National Institutes of Health Stroke Scale in Plain English: Reliable for Novice Users with Minimal Training
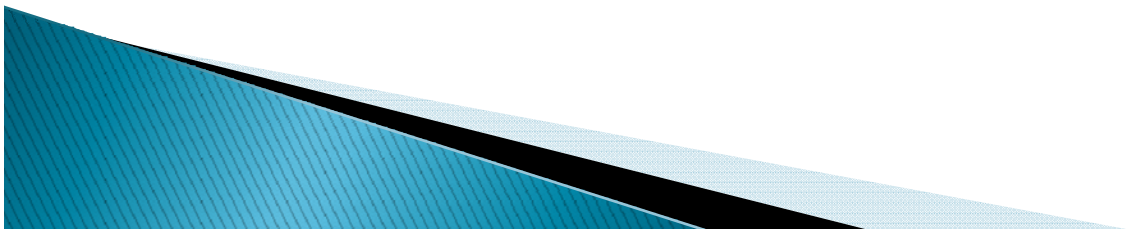
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I have no conflicts of interest to disclose.

NIH Stroke Scale

- Preferred assessment tool for Primary Stroke Center certification
- Required for most stroke clinical trials

NIH Stroke Scale in Plain English: Background

- Infrequent users of NIHSS find it:
  - Difficult to use
  - Time consuming
  - Intimidating
- So, we simplified it:
  - Developed by multidisciplinary team
  - Translated neuro terminology
 - No deleted components or changes to scoring

Providence Portland Medical Center

NIH STROKE SCALE IN PLAIN ENGLISH

Sedating medications affecting scale? (Circle Y or N) ➡		Y / N
Date / Time / Initials ➡		

1a. Level of Consciousness	0= Alert 1= Sleepy but arouses 2= Can't stay awake 3= No purposeful response	
1b. Questions (month, age)	0=Both correct 1=One correct /intubated 2=Neither correct	
1c. Commands (Close eyes, make fist)	0= Obeys both 1= Obeys one 2= Obeys neither	
2. Lateral Gaze (Eyes open. Eyes follow examiners fingers/face side-to-side)	0= Normal side-to-side eye movement 1= Partial side-to-side eye movement 2= No side-to-side eye movement	
3. Visual Fields (Both eyes open, count 1/2/5 fingers/detect movement, 4 visual fields	0= Normal visual fields ⊕ 1= Blind upper or lower field one side. 2= Blind upper & lower field one side. 3= Blind in both eyes/4 fields ●	
4. Facial Weakness (Smile/grimace, raise eyebrows, squeeze eyes shut)	0= Normal 1= Mild one sided droop with smile 2= Obvious droop at rest 3= Upper & lower face weak	

5a. Arm Weakness– Left **5b. Arm Weakness– Right** (Pt. holds arm at 90° if sitting, 45° if supine for 10 sec.)	0= No drift X 1= Drifts dow 2= Drifts dow 3= Can move 4= No movem	**6a. Leg Weakness– Lt** **6b. Leg Weakness– Rt** (Pt. holds leg straight out if sitting, 30° if supine) 5 sec.	0= No drift X= Untestable,joint fused, etc 1=Drifts down, does not hit bed 2= Drifts down to hit bed 3= Can move but can't lift 4= No movement	Lt. Rt.	
		7. Coordination Finger-to-nose, heel-to-shin. Score only if not caused by weakness.	0= Normal or no movement 1= Clumsy in one limb 2= Clumsy in two limbs		
		8. Sensation (feeling) (Pin prick face, arm, leg – compare sides)	0= Normal 1= Decreased sensation 2= Can't feel, no pain withdrawal		
		9. Speech (content) Intubated pt can write. Give blind pt objects to name. (name objects, describe cookie picture)	0= Correct full sentences 1= Wrong or incomplete sentences 2= Words don't make sense 3= Can't speak at all		
		10. Speech (slurring) Slurring. (Listen to patient read/repeat words)	0= No slurring X= Intubated/physical barrier 1= Slurs but you can understand 2= Slurs and you can't understand or mute		
		11. Neglect (Ignores one side of body; test vision then test touch on both sides at once)	0= Sees & feels when both sides tested at once. 1= Doesn't see or feel one side when tested at once 2= Doesn't see & feel one side when tested at once		

