



Assessing Stroke Severity: Acute Stroke Evaluation

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Presenter Disclosure Information

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FINANCIAL DISCLOSURE: NONE

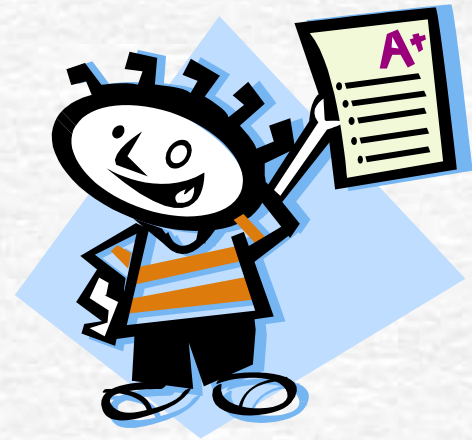
UNLABELED/UNAPPROVED USES DISCLOSURE: NONE

Stroke Assessment Scales

- Importance of Stroke Scales
- Pro's and Con's of scales
- Barriers to using the scales
- Best Practice in using the Stroke Scales

The Perfect Stroke Scale

- Simple
- Easy to use
- Valid – accurately describes phenomenon
- Reliable – reproducible and consistent





The Story....

It was the 4th of July and Mr. H. got up and went into the bathroom. He is a left handed, 62 year-old, African American, with a history of hypertension (on two antihypertensives).

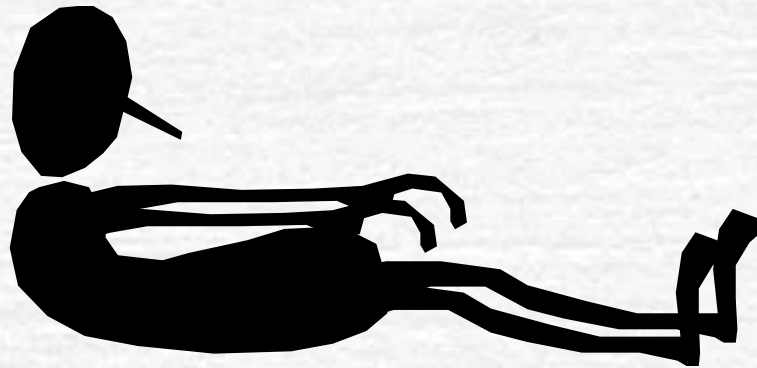
He was found by his wife on the bathroom floor. She called 9-1-1.

Last seen normal at 7:15am



The Story Continues...

- Prehospital found Mr. H. at 7:52AM with an altered mental status, no movement on the left side and aphasic.



Prehospital Stroke Assessment Tools



Importance of Prehospital Stroke Scales

- Rapid identification of potential stroke patient
- Prearrival notification of receiving facility – early mobilization of stroke team

Cincinnati



- Facial Droop
 - Have patient look up at you, smile, and show their teeth
- Arm Drift
 - Have patient lift arms up and hold them out with eyes closed for 10 seconds
- Speech
 - Have patient say “You can’t teach an old dog new tricks”



Cincinnati - 1997

- Patient with 1 finding has 72% probability of stroke, all 3 findings has 85% probability
- Pro's
 - Easy – 3 items – performed in < one minute
 - Derived from NIHSS
 - Taught in 10 minutes
 - Sensitivity 100%, Specificity 88%
- Con's
 - Doesn't measure posterior circulation strokes

Mr. H and the Cincinnati

- Facial Droop – **not mentioned**
 - Have patient look up at you, smile, and show their teeth
- Arm Drift – **“no movement on the left”**
 - Have patient lift arms up and hold them out with eyes closed for 10 seconds
- Speech – **“aphasic”**
 - Have patient say “You can’t teach an old dog new tricks”

Los Angeles Prehospital Stroke Screen (LAPSS)

1. Age > 45 years
 2. History of seizures or epilepsy absent
 3. Symptom duration < 24 hours
 4. At baseline, patient is not wheelchair bound or bedridden
 5. Blood glucose between 60 and 400
 6. Obvious asymmetry (right vs left) in any of the following 3 exam categories (must be unilateral)
 - Facial smile/grimace: droop
 - Grip: weak or no grip
 - Arm strength: drifts down or falls rapidly
- If yes (or unknown) to all items potential stroke patient

Los Angeles - 1998



- Patient with positive findings has 97% probability of stroke
- Pro's
 - More sensitive/specific than Cincinnati
 - Sensitivity 93%, Specificity 97%
 - Takes < 3 minutes to complete
- Con's
 - Nine (9) items to assess

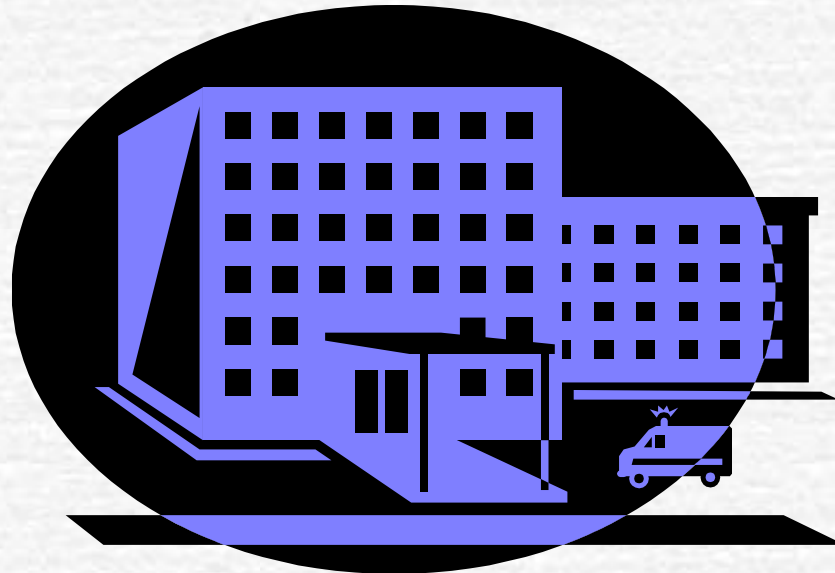
Mr. H. and the LAPSS

1. Age > 45 years (yes)
 2. History of seizures or epilepsy absent (yes)
 3. Symptom duration < 24 hours (yes)
 4. At baseline, patient is not wheelchair bound or bedridden (yes)
 5. Blood glucose between 60 and 400 (BS – 86 yes)
 6. Obvious asymmetry (right vs left) in any of the following 3 exam categories (must be unilateral)
 - Facial smile/grimace: droop (none mentioned)
 - Grip: weak or no grip (no grip on left side)
 - Arm strength: drifts down or falls rapidly (left side falls rapidly)
- If yes (or unknown) to all items potential stroke patient

The Story Goes On...

