4. Patients with visual loss can be asked to describe an object in their hand. Intubated patients can be asked to write their answers.
5. Turn off sedation before the exam.

Mrs. Crosby's Imaging

- **Head CT-** negative for hemorrhage
- **CTA-** occlusion of R ICA at the proximal cervical segment with re-opacification at M1 segment & chronic occlusion of L ICA at the paraclinoid segment with re-opacification at left M1 segment



Treatment Options

- www.menti.com
- Code 10 50 99

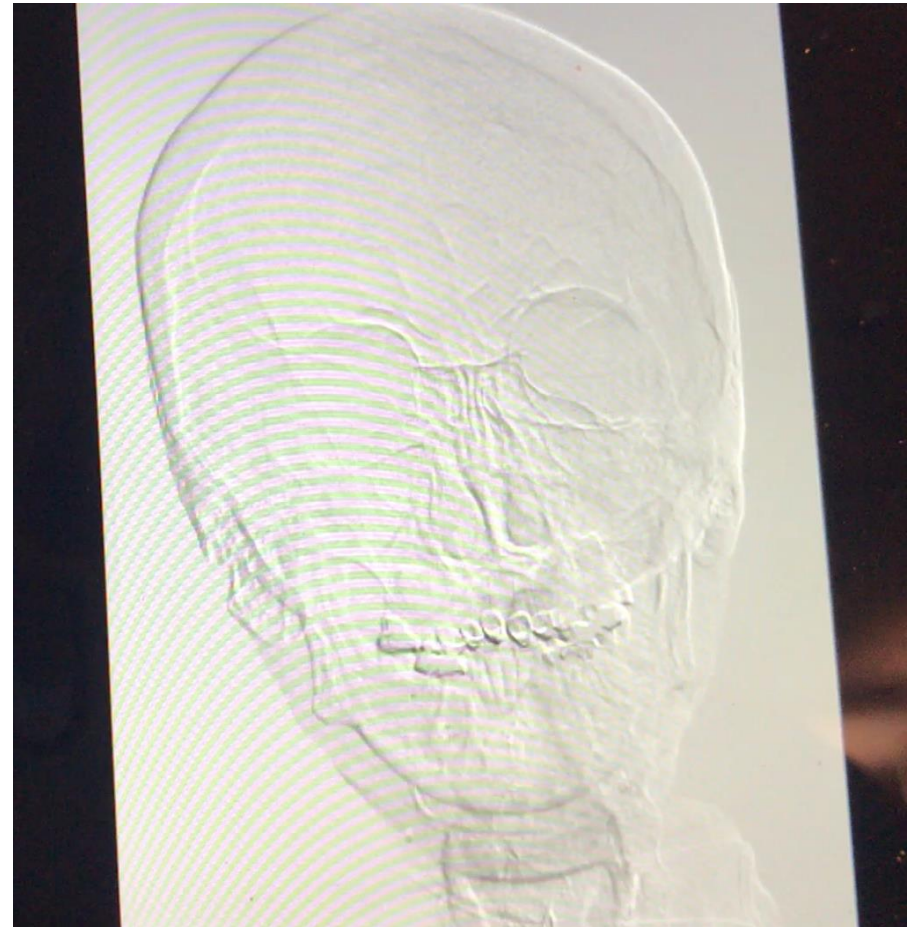
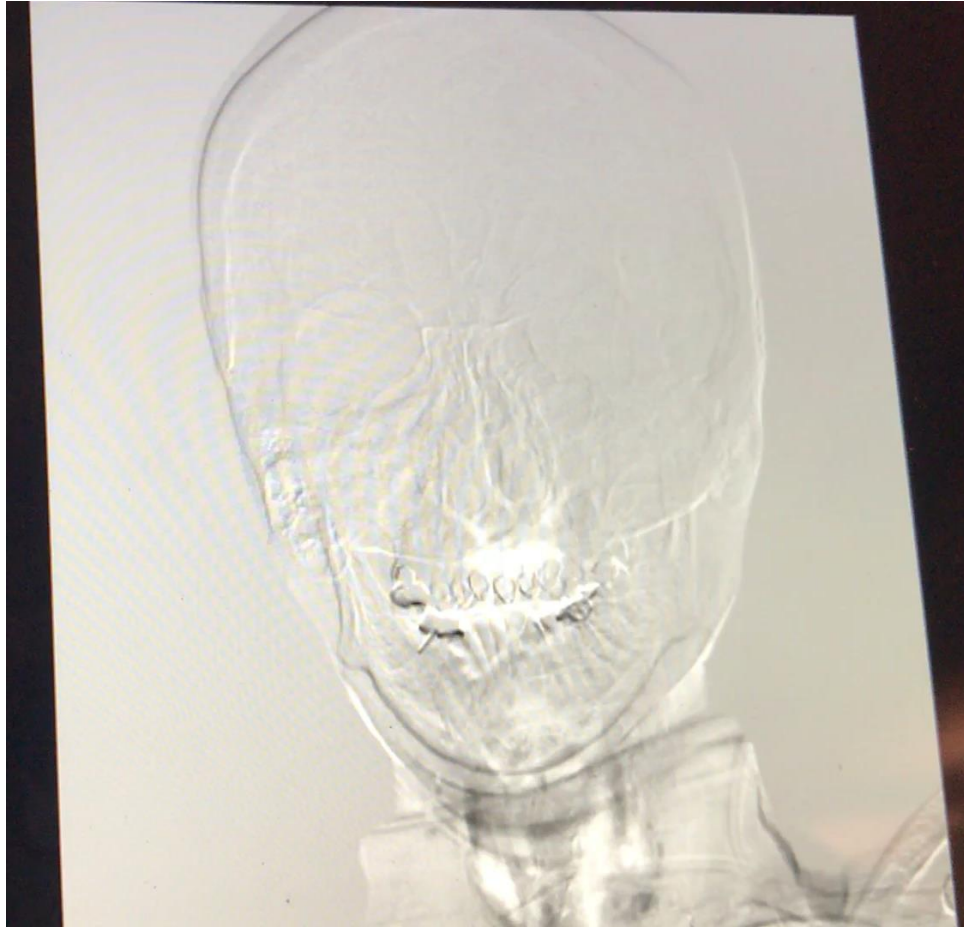
Mrs. Crosby's Treatment Plan

