Assessing disability in acute ischemic stroke: Beyond just the NIHSS

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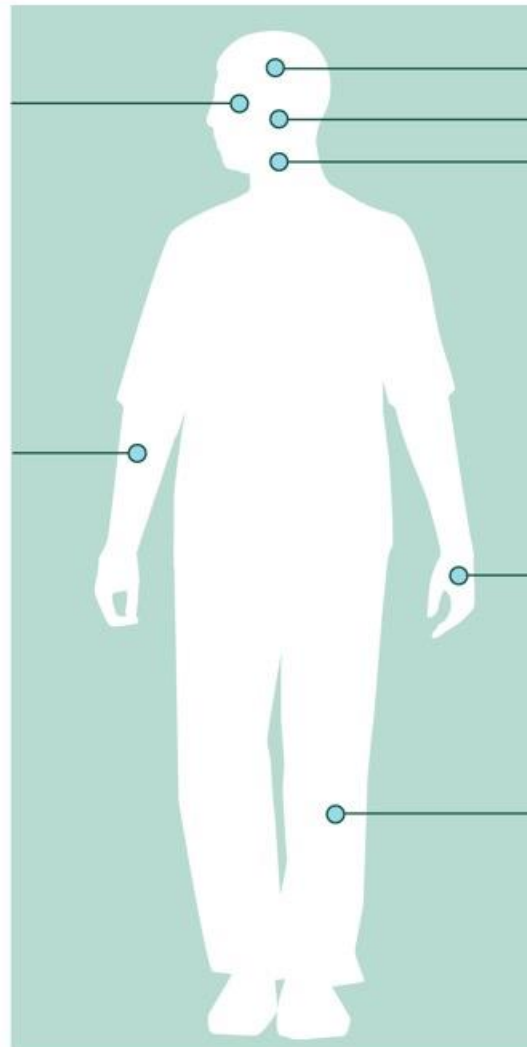
Today's objectives

At the end of this presentation, you will be able to:

- Discern what is and is not assessed by the NIHSS

- Explain why low NIHSS scores do not always equate to an absence of disability

- Recognize the importance of considering potential disability in stroke assessment

- List deficits that the AHA/ASA considers disabling

NIHSS measures stroke-related neurological deficits[1,2]

Best gaze
Visual fields
Extinction and inattention

Level of consciousness

Facial palsy

Best language
Dysarthria

Motor: arms
Limb ataxia
Extinction and inattention

Sensory
Extinction and inattention

Motor: legs
Limb ataxia
Extinction and inattention

References: 1. Kasner SE. *Lancet Neurol.* 2006;5:603-612. **2.** National Institutes of Health Stroke Scale. National Institute of Neurological Disorders and Stroke website. https://www.ninds.nih.gov/sites/default/files/NIH_Stroke_Scale.pdf. Accessed December 15, 2017.

Patient profile: JENNIFER

- 41-year-old woman
- Surgeon
- Lives an active lifestyle, regularly competes in triathlons

Presenting symptoms	Presenting total NIHSS score
Weakness to left leg and left arm, dizziness, nausea, headache	**2** **Question 5a** Left arm drift: score of 1 **Question 6a** Left leg drift: score of 1

Does Jennifer's total NIHSS score fully quantify her symptoms?

Patient profile: JONATHAN

- 66-year-old man
- Retired accountant
- Lives an independent lifestyle in the country

Presenting symptoms	Presenting total NIHSS score
Gait ataxia, diplopia, nystagmus, difficulty breathing, partial gaze palsy, mild loss of sensation	**2** **Question 2** Partial gaze palsy: score of 1 **Question 8** Mild sensory loss: score of 1

Does Jonathan's total NIHSS score fully quantify his symptoms?

