Standardized Stroke Scales and Implications for Healthcare Personnel

2016 ND Stroke and Cardiac Conference

Presented by Megan Carlblom, MSN, RN, SCRN
CONFLICTS OF INTEREST:
All activity planners and presenters have reported no conflicts of interest related to the presentation.

COMMERCIAL SUPPORT:
No commercial support was received.

OFF-LABEL USE:
All conference presenters have agreed to disclose to participants prior to their presentations if off-label (or unlabeled uses) of commercial products will be discussed during their presentation(s).
Objectives

- **Objective 1:** Upon completion of this session, learners should be able to recognize the Cincinnati Prehospital Stroke Scale.
- **Objective 2:** Upon completion of this session, learners should be able to identify the components of the National Institutes of Health Stroke Scale.
- **Objective 3:** Upon completion of this session, learners should know how to document a neurological exam within the North Dakota Acute Stroke Transfer Protocol.
- **Objective 4:** Upon completion of this session, learners should recognize the importance of a neurological exam after treating a patient with intravenous thrombolytics.
Types of Stroke

Thrombotic stroke. Cerebral thrombosis is a narrowing of the artery by fatty deposits called plaque. Plaque can cause a clot to form, which blocks the passage of blood through the artery.

Embolic stroke. An embolus is a blood clot or other debris circulating in the blood. When it reaches an artery in the brain that is too narrow to pass through, it lodges there and blocks the flow of blood.

Hemorrhagic stroke. A burst blood vessel may allow blood to seep into and damage brain tissues until clotting shuts off the leak.
8 D’s of Stroke Care

2. Dispatch 5. Data 8. Disposition
3. Delivery 6. Decision
Detection

STROKE WARNING SIGNS

THINK F.A.S.T.

FACE
Does the face look uneven?
Ask them to smile

ARM
Does the 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 911 at any sign of stroke
# Dispatch

## AHA/ASA EMS Response Time Goals

<8 minutes to the scene, <15 minutes on-scene

<table>
<thead>
<tr>
<th>Dispatch Time</th>
<th>Turnout Time</th>
<th>Travel Time</th>
<th>On-Scene Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time call is received to time EMS unit is notified to respond</td>
<td>From time EMS unit is notified until wheels move</td>
<td>Time until EMS arrives on scene</td>
<td>Time spent with patient before start of transport</td>
</tr>
<tr>
<td>&lt;1 minute</td>
<td>&lt;1 minute</td>
<td>=Time for trauma or heart attack calls</td>
<td>&lt;15 minutes</td>
</tr>
</tbody>
</table>
# AHA/ASA EMS Guidelines for Management of Suspected Stroke

## Delivery

### On Scene
- Manage CABs: circulation, airway, breathing (O2 if needed)
- Pre-hospital Stroke Scale
- Establish **LAST KNOWN WELL**
- Brief History/Medications
- What is “The Story?”
  - Family contact (phone number)

### In Transit
- Rapid transport to closest facility capable of treating stroke
- Pre-notify receiving hospital
- Check and record blood glucose to assess for hypoglycemia
- Check and record VS
- Cardiac monitor
- IV access (18 in AC is preferred)
Pre-hospital Stroke Scales

Cincinnati Pre-hospital Stroke Scale

1. **FACIAL DROOP**: Have patient show teeth or smile.
   - **Normal**: Both sides of the face move equally
   - **Abnormal**: One side of the face does not move as well as the other side

2. **ARM DRIFT**: Patient closes eyes & holds both arms out for 10 sec.
   - **Normal**: Both arms move the same or both arms do not move at all
   - **Abnormal**: One arm does not move or drifts down compared to the other

3. **ABNORMAL SPEECH**: Have the patient say “you can’t teach an old dog new tricks.”
   - **Normal**: Patient uses correct words with no slurring
   - **Abnormal**: Patient slurs words, uses the wrong words, or is unable to speak

**INTERPRETATION**: If any 1 of these 3 signs is abnormal, the probability of a stroke is 72%
Determining Last Known Well

- Clarify when the person was last seen NORMAL or at baseline
- Try help identify a timeframe if they are unable to recall LKW
- Try to avoid “minutes ago”; convert to an actual time
Transfer of Stroke Patients

Considerations:

• Pre-determined triage plan for EMS
• No more than 15 minute delay
• Air transport similar to trauma
• TIME OF ONSET
ND Acute Stroke Treatment Guidelines

Fax this packet as soon as possible to the appropriate number below with the following documents:

- Lab
- NIHSS
- ED Records
- EKG
- Current Medication List
- Any other supporting documents

One-Call Numbers/Fax for Transfers

Altru Health System—Grand Forks
Phone: 701-790-5206 or 1-855-425-8781
Fax: 701-790-1097

Essentia Health—Fargo
Phone: 701-304-CALL (2255) or 844-865-CALL (2255)
Fax: 701-304-6405

Sanford Health – Bismarck
Phone: 1-855-550-1225
Fax: 701-323-5151

Sanford Health—Fargo
Phone: 877-647-1225
Fax: 701-234-7263

CHI St. Alexius Health—Bismarck
Phone: 701-530-7699 or 1-877-735-7699
Fax: 701-530-7005

Trinity Health—Minot
Phone: 701-857-3000 or 1-800-223-1506
Fax: 701-857-3260

Reminder!
Please Fax Documents

Door
NIHSS

• National Institutes of Health Stroke Scale (NIHSS)
• Since 1996 has been a standard of care in US stroke centers for ongoing neurological exam supported by ASA and Brain Attack Coalition
• Provides information useful for predicting outcomes
• Is reproducible and reliable if done consistently
Why Use the NIHSS?

Allows healthcare personnel to:

- Express our clinical exam
- Determine changes in neurological status
  - Improvement and deterioration
- Communicate patient status
# NIHSS and Outcomes

<table>
<thead>
<tr>
<th>Score</th>
<th>Stroke Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Stroke Symptoms</td>
</tr>
<tr>
<td>1-4</td>
<td>Minor Stroke</td>
</tr>
<tr>
<td>5-15</td>
<td>Moderate Stroke</td>
</tr>
<tr>
<td>16-20</td>
<td>Moderate to Severe Stroke</td>
</tr>
<tr>
<td>21-42</td>
<td>Severe Stroke</td>
</tr>
</tbody>
</table>
NIHSS Guiding Principles

• No coaching; unless specified in the instructions

• Record what the patient does; not what you think the patient can do

• The most reproducible response is generally the first response
# NIH Stroke Scale

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale Definition</th>
<th>Date/Time</th>
<th>Date/Time</th>
<th>Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Level of Consciousness (alert, drowsy, etc.)</td>
<td>0= Alert 1= Drowsy 2= Stuporous 3= Coma</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>1b. LOC Questions (Month, age)</td>
<td>0= Answers both correctly 1= Answers one correctly</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>1c. LOC Commands (Open, close, eyes, makes fist, let go)</td>
<td>0= Performs both correctly 1= Performs one correctly</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>2. Best Gaze (eyes open, patient follows examiner’s fingers/face)</td>
<td>0= Normal 1= Partial Gaze Palsy</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>3. Visual field (introduce visual stimulus or threat to patient’s visual field)</td>
<td>0= No visual loss 1= Partial hemianopia (blind) 2= Complete hemianopia 3= Bilateral hemianopia</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>4. Facial Palsy (chew teeth, raise eyebrow, and squeeze eye shut)</td>
<td>0= Normal 1= Minor paralysis 3= Complete paralysis</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>5a. Left Arm (Elevate extremity to 90° and score drift/movement)</td>
<td>0= No drift 1= Diff 2= Some effort against gravity 3= No effort against gravity 4= No movement UN= Amputation or joint fusion</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>5b. Right Arm (Elevate extremity to 90° and score drift/movement)</td>
<td>0= No drift 1= Diff 2= Some effort against gravity 3= No effort against gravity 4= No movement UN= Amputation or joint fusion</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>6a. Left Leg (Elevate extremity to 30° and score drift/movement)</td>
<td>0= No drift 1= Diff 2= Some effort against gravity 3= No effort against gravity 4= No movement UN= Amputation or joint fusion</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>6b. Right Leg (Elevate extremity to 30° and score drift/movement)</td>
<td>0= No drift 1= Diff 2= Some effort against gravity 3= No effort against gravity 4= No movement UN= Amputation or joint fusion</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>7. Limb Ataxia (Finger, nose, heel, down shin)</td>
<td>0= Absent 1= Present in one limb 2= Present in two limbs 3= Amputation or joint fusion</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
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<tr>
<td>8. Sensory (Pinprick to face, arm [trunk] and leg—compare side to side)</td>
<td>0= Normal 1= Mild to moderate sensory loss 2= Severe to total sensory loss</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
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<tr>
<td>9. Best Language (Name items, describe a picture and read sentences)</td>
<td>0= No aphasia, normal 1= Mild to moderate aphasia</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>10. Dysarthria (Evaluate speech clarity by patient’s repeating listed words)</td>
<td>0= Normal 1= Mild to moderate dysarthria 2= Severe dysarthria UN= inaudible</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
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<tr>
<td>11. Extinction and inattention (Use information from prior testing to identify neglect or double simultaneous stimuli)</td>
<td>0= No Neglect 1= Partial Neglect 2= Profound Neglect</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
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</tbody>
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# Data

