NIH Stroke Scale

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Purpose The purpose of this course is to explain how to administer the NIH Stroke Scale, consistently and accurately.

Goals Upon completion of this course, the healthcare provider should be able to:

- Explain the purpose of the NIH Stroke Scale.
- Explain the 11 items in the stroke scale.
- Explain visual field testing.
- Discuss scoring parameters for all 11 items.
- Discuss methods of administering each item.

Introduction

Most stroke patients are seen initially by first responders and then emergency room nurses and doctors rather than neurologists or neurosurgeons. Numerous assessment scales for stroke have been used, but this has made consistent evaluation of condition and progress difficult. The National Institutes of Health developed to NIH Stroke Scale to provide a common language and method of assessment for all healthcare providers.

This scale focuses on functional impairment and ensures the patient is thoroughly examined consistently. The results are easily communicated and understood when patient care is transferred and when the patient's progress is assessed.

Studies have shown that a patient's NIH Stroke Scale results correlate with long-term progress. That is, those with low scores of 4 to 5 usually have positive outcomes, and those with higher scores have more severe impairment and more guarded outcomes. The NIH Stroke Scale can be easily administered in about 5 minutes.

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Elements of the NIH Stroke Scale

Healthcare providers administering the NIH Stroke Scale should be specifically trained to use the scale and should have a copy of the scale available when administering the assessment. Without training, the results are likely to be inconsistent.

Instructions
Administer stroke scale items in the order listed. Record performance in each category after each subscale exam. Do not go back and change scores. Follow directions provided for each exam technique. Scores should reflect what the patient does, not what the clinician thinks the patient can do. The clinician should record answers while administering the exam and work quickly. Except where indicated, the patient should not be coached (i.e., repeated requests to patient to make a special effort).

It's especially important to do the scale in order, starting with item 1 and moving through the evaluation to item 11. Do not skip any question because the examiner assumes he or she knows the answer. Generally, the patient's first response is the one scored, and once the healthcare provider has entered a score, that score should not be changed. Additionally, the patient should be scored for actual performance, not the healthcare provider's expectations of what the patient can or should be able to do.

The examiner should not tell the patient the purpose of the testing as a whole or the individual items as this may increase patient anxiety. Before beginning the evaluation, the examiner should ensure that he or she has a copy of the scale and the picture and word cards necessary for testing. The examiner should score after each item rather than relying on memory to fill out the scores after completion of testing.

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1a Level of Consciousness	
The investigator must choose a response if a full evaluation is prevented by such obstacles as an endotracheal tube, language barrier, orotracheal trauma/bandages. A 3 is scored only if the patient makes no movement (other than	0 = **Alert;** keenly responsive. 1 = **Not alert**; but arousable by minor stimulation to obey, answer, or respond. 2 = **Not alert**; requires repeated stimulation to attend, or is obtunded and requires strong or

reflexive posturing) in response to noxious stimulation.	painful stimulation to make movements (not stereotyped). 3 = Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, and areflexic.

Level of Consciousness is assessed by greeting the patient, introducing yourself, and asking simple questions, such as "How are you feeling" and "Do you have any pain?" A patient with no impairment should respond readily; and, if speech is not impaired, verbally. Those with speech impairment may attempt to speak, speak slowly and deliberately, or use body language or gestures, so careful observation is necessary.

Remember that this is testing level of consciousness and not speech ability, so one should not assume that a person is not alert just because the person can't speak.

Scoring:

- A patient who answers readily and appears to comprehend is scored as 0.
- If the examiner must repeat the question because the patient doesn't appear to understand or touch or otherwise stimulate the patient to get a response, then this is scored as 1 or 2, depending on the degree of stimulation needed.
- A person who responds by movement only to painful stimuli, such as pinching of the nail beds, is scored as a 2.
- Those who are totally non-responsive, such as comatose patients, or have only reflexive posturing to noxious stimuli (rubbing chest or pinching nailbed) are scored as 3.

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Note: While medical translators are more appropriate than family members for translation during history and physical, for this scale family members or friends may be asked to translate for the healthcare provider and patient as the instructions and responses are usually simple.

1b. LOC Questions	
The patient is asked the month and his/her age. The answer must be correct - there is no partial credit for being close. Aphasic and	0 = **Answers** both questions correctly. 1 = **Answers** one question

stuporous patients who do not comprehend the questions will score 2. Patients unable to speak because of endotracheal intubation, orotracheal trauma, severe dysarthria from any cause, language barrier, or any other problem not secondary to aphasia are given a 1. It is important that only the initial answer be graded and that the examiner not "help" the patient with verbal or non-verbal cues.	correctly. 2 = **Answers** neither question correctly.

Part 1b tests the level of consciousness as well as the ability to comprehend and answer questions. Two questions are posed:

- What month is it?
- How old are you?

The examiner should not coach the patient ("almost," "try again") or signal by facial expression that an answer is right or wrong but should simply score the answers given (or NOT given); however, if a patient spontaneously corrects an answer, such as "I'm 72, no….uh….73," then the correction is accepted as the response.

If the patient cannot speak, the examiner should ask the patient if he or she is able to write and provide a pencil/pen and paper. Spoken or written responses are equally valid. Misspellings should be ignored as long as writing can be understood.

Scoring:

- Patients who answer both questions correctly are scored as 0.
- Patients who are not able to respond verbally or in writing because of intubation, trauma or other problems (excluding aphasia) are given a score of 1.
- Patients who answer one question correctly are scored as 1 as well.
- However, aphasic patients who cannot respond or comatose patients are given a score of 2.