NIH Stroke Scale *in plain English*				NIH Stroke Scale	
3. **Visual Fields** (Both eyes open, count 1/2/5 fingers/detect movement, 4 visual fields)	0=Normal visual fields 1=Blind upper **or** lower field one side. 2=Blind upper **&** lower field one side. 3=Blind in both eyes/4 fields			**3**. **Visual Fields** (Introduce visual stimulus/threat to pt's visual field quadrants)	0 = No visual loss 1 = Partial Hemianopia 2 = Complete Hemianopia 3 = Bilateral Hemianopia (blind)

|					
7. **Coordination** (Finger-to-nose, heel-to-shin) Score <u>only</u> if not caused by weakness.	0=Normal or **no movement** 1=Clumsy in one limb 2=Clumsy in two limbs			**7. Limb Ataxia** (Finger-nose, heel down shin)	0 = No ataxia 1 = Present in one limb 2 = Present in two limbs
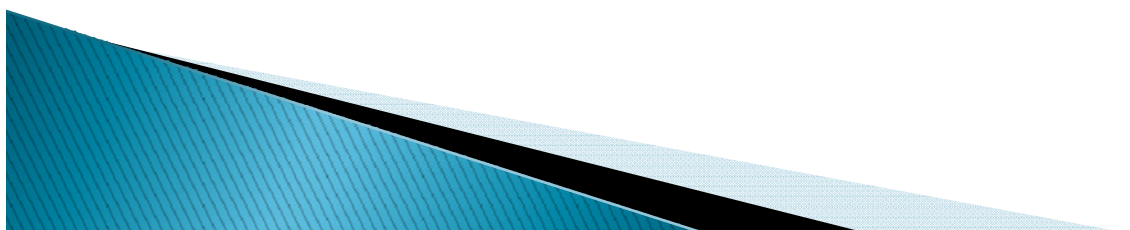
National Institutes of Health Stroke Scale Reliable and Valid in Plain English

Sandy Dancer, Allen J. Brown, Lisa Rietz Yanase

ABSTRACT

The National Institutes of Health Stroke Scale (NIHSS) is commonly used in the assessment of stroke severity. Nurses who use the tool infrequently find it difficult to use due to the neurologic terminology embedded in the scale. For this project, we modified the NIHSS by replacing the neuroterminology for each component of the original scale with plain English. No components were deleted or changed; the language was merely simplified. Testing showed the modified tool to be reliable (0.96) and valid (0.977) when compared with the NIHSS.
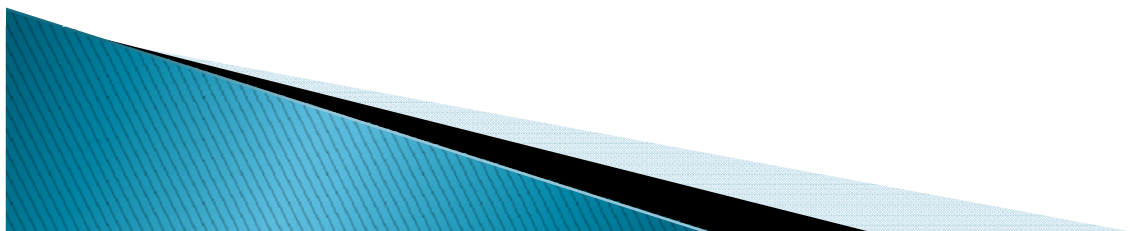
Phase I:
Is the NIHSS-PE Reliable and Valid?

