Recognize Subtle Stroke Signs: Quick Action Saves Brain

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The speaker has no disclosures to report
Webinar Goal
Recognize symptoms of acute stroke and interventions that will improve patient outcomes

Session Topics
- Application of the NIH Stroke Scale to hospitalized patients
- Correlation of signs and symptoms of acute stroke to neuroanatomy
- Priority interventions that improve outcomes in acute stroke
In-Hospital Ischemic Stroke

Up to 17% of all strokes occur during hospitalization

In-hospital stroke patients:

- Are **more likely** to have symptoms that mimic stroke
- Are **less likely** to be candidates for thrombolytic therapy

In hospital patients have **worse outcomes** compared to patients with community-onset strokes

- Mortality rate 2–3 times greater
- Absolute mortality rates of 14% to 19%


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In-Hospital Ischemic Stroke

Characteristics of patients

- Median age 73 (53% women)
- Prior to admission:
  - 49% on antiplatelet therapy
  - 17% on anticoagulation
- Higher median National Institutes for Health Stroke Severity (NIHSS) score (9 inpatient vs 4 on new admission)
- Between 50% and 66% are cardiology or cardiovascular surgery patients

NIHSS SCALE

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What is the best method of evaluating patients for acute stroke?
Polling Question

How do you perform neuro assessment(s) on the patients in your unit?

a) Glasgow Coma Scale
b) FAST
c) NIH Stroke Scale
d) Hospital’s neuro assessment form
# NATIONAL INSTITUTES OF HEALTH STROKE SCALE

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1A</strong> Level Of Consciousness</td>
<td>0 – 3</td>
</tr>
<tr>
<td><strong>1B</strong> Level Of Consciousness Questions</td>
<td>0 – 2</td>
</tr>
<tr>
<td><strong>1C</strong> Level Of Consciousness Commands</td>
<td>0 – 2</td>
</tr>
<tr>
<td><strong>2</strong> Best Gaze</td>
<td>0 – 2</td>
</tr>
<tr>
<td><strong>3</strong> Visual fields</td>
<td>0 – 3</td>
</tr>
<tr>
<td><strong>4</strong> Facial palsy (paresis)</td>
<td>0 – 3</td>
</tr>
<tr>
<td><strong>5A</strong> Motor–Left arm</td>
<td>0 – 4, UN</td>
</tr>
<tr>
<td><strong>5B</strong> Motor–Right arm</td>
<td>0 – 4, UN</td>
</tr>
<tr>
<td><strong>6A</strong> Motor–Left leg</td>
<td>0 – 4, UN</td>
</tr>
<tr>
<td><strong>6B</strong> Motor–Right leg</td>
<td>0 – 4, UN</td>
</tr>
<tr>
<td><strong>7</strong> Limb Ataxia</td>
<td>0 – 2, UN</td>
</tr>
<tr>
<td><strong>8</strong> Sensory</td>
<td>0 – 2</td>
</tr>
<tr>
<td><strong>9</strong> Best Language</td>
<td>0 – 3</td>
</tr>
<tr>
<td><strong>10</strong> Dysarthria (articulation of words)</td>
<td>0 – 2, UN</td>
</tr>
<tr>
<td><strong>11</strong> Extinction</td>
<td>0 – 2</td>
</tr>
</tbody>
</table>

Adapted from NIH materials.  
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NIH Stroke Scale Assessment

Item 1: Level of Consciousness (LOC)

- 1a. LOC
  - Anesthesia does affect assessment
- 1b. LOC Questions
  - Age and month
- 1c. LOC Commands
  - Opens and closes eyes, grips

LOC changes can occur for many clinical reasons.
NIH Stroke Scale Assessment

Item 2: Best Gaze

- Normal
- Partial gaze palsy: one or both eyes
- Forced palsy: total gaze paresis not overcome by oculocephalic maneuver
NIH Stroke Scale Assessment

Item 3: Visual

- No visual loss
- Partial hemianopsia
- Complete hemianopsia
- Bilateral hemianopsia – Cortical blindness

PARTIAL HEMIANOPSIA

COMPLETE HEMIANOPSIA
NIH Stroke Scale Assessment

Item 4: Facial Palsy

- Normal symmetrical movement
- Minor paralysis
- Partial paralysis
- Complete paralysis