1c. LOC Commands	
The patient is asked to open and close the eyes and then to grip and	0 = **Performs** both tasks correctly.

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release the non-paretic hand. Substitute another one step command if the hands cannot be used. Credit is given if an unequivocal attempt is made but not completed due to weakness. If the patient does not respond to command, the task should be demonstrated to him or her (pantomime), and the result scored (i.e., follows none, one or two commands). Patients with trauma, amputation, or other physical impediments should be given suitable one-step commands. Only the first attempt is scored	1 = **Performs** one task correctly. 2 = **Performs** neither task correctly.

When asking the patient to carry out a physical action, make sure the patient is focusing on you and whenever possible demonstrate as well as direct the patient. For example, state, "I want you to open your eyes wide and then close them tightly" and demonstrate the action you want.

Next, ask the patient to make a tight fist and then relax the hand on the non-paralyzed side or sides. Again, providing an example is especially valuable for those who have difficulty comprehending speech or speak another language. If the patient cannot make a fist for some reason, such as amputation, then ask the patient to carry out another simple on-step command, such as "Point your toes to the ceiling and then the wall."

Scoring:

It's important to score the patient's first attempt. This is fairly simple to score as the patient is scored according to the ability to do both, one, or no tasks.

- Both tasks correctly done, score 0.
- One task correctly done, score 1.
- Neither task done correctly, score 2.

2. Best Gaze	
Only horizontal eye movements will be tested. Voluntary or reflexive (oculocephalic) eye movements will be scored, but caloric testing is not done. If the patient has a conjugate deviation of the eyes that can be overcome by voluntary or reflexive activity, the score will be 1. If a patient has an isolated peripheral nerve paresis (CN III, IV or VI), score a 1. Gaze is testable in all aphasic patients. Patients with ocular trauma, bandages, pre-existing blindness, or other disorder of visual acuity or fields should be tested with reflexive movements, and a choice made by the investigator. Establishing eye contact and then moving about the patient from side to side will occasionally clarify the presence of partial gaze palsy.	0 = **Normal.** 1 = **Partial gaze palsy;** gaze is abnormal in one or both eyes, but forced deviation or total gaze paresis is not present. 2 = **Forced deviation,** or total gaze paresis not overcome by the oculocephalic maneuver.

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This item is done only to evaluate the horizontal movement of the eyes. In some types of strokes, the eyes may have a forced deviation to the side of the stroke (most often with right-sided strokes). The examiner may need to hold the eyelids open by pulling them toward the eyebrows with the thumbs.

This item is usually tested by simply asking the patient to follow a finger with his/her eyes (while demonstrating), but for a patient who is less alert or has difficulty with that, you can ask the patient to look at your face and move from one side of the patient to the other.

Normal response:

If deviation is present, then the oculocephalic maneuver can be carried out to determine if one or both eyes has reflexive movement. This involves grasping the patient's head on each side and turning it quickly side to side while observing the eyes. A normal response is for the eyes to deviate away from the side the head is turned to and then to return toward midline. If there is no movement, then the best gaze is scored as 2.

Scoring:

- If there is no abnormality with eyes moving horizontally right and left, score 0.
- If there is abnormality in one eye but no forced deviation or forced deviation that is overcome by voluntary effort or reflexive movement, score 1.
- If there is forced deviation with no ability to overcome or reflexive movement, score 2.
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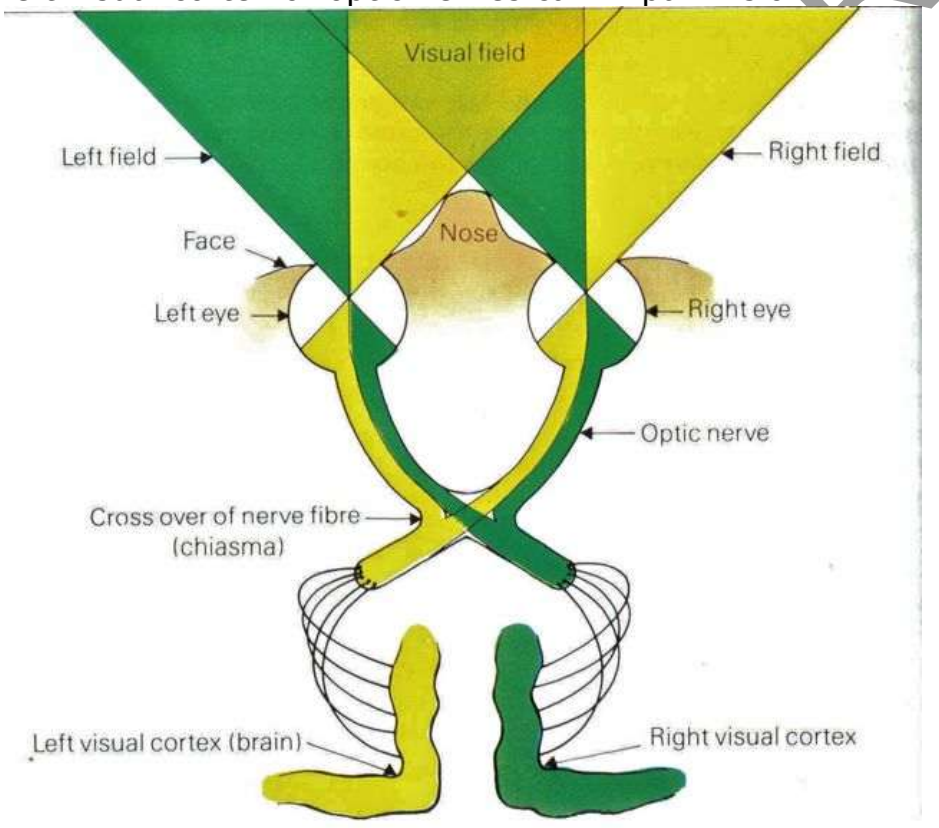
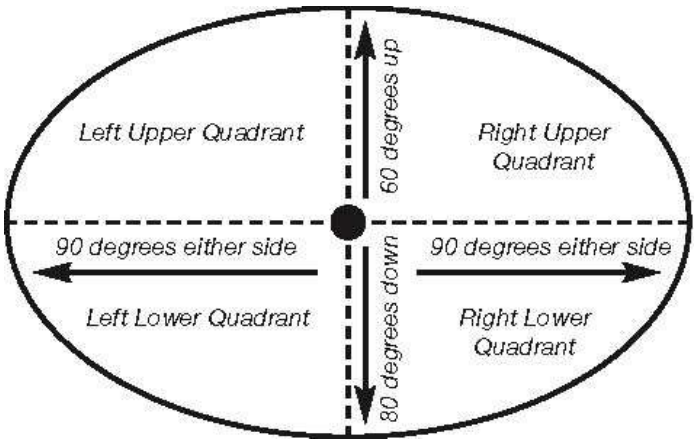
3. Visual	
Visual fields (upper and lower quadrants) are tested by confrontation, using finger counting or visual threat, as appropriate. Patients may be encouraged, but if they look at the side of the moving fingers appropriately, this can be scored as normal. If there is unilateral blindness or enucleation, visual fields in the remaining eye are scored.	0 = **No visual loss.** 1 = **Partial hemianopia.** 2 = **Complete hemianopia.** 3 = **Bilateral hemianopia** (blind including cortical blindness).