- Volunteer RN's
- AHA NIHSS training DVD
- Certification video patients
- NIHSS vs. NIHSS-PE

		NIHSS	NIHSS-PE
Novice	16	X	X
Competent	15	X	X
Expert	15	X	X
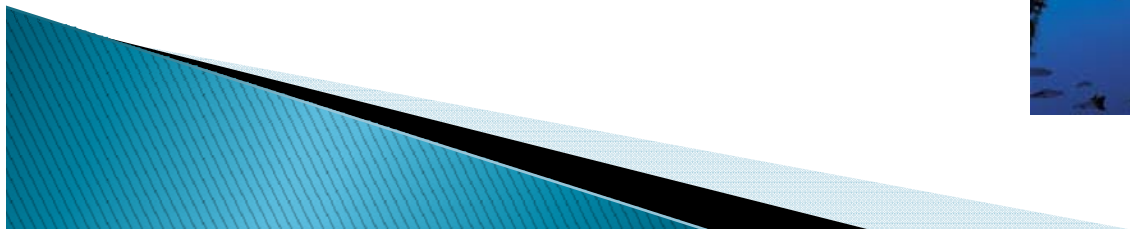
NIHSS-PE: Reliable and Valid

Reliability	NIHSS	NIHSS-PE
Omega Heise & Bohrnstedt	0.964	0.974
Alpha Cronbach	0.854	0.849

| Validity	NIHSS	NIHSS-PE
Concurrent Validity (Total Score Correlation of NIHSS-PE to NIHSS)	-------	0.977
Heise & Bohrnstedt Validity (Correlation with 1st factor)	0.979	0.977

Phase II:

Can naïve users of the NIHSS-PE (ie, rural ED MD/RN's) get reliable scores to communicate with telestroke or other referral centers, *with little to no training?*
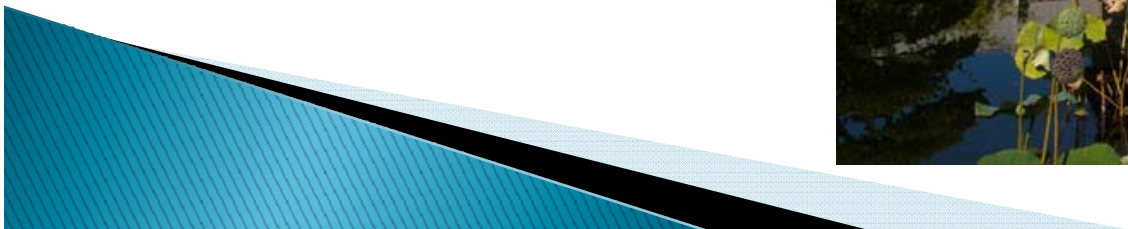
Hypotheses

1. Trained will perform better than untrained on both scales. (Trained > Untrained)

2. NIHSS-PE will perform at least as well as NIHSS.

   (NIHSS-PE $\geq$ NIHSS)

3. Untrained NIHSS-PE will perform similarly to trained NIHSS.

   (Untrained NIHSS-PE =
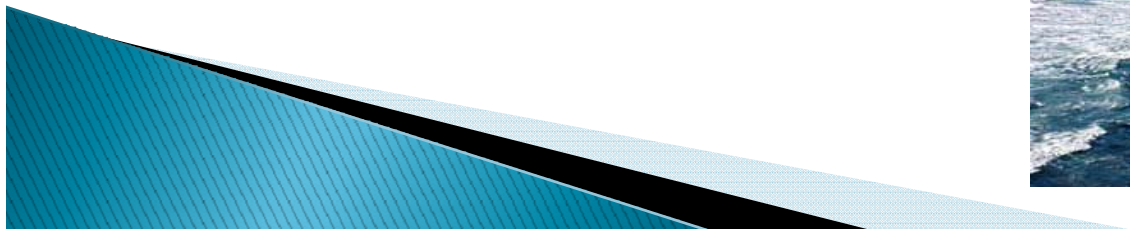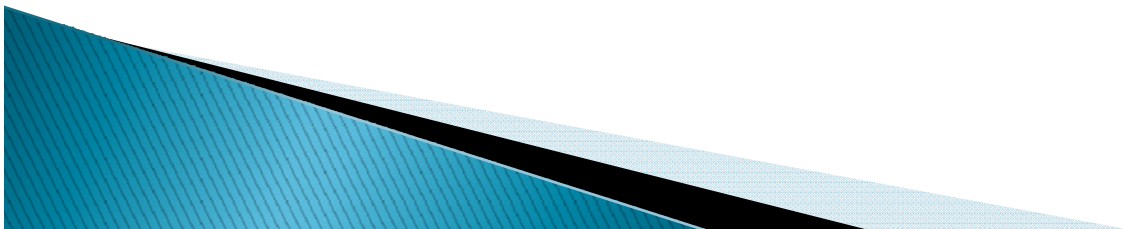
          Trained NIHSS)

