Pediatric Stroke Hemiplegic Motor Impairment Scale
Upper Extremity Subscale
(Pedi HEMIs-UE)
Administration Guide

This measure is an observation-based motor impairment measure for children with unilateral stroke. It was developed by a multidisciplinary team at the Kennedy Krieger Institute. To reference this measure, please see the manuscript: ***.

Tips for administration:

The children should be seated for the majority of the upper extremity subscale administration. The unaffected side should be used as an internal control to account for typical development. Have the child complete each item with both the affected side and the unaffected side. For the reach movement patterns, children should make a reaching movement of the entire arm and each joint is scored, as opposed to isolated movements of each joint. For reach movement patterns, ensure that the wrist is up in extension as opposed to a neutral position. Timing of movement is not taken into account for scoring.

In younger children, incorporate play-based administration techniques to evoke the movement of interest. For example, for the reaching movement patterns, hold out a toy of interest slightly above their head in front of them or to the side of them. This will require the child to reach to reach out completely and hold the movement pattern as they try to grasp the toy when just out of reach. It is also likely to reveal any compensatory movements. When developmentally appropriate, have the child give you a "high 5" or touch a toy that requires pushing (e.g., button) to motivate them to demonstrate wrist extension.

For pronation/supination movement, example play-based administration techniques in younger children include, placing a sticker on the inner part of their wrist or palm of their hand, having them blow kisses, or giving them a small piece of food to bring to their mouth to eat.

For grasping objects, children need only to maintain grasp in order to completely lift the object off the table. They need not be able to release objects. If they drop the object after lifting off of the table, that is ok. Example items to grasp include: a small marble-size item, a crayon/marker/pencil, and a larger item like a tennis ball.

Limb appearance and resting posture can be assessed visually throughout the entire administration.

Scoring:

Each item is scored between 0 and 2. Higher values indicate more impairment. The maximum upper extremity subscale is 30 points. If a particular movement cannot be administered in either extremity (i.e., due to developmental stage), make a note on the scoring sheet. The score could then be calculated out of the total administered points (e.g., 24 out of 28 points).

When scoring movements, compensatory movements should not be included when assessing range of motion of joints. If compensatory movements are noted, participants can't receive full credit (0) for movement. Examples of compensatory movements to watch for are indicated for each movement on the scoring sheet. When possible, movements should be scored based on sustained movements. If patient is on the edge between 2 scores, score as more impairment (e.g., 2 instead of 1).

Tips for videotaping:

Although not required for the measure, it can be videotaped for later scoring.

1. Record multiple trials of the movement, especially in younger children where there is more variability in their movements and behavior.
2. Record movements from different views (e.g., in front of the child and off to the side of the child).

3. Obtain recording of the child in different resting positions outside of voluntary use (e.g., standing, sitting). Ensure at least 1 position is with the arm unsupported (e.g., not resting on a table). Resting posture for the upper extremity should also be assessed during gait.

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Note: Compensatory movements should not be included when assessing range of motion of joints. If compensatory movements are noted, part cipants can't receive full credit (0) for movement. When possible, movements should be scored based on sustained movements. If patient is on the edge between 2 scores, score as more impairment (e.g., 2 instead of 1).

**Upper extremity**

Additional Instruct ons/Tips & Tricks

		Yes	No	Could not be administered or assessed?	This assessment is designed to be assessed throughout the visit as the child is in different positions.
I. Abnormal limb appearance					
completely flaccid extremity or spastic/contracted extremity		2	0		

II. Movement patterns

A. Reach forward and above head (STOP motion) - Assess movement synergy in highest shoulder flexion position participant exhibits. If subject is unable to perform reach at all, they should receive all 2's. Elbow hyperextension may be noted but should only be scored as abnormal in resting posture, not for movement patterns.

Have a toy out in front for child to grasp; When developmentally appropriate have them give you a "high 5" or touch a toy that requires pushing (e.g., button) in order to mot vate them to demonstrate wrist extension.