Score 1 only if a clear-cut asymmetry, including quadrantanopia, is found. If patient is blind from any cause, score 3. Double simultaneous stimulation is performed at this point. If there is extinction, patient receives a 1, and the results are used to respond to item 11.	

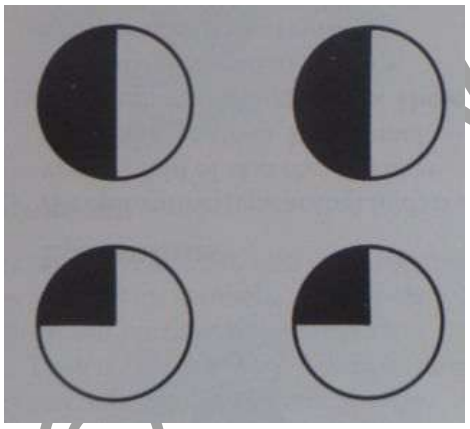
The visual field includes all the eyes can see when looking forward, including peripheral vision. There is a left visual field and a right visual field with an overlap at the center of vision. Damage to the right or left visual cortex or optic nerves can impair vision.



The visual field of each eye is divided into 4 quadrants—with the horizontal visual field wider than the vertical. Test 3 assesses the visual fields for impairment.



Various visual field defects can occur with a stroke. When vision is absent or impaired on one side of the visual field (both an upper and lower quadrant), this is referred to as hemianopia (or hemianopsia), or half vision. When the same side is affected in both eyes, it is referred to as homonymous hemianopia.
In some cases, only part of one side is affected, for example, only one quadrant. This is referred to as quadrantanopia. If the same quadrant is affected in both eyes, it is homonymous quadrantanopia. With right hemispheric strokes, left visual field deficits commonly occur, and with left hemisphere, right visual field defects.



When testing the visual field, begin by asking the patient to cover one eye (if possible) or use your free hand to cover the patient's eye while testing with the other hand. A folded washcloth or gauze dressing may also be placed over the eye if that's easier. Advise the patient to look directly into your eyes or at your nose. Remind the patient as necessary.

Each eye is tested independently. If a patient has unilateral blindness, then the examiner should score the eye with vision.

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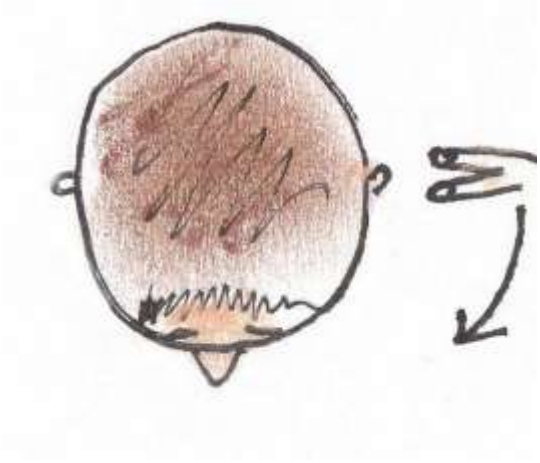
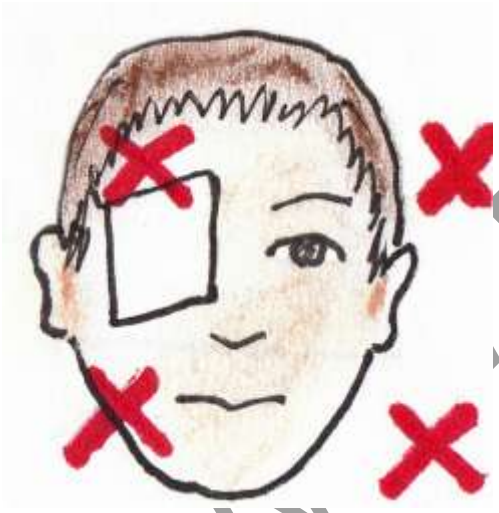


Testing usually begins by starting with one hand beside one of the patient's ears, two fingers extended and wiggling. The examiner slowly moves the fingers forward in an arc around the face, asking the patient to point or tell you when he or she sees the fingers.

