Objectives

- Discuss pre-hospital stroke scales, IPD stroke scales and the NIHSS
- Review the neurological assessment needed to use the NIHSS
- Practice the scoring of a stroke patient utilizing the NIHSS

Importance of Stroke Scales

- Standardized stroke severity scale to describe neurological deficits in acute stroke patients.
- Allows us to:
  - Quantify our clinical exam
  - Provide for standardization
  - Determine if the patient’s neurological status is improving or deteriorating
  - Communicate patient status
Lets discuss some commonly used pre-hospital stroke scales and their importance

Commonly Used Pre-hospital Stroke Scales
- Cincinnati Pre-Hospital Stroke Scale (CPS5)
- Los Angeles Prehospital Stroke Scale (LAPSS)
- Face, Arm, Speech, Time (FAST)
- Balance, Eye, Face, Arms, Speech, Time (BEFAST)
- Scales often used by EMS personnel prior to transfer to the hospital.

Cincinnati Pre-hospital Stroke Scale
- Facial Droop
- Arm Drift
- Speech
- Patients with 1 of these 3 findings as a new event have a 72% probability of an ischemic stroke.
- If all 3 findings are present the probability of an acute stroke is more than 85%.
Los Angeles Pre-hospital Stroke Scale

- Over the age of 45
- No history of seizures
- Neurological symptoms started to present within the last 24 hours
- Patient is not hospitalized
- Blood sugar is 60-400 mg/dL
- Unilateral (and not bilateral) exhibition of facial droop, grip weakness, arm weakness or other observable motor asymmetries

If all of these criteria are met (or not ascertainable) the LAPSS is positive for stroke. Patients may still be experiencing a stroke even if LAPSS criteria are not met.

Face, Arm, Speech, Time (FAST)

- FACE is it drooping
- ARMS can you raise both
- SPEECH is it slurred or jumbled
- TIME to call 911 right away

Used to teach the general public stroke symptoms and the urgency.

There is a modified version becoming more common called BEFAST to help identify posterior stroke symptoms

- In addition to the FAST acronym it includes:
  - B: balance
  - E: eyes

Large Vessel Occlusion Scales (LVO screening tools)

- Los Angeles Motor Scale (LAMS)
- Rapid Arterial Occlusion Evaluation (RACE)
- Vision, Aphasia, Neglect assessment (VAN)
Los Angeles Motor Scale (LAMS)
- Facial Droop:
  - Absent: 0
  - Present: 1
- Arm Drift:
  - Absent: 0
  - Drifts Down: 1
  - Falls rapidly: 2
- Grip Strength:
  - Absent: 0
  - Weak grip: 1
  - No grip: 2

LAMS ≥ 4 is severe; potential Large Vessel Occlusion

Rapid Arterial Occlusion Evaluation (RACE)
- Facial palsy:
  - Absent: 0
  - Mild: 1
  - Moderate to severe: 2
- Arm motor impairment:
  - Normal to mild: 0
  - Moderate: 1
  - Severe: 2
- Leg motor impairment
  - Normal to mild: 0
  - Moderate: 1
  - Severe: 2
- Head or gaze deviation:
  - Absent: 0
  - Present: 1
- Aphasia:
  - Absent: 0
  - Mild: 1
  - Severe: 2

Score of ≥ 4 should be concerned for a Large Vessel Occlusion

Vision, Aphasia, Neglect (VAN)
- Vision: can they see left, right and up and down
- Aphasia: can they understand and produce speech
- Neglect: are they looking to one side and ignoring the other? Eyes are usually looking to the left or right.

No need to calculate. If one of the above is positive then consider Large Vessel Occlusion
National Institutes of Health Stroke Scale (NIHSS)

- 11 item scoring system
- Integrates components of neurological exam
  - LOC, select cranial nerves, motor, sensory, cerebellar function, language, inattention (neglect)
- Maximum score: 42, minimum score: 0
- Is a validated tool.

NIHSS

- LOC
- Best gaze
- Visual field testing
- Facial paresis
- Arm & leg motor function
- Limb ataxia
- Sensory
- Best language
- Dysarthria
- Extinction & inattention
NIHSS Rules

- The most reproducible response is generally the first response.
- Do not coach patients unless specified in the instructions.
- Some items are scored only if definitely present.
- Record what the patient does, not what you think the patient can do.