Adapted from the ACLS Cincinnati Stroke Scale.
NIH Stroke Scale Assessment

Items 5 and 6: Motor Arm and Motor Leg, Right and Left

- No drift; limb holds at 90° (or 45°) for full duration
- Drift; limb holds at 90° (or 45°), but drifts down to bed before time period up—does not hit bed
- Drifts to bed before time period; some effort against gravity
- No effort against gravity; limb falls to bed immediately
- No movement

Arm = 10 seconds
Leg = 5 seconds
NIH Stroke Scale Assessment

Items 7 and 8: Limb Ataxia and Sensory

**Limb Ataxia**
- Absent
- Present in one limb
- Present in two limbs
- Untestable (amputee, joint fusion)

**Sensory**
- Normal; no sensory loss
- Mild-to-moderate loss
- Severe-to-total loss
## NIH Stroke Scale Assessment

**Items 9 and 10: Language and Dysarthria**

<table>
<thead>
<tr>
<th>LANGUAGE</th>
<th>DYSARTHRIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>No aphasia, normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Mild-to-moderate aphasia</td>
<td>Mild-to-moderate</td>
</tr>
<tr>
<td>Severe aphasia</td>
<td>Severe</td>
</tr>
<tr>
<td>Mute, global aphasia</td>
<td></td>
</tr>
</tbody>
</table>
NIH Assessment: Speech

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.

MAMA
TIP – TOP
FIFTY – FIFTY
THANKS
HUCKLEBERRY
BASEBALL PLAYER

Courtesy National Institutes of Health.

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NIH Stroke Scale Assessment

Item 11: Extinction and Inattention

- No Abnormality
- Extinction to bilateral simultaneous stimulation in one sensory modality
- Profound hemi-inattention or extinction to more than one sensory modality
Case study: Correlating assessment findings to neuroanatomy
Case Study: Mrs. H.

• Mrs. H is a 74-year-old who underwent single vessel CABG and AVR after presenting with fatigue, dyspnea, and exercise intolerance. Her pre-op EF was 65%

• She has a history of hypertension, hyperlipidemia, diabetes type 2, stroke, asymptomatic carotid stenosis, and s/p left carotid endarterectomy
Case Study: Postoperatively

- At 1645 she arrives to the ICU sedated and intubated, GCS=3. Her post-op TEE shows no clot, EF 55%-60%, and a large left atrial appendage.

- Assessments at 2000 and 0000 both show a GCS=8. She is extubated at 0200 and is confused, not alert, disoriented.

- At 0800 assessment, she is sleeping unless stimulated. When awakened to bathe, RN notes that her left arm is not moving equally with right, and she is continually looking right.

- In-house code stroke called at 0815.
Case Study: Code Stroke Events

Stroke team notes last known well was immediately before surgery. Review of monitor shows NSR at 88 but episodes of rapid atrial fibrillation overnight.

Due to recent surgery, she is not a candidate for alteplase.

**Stroke Team Plan**

- Stat noncontrast CT
- Assessment with NIH Stroke Scale
- Notify neurologist and endovascular team, if available
Correlative Anatomy
Middle Cerebral Artery Blood Supply

Important: Distinguish receptive aphasia from confusion
Correlative Anatomy
Motor Homunculus
<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SCORE</th>
<th>CASE STUDY: MRS. H.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOC Ia</td>
<td>2</td>
<td>Required repeated stimulation to arouse</td>
</tr>
<tr>
<td>LOC Ib</td>
<td>2</td>
<td>Unable to answer correct month and age</td>
</tr>
<tr>
<td>LOC Ic</td>
<td>0</td>
<td>Opens and closes eyes and will grip hand on command</td>
</tr>
<tr>
<td>Best Gaze</td>
<td>1</td>
<td>Gaze Preference to right, but could look to left</td>
</tr>
<tr>
<td>Visual fields</td>
<td>2</td>
<td>Visual threat—complete hemianopia—visual field loss to left</td>
</tr>
<tr>
<td>Facial palsy</td>
<td>1</td>
<td>Left lower facial droop</td>
</tr>
<tr>
<td>Motor—right arm</td>
<td>0</td>
<td>No drift</td>
</tr>
<tr>
<td>Motor—left arm</td>
<td>3</td>
<td>No effort against gravity</td>
</tr>
<tr>
<td>Motor—right leg</td>
<td>0</td>
<td>No drift</td>
</tr>
<tr>
<td>Motor—left leg</td>
<td>1</td>
<td>Slight drift, does not touch the bed in 5 sec</td>
</tr>
<tr>
<td>Ataxia</td>
<td>0</td>
<td>Weakness on left – ataxia absent</td>
</tr>
<tr>
<td>Sensory</td>
<td>1</td>
<td>Pinprick on left elicits less moaning</td>
</tr>
<tr>
<td>Best Language</td>
<td>0</td>
<td>No aphasia</td>
</tr>
<tr>
<td>Dysarthria</td>
<td>1</td>
<td>Mild slurring of speech</td>
</tr>
<tr>
<td>Extinction</td>
<td>1</td>
<td>Visual hemi-inattention</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>Severe right hemisphere stroke</td>
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</table>
Case Study: CT Head Scan and CT Angiogram