This helps to establish the right position for testing. The same thing is done on the opposite side. Once the visual field is established, the examiner moves the fingers up to examine the upper quadrants and down for the lower quadrants.



Positioning of the hand may vary slightly depending on the patient's visual field. The testing hand is usually positioned about 6 inches lateral to the nose (or with the tips of the fingers aligned with the side of the face) and anterior to the ear for outer quadrants at about the level of the temples for upper quadrant evaluation and the mouth or chin for lower quadrant evaluation. (When testing inner quadrants, the fingers need to come forward a few inches to compensate for the bulk of the hand covering the opposite eye.)

The visual field of each eye is evaluated in random order—for example RUQ, RUQ, LLQ, LUQ, RLQ and so on. You should explain the finger counting exercise: "I'm going to hold up different numbers of fingers, and I'd like you to tell me (or show me) how many you see."

In some cases, a patient may be able to write the number or indicate the number with fingers if the patient is not able to speak. Sometimes, if patients are unable to talk, you may note the eyes moving toward the fingers on movement—an indication the patient can see them.

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Finger counting is done in all quadrants for each eye. You should hold up random numbers of fingers and, again, reminding the patient to focus on your eyes or nose.

If the patient cannot reply or point, you can use visual threat to evaluate the visual field. This involves starting with the hand about 12 inches lateral to the nose at the temple and chin area and thrusting the hand quickly toward the eye from the various quadrants to determine if the patient cringes and the eye closes protectively. It's important when doing this maneuver that the examiner curl the fingers because a pointed finger thrust toward an eye can be disconcerting and could result in injury.

After checking each side, if the patient has vision in all fields, then simultaneous bilateral testing should be done to determine if vision is extinguished on one side. That is, with some types of injury, patients may develop blindness on one side when visual stimulation occurs

simultaneously on both sides. If this occurs, the visual field item is scored as 1.

Scoring:

- If vision is intact in all quadrants, score 0.
- If there is partial hemianopia/quadrantanopia or if extinction occurs with bilateral simultaneous testing, score 1.
- If there is complete hemianopia (half blindness in one eye), score 2.
- If there is bilateral hemianopia (half blindness in both eyes) or total blindness, score 3.

4. Facial palsy	
Ask – or use pantomime to encourage – the patient to show teeth or raise eyebrows and close eyes. Score symmetry of grimace in response to noxious stimuli in the poorly responsive or non-comprehending patient. If facial trauma/bandages, orotracheal tube, tape or other physical barriers obscure the face, these should be removed to the extent possible.	0 = **Normal** symmetrical movements. 1 = **Minor paralysis** (flattened nasolabial fold, asymmetry on smiling). 2 = **Partial paralysis** (total or near-total paralysis of lower face). 3 = **Complete paralysis** of one or both sides (absence of facial movement in the upper and lower face).

If a patient has a pronounced paralysis of one side of the face, that may be quite evident, but paresis or partial paralysis may be more difficult to recognize. The healthcare provider may ask the patient to raise the eyebrows and close the eyes, similar to 1c, but the focus here is on symmetry rather than the ability to follow commands.

Upper palsy may be exhibited by drooping of the eyelid or smoothing of wrinkles on the affected side and unequal lifting of the eyebrows. The lower part of the face, especially about the mouth, is usually the best place to focus because paresis may be most evident there. Ask the patient to show his or her teeth or make a big smile (giving a demonstration).

If patients are edentulous, they should be asked to show their gums; however, if they have dentures available and can put them into their mouths, they should be examined with dentures.

If there is no facial palsy, the smile should be relatively even with the lips in basically the same position on both sides. Notice in the photo below that the same numbers of teeth are visible on both sides, an indication that there is no palsy.

With palsy, the mouth may appear skewed and lips elevated more on one side than the other.

In some cases, there may be very little movement of the lips and few teeth showing.

If a patient is aphasic or responds poorly, you can use noxious stimuli, such as pinching the nail bed, to elicit a grimace and observe the grimace closely for asymmetry.

Scoring:

- If movements are normal and symmetrical, score 0.
- If there is minor paralysis or asymmetry, score 1.
- If there is partial paralysis with total or near-total paralysis of the lower face, score 2.
- If there is complete paralysis of one or both sides with absence of facial movement in the upper and lower face, score 3.

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5. Motor Arm	
The limb is placed in the appropriate position: extend the arms (palms down) 90 degrees (if sitting) or 45 degrees (if supine). Drift is scored if the arm falls before 10 seconds. The aphasic patient is encouraged using urgency in the voice and pantomime, but not noxious stimulation. Each limb is tested in turn, beginning with the non-paretic arm. Only in the case of amputation or joint fusion at the shoulder, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice.	0 = **No drift;** limb holds 90 (or 45) degrees for full 10 seconds. 1 = **Drift;** limb holds 90 (or 45) degrees, but drifts down before full 10 seconds; does not hit bed or other support. 2 = **Some effort against gravity;** limb cannot get to or maintain (if cued) 90 (or 45) degrees, drifts down to bed, but has some effort against gravity. 3 = **No effort against gravity;** limb falls. 4 = **No movement.** UN = **Amputation** or joint fusion, explain: _____ **NOTE:** Score each arm separately: **5a. Left Arm** **5b. Right Arm**

This test evaluates the patient's ability to hold the arm in a stable position without drift (falling). Each limb is scored separately. The left arm is usually tested first and then the right; however, if paralysis or paresis is present, the examination should begin with the non-paretic arm.