- **Attempt Thrombectomy**

- **17:40**- enters Neuro Interventional Radiology Suite
- **18:03**- groin accessed
- **18:20**- clot accessed
- **18:27**- Intra-arterial thrombectomy done with TICI2b recanalization

Grade 0	No perfusion
Grade 1	Penetration with minimal perfusion
Grade 2	Partial perfusion
2a	Only partial filling (2/3) of the entire vascular territory is visualized
2b	Complete filling of all of the expected vascular territory is visualized, but the filling is slower than normal
Grade 3	Complete perfusion

Neuro Interventional Radiology



Outcome & Discharge Plan



Post-Intervention

- Pt with marked improvement to NIHSS 3- left facial droop & mild dysarthria



Hospital Course

- Complicated by recent open heart surgery, effusion & anti-coagulation management



Discharge Plan

- Home with spouse, NIHSS 1- facial droop

Functional Assessment Scales

Modified Rankin Scale (mRS)

0 - No symptoms

1 - No significant disability

Able to carry out all usual activities, despite some symptoms.

2 - Slight disability

Able to look after own affairs w/o assistance, unable to resume all previous activities.

3 - Moderate disability

Requires some help, able to walk unassisted.

4 - Moderately severe disability

Unable to attend to own bodily needs w/o assistance, unable to walk unassisted.

5 - Severe disability

Requires constant nursing care / attention, bedridden, incontinent.