Reach forward

Goal: Shoulder flexion >90 degrees			
No shoulder flexion (0 degrees) or no shoulder movement	2		
Shoulder flexion present but < 90 degrees (upper arm not able to reach parallel to ground).		1	
Shoulder flexion present and >= 90 degrees (upper arm goes more than parallel to ground). Compensation to watch for: External rotation of shoulder/abduction of arm.Trunk/shoulder tilt towards opposite side.			0

Goal: Elbow extension to 180 degrees (arm completely outstretched)			
Elbow extension <= 90 degrees (90 degrees = forearm perpendicular to body)	2		
Elbow extension > 90 degrees but unable to straighten completely		1	
Elbow can make it through full range of motion to 180 degrees (180 degrees = forearm and upper arm straight out)			0

Goal: Wrist extension (wrist up like to give a high five)			
Wrist below neutral position (flexion) (down towards the ground)	2		
Wrist can raise to neutral position (flat with arm)		1	
Wrist above neutral position (extension) (wrist up towards the ceiling)			0

B. Reach to the side and above head (STOP motion)- Assess movement synergy in highest shoulder abduction position participant exhibits. If subject is unable to perform reach at all, they should receive all 2's. Elbow hyperextension may be noted but should only be scored as abnormal in resting posture, not for movement patterns.

Grasp at a toy out to the side

Reach to the side

Goal: Shoulder abduction >90 degrees			
No shoulder abduction (0 degrees) or no shoulder movement	2		
Shoulder abduction present but < 90 degrees (upper arm not able to reach parallel to ground).		1	
Shoulder abduction present and >= 90 degrees (upper arm goes more than parallel to ground). Compensation to watch for: Trunk/shoulder tilt towards opposite side.			0

Goal: Elbow extension to 180 degrees (arm completely outstretched)			
Elbow extension <= 90 degrees (90 degrees = forearm perpendicular to body)	2		
Elbow extension > 90 degrees but unable to straighten completely		1	
Elbow can make it through full range of motion to 180 degrees (180 degrees = forearm and upper arm straight out)			0

Goal: Wrist extension (wrist up like to give a high five)			
Wrist below neutral position (flexion)(down towards the ground)	2		
Wrist can raise to neutral position (flat with arm)		1	
Wrist above neutral position (extension) (wrist up towards the ceiling)			0

C. Pronation/Supination

Watch as child brings food to his/her mouth or place sticker in palm of hand

No movement from pronation to supination or only limited supination (less than neutral [thumb pointing to ceiling])	2		
Starts to supinate but can only make it up to neutral position (thumb pointed towards ceiling)		1	
Able to supinate past neutral position. Compensation to watch for: external rotation of shoulder and upper forearm. Elbow will come in towards the body.			0

III. Hand (have child grasp 3 different objects 1-2 times(small circular object (e.g. cheerio, bead), medium square object (e.g. block), thin cylindrical object (e.g. pen, crayon)). Use unaffected side to ascertain developmentally appropriate grasp for age. Do not penalize for development.

Have child grasp a small object that would fit in the palm of his/her hand (e.g., block, ball, etc.)

	Picks up 0 objects	Picks up at least 1 object, but fewer than unaffected side	Picks up same number of objects as unaffected side
Able to pick up objects successfully from tabletop? Child must only be able to raise object off the tabletop surface.	2	1	0

	No active movement	Active movement
Active thumb used for grasp or attempted grasp with comparison to unaffected side. Look for thumb extension and then flexion. Thumb has to abduct and be in contact the object. Score on best attempt (any object). <u>Compensation to watch for: thumb held in the hand and used to wedge object in palm.</u>	2	0
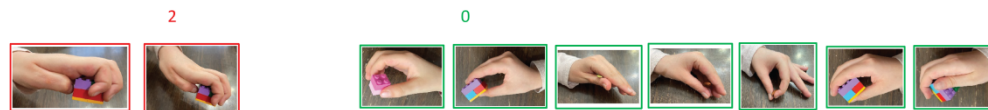
	No active movement	Active movement but asymmetric to unaffected side (e.g. movement of MCP but minimal/no movement of DIP)	Active movement and symmetric to unaffected side
Active finger motion for grasp or attempted grasp with comparison to the unaffected side. Do not penalize for movements taking longer. Score on best attempt (any object).	2	1	0

IV. Coordination

Have child reach for a small toy that requires accuracy or point to a particular number/letter on an object

	Marked	Slight	None
Tremor or involuntary movements when reaching for toys	2	1	0
Dysmetria (over/undershoot) when reaching for toys	2	1	0

V. Inappropriate resting posture (observation only in both standing/walking position and seated position, <u>when affected arm is not in use</u>. You can use the unaffected side as comparison to adjust for development)

	Yes, present	No, not present
Abnormal distal posture: finger/thumb position(thumb flexed in against palm and fingers curled down or fingers hyperextended) AND/OR wrist position (either flexion or extension)	2	0
Abnormal proximal posture: elbow position (either flexion or extension) AND/OR shoulder position (internal or external rotation)	2	0

Total Score (maximum = 30)