If the patient is sitting, position the arm *palm down* at 90° or at 45° if the patient is supine and ask the patient to hold it at that position until told to lower the arm. If the patient is aphasic, demonstrate holding the arm up to show the patient what is expected.

Once the arm is in the correct position, release the arm. A slight dip is normal upon release, but then the arm position should stabilize. You should count down 10 seconds, verbally and showing fingers.

Stand to the side and use an environmental marker, such as a window, poster, or curtain, behind the limb to help determine if the arm is drifting. It can be difficult to see drift if you are standing over and looking down at the arm.

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45° position:	Drift:

If the patient can't hold the arm up and it falls onto the bed, ask the patient to try to lift the arm and note any proximal movement.

Flaccid:	Proximal lift:

Scoring should always be done, even though the patient is paralyzed. If patients are limited in mobility because of disease, or disability, such as arthritis, the examiner must use best judgment when evaluating.

Scoring:

- If there is no drift (normal), the score is 0.
- If the arm drifts downward but doesn't hit a support, such as the bed or arm of a chair, the score is 1.
- If there is some effort to maintain the arm but it falls onto support before the 10 seconds elapse, the score is 2.
- UN for untested should only be used with amputation or joint fusion.
- If the arm immediately falls onto support, and there is no effort against gravity, the score may be 3 or 4. In this case, you should ask the patient to try to lift the arm and note any proximal movement of the shoulder. If movement is evident, the score is 3, even if the movement is minimal.

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- If there is no voluntary movement at all of if the patient is comatose, the score is 4.

6. Motor Leg	
The limb is placed in the appropriate position: hold the leg at 30 degrees (always tested supine). Drift is scored if the leg falls before 5 seconds. The aphasic patient is encouraged using urgency in the voice and pantomime, but not noxious stimulation. Each limb is tested in turn, beginning with the non-paretic leg. Only in the case of amputation or joint fusion at the hip, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice.	0 = **No drift;** leg holds 30-degree position for full 5 seconds. 1 = **Drift;** leg falls by the end of the 5-second period but does not hit bed. 2 = **Some effort against gravity;** leg falls to bed by 5 seconds, but has some effort against gravity. 3 = **No effort against gravity;** leg falls to bed immediately. 4 = **No movement.** UN = **Amputation** or joint fusion, explain: _____ **NOTE:** Score each leg separately: **6a. Left Leg** **6b. Right Leg**

This item is very similar to item 5 except the leg is evaluated for drift. For this examination, the patient must be supine. Again, both legs are tested and scored separately, beginning with the left or non-paretic leg. If the patient is aphasic, the examiner may need to pantomime to show what is expected.

The leg is lifted to 30° and the patient told to hold the leg in that position. The leg is held for 5 seconds rather than 10. An initial dip is expected, and the counting starts after the dip. As with the arm, the examiner should note an environmental marker and observe the leg from the side rather than looking down at it.

30° position:	**Drift:**

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If the patient cannot hold the leg up or it appears flaccid, ask the patient to try to lift the leg and observe closely for proximal lift. In the following picture, note the slight elevation under the knee as the patient tries to life the leg.

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Scoring:

The scoring is also the same as with the arm.

- If there is no drift, the score is 0.
- If there is some drift but the leg does not touch the bed, the score is 1.
- If there is some effort to hold the leg up but the leg drifts to the bed before the count of 5, the score is 2.
- If the leg falls back to the bed but there is SOME effort at movement, such as proximal movement of the hip, the score is 3.
- If there is no movement at all, the score is 4.
- As with the arm, UN is only scored with amputation or joint fusion because all limbs should be examined.

7. Limb Ataxia	
This item is aimed at finding evidence of a unilateral cerebellar lesion. Test with eyes open. In case of visual defect, ensure testing is	

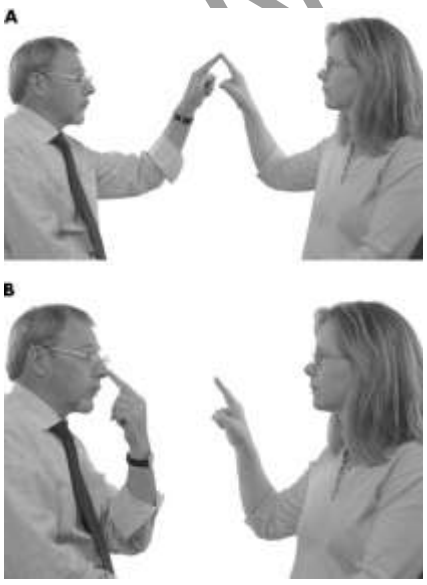
done in intact visual field. The finger-nose-finger and heel-shin tests are performed on both sides, and ataxia is scored only if present out of proportion to weakness. Ataxia is absent in the patient who cannot understand or is paralyzed. Only in the case of amputation or joint fusion, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice. In case of blindness, test by having the patient touch nose from extended arm position.	0 = **Absent.** 1 = **Present in one limb.** 2 = **Present in two limbs.** UN = **Amputation** or joint fusion, explain: _____

The test for ataxia evaluates muscle control and coordination, differentiating these from general weakness. In this case, ataxia does not refer to gait (a common usage of the term). Two tasks are required:

- Finger-nose-finger test.
- Heel-shin test.
-

Note: Patients who are blind should extend their arms and touch their noses, repeating the action 3 or 4 times.

