UNIVERSITY of ROCHESTER
DIVISION OF PREHOSPITAL MEDICINE

STROKE ASSESSMENT TOOLBOX

Resource for EMS Educators

Background:

EMS clinicians play a critical role in improving outcomes for patients with stroke. When stroke is recognized early by EMS, and patients are quickly transported to stroke centers with advance notification, it helps shorten the time to treatment—leading to better results for patients.

However, research shows that many strokes are not recognized in the prehospital setting. Most of these missed strokes affect the back part of the brain (posterior circulation) and cause symptoms like vision problems and poor coordination. These strokes often appear as dizziness, nausea, vomiting, or falls—symptoms that are not typically taught as signs of a stroke.

To help address this, the URMC Division of Prehospital Medicine and Stroke Center have worked together to create this educational toolbox. It includes a lesson plan, video resources (for classroom or pre-learning), in-class activities, and a knowledge quiz. The materials explain how strokes affect the brain, teach a more complete stroke assessment (which all EMS clinicians can perform), and include real patient videos to show how these signs appear in actual cases.

We encourage you to use all parts of this toolbox in your teaching. If you have feedback, please send it to Maia_Dorsett@URMC.Rochester.edu.

Learning Objectives:

1. Describe the clinical presentation of stroke, including common signs and symptoms and the timing of symptom onset.
2. Discuss the importance of broad indications for stroke assessment, particularly in patients who present with fall, dizziness, visual symptoms or generalized weakness.
3. Obtain a history from a patient presenting with clinical signs and symptoms suggestive of a possible stroke, including the onset, duration, and progression of symptoms.
4. Conduct a tiered stroke assessment by evaluating for dysmetria, nystagmus, visual fields and truncal ataxia when the initial assessment of facial movement, arm strength, and speech assessment shows no abnormalities.
5. Utilizing a series of case videos, identify positive findings on history and exam of patients who have experienced a posterior circulation stroke.

PREWORK/FOUNDATIONAL WORK:

This foundational work can be watched as a video in class or assigned as pre-work for students. It consists of three modules and links below. If you decide to assign as pre-work, the Appendix has a pre-work assignment language that you can share with your learners.

	Objective(s)	Format	Length (min)
Module 1: Stroke Signs and Symptoms	1,2	Didactic Video	38
Description: Didactic on the signs and symptoms of stroke, including posterior circulation stroke. Associated basic neuroanatomy should be reviewed. Link: https://www.youtube.com/watch?v=r2PccsvOPxE			
Module 2: Stroke Assessment	2,3,4	Skills Video	8
Description: Videos demonstrating how to conduct a comprehensive stroke assessment, including: 1) taking a patient history while paying attention to cues that may indicate a possible stroke (e.g., sudden onset of symptoms and associated signs), and 2) performing a structured, step-by-step stroke assessment, starting with the evaluation of facial movement, arm strength, and speech, followed by assessments for nystagmus, dysmetria, and truncal ataxia. Link: https://www.youtube.com/watch?v=Lzr0c-lX2b4			
Module 3: Case Examples	5	Narrated Videos	15
Description: Review of 4 real cases to illustrate 1) Clinical signs/symptoms and onset concerning for stroke 2) Positive clinical findings consistent with stroke, including the posterior circulation. Link: https://www.youtube.com/watch?v=1P8U2Tiu_4U			

CLASS SESSION.

The live class session should have three parts – review and discussion of the prework, practicing of stroke assessment, and a summative knowledge assessment.

	Objective(s)	Format	Length (min)
Module 4: Discussion and review	1,2,3	Discussion	30
Description: Moderated Class discussion to review and discuss the content of the videos (see Instructor Guide in Appendix below)			
Module 5: Stroke Assessment Practice	4	Skills Practice	20
Description: Students practice stroke assessment maneuvers on each other with instructor guidance (see Stroke Assessment skill sheet).			
Cognitive Assessment			
Description: Multiple choice quiz. Quiz and Quiz with Answer Key are in Appendix. Students should take the quiz on their own and the class should review as a group.			

APPENDIX

STROKE ASSESSMENT – PREWORK

In this section, we will learn about how to assess a patient for stroke. As an EMS clinician, knowing how to do a stroke assessment is an important skill. Stroke is a time-sensitive emergency, and what we do in the field can make a big difference in the patient's outcome.

In our next class, we will talk about stroke and practice stroke assessments together. Before class, please watch the videos listed and think about the following questions:

1. What signs and symptoms should make me check a patient for stroke?
2. How does a stroke affect the brain and cause symptoms?
3. What are the parts of a stroke assessment? Why do I need to check the whole brain?
4. Why is it important to practice stroke assessments often as part of my EMS care?