Item 1A
Level of Consciousness

Item 1B
Level of Consciousness
Item 4
Facial Palsy

Item 5
Motor Arm

Item 6
Motor Leg
Item 10
Dysarthria

Item 11
Extinction and Inattention

NIHSS and Patient Outcomes

- Initial score of 7 was found to be important cut-off point
  - NIHSS >7 demonstrated a worsening rate of 45.7%
  - NIHSS >7 demonstrated a worsening rate of 14.8% and were almost twice as likely to be functioning normally at 48 hours (45%)

- NIHSS <7 most strongly associated with D/C home
- NIHSS 6-13 most strongly associated with D/C to rehab
- NIHSS > 13 most strongly associated with D/C to nursing facility
  (Schlegel et al., 2003)

- Likelihood of intracranial hemorrhage:
  - NIHSS >20 = 17% likelihood
  - NIHSS <20 =3% likelihood
  (Adams et al., 2003)

- NIH > 6 is often used as the cut-off when considering a Large Vessel Occlusion
### NIHSS Tips for the patient in a coma, aphasic or confused, or intubated and unresponsive

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
<th>Coma</th>
<th>Aphasic or confused</th>
<th>Intubated but responsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Level of consciousness (alert, drowsy, etc.)</td>
<td>0-3</td>
<td>Standard scoring</td>
<td>Standard scoring if sedated follow comatose tips</td>
<td></td>
</tr>
<tr>
<td>1b. LOC, questions (month, age)</td>
<td>0-2</td>
<td>Can write response 2 if patient does not comprehend</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1c. LOC commands (open eyes, makes fists, let go)</td>
<td>0-2</td>
<td>Ask and pantomime</td>
<td>Standard scoring</td>
<td></td>
</tr>
<tr>
<td>2. Best Gaze (eyes open-patient follows examiner’s finger or face)</td>
<td>0-2</td>
<td>Exam with doll's eyes maneuver</td>
<td>Establish eye contact-move around bed. Examine with doll's eyes.</td>
<td></td>
</tr>
<tr>
<td><strong>If intubated patient is sedated or unresponsive follow the comatose tips</strong></td>
<td></td>
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<td>3. Visual Introduced visual stimulus/threat to patient’s visual field quadrants)</td>
<td>0-3</td>
<td>Threat exam</td>
<td>Test visual quadrants-point to fingers moving. Score 0 if points or looks at moving fingers</td>
<td>Threat exam</td>
</tr>
<tr>
<td>4. Facial Palsy (show teeth, raise eyebrows, and squeeze eyes shut)</td>
<td>0-3</td>
<td>Ask and pantomime or noxious stimuli</td>
<td>Standard scoring</td>
<td></td>
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<tr>
<td>5. Motor Arm (Elevate extremity to 90º &amp; score drift/movement) Only score UN if amputation or joint fusion</td>
<td>0-4</td>
<td>Put arm in starting position-encourage them to hold it up</td>
<td>Standard scoring</td>
<td></td>
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<tr>
<td>6. Motor Leg (Elevate extremity to 30º &amp; score drift/movement) Only score UN if amputation or joint fusion</td>
<td>0-4</td>
<td>Put leg in starting position-encourage them to hold it up</td>
<td>Standard scoring</td>
<td></td>
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<td>7. Limb Ataxia (Finger-nose, heel down shin)</td>
<td>0-4 UN</td>
<td>None limb passively to show patient. Score 0 if unable to understand</td>
<td>Standard scoring</td>
<td></td>
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<tr>
<td>8. Sensory (Pin prick to face, arm, trunk and leg-compare side to side)</td>
<td>0-2</td>
<td>Use painful stimuli, observe reaction</td>
<td>Standard scoring</td>
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<td>9. Best language (Name item, describe picture, and read sentences)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>10. Dysarthria (Evaluate speech clarity by patient repeating listed words)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>UN</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>UN</td>
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<tr>
<td>11. Extinction and inattention (Use prior testing to identify or simultaneous stimuli)</td>
<td>0</td>
<td>1</td>
<td>2</td>
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Let’s Practice!

Practice Patient #1
Practice Patient #2

Free NIHSS Certification

- www.stroke.org
  - We can help tab
  - Healthcare professionals-improve your skills
  - Tools, training and resource tab
  - Training tab
  - NIH stroke scale

References

- Emergency Assessment of Acute Ischemic Stroke [Booklet]. (2017) USA: Genentech
- www.stroke.org