When explaining the finger-nose-finger task, state, "I want you to put touch your finger to mine" and reach out and touch the patient's finger as a demonstration, "and then touch your nose," again demonstrating, and then, "Good, now repeat that a few times."



If a visual field defect was identified, then the examiner should be sure to place his or her finger within the patient's visual field. If the patient has difficulty with the first task, the examiner should observe the patient carefully to determine if the problem seems to be weakness or ataxia. If, for example, an arm is quite weak, the patient may have some difficulty directing his or her finger toward the examiner's finger and the patient' own nose and movement may be unsteady. If the limb is

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extremely weak, the examiner should usually assume the score is 0.

For the heel-shin test, unless the patient is very alert and responsive, it's often best to help position the heel on the shin (starting below the knee) when explaining to the patient to run the heel of one foot down and back up the shin of the opposite leg. If the patient has difficulty understanding, you can move the heel down and back up the shin in demonstration. Both legs are examined. If a patient is paralyzed on one side or in one limb, then the nonparetic limbs are tested.

Scoring:
Ataxia is scored only if it's present:

- If a patient cannot do the tasks because of coma, paralysis, or lack of ability to understand the directions, then the score is 0. Example:
  - Left-sided paralysis with no ataxia on the right = 0.
- If ataxia is found in one limb, then the score is 1. Example:
  - Right-sided paralysis with ataxia in the left arm but not the left leg = 1.
- If ataxia is found in two or more limbs (arms, legs, or a combination), the score is 2.
- The only circumstances in which UN for untested can be scored is if the patient has amputation or joint fusion that prevents completion of the task.

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8. Sensory	
Sensation or grimace to pinprick when tested, or withdrawal from noxious stimulus in the obtunded or aphasic patient. Only sensory loss attributed to stroke is scored as abnormal and the examiner should test as many body areas (arms [not hands], legs, trunk, face) as needed to accurately check for hemisensory loss. A score of 2, "severe or total	0 = **Normal;** no sensory loss. 1 = **Mild-to-moderate sensory loss;** patient feels pinprick is less sharp or is dull on the affected side; or there is a loss of superficial pain with pinprick, but patient is aware of being touched. 2 = **Severe to total sensory loss;** patient is not aware of being touched in the face, arm, and leg.

sensory loss," should only be given when a severe or total loss of sensation can be clearly demonstrated. Stuporous and aphasic patients will, therefore, probably score 1 or 0. The patient with brainstem stroke who has bilateral loss of sensation is scored 2. If the patient does not respond and is quadriplegic, score 2. Patients in a coma (item 1a=3) are automatically given a 2 on this item.	

The pinprick test should be done with a sterile safety needle, being careful not to break the skin. Testing should be on bare skin because testing through clothing blunts the sensation. Testing should not be done on the hands or feet because preexisting neuropathy may impair sensation in those areas. Testing is usually done on each side of the face and in the proximal portions of the limb and above wrists and ankles.

Sites for testing may include:

- Sides of face (in front of the ears).
- Above the wrists.
- Trunk.
- Slightly below the knees (medial aspect).
- Above the ankles.

At the beginning of the test, ask the patient to close his or her eyes and tell the patient he or she may feel small pricks to the skin. The patient can indicate where he or she feels the needle pricks by saying "right" or "left," pointing, or writing. You should avoid asking the patient if the needle prick feels sharp or dull as this may confuse some patients but should ask, "Which side feels sharper?"

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When testing, usually start at the top and work down, pricking the skin in random order, such as right face, left face, right face, right face, left face, right face, and left face. If a regular pattern is used, the patient may indicate a sensation on a side because of an expectation that the same pattern is persisting.

If the patient responds to one side and not the other, You should prick the side the patient is not responding to and ask the patient directly, "Do you feel that?" and then prick the other side, "Do you feel that?"

If the patient cannot respond verbally, look carefully at the patient's face and observe for grimace, which indicates discomfort and sensation.

Scoring:
The patient is scored as 1 or 2 only is sensory loss is clearly demonstrated. Thus, patients who are aphasic or

- If the patient can feel pinpricks normally and equally, score 0.
- If the patient appears to grimace equally for pinpricks on both sides, score 0.
- If the patient can detect touch but doesn't feel pain or feels one side is duller than the other, score 1. Patients who are in a stupor or aphasic are usually assumed to be 0 or 1.
- If the patient has no sensation of touch on one or both sides or is non-responsive because of coma, score 2.

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9. Best Language	
A great deal of information about comprehension will be obtained during the preceding sections of the examination. For this scale item, the patient is asked to describe what is happening in the attached picture, to name the items on the attached naming sheet and to read from the attached list of sentences. Comprehension is judged from responses here, as well as to all of the commands in the preceding general neurological exam. If visual loss interferes with the	0 = **No aphasia;** normal. 1 = **Mild-to-moderate aphasia;** some obvious loss of fluency or facility of comprehension, without significant limitation on ideas expressed or form of expression. Reduction of speech and/or comprehension, however, makes conversation about provided materials difficult or impossible. For example, in conversation about provided materials, examiner can identify picture or naming card content from patient's response. 2 = **Severe aphasia;** all

tests, ask the patient to identify objects placed in the hand, repeat, and produce speech. The intubated patient should be asked to write. The patient in a coma (item 1a=3) will automatically score 3 on this item. The examiner must choose a score for the patient with stupor or limited cooperation, but a score of 3 should be used only if the patient is mute and follows no one-step commands.	communication is through fragmentary expression; great need for inference, questioning, and guessing by the listener. Range of information that can be exchanged is limited; listener carries burden of communication. Examiner cannot identify materials provided from patient response. 3 = **Mute, global aphasia;** no usable speech or auditory comprehension.