- He arrives in the ED at 8:13AM. He is alert and knows the month and his age
- He is able to follow commands
- He has a complete hemianopia and a complete facial palsy
- There is no motor movement on the left, with no drift on the right
- Limb ataxia is present in two limbs
- He has global aphasia and severe dysarthria
- He has severe sensory loss and inattention

Acute Assessment Scales



Importance of Acute Stroke Scales

- Measures deficit – stroke severity
- Stroke severity predicts patient discharge disposition
- Standardize neurological exam
- Monitor neurological status
- Match patients for comparison in clinical trials

National Institutes of Health Stroke Scale NIHSS

- Developed in 1983 by NIH stroke research neurologists
- Systematic tool designed to measure neuro deficits most often seen with stroke
- Designed to standardize and document reliable and valid neuro exam

NIHSS

- Need to be trained and certified to perform
- 11 items
- Less than 10 minutes to perform
- Range of scores 0 – 42
 - Lower score indicate less impairment
- Score reflects what the patient does!!!

NIHSS

- Helps to determine level of stroke severity
- Get points for deficits
 - 0 -1 Normal
 - 1 - 4 Minor Stroke
 - 5 - 15 Moderate Stroke
 - 15 - 20 Moderately Severe Stroke
 - > 20 Severe Stroke

NIHSS

- Improvement considered with score changing by 4 points
- Predicts outcome
 - <14 there is a 80% good outcome
 - >20 there is a 20% good outcome

NIHSS

- Aids in planning rehabilitation needs
 - ≥ 14 Severe: long term care
 - 6 – 13 Adequate: acute inpatient rehab
 - ≤ 5 Mild: 80% discharged home

NIHSS

- General Instructions
 - Administer items in order listed
 - Follow directions for each exam
 - Do not coach patient
 - Record first answers after each subscale exam
 - Do not go back and change scores

NIHSS

1a. LOC

1b. LOC Questions

1c. LOC Commands

2. Best Gaze

3. Visual fields

4. Facial palsy

5. Motor Arm

6. Motor Leg

7. Limb ataxia

8. Sensory

9. Best Language

10. Dysarthria

11. Extinction & Inattention

Modified NIHSS (2001)

1b. LOC Questions

1c. LOC Commands

2. Best Gaze

3. Visual fields

5a. Left Motor Arm

5b. Right Motor Arm

6a. Left Motor Leg

6b. Right Motor Leg

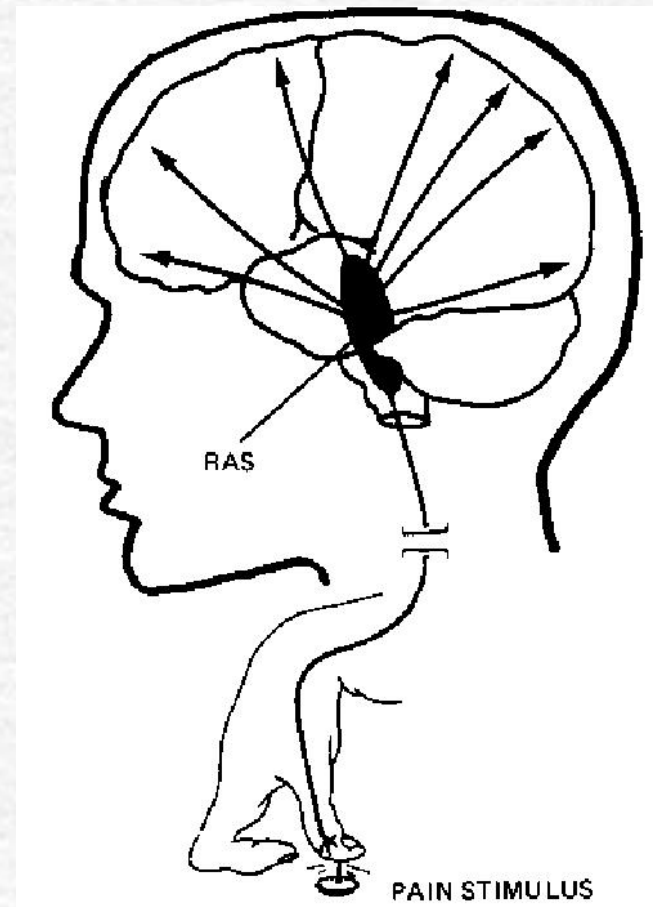
8. Sensory

9. Language

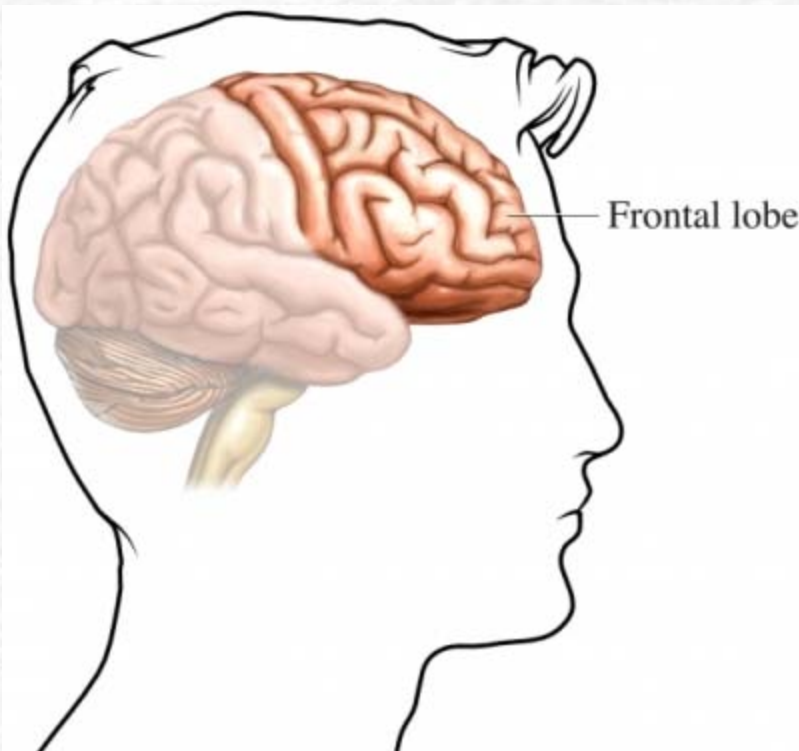
11. Extinction & Inattention

Level of Consciousness

- Arousal
- 0 = Alert
- 1 = Not alert, but arousable
- 2 = Not alert, repeated stimulation
- 3 = Responds only with reflex motor to noxious stimuli