6 - Dead

Outcome Assessment Scale

Functional Independence Measure (FIM) Score

No Helper

7 Complete independence

6 Modified Independence (device)

Helper/Modified Dependence

5 Supervision

4 Minimal Assistance

3 Moderate Assistance

Helper

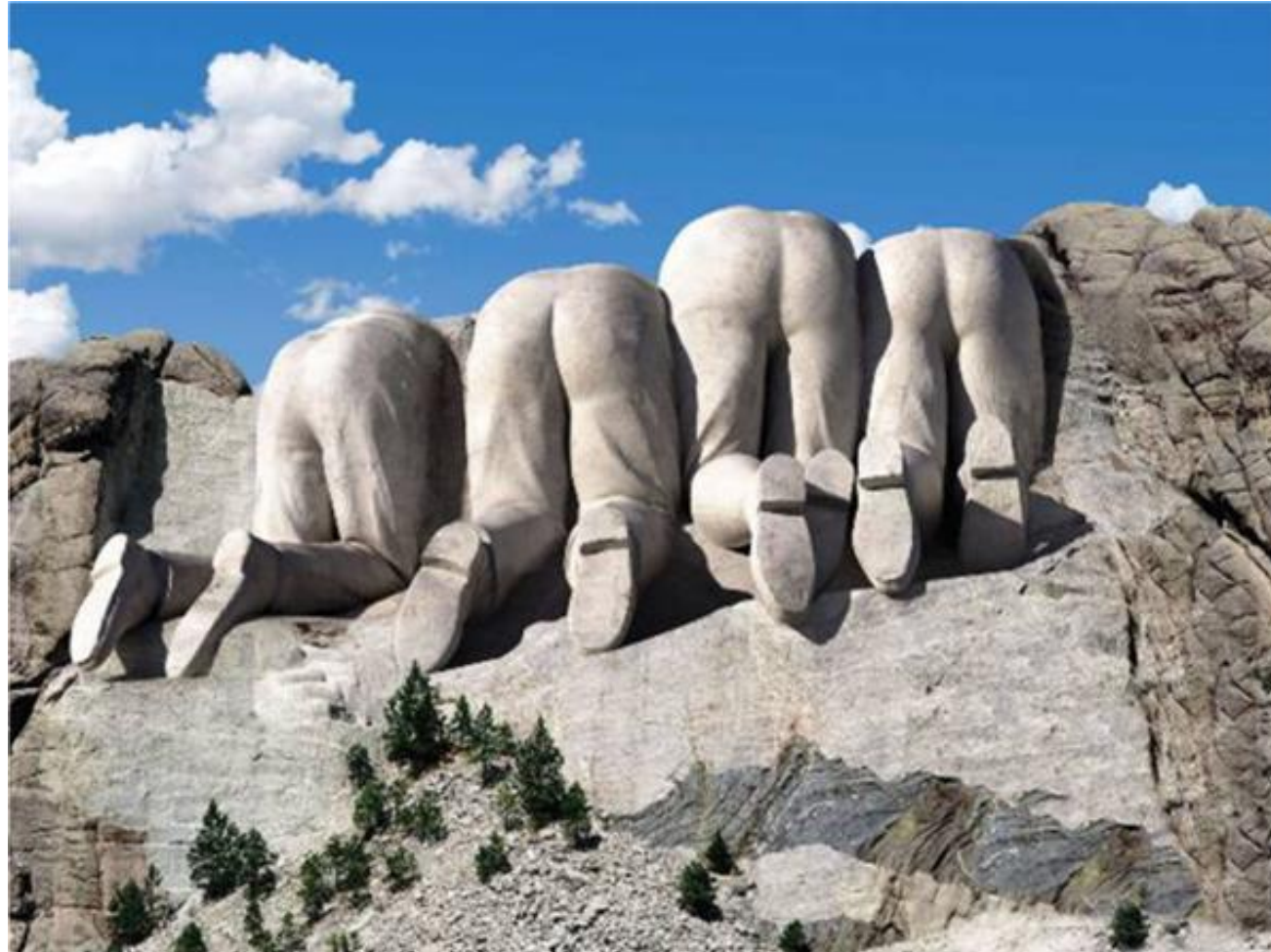
2 Maximal Assistance

1 Total Assistance

Scores 18 items into 7 levels of function ranging from complete dependence to complete independence

- Self Care
- Sphincter Control
- Mobility
- Locomotion
- Cognition
- Social Cognition

The Other Side of Ischemic Stroke- The Bleeds



Severity Scales for Hemorrhagic Strokes

Hunt and Hess Scale

- **Grade 1:** Asymptomatic or mild headache, slight nuchal rigidity
- **Grade 2:** Moderate to severe HA, stiff neck, no neuro deficit except cranial nerve palsy
- **Grade 3:** Drowsy or confused, mild focal neuro deficit
- **Grade 4:** Stupor, moderate or severe hemiparesis
- **Grade 5:** Deep coma, decerebrate posturing

ICH Scale

GCS score

- 3-4: 2 points
- 5-12: 1 point
- 13-15: 0 points

ICH volume

- $\geq 30 \text{ cm}^3$: 1 point
- $< 30 \text{ cm}^3$: 0 points

IVH

- Yes: 1 point
- No: 0 points

Infratentorial origin of ICH

- Yes: 1 point
- No: 0 points

Age

- Age 80 years or older: 1 point
- Younger than 80 years: 0 point

Summary



30-40 neuro assessment & stroke scales exist internationally

- Pre-hospital, acute, functional & outcome scales



Designed for initial & ongoing assessments, prognostic indicator, communication & measure of successful outcome



Provide framework for multiple disciplines to speak the same language

Questions?



PresenterMedia

References

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