Study Design

	Trained	Untrained
NIHSS	31* (25.4%)	30 (24.5%)
NIHSS-PE	31** (25.4%)	30 (24.5%)

*AHA DVD (55 min)
**Providence Stroke Team Power Point (13 min)

Methods

- Patients #1,3,5 (AHA NIHSS certification DVD)
- Gold standard: Expert panel
- Test group: Univ. of Portland Nursing students
- Analysis per General Linear Model

Results: Trained vs. Untrained (Deviation=|Participant score – Expert score|)

Pt # (Expert score)		Pt 1 (5)		Pt 3 (7)		Pt 5 (12)		Overall		
	n	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Sig
Untrained	60	2.5	2.4	3.4	2.7	4.6	2.4	3.5	2.5	0.011
Trained	62	2.8	1.5	2.1	2.2	3.3	2.7	2.7	2.3	

Hypothesis 1:Trained will perform better than untrained on both scales.
(Trained > Untrained)
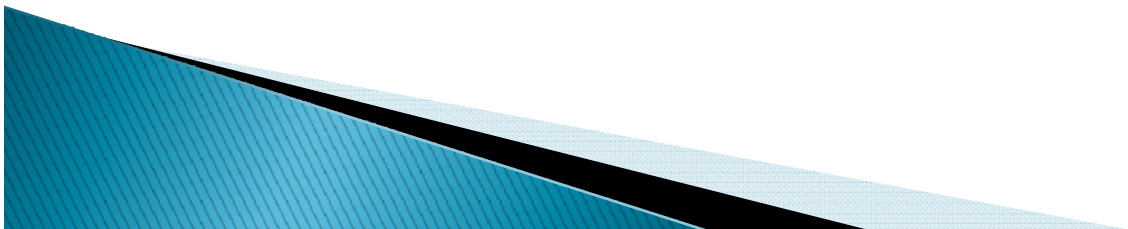
Results: NIHSS–PE vs. NIHSS
(Deviation=|Participant score – Expert score|)

| Pt # (Expert score)		Pt 1 (5)		Pt 3 (7)		Pt 5 (12)		Overall		
	n	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Sig
NIHSS–PE	61	2.3	1.3	2.0	2.0	4.1	2.7	2.8	2.1	0.033
NIHSS	61	3.0	2.5	3.5	2.8	3.7	2.6	3.4	2.7	

Hypothesis 2: NIHSS-PE will perform at
least as well as NIHSS.
(NIHSS-PE $\geq$ NIHSS)
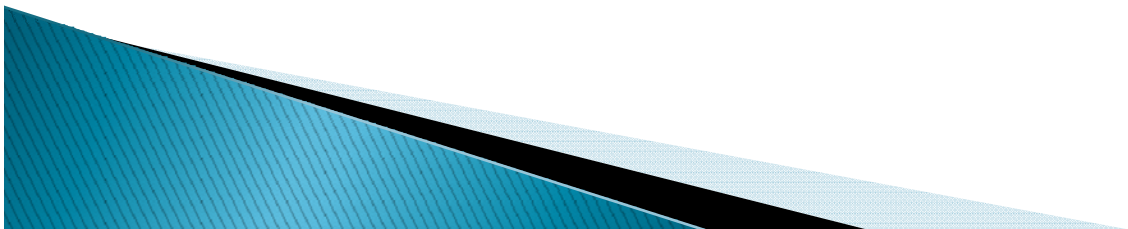
Results: Untrained NIHSS–PE vs. Trained NIHSS (Deviation=|Participant score – Expert score|)