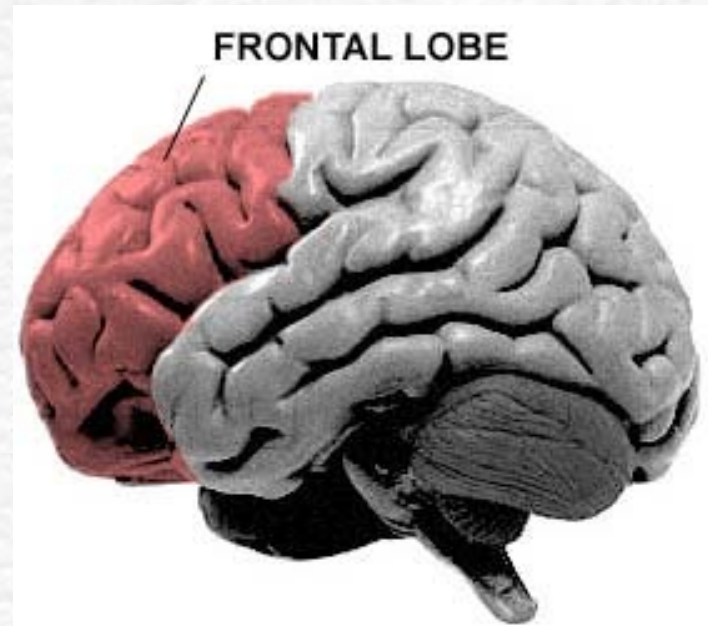
LOC Questions



- Awareness
- Month & age
- 0 = Answer both questions
- 1 = Answer one
- 2 = Answer neither

LOC Commands

- Open & close eyes, grip and release hand
- 0 = Performs both correct
- 1 = Performs one correct
- 2 = Performs neither



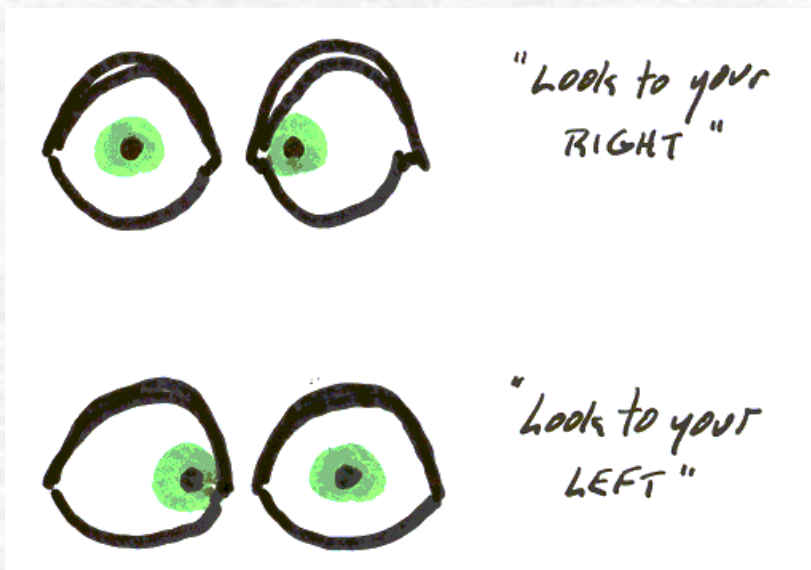


LOC Pearls



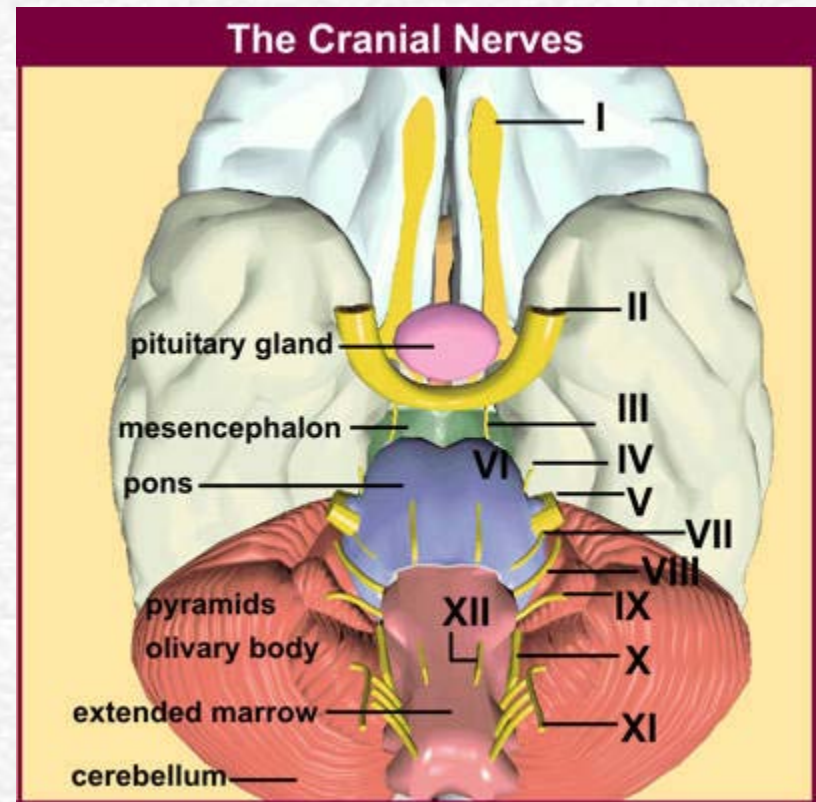
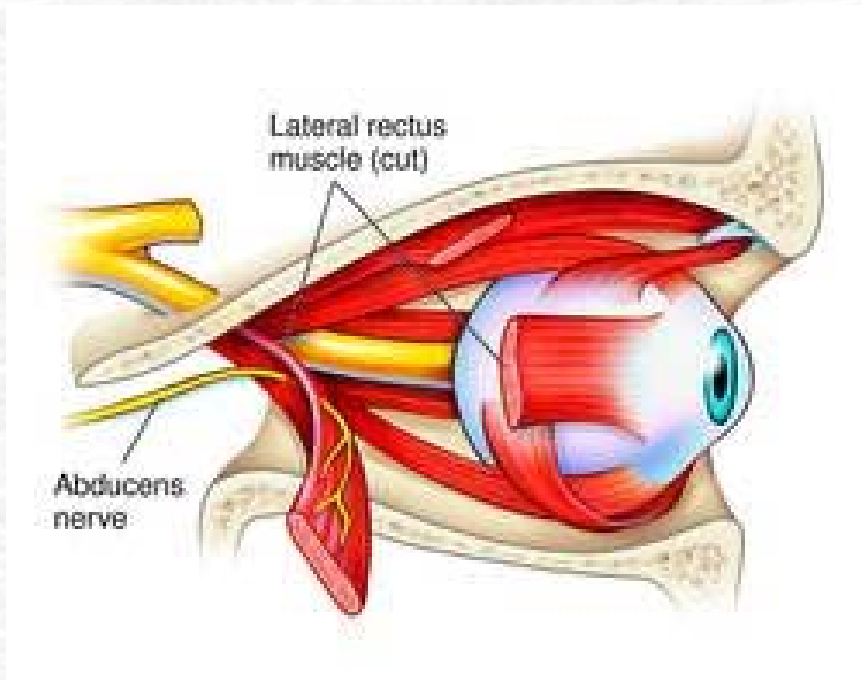
- MOST IMPORTANT
- Sensitive indicator of cortical function
 - Decreased LOC only if both hemispheres/brainstem dysfunction
- Key predictor of outcome