When doing any testing that involves vision, it's important to find out if the patient normally wears glasses and needs them to read or look at images. Glasses are often removed by first responders, especially if patients use oxygen masks during transit, but glasses should be returned to a patient for this examination if possible.

Patients may experience various visual defects because of the stroke, including diplopia, impaired visual memory, and visual hallucinations, and these defects may interfere with the patient's ability to complete this task.

Even if the examiner believes he or she has an adequate understanding of the patient's language skills by this point of the exam, this part should still be completed for confirmation. If a patient is blind or has severe visual impairment, this part of the test can be done by asking the patient to feel and describe common items, such as a glass, ballpoint pen, magazine, comb, or toothbrush. If a patient cannot speak for any reason (aphasia, trauma, intubation), but is able to write, the patient can write out answers to demonstrate language ability.

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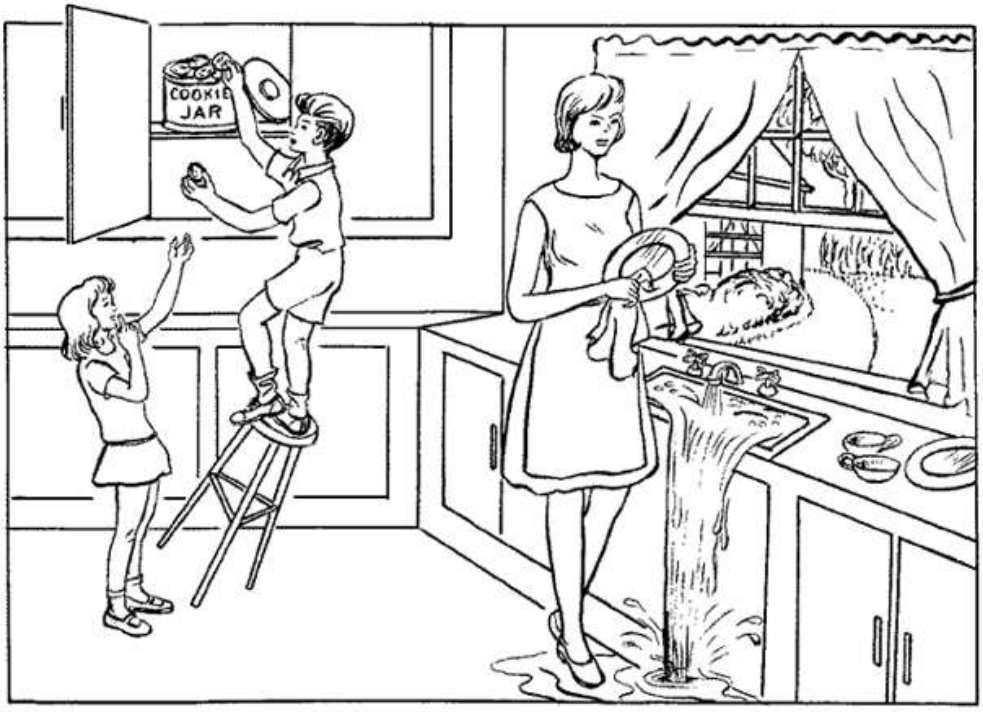
Note: Patients with a left hemisphere stroke, characterized by right sided paralysis or paresis, may have expressive, receptive, or global aphasia.

Task 1 For a patient with vision, show the patient the following picture and ask the patient to describe what is in the picture: "Can you tell me what you see in this picture?" As the patient responds, listen very carefully to the patient's articulation and note any slurring or difficulty expressing ideas.

The primary elements of the picture include:

- The boy is taking cookies from the cookie jar while the girl reaches for a cookie.
- The mother is washing dishes.
- The boy's stool is falling.
- The sink is overflowing.



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If the patient hesitates or speaks slowly but eventually does an adequate job of describing the picture, this is scored as normal. If, for example, the patient states the boy is reaching for a cookie and the woman is washing dishes, the examiner should NOT coach by asking "What is happening to the stool" or "What do you notice about the sink," but encourage the patient to give more details by asking, "What else do you see?"

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Task 2

The next task involves showing the patient the following drawings of common items and asking the patient to identify those items you point to. Items include:

- Glove.
- Key.
- Feather.
- Cacti (or cactuses).

- Chair.
- Hammock.

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People with visual impairment often identify the glove as a "hand" and the feather as a "leaf," and these answers are considered correct. Additionally, many people (especially those who don't live in desert areas) have trouble identifying cacti and may perceive them as cartoon animals, and that is considered correct if it seems reasonable.

Hammocks are not common in all parts of the world, so some people may not recognize the hammock or know the word and may describe it as a swing or describe the tree trunks/stumps or grass. The examiner should allow some leeway in naming because the primary purpose is to evaluate the patient's ability to use language and speak clearly.

Task 3 The last task is to hand the patient the following list of sentences (or hold them where the patient can see them) and ask the patient to read the sentences. If the patient is unable to read, ask the patient to repeat the sentences.

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.

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Scoring:

- If speech seems normal and content is accurate, score 0.
- A score of 1 can indicate slight to moderate slurring and can include some halting and difficulty expressing ideas, but the patient's content is essentially correct and can be understood.
- A score of 2 is given if severe aphasia is present and the patient's attempts at speech are so fragmented that the examiner cannot determine content from the response.
- A score of 3 is reserved for those who are mute (for any reason, including inability to cooperate), completely aphasic, or comatose.