We will begin class by talking about these questions. Then, we will practice doing stroke assessments. There will be a short quiz at the end of class to check what you've learned.

Follow the hyperlink to watch the video.

VIDEO 1: INTRODUCTION TO STROKE SIGNS & SYMPTOMS

VIDEO 2: EXAMPLE STROKE ASSESSMENT

VIDEO 3: PATIENT VIDEOS

Instructor Guide – Stroke Assessment Pre-Work Discussion

Question 1: What signs and symptoms should make me assess a patient for stroke?

You should assess for stroke in any patient with sudden neurologic changes**,** even if the call was not dispatched as a stroke. This includes:

- Weakness or numbness on one side of the body
- Slurred speech or trouble finding the right words
- Facial droop
- Vision changes or difficulty seeing
- Sudden dizziness, nausea, or vomiting without another cause
- Difficulty with coordination or balance
- A fall, especially if unexplained or accompanied by any of the above symptoms

Teaching Tip: Emphasize that posterior strokes can present subtly and may look like other conditions (vertigo, intoxication, etc.), so a **broad differential and low threshold** for assessment is important.

Question 2: How does a stroke affect the brain and cause symptoms?

Sample Answer:
A stroke happens when **blood flow to part of the brain is blocked or a blood vessel ruptures**. This damages brain cells in that area.

- **Ischemic stroke** (most common) is due to a blockage, like a clot.
- **Hemorrhagic stroke** is from bleeding in the brain.

The **symptoms depend on what part of the brain is affected**:

- The **anterior circulation** (carotid arteries) affects face, arm, speech.
- The **posterior circulation** (vertebral/basilar arteries) affects vision, coordination, balance, and eye movement.

Teaching Tip: You can draw parallels between different brain areas and body functions—help students understand "why" certain symptoms happen based on brain anatomy.

Question 3: What are the parts of a stroke assessment? Why do I need to check the whole brain?

Sample Answer:
A complete stroke **physical assessment** includes:

- **Face** – Look for droop or asymmetry
- **Arms** – Ask the patient to hold both arms up; look for weakness or drift
- **Speech** – Listen for slurred speech; test understanding and word-finding
- **Eyes** – Test visual fields, eye movement, and look for nystagmus
- **Dizziness/Balance** – Test coordination (finger-to-nose) and standing balance

It's important to check **both anterior and posterior circulation signs**. Stroke scales like the Cincinnati Stroke Scale (CPSS) mostly detect **anterior strokes**. **Posterior strokes** may be missed without checking coordination, vision, and balance.

When stroke is suspected, it is also important to determine:

- Time the patient was last known normal/well
- Anticoagulant/blood thinner use

A blood sugar should be checked in all suspected strokes as hypoglycemia can be a stroke mimic.

Teaching Tip: Reinforce the concept of a structured head-to-toe neurologic assessment, not just relying on dispatch impression or initial symptoms.

Question 4: Why is it important to practice stroke assessments often as part of my EMS care?

Sample Answer:

- It helps you **recognize subtle findings**.
- Many stroke symptoms are **easy to miss**—especially posterior strokes.
- Practicing regularly builds **muscle memory and pattern recognition**, which is critical in stressful or unclear situations.
- You get better at recognizing "normal" so you can spot what's abnormal.
- Stroke is a **time-sensitive emergency** where EMS care directly impacts treatment and outcomes.

Teaching Tip: Encourage students to perform stroke assessments broadly (e.g., on falls, dizziness, weakness), not just when they're "sure" it's a stroke.

STROKE ASSESSMENT SKILL SHEET

Area	Assessment Task	Complete?
FACE	Ask the patient to "Show me your teeth." Look for facial droop or asymmetry.	
ARM	Ask the patient to hold both arms up for 10 seconds. Watch for one arm drifting or dropping.	
SPEECH	Ask the patient to say a sentence like "You can't teach an old dog new tricks." Listen for slurred speech (dysarthria).	
	Give a verbal-only command (no gestures), such as "Show me two fingers," to test if they understand speech (receptive aphasia).	
	Ask the patient to name an object, such as a pen, your knuckles, or thumb, to test if they can find the right word (expressive aphasia).	
EYES	Test visual fields by asking the patient to look at your nose and point to or say when they see your wiggling fingers in all four quadrants. Your fingers should be just at the edge of your own peripheral vision.	
	Have the patient follow your finger in an "H" shape. Look for smooth eye movement, gaze preference, or nystagmus (twitching).	
DIZZINESS	Test for coordination using the finger-to-nose test on both sides (dysmetria).	
	If no other deficits are found, have the patient stand up without assistance. Be ready to support them if needed. This tests for balance problems (ataxia).	