Best Gaze



- Horizontal eye movement
- 0 = Normal
- 1 = Partial gaze palsy (one or both eyes)
- 2 = Forced deviation or total gaze paresis

Best Gaze

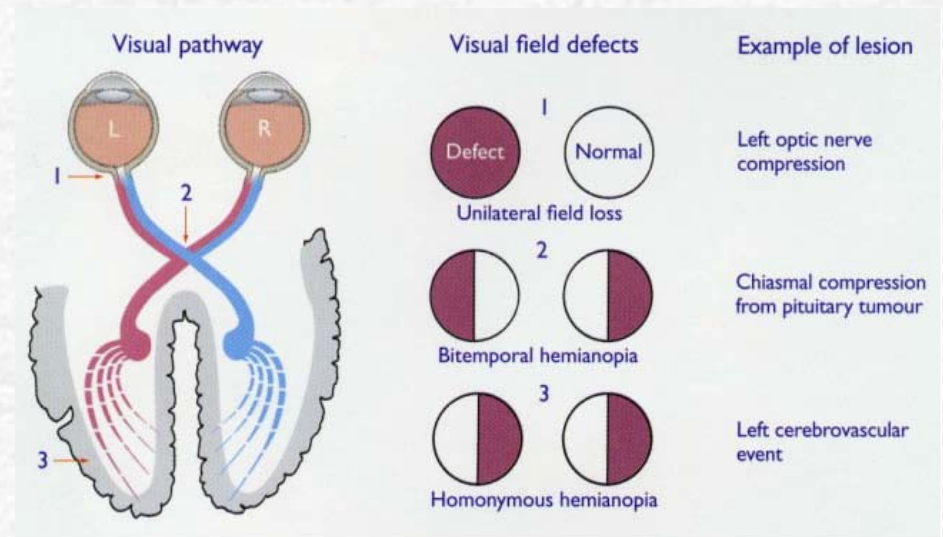


Best Gaze Pearls

- CN VI longest intracranial course
- Frequently involved
- Double vision maybe experienced

Visual Fields

- Finger counting or visual threat
- 0 = No visual loss
- 1 = Partial hemianopia
- 2 = Complete hemianopia
- 3 = Bilateral hemianopia (blindness)



Visual Fields Pearls

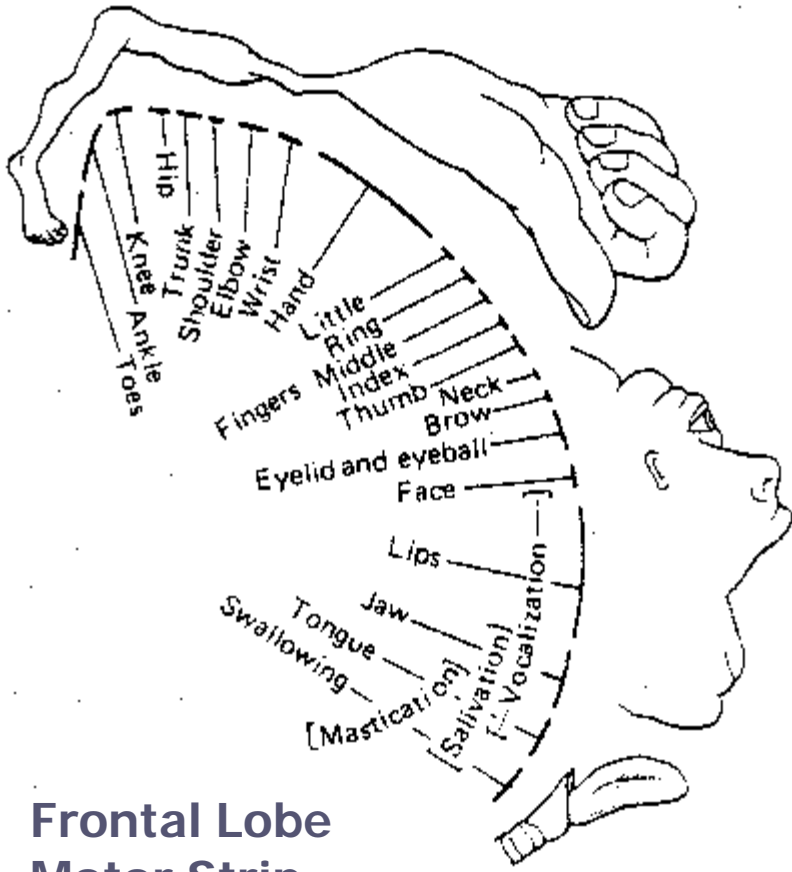
- Injury to Middle Cerebral Artery
- Opposite side injury
 - Stand on the RIGHT for Left MCA
 - Stand on the LEFT for Right MCA

Facial Palsy

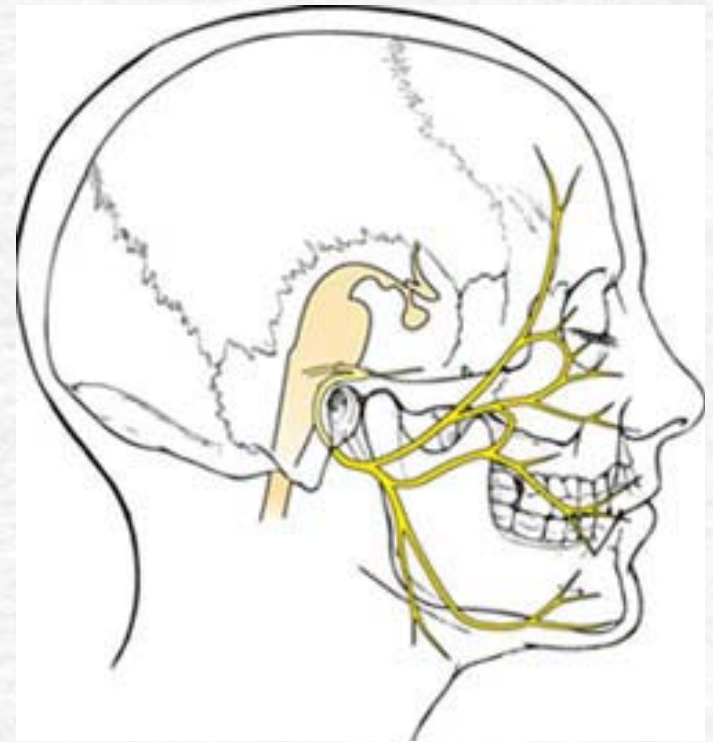
- Show teeth, raise eyebrows, close eyes
- 0 = Normal
- 1 = Minor paralysis
(flattened nasolabial fold, asymmetry on smiling)
- 2 = Partial paralysis
(total/near total paralysis of lower face)
- 3 = Complete paralysis, one or both sides
(absence of movement in upper/lower face)