Pt # (Expert score)		Pt 1 (5)		Pt 3 (7)		Pt 5 (12)		Overall		
	n	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Sig
NIHSS–T	31	3.0	1.7	2.6	2.3	3.0	2.9	2.9	2.3	0.176
NIHSS–PE–T	31	2.7	1.4	1.6	2.1	3.6	2.6	2.6	2.2	
NIHSS–U	30	3.1	3.2	4.4	3.1	4.4	2.1	4.0	2.9	
NIHSS–PE–U	30	2.0	1.1	2.5	1.8	4.7	2.8	3.0	2.0	

Hypothesis 3: Untrained NIHSS-PE will perform similarly to trained NIHSS.
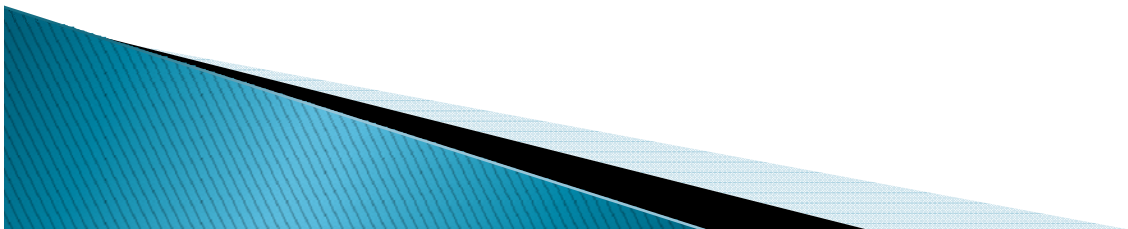(Untrained NIHSS-PE = Trained NIHSS)
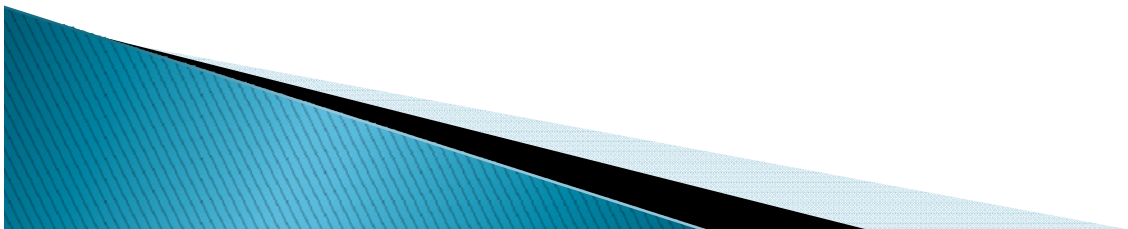
Conclusions

▸ Phase I:

The NIHSS-PE is reliable and valid compared to the NIHSS.

▸ Phase II:

With minimal training, infrequent or novice users of the NIHSS-PE can get reliable scores of stroke severity.
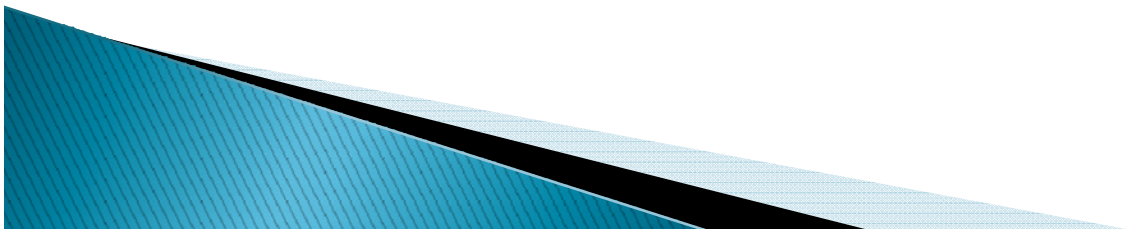
Implications