STROKE ASSESSMENT: QUIZ

Name _____ Date_____

1. Which of the following best describes the difference between an ischemic and a hemorrhagic stroke?
A. Ischemic stroke is caused by bleeding into the brain, while hemorrhagic stroke is caused by a blockage
B. Ischemic stroke symptoms develop slowly over days, while hemorrhagic strokes always occur instantly
C. Ischemic stroke is caused by a blood vessel blockage, while hemorrhagic stroke is caused by a ruptured blood vessel
D. Ischemic strokes do not affect consciousness, but hemorrhagic strokes always cause loss of consciousness

2. A 52 yo patient calls 911 for posterior headache, dizziness and vomiting. If present, which of the following would most suggest a stroke as the etiology of the patient's symptoms?
A. Symptom onset over several hours
B. Symptom onset over one day
C. Sudden onset of symptoms
D. Waxing and waning symptoms

3. Which symptom is most likely to be associated with an occipital lobe stroke?
A. Expressive aphasia
B. Facial droop
C. Visual field loss
D. Hemiparesis

4. Which of the following is a critical EMS intervention that improves stroke outcomes?
A. Immediate administration of aspirin
B. Stroke pre-notification to receiving hospital
C. Blood pressure management
D. Notification of Advanced Life Support

5. Which of the following symptoms is most commonly associated with an anterior circulation stroke?
A. Loss of coordination in the limbs
B. Visual field cuts
C. Slurred speech and facial droop
D. Vertigo with nausea and vomiting

6.Which stroke subtype is most likely to be missed in the prehospital setting?
A. Ischemic stroke in the frontal lobe
B. Hemorrhagic stroke in the parietal lobe
C. Anterior circulation stroke
D. Posterior circulation stroke

7. What is the clinical significance of time in stroke assessment?
A. It helps determine the stroke subtype
B. It guides whether to use aspirin in the field
C. It determines eligibility for thrombolysis or embolectomy
D. It predicts if the patient will have a hemorrhagic stroke

8. When assessing for facial droop, what specific instruction should be given to improve detection of asymmetry?
A. “Smile for me”
B. “Show me your teeth”
C. “Puff out your cheeks”
D. “Open your mouth wide”

9. Which of the following improves sensitivity in detecting subtle arm weakness during stroke assessment?
A. Ask patient to each arm for 5 seconds each
B. Ask patient to squeeze both fists simultaneously
C. Ask patient to hold both arms up for 10 seconds
D. Ask patient to lift arms up one at a time

10. Which statement about testing receptive aphasia is true?
A. It is assessed by observing facial droop
B. It requires asking the patient to follow a verbal command
C. It is identified by having the patient repeat a phrase
D. It cannot be assessed in the field

11. Which of the following best tests expressive aphasia?
A. Asking the patient to raise their eyebrows
B. Asking the patient to mimic a motion
C. Asking the patient to name specific objects
D. Having the patient smile and show teeth

12. You are dispatched for an 83 yo with altered mental status. When you converse with the patient, they are difficult to understand because their speech is slurred. This neurologic finding is called
A. receptive aphasia
B. expressive aphasia

C. dysarthria
D. dysphasia

13. You are dispatched to a 74 yo patient with a fall. Upon questioning, she reports feeling lightheaded and off-balance since she woke up 3 hrs ago. Which of the following findings would be most concerning for stroke as the etiology of her symptoms?
A. Chest pain
B. Left sided Headache
C. Falling to the left upon standing
D. Nausea and Vomiting

14. Which of the following symptoms should prompt you to perform a stroke assessment, even if stroke was not the dispatch complaint?
A. Chest pain
B. Dizziness
C. Fever and chills
D. Shortness of breath

15. What is nystagmus?
A. Rapid twitching of the facial muscles
B. Repetitive, involuntary eye movements
C. Sudden loss of visual acuity in one eye
D. Slow, side-to-side head movement

16. Which component is not typically part of the traditional FAST screen or Cincinnati Stroke Scale (CPSS), but is important to identify posterior circulation strokes?
A. Speech abnormalities
B. Arm drift
C. Facial droop
D. Coordination

17. You arrive to find a 65-year-old patient who crashed their car while changing lanes. They deny trauma but report not seeing the car next to them. What should you do?
A. Suspect seizure and perform a glucose check
B. Perform a visual field test for possible stroke
C. Consider it a mechanical accident and transport non-emergently
D. Immediately perform a gait assessment

18. You assess a patient with word-finding difficulty. They frequently pause in frustration when they cannot come up with the right word. Which deficit are they exhibiting?
A. Dysarthria
B. Receptive aphasia
C. Expressive aphasia
D. Hemineglect