Facial Palsy



Frontal Lobe
Motor Strip
MCA artery territory



Cranial Nerve VII
Facial Nerve

Facial Palsy Pearls

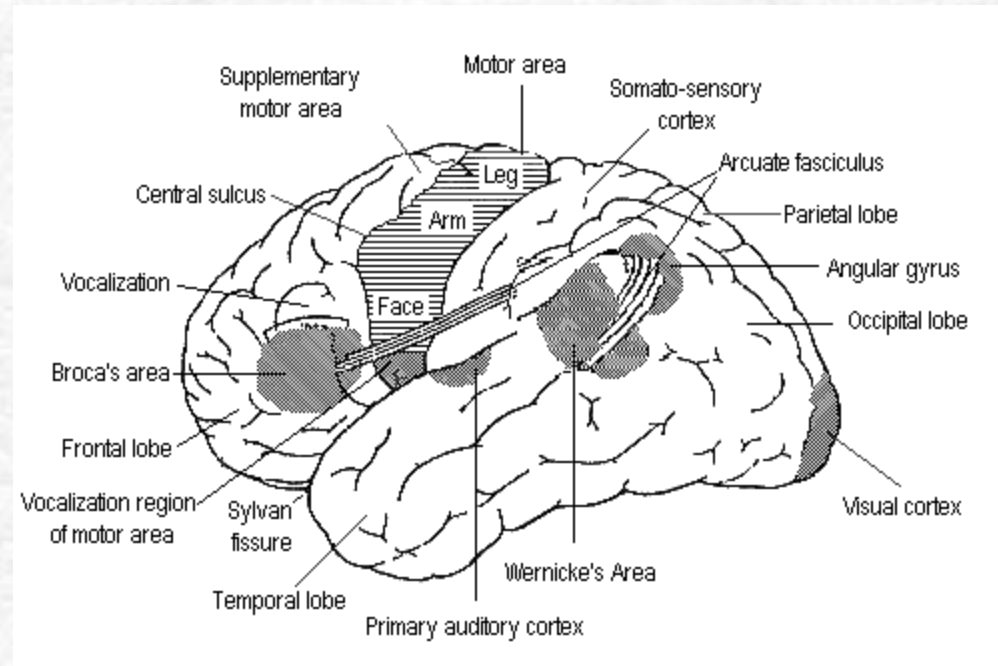
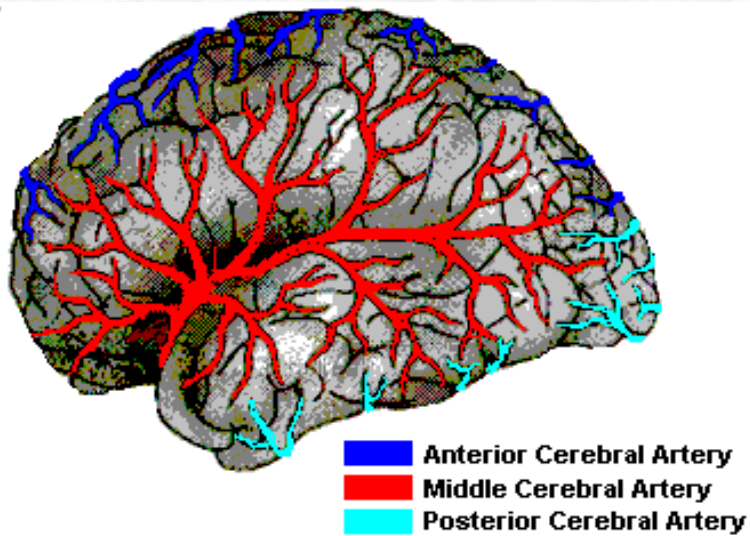
- Same side deficit
- Eating is difficult
- Damage cornea – unable to close eye

Motor Arm

- Limb 45° supine, 90° sitting, drift if falls before 10 seconds
- 0 = No drift
- 1 = Drift (does not hit bed)
- 2 = Some effort against gravity (drifts to bed)
- 3 = No effort (limb falls)
- 4 = No movement
- UN = Untestable



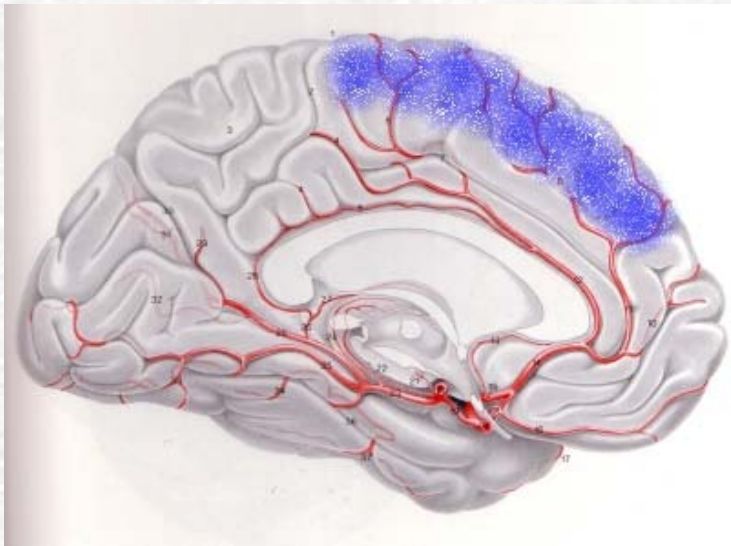
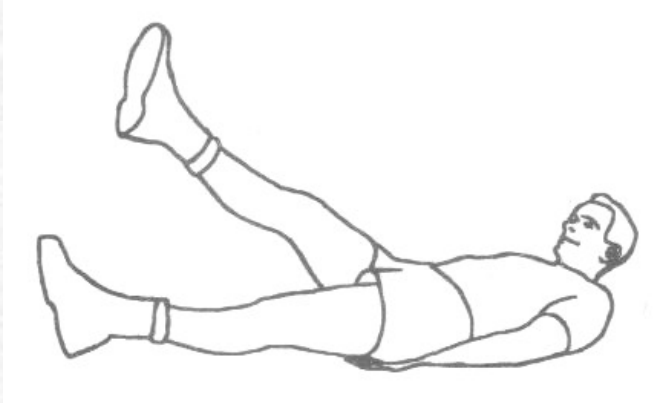
Motor Arm



Motor Arm Pearls

- Unilateral deficit common with anterior cerebral injury
- Bilateral deficit common with brainstem injury
- Unilateral arm drift common with MCA stroke