## National Door to Needle Time Goals

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>0 min</td>
<td>Symptoms identified</td>
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<tr>
<td>10 min</td>
<td>Physician evaluation</td>
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<tr>
<td>25 min</td>
<td>Head CT w/o contrast; Labs sent</td>
</tr>
<tr>
<td>45 min</td>
<td>CT &amp; labs results; ECG &amp; CXR completed</td>
</tr>
<tr>
<td>60 min</td>
<td>IV alteplase initiated</td>
</tr>
</tbody>
</table>
Ischemic Stroke Imaging

CT Scanning
Ischemic Stroke Imaging

MRI Scanning
Decision

- Type of Stroke
- Time of Onset
- Severity of Stroke
- Risk and Benefits
Ischemic Stroke Treatment

- **Within 0 to 4.5 hours of symptom onset:**
  - IV alteplase
  - Intra-arterial (IA) alteplase
  - Endovascular retrieval
- **Within 6 hours of symptom onset:**
  - IA alteplase
  - Endovascular retrieval
- **Within 0 to 24 hours of symptom onset:**
  - Endovascular retrieval (depending on the area of occlusion and extent of the infarct)
Alteplase

- Alteplase is considered the “standard of care” for acute ischemic stroke
  - Research supports the use of Activase in the AHA/ASA guidelines published in 2013 and in 2007 (Class 1, Level of Evidence A recommendation)

- Alteplase is FDA approved for use in acute ischemic stroke
  - 3 hour time window (FDA approved)
  - 4.5 hour time window (not FDA approved, but supported by research and is accepted practice for appropriate candidates)
IA Alteplase

- Can be used within 6 hours from Last Known Well
- Small vessel or large vessel occlusions
- Can be used in combination with IV alteplase and endovascular therapies
Interventional Therapy

- Up to 6 hours after last known well (typically)
- May be done as long as 24 hours after last known well
- CT or MR-Perfusion helps to determine candidates for intervention
- Now considered to be the Standard of Care along with IV alteplase
Interventional Therapy (Endovascular)
Ischemic Penumbra

Ischemic tissue potentially destined for infarction but not yet irreversibly injured and the target of acute therapies.
Drug

- Give within 0-4.5 hours of Last Known Well
- Patient must meet criteria
- Works well for small vessel strokes
- Can be helpful in large vessel strokes

– Remember: Time is Brain!!
tPA (tissue plasminogen activator)

• tPA is also called Activase or Alteplase

• Mechanism of action:
  – Binds to fibrin in the thrombus and converts entrapped plasminogen to plasmin, initiating local fibrinolysis

Retrieved from www.cathflo.com
Alteplase Exclusion Criteria

• See alteplase Inclusion/Exclusion Criteria form
• Key exclusion criteria to consider right away:
  – Hemorrhage on CT
  – INR > 1.7
  – Beyond the 4.5 hour time window for any patient
  – BP > 185/110 despite treatment
Monitoring

- Before bolus: Full NIHSS and baseline VS
- During infusion: VS and abbreviated NIHSS
  - Q15” x 2 hours, then
  - Q 30” x 6 hours, then
  - Q 1 hour x 16 hours

________

Full 24 hours of close monitoring

- Documentation is key!!
# Vital Signs and Neuro Check Flow Sheet

To be initiated at the Critical Access Hospital and continued by EMS. Please highlight or indicate when hand off occurred.