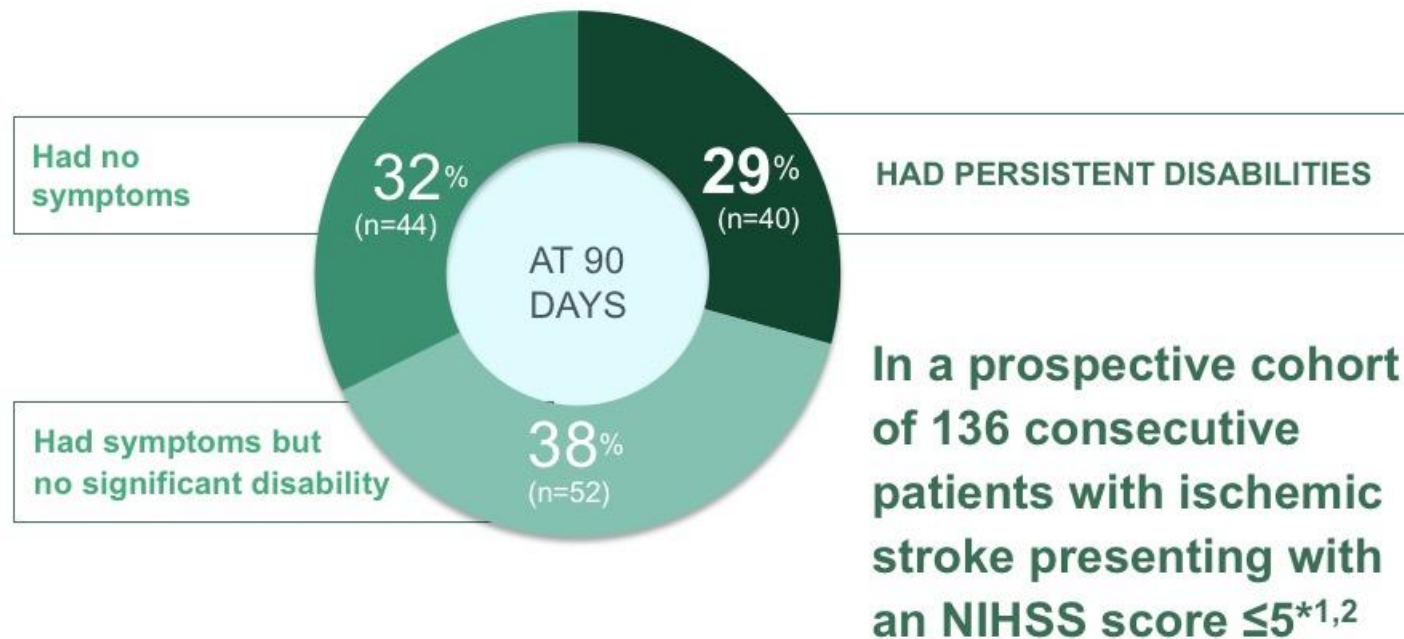# Not all strokes are adequately captured using the NIHSS[1]

The NIHSS scoring system is heavily biased toward anterior circulation and left-hemisphere strokes.[1]

Cranial nerve signs and ataxia, typical of posterior strokes, receive fewer points or are excluded entirely.[2]

Right-hemisphere strokes are often underestimated, as only 2 points are directed toward neglect, compared to 7 toward language.[3]

Due to this bias, certain strokes may receive low NIHSS scores that may not accurately quantify the patient's actual neurological deficits.[1]

References: 1. Martin-Schild S, et al. *Ann Emerg Med*. 2011;57:42-45. 2. Sato S, et al. *Neurology*. 2008;70:2371-2377. 3. Woo D, et al. *Stroke*.1999;30:2355-2359.

Patients with low NIHSS scores may have substantial rates of disability[1]

Had no symptoms

32% (n=44)

AT 90 DAYS

29% (n=40)

HAD PERSISTENT DISABILITIES

Had symptoms but no significant disability

38% (n=52)

In a prospective cohort of 136 consecutive patients with ischemic stroke presenting with an NIHSS score ≤5*[1,2]

*Eligible patients were ≥18 years of age, within 24 hours of symptom onset, and without a magnetic resonance imaging contraindication.