Motor Leg



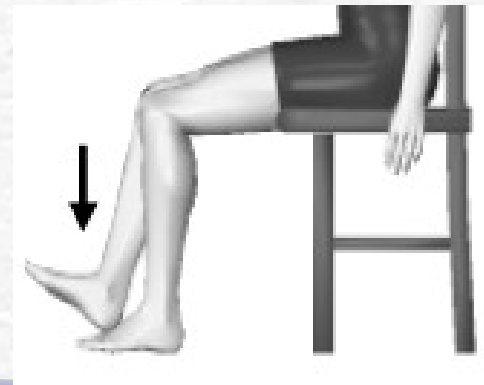
- Limb 30 , drift if falls before 5 seconds
- 0 = No drift
- 1 = Drift
- 2 = Some effort against gravity
- 3 = No effort
- 4 = No movement
- UN = Untestable

Motor Leg Pearls

- Unilateral deficit common with anterior cerebral injury
- Bilateral deficit common with brainstem injury
- Unilateral leg drift common with ACA stroke

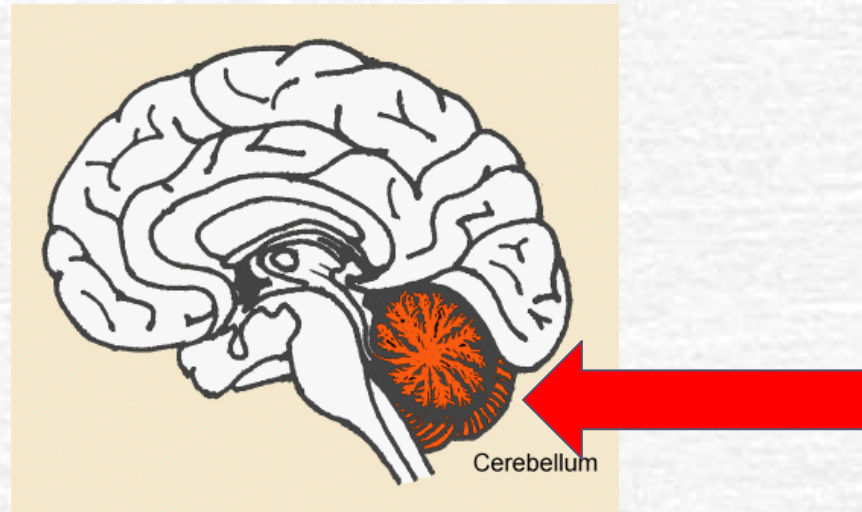
Limb Ataxia

- Finger-nose, heel shin
- Scored only if present out of proportion to weakness
- 0 = Absent
(cannot understand, paralyzed)
- 1 = Present in one limb
- 2 = Present in two limbs
- UN = Untestable

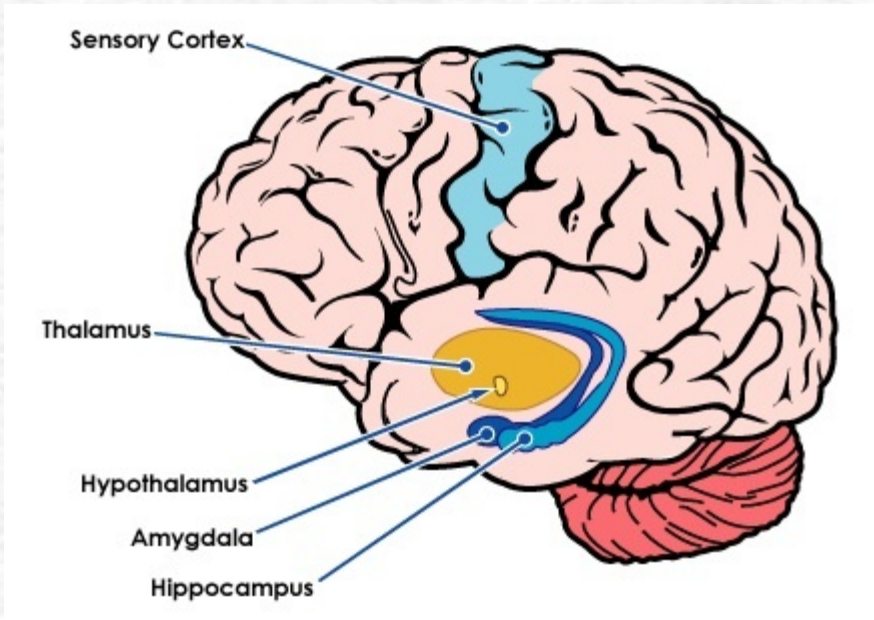


Limb Ataxia Pearls

- Deficit may indicate cerebellar injury



Sensory



Pinprick

Face, arms, trunk, legs

Bilateral testing

0 = Normal

1 = Mild – moderate loss
(feels less sharp on affected side)

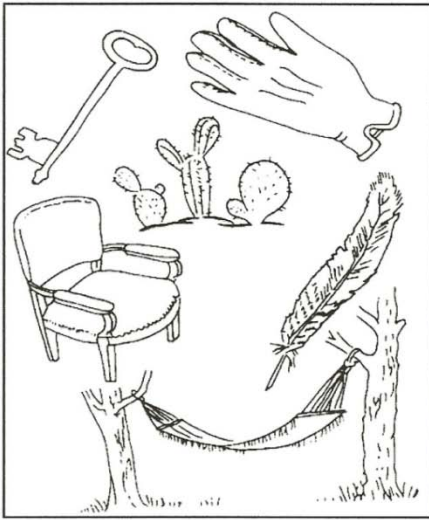
- 2 = Severe – total loss
(not aware of being touched)

Sensory Pearls

- Consider parietal lobe injury
- Contralateral injury occurs
- Unilateral neglect syndrome may be present

Best Language

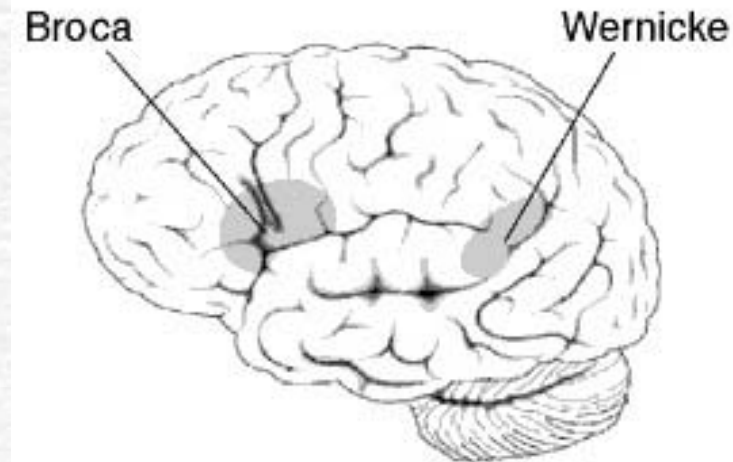
- Describe pictures
- Read



- You know how
- Down to earth
- I got home from work
- Near the table in the dining room
- They heard him speak on the radio last night