<table>
<thead>
<tr>
<th>Date:</th>
<th>Time</th>
<th>Baseline</th>
<th>15 min</th>
<th>30 min</th>
<th>45 min</th>
<th>1 hr</th>
<th>1.25 hr</th>
<th>1.75 hr</th>
<th>2 hr</th>
<th>2.25 hr</th>
<th>2.5 hr</th>
<th>2.75 hr</th>
<th>3 hr</th>
<th>3.5 hr</th>
<th>4 hr</th>
<th>4.5 hr</th>
<th>5 hr</th>
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</table>

**BP**

**P**

**R**

**Temp**

**SpO2 RA/02**

**Pain - H/A**

### Neuro Checks:

#### Level of Consciousness (LOC)
- **A:** alert
- **C:** confused
- **L:** lethargic
- **S:** stuporous
- **O:** comatose

**LOC Questions - month / ago**

**LOC Commands**
- open/close eyes
- squeeze/release hands

**Right pupil size/response**

**Left pupil size/response**

**Extraocular Movements (EOMs)**
- normal =
- 0 gaze abnormal in one or both eyes
- 1 eyes deviated and fixed = 2

**Visual fields**
- Normal - recognize finger movement in all 4 quad = N
- Right visual field defect = R
- Left visual field defect = L

**Facial symmetry (+/-)**

| Motor arms R/L | / | / | / | / | / | / | / | / | / | / | / | / |
| Motor Legs R/L | / | / | / | / | / | / | / | / | / | / | / | / |
| Arm sensation (+/-) R/L | / | / | / | / | / | / | / | / | / | / | / | / |
| Leg sensation (+/-) R/L | / | / | / | / | / | / | / | / | / | / | / | / |

**Speech**
- No wrong words, no slurring = N
- Wrong words = W
- Slurring = S

**RN / EMS initials:**

### Motor Scale
- 5: normal strength (no drift)
- 4: against some resistance (drift)
- 3: overcomes gravity
- 2: can't overcome gravity
- 1: flicker of muscle
- 0: no movement, flaccid

### Pupil Size

<table>
<thead>
<tr>
<th>Pupil Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mm</td>
</tr>
</tbody>
</table>

### Pupil Response
- (+): present
- (-): absent
- NR: no response

### LOC Questions / Commands
- "You can't teach an old dog new tricks"
- "No ifs ands or buts about it"

<table>
<thead>
<tr>
<th>Patient Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: answers/obeys both correctly</td>
</tr>
<tr>
<td>1: answers/obeys one correctly</td>
</tr>
<tr>
<td>2: incorrect</td>
</tr>
</tbody>
</table>
After Giving Alteplase

• Avoid:
  – Intra-arterial catheters, NG tubes, foley placement, IV sticks for 24 hours
  – No antithrombotics/antiplatelets/anticoagulants for 24 hours (aspirin, heparin, plavix, coumadin, etc…)
What are You Monitoring For?

- Any new bleeding
- Any sign of hemorrhage in the brain
  - Sudden neurologic decline
  - New headache
  - Nausea/Vomiting
  - Sudden rise in BP
- Angioedema
What to do if S/S of Bleeding?

- Stop the drug
- Notify provider immediately
- Prepare for STAT head CT
- Prepare to draw Type & Cross
- Order coag lab tests
Is Alteplase Dangerous?

• NINDS pivotal trial: patients who received alteplase had a 6.4% risk of having an ICH vs 0.6% from placebo
  – Study done in 1995
  – Patients who received alteplase were 33% more likely to experience MINIMAL to NO disability at 3 months vs. placebo

• Time is Brain!!
  • Symptomatic ICH rates decrease as time to treatment decreases
  • Every 15 minute faster interval was associated with:
    • Fewer sICH
    • Reduced in-hospital mortality
    • More patients with independent ambulation at discharge
    • More patients discharged home
Disposition

- Stroke Units or Intensive Care Units
- Evidence-based stroke care
- Stroke etiology
What does the future look like…?

• Identification of Large Vessel Occlusions (LVO) in the Field
  – More significant deficits
  – Higher morbidity and mortality

• Regional Stroke Systems
  ✓ ND and MN developing systems currently!
Questions?
Thank You!

For More Information or Resources Contact:

Megan Carlblom, Stroke Program Manager at Essentia Health-Fargo at (701).364.4398
References