References: 1. Khatri P, et al. *Stroke*. 2012;43:560-562. **2.** Modified Rankin Scale. Internet Stroke Center website. http://www.strokecenter.org/wp-content/uploads/2011/08/modified_rankin.pdf. Accessed December 15, 2017.

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Even patients with an NIHSS score of 0 may have disability at discharge[1]

In an analysis using data from the GWTG–Stroke program[*1]:

Discharge outcome	NIHSS score = 0[†]	NIHSS score = 4
Unable to be discharged home	**15.5%** (n=500/3229)	**35.4%** (n=596/1682)
Nonambulatory at discharge	**16.1%** (n=488/3025)	**33.9%** (n=528/1557)

*Data from the GWTG–Stroke program: n=29,200 ischemic stroke patients from 1092 hospitals between 2003 and 2009 arriving within 2 hours after symptom onset.[1]

†An example is truncal ataxia.[2]

GWTG=Get With The Guidelines.

References: 1. Smith EE, et al. *Stroke*. 2011;42:3110-3115. **2.** Martin-Schild S, et al. *Ann Emerg Med*. 2011;57:42-45.

DISCUSSION QUESTION

How do you know if your patient's deficits will eventually be disabling?

Disability can be quantified using the modified Rankin Scale (mRS)[1]

An mRS score of 0 or 1 is often considered a favorable outcome after stroke.[2]

Score	Description
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
3	Moderate disability; requiring some help but able to walk without assistance
4	Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5	Severe disability; bedridden, incontinent, and requiring constant nursing care and attention
6	Dead

References: 1. Modified Rankin Scale. Internet Stroke Center website. http://www.strokecenter.org/wp-content/uploads /2011/08/modified_rankin.pdf. Accessed December 15, 2017. 2. Sulter G, et al. Stroke. 1999;30:1538-1541.

Patient profile: JENNIFER

- 41-year-old woman
- Surgeon
- Lives an active lifestyle, regularly competes in triathlons

Presenting symptoms	Presenting total NIHSS score	Projected mRS score
Weakness to left leg and left arm, dizziness, nausea, headache	**2**	**2 (slight disability)**

If this patient's condition does not improve, will she be able to return to her life as normal?

Patient profile: JONATHAN

- 66-year-old man
- Retired accountant
- Lives an independent lifestyle in the country

Presenting symptoms	Presenting total NIHSS score	Projected mRS score
Gait ataxia, diplopia, nystagmus, difficulty breathing, mild loss of sensation	**2**	**4 (moderately severe disability)**

If this patient's condition does not improve, will he be able to return to his life as normal?

Differentiate between disabling and nondisabling deficits on a patient-by-patient basis

The AHA/ASA considers the following deficits to be disabling[1]:

- Complete hemianopsia

- Severe aphasia

- Visual or sensory extinction

- Any weakness limiting sustained effort against gravity

- Any deficits that lead to a total NIHSS score >5

- Any remaining deficit the patient or practitioner considers potentially disabling (clinical judgment is required)

Reference: **1.** Demaerschalk BM, et al. *Stroke.* 2016;47:581-641.

Summary

- Although the NIHSS is an essential tool for assessing stroke, it is heavily biased toward anterior circulation strokes[1]

- Patients with low NIHSS scores, including those presenting with scores of 0, may have significant disability[2,3]

- It is recommended to differentiate between disabling and nondisabling deficits on a patient-by-patient basis[4]

References: 1. Martin-Schild S, et al. *Ann Emerg Med.* 2011;57:42-45. 2. Khatri P, et al. *Stroke.* 2012;43:560-562.
3. Smith EE, et al. *Stroke.* 2011;42:3110-3115. 4. Demaerschalk BM, et al. *Stroke.* 2016;47:581-641.

Questions ?