Note: Even though slurring is one consideration for language, the *primary* focus is on the ability to understand and use language correctly.

10. Dysarthria	
If the patient is thought to be normal, an adequate sample of speech must be obtained by asking the patient to read or repeat words from the attached list. If the patient has severe aphasia, the clarity of articulation of spontaneous speech can be rated. Only if the patient is intubated or had other physical barriers to producing speech, the examiner should record the score as untestable (UN) and clearly write an explanation for this choice. Do not tell they patient why he or she is being tested.	0 = **Normal.** 1 = **Mild-to-moderate dysarthria**; patient slurs at least some words and, at worst, can be understood with some difficulty. 2 = **Severe dysarthria;** patient's speech is so slurred as to be unintelligible in the absence of or out of proportion to any dysphasia, or is mute/anarthric. UN = **Intubated** or other physical barrier, explain._____

This item of the scale directly evaluates dysarthria, or slurring. As with previous items of the scale, even if the examiner feels he or she knows the patient's score, this testing should be completed. If a patient has a strong foreign accent, the examiner should try to focus on the clarity of the words and sounds rather than the pronunciation. If family members are present, the examiner can ask if the patient's speech sounds normal or somewhat different.

Note: This part of the test involves reading, but if a patient is aphasic, a non-reader, or cannot read for any reason, then the patient should be asked to repeat the words. If the patient cannot repeat words, evaluate any responses or spontaneous speech for clarity.

The examiner asks the patient to read the following words, and listens very closely for evidence of slurring, observing the patients lips and mouth for positioning. Each word presents a different challenge. "Mama" requires the patient to bring the lips together twice to make the repetitive sounds. Note the ability to pronounce ending "p" sounds, such as with "tip-top" and the "f" sound occuring in "fifty-fifty." The "ft" combination can be particularly difficult if dysarthria is present.

"Th" sounds require positioning of the tongue that may be difficult with paresis or paralysis, so the patient may pronounce "th" as with a "d," or "z" sound. "Huckleberry" is a 4-syallable word that requires repositioning of the mouth and tongue for each syllable, so slurring

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may be evident. “Baseball player” is a 4-syllable combination that requires a sibilant “s” is the middle of the word and a shift from “b” to “p.”

MAMA

TIP – TOP

FIFTY – FIFTY

THANKS

HUCKLEBERRY

BASEBALL PLAYER

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Scoring:

- If the speech is very clear and normal in sound, score 0.
- If mild to moderate slurring is present but the words are understandable, score 1.
- If speech is severely slurred and cannot be understood in any meaningful way or the patient is mute or comatose, it is scored as 2.
- If the patient is intubated or there is some other physical barrier, such as trauma, that prevents the person from doing this part of the test, then it is scored as UN for untested, but a complete explanation must be provided.

11. Extinction and Inattention (formerly Neglect):	
Sufficient information to identify neglect may be obtained during the prior testing. If the patient has a severe visual loss preventing visual double simultaneous stimulation, and the cutaneous stimuli are normal, the score is normal. If the patient has aphasia but does appear to attend to both sides, the score is normal. The presence of	0 = **No abnormality.** 1 = **Visual, tactile, auditory, spatial, or personal inattention** or extinction to bilateral simultaneous stimulation in one of the sensory modalities. 2 = **Profound hemi-inattention or extinction to more than one modality;** does

visual spatial neglect or anosognosia may also be taken as evidence of abnormality. Since the abnormality is scored only if present, the item is never untestable.	not recognize own hand or orients to only one side of space.

Item 11 basically determines if simultaneous bilateral testing blocks sensation on one side—in any modality. This may have been noted during the visual field examination or with earlier sensory testing, so this part of the test includes information gained from other items of the scale—one of the reasons it's so important to complete each section.

Additional testing here usually includes asking the patient to close his or her eyes and then lightly touching both sides of the body (face, above wrists, below knees, above ankles), first on one side and then the other and finally both sides together. The patient indicates which side or sides are being touched as above. Painful stimuli, such as pinching of nailbeds, may be used to elicit response in aphasic patients.

With strokes in the right hemisphere, patients may develop left-sided neglect to the extent that they ignore or can't perceive items or people on their left side. Denial of impairment may also characterize this condition. If the patient does not appear to respond when you are standing on one side, you should move to the other side to determine if there is a difference.

Scoring:

- A patient who exhibits no indications of neglect or extinction is scored as 0.
- If neglect or extinction occurs in one sensory modality, then the score is 1.
- A patient who is profoundly paralyzed on one side and cannot feel sensations or is comatose is scored as 2. The patient with extinction in more than one modality (such as to both visual and sensory stimuli) is also scored as 2.

Conclusion

When all of the items are tested, the total scores are added to arrive at a final score. Please note, in some earlier versions of the scale,

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amputations were scored as "9," but this score is omitted when scoring as it has been replaced by UN for untested.

The NIH Stroke Scale is not difficult, but administration and accuracy improves with practice and experience. For example, ataxia and muscle weakness can be difficult to differentiate for those with little experience caring for or observing stroke patients; however, most of the scale if fairly straight-forward and can be mastered easily. Even skilled examiners may vary slightly in scoring, but most people who are trained have similar scores. One may score a patient as a 4 and another as a 5, but a significant variance suggests a need for review.

Ideally, when first using the scale, a healthcare provider should be teamed with someone who is more experienced. The beginner should observe first and score the patient, comparing his or her results with the examiner's score, and then score a patient while an experienced observer also scores, and again compare results.

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