CT HEAD
HYPER-DENSE RIGHT MCA SIGN, NO HEMORRHAGE

CT ANGIOGRAM
RIGHT MCA OCCLUSION

Images courtesy of Deborah Summers.

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Case Study: Cerebrovascular Angiogram

RIGHT MCA CLOT AT M1  →  STENT RETRIEVER  →  SUCCESSFUL REPERFUSION

Images courtesy Deborah Summers.

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In-Hospital Stroke

- 42% of strokes were identified on postoperative day 1 and additional 20% by day 2
- Chart reviews suggest the majority of strokes occur several days after surgery

Patients have worse outcomes compared to community-onset strokes

- Mortality rate 2–3 times greater
- Absolute mortality rates of 14% to 19%

How do we improve outcomes for patients who suffer in-hospital acute stroke?
In-Hospital Ischemic Stroke

Quality Gaps Identified
- Delay in recognizing acute stroke
- Delay in treating acute stroke
- Poor adherence to consensus measures
## Barriers and Solutions

### Delay in Recognizing Stroke

<table>
<thead>
<tr>
<th>BARRIERS</th>
<th>SOLUTIONS</th>
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<tbody>
<tr>
<td>Complex patents with multiple comorbidities</td>
<td>Educate hospital staff on stroke recognition</td>
</tr>
<tr>
<td>Routine nursing assessment is not sensitive to stroke signs</td>
<td>Develop in-hospital stroke prediction models to identify those at risk</td>
</tr>
<tr>
<td>Assessments spaced too far apart for early identification</td>
<td>Schedule neuro exams for patients at high risk</td>
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## Barriers and Solutions

### Delay in Treating Acute Stroke

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<tr>
<td>Stroke order sets often designed only for initial admission</td>
<td>Develop order sets for inpatient use</td>
</tr>
<tr>
<td>Many strokes occur on units not specializing in neurology</td>
<td>Post triggers for in-hospital stroke alerts</td>
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<tr>
<td>Primary team may not consult neurology</td>
<td>Collaborate on protocol for neurology consults</td>
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**BARRIERS**

- Stroke order sets often designed only for initial admission.
- Many strokes occur on units not specializing in neurology.
- Primary team may not consult neurology.

**SOLUTIONS**

- Develop order sets for inpatient use.
- Post triggers for in-hospital stroke alerts.
- Collaborate on protocol for neurology consults.
# Barriers and Solutions

**Poor Adherence to Consensus Measures**

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<th>SOLUTIONS</th>
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<tr>
<td>Low-volume but high-risk situation</td>
<td>Mock in-hospital stroke alerts to provide practice for staff</td>
</tr>
<tr>
<td>Absence of stroke response team</td>
<td>Consider stroke training for general rapid response team</td>
</tr>
<tr>
<td>Controversy over risk/benefit of transfer to stroke center</td>
<td>Rapid transportation protocol for in-hospital stroke evaluation</td>
</tr>
</tbody>
</table>
Summary

- Perioperative stroke is associated with **worse outcomes**
- Pre-op: **identify patients at high risk of stroke**
- Post-op: **increase assessment frequency, apply elements from the NIH Stroke Scale**
- **Collaborate to address barriers** that delay stroke treatment
Questions?
AACN Implementation
Tools and Resources

Designed to help you apply these practices in your environment

- **Tools and Tactics:** Blueprint for Recognizing Subtle Stroke Signs: Quick Action Saves Brain
- **Bridging the Gap:** A Gap Analysis
- NIH Stroke Scale
- Ask the Experts: Neurologic Assessment After Fibrinolytic Therapy for Myocardial Infarction
- Improving Recognition and Response to the Onset of Stroke
- Deficits Due to Right and Left Hemisphere Strokes

Find these tools on the Recognizing Subtle Stroke Signs webinar information page at [www.aacn.org/education/webinar-series](http://www.aacn.org/education/webinar-series)
References