Best Language

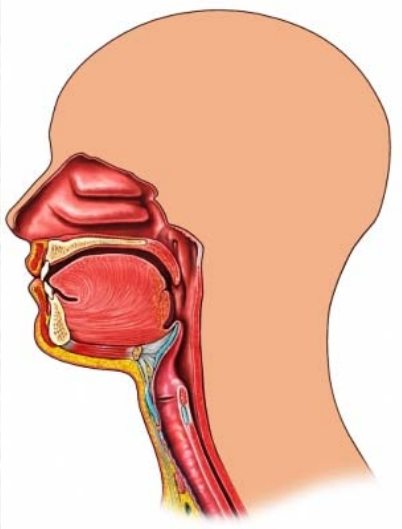
- 0 = No aphasia
- 1 = Mild-moderate aphasia
(loss of fluency, can identify content from patient response)
- 2 = Severe aphasia
(fragmented expression, cannot identify content from patient response)
- 3 = Mute, global aphasia



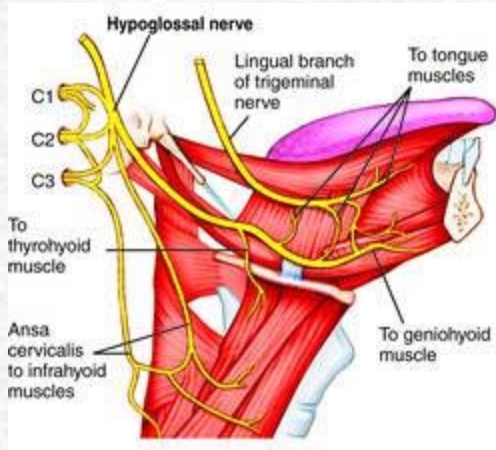
Best Language Pearls

- Aphasia
 - Problem with central language processing
 - Dominant hemisphere injury
 - Left hemisphere in almost all right-handed and 70% of left-handed or ambidextrous

Dysarthria



- Say "mama, tip-top, fifty-fifty, thanks, huckleberry, baseball player"



**Cranial Nerve XII
Hypoglossal**

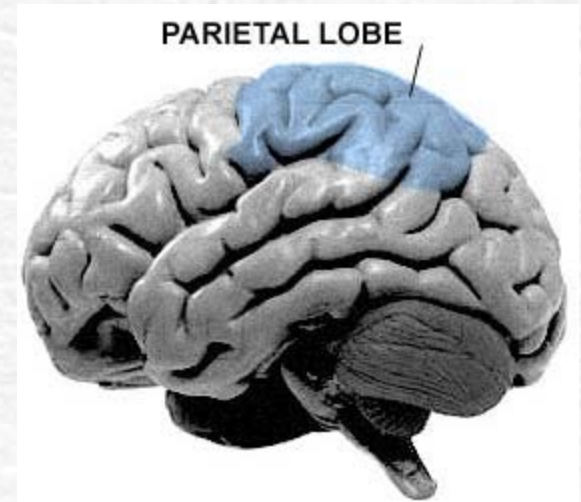
- 0 = Normal
- 1 = Mild – moderate dysarthria (slurs at least some words, can be understood)
- 2 = Severe dysarthria (unintelligible)
- UN = Intubated

Dysarthria Pearls

- Problem with motor mechanism of speech
- Inability to articulate spoken words

Extinction/Inattention

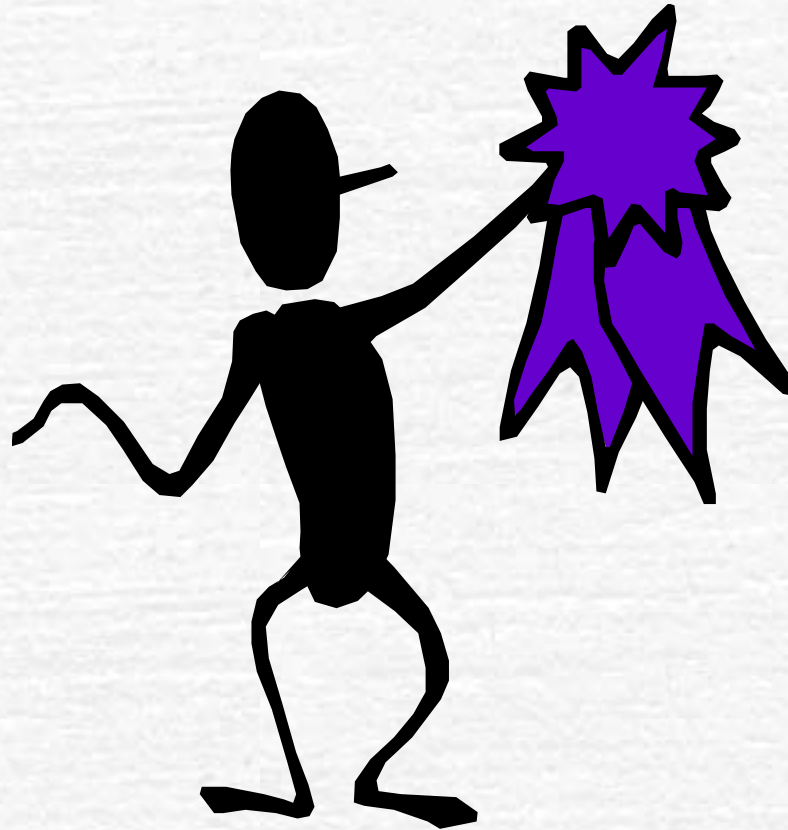
- 0 = Normal
- 1 = Inattention/extinction to bilateral simultaneous stimulation in one of sensory modalities (visual, tactile, auditory, spatial, or personal inattention)
- 2 = Profound hemi-inattention extinction to more than one modality (does not recognize own hand)