▸ We hope that this user-friendly version will make the NIHSS more accessible to rural and small sites, allowing more confident assessment of stroke patients.
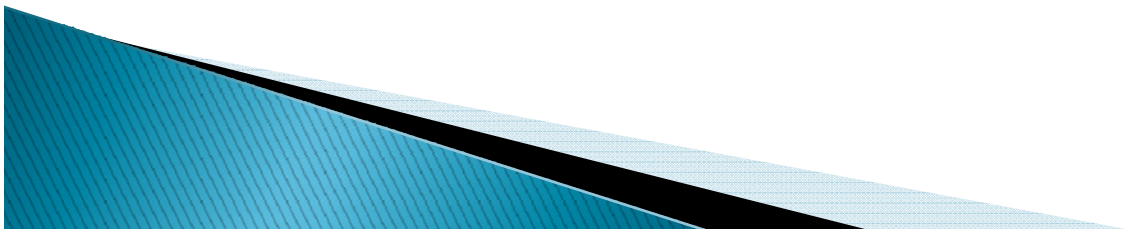
Thank You,

and Thanks to:

University
of Portland

The Providence Medical Foundation
sandy.dancer@providence.org

1a. Level of Consciousness (Alert, drowsy, etc.)	0 = Alert 1 = Drowsy 2 = Stuporous 3 = Coma		
1b. LOC Questions (Month, age)	0 = Answers both correctly 1 = Answers one correctly 2 = Incorrect		
1c. LOC Commands (Open/close eyes, make fist/let go)	0 = Obeys both correctly 1 = Obeys one correctly 2 = Incorrect		
2. Best Gaze (Eyes open - patient follows examiner's finger or face)	0 = Normal 1 = Partial gaze palsy 2 = Forced deviation		
3. Visual Fields (Introduce visual stimulus/threat to pt's visual field quadrants)	0 = No visual loss 1 = Partial Hemianopia 2 = Complete Hemianopia 3 = Bilateral Hemianopia (Blind)		
4. Facial Paresis (Show teeth, raise eyebrows and squeeze eyes shut)	0 = Normal 1 = Minor 2 = Partial 3 = Complete		
5a. Motor Arm - Left 5b. Motor Arm - Right (Elevate arm to 90° if patient is sitting, 45° if supine)	0 = No drift 1 = Drift 2 = Can't resist gravity 3 = No effort against gravity 4 = No movement X = Untestable (Joint fusion or limb amp)	Left	
		Right	

6a. Motor Leg - Left 6b. Motor Leg - Right (Elevate leg 30° with patient supine)	0 = No drift 1 = Drift 2 = Can't resist gravity 3 = No effort against gravity 4 = No movement X = Untestable (Joint fusion or limb amp)	Left	
		Right	
7. Limb Ataxia (Finger-nose, heel down shin)	0 = No ataxia 1 = Present in one limb 2 = Present in two limbs		
8. Sensory (Pin prick to face, arm, trunk, and leg - compare side to side)	0 = Normal 1 = Partial loss 2 = Severe loss		
9. Best Language (Name item, describe a picture and read sentences)	0 = No aphasia 1 = Mild to moderate aphasia 2 = Severe aphasia 3 = Mute		
10. Dysarthria (Evaluate speech clarity by patient repeating listed words)	0 = Normal articulation 1 = Mild to moderate slurring of words 2 = Near to unintelligable or worse X = Intubated or other physical barrier		
11. Extinction and Inattention (Use information from prior testing to identify neglect or double simultaneous stimuli testing)	0 = No neglect 1 = Partial neglect 2 = Complete neglect		