19. Which of the following should EMS avoid when testing receptive aphasia?
A. Giving a verbal command
B. Giving a visual cue during the command
C. Giving a command to a patient who is mute
D. Asking them to show two fingers

20. You are called for an elderly patient who experienced a fall after their right leg “gave way”. The patient has tenderness and deformity over the proximal right hip but numbness in the right lower leg. Which of the following would heighten your concern for a stroke as the cause of the numbness?
A. The right leg has decreased pulses compared to the left.
B. The patient has right arm drift.
C. The patient is unable to wiggle their toes.
D. No improvement in symptoms after pain medications

Stroke Quiz Answer Key

Question 1
Correct Answer: C. Ischemic stroke is caused by a blood vessel blockage, while hemorrhagic stroke is caused by a ruptured blood vessel
Rationale: Ischemic strokes result from a blockage in a blood vessel, while hemorrhagic strokes are due to a rupture, leading to bleeding in the brain.

Question 2
Correct Answer: C. Sudden onset of symptoms
Rationale: Stroke symptoms typically begin suddenly due to abrupt disruption in blood flow to the brain (ischemic stroke) or sudden rupture of a blood vessel (hemorrhagic stroke).

Question 3
Correct Answer: C. Visual field loss
Rationale: The occipital lobe processes visual information, so strokes here commonly result in visual field deficits.

Question 4
Correct Answer: B. Stroke pre-notification to receiving hospital
Rationale: Early notification enables the hospital to activate stroke teams, reducing time to imaging and intervention.

Question 5
Correct Answer: C. Slurred speech and facial droop
Rationale: These symptoms are commonly associated with strokes affecting the anterior circulation, which includes areas responsible for motor control of the face and speech.

Question 6
Correct Answer: D. Posterior circulation stroke
Rationale: Posterior strokes often present with non-specific symptoms like dizziness or nausea and are more easily missed.

Question 7
Correct Answer: C. It determines eligibility for thrombolysis or embolectomy
Rationale: Stroke treatment options are time-sensitive, with strict windows for intervention.

Question 8
Correct Answer: B. “Show me your teeth”
Rationale: This command allows better visualization of facial asymmetry than a general smile request.

Question 9
Correct Answer: C. Ask patient to hold both arms up for 10 seconds
Rationale: This test increases the chance of identifying subtle weakness by observing arm drift over time.

Question 10
Correct Answer: B. It requires asking the patient to follow a verbal command
Rationale: Receptive aphasia is identified when the patient cannot follow spoken instructions despite appearing alert.

Question 11
Correct Answer: C. Asking the patient to name specific objects
Rationale: Expressive aphasia impairs the ability to produce language; naming objects tests this function.

Question 12
Correct Answer: C. Dysarthria
Rationale: Dysarthria refers to slurred or unclear articulation of speech due to motor control issues.

Question 13
Correct Answer: C. Falling to the left upon attempted ambulation
Rationale: Sudden onset of imbalance or falling can be a sign of a stroke, especially if lateralized. Falling to the left can be a symptom of a stroke affecting left cerebellum (cerebellar strokes affect the same side of the body).

Question 14
Correct Answer: B. Dizziness
Rationale: Dizziness, particularly with sudden onset and no clear explanation, can indicate posterior circulation stroke.

Question 15
Correct Answer: B. Repetitive, involuntary eye movements
Rationale: Nystagmus is a neurological finding often associated with vestibular or cerebellar dysfunction. Review videos with class if needed to reinforce.

Question 16
Correct Answer: D. Coordination and visual field testing
Rationale: FAST and CPSS focuses on anterior stroke symptoms; posterior strokes often present with coordination and vision issues.

Question 17
Correct Answer: B. Perform a visual field test for possible stroke
Rationale: The patient's complaint suggests a visual field deficit, which may indicate an occipital stroke.

Question 18
Correct Answer: C. Expressive aphasia
Rationale: Word-finding difficulty and misnaming objects are classic signs of expressive aphasia.

Question 19
Correct Answer: B. Giving a visual cue during the command
Rationale: Receptive aphasia refers to impaired ability to understand spoken language. If a visual cue accompanies the command (e.g., holding up two fingers while saying "show me two fingers"), the patient may simply mimic the motion without actually processing the verbal command. This behavior relies on imitative motor pathways**,** not language comprehension, and can mask receptive deficits**.** Only verbal instructions should be given without gestures or visual prompts to assess comprehension.

Question 20
Correct Answer: B. The patient has right arm drift.
Rationale: Neurologic signs in the upper extremity, especially when not explained by trauma, suggest central nervous system involvement such as stroke rather than a local neurovascular injury.