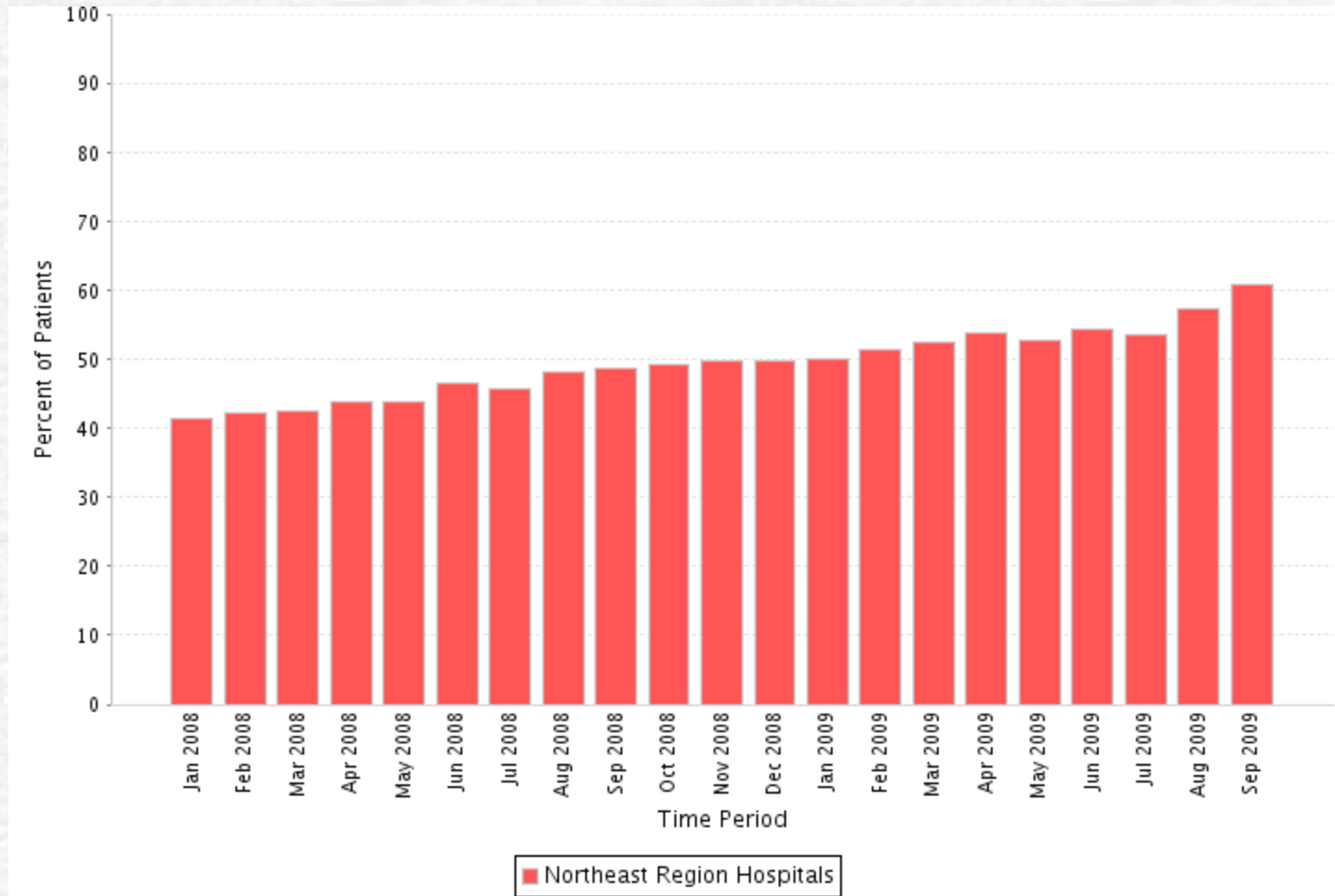
Extinction/Inattention Pearls

- Looking for neglect
- Possible injury to parietal lobe

Best Practice




Documentation of NIHSS





Other Acute Assessment Scales

- Scandinavian Stroke Scale – 1985
 - Canadian Neurological Scale – 1986
 - European Stroke Scale – 1994
- 

Scandinavian Stroke Scale

“We did not find any of the available scoring systems entirely relevant for the present study and therefore constructed a scale adjusted to this study for use by non-neurologists” (Asplund, 1985)

Scandinavian Stroke Scale

- Consciousness
- Eye Movement
- Arm, motor power
- Hand, motor power
- Leg, motor power
- Orientation
- Speech
- Facial palsy
- Gait



Canadian Neurological Scale

“No universally accepted or reliable standardized method exists for the clinical monitoring of acute stroke.”
(Cote, 1986)



Canadian Neurological Scale

- Mentation
 - Level of Consciousness – Orientation – Speech
- No Comprehension Deficit
 - Face – Proximal/Distal Arm - Proximal/Distal Leg
- Comprehension Deficit
 - Face – Arms - Legs

European Stroke Scale

“For detecting therapeutic effect and matching of treatment groups in stroke trials, a scale that meets the clinimetric criteria is of the utmost importance.”
(Hantson, 1994)

European Stroke Scale

- Level of Consciousness
- Comprehension
- Speech
- Visual field
- Gaze
- Facial movement
- Arm positioning maintained
- Arm raising
- Wrist extension
- Finger strength
- Leg position, maintain
- Leg flexing
- Foot dorsiflexion
- Gait

American Stroke Association

"Give Me 5"

- Give Me 5 quick stroke check:
 - Walk – Is their balance off?
 - Talk – Is their speech slurred or face droopy?
 - Reach – Is one side weak or numb?
 - See – Is their vision all or partly lost?
 - Feel – Is their headache severe?



National Stroke Association

F-A-S-T



- **F** = FACE numbness or weakness especially one side of body



- **A** = ARM numbness or weakness one side of body



- **S** = SPEECH slurred or difficulty speaking or understanding



- **T** = TIME to immediately call 9-1-1 and note time symptoms started or last time person was seen normal

Stroke Heroes Act FAST

Face
Does the face look uneven?
Ask them to smile.

Arm
Does one arm drift down?
Ask them to raise both arms.

Speech
Does their speech sound strange?
Ask them to repeat a phrase.

Time
Every second brain cells die. Call 9-1-1 at *any* sign of stroke!

Is it a stroke?
Check these signs **FAST!**
Call 9-1-1 at any sign of stroke.



Functional Assessment Scales



Modified Rankin Scale

- Functional outcome after stroke
- Score 0 - 2 Independent
- Score 3 - 5 Disabled

Modified Rankin Scale

0- No symptoms at all

1- No significant disability despite symptoms

- Able to carry out all usual duties and activities

2- Slight disability

- Unable to carry out all previous activities but able to look after own affairs without assistance

Modified Rankin Scale

3- Moderate disability

- Requiring some help, but able to walk without assistance

4- Moderately severe disability

- Unable to walk without assistance, unable to attend to own bodily needs without assistance

5- Severe disability

- Bedridden, incontinent, and requiring constant nursing care and attention

6 - Dead

Outcome Assessment Scales

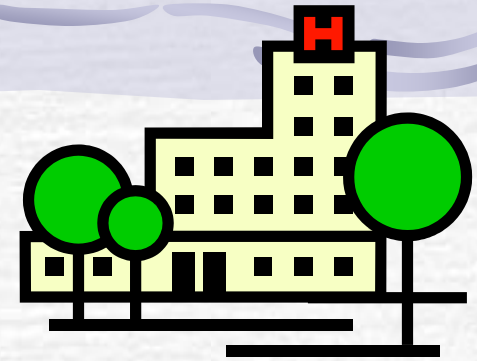


Barthel Index

- **Outcome assessment of ADLs**
- **Scale of 0 - 100**
- **Higher the score higher the capabilities**

Barthel Index

- Bowel/bladder control
- Chair/bed transfer
- Grooming
- Mobility/ambulation
- Toilet transfer/use
- Dressing
- Feeding
- Stair climbing
- Bathing



The Rest of the Story...

- Head CT Scan showed a dense right MCA sign
- IV tPA was administered 2 hours after last seen normal
- He was admitted to the Neuro ICU then transferred to neuroscience floor
- Discharged to acute rehabilitation after a six day stay in the hospital

QUESTIONS ????

