

MOTOR EVALUATION SCALE FOR UPPER EXTREMITY IN STROKE PATIENTS (MESUPES-arm and MESUPES-hand)

Name patient:
 Name examiner:
 Handedness: right/left
 Hemiplegic side: right/left
 Remarks:

Test date - hour:
 Duration of the test: min
 Support sitting position: no/yes
 Transfer with help: no/yes
 Tonus relax: easy/difficult

MESUPES-arm

ITEMS	SCORES	EXECUTION					
		passive		assisted	by him/herself		
		0	1	2	3	4	5
<i>STARTING POSITION</i> supine on a treatment plinth, the head resting on a pillow, a small cylindrical pillow placed under the knees to support the legs, arms extended and resting on the table, forearms in pronation, fingers in a relaxed extended and adducted position							
1. hand to stomach							
2. hand back to the starting position							
3. abduction 0°-90°, arm extended, forearm in neutral position (arm slides on the table)							
4. arm back to the starting position							
<i>STARTING POSITION</i> sitting on a treatment plinth, hips and knees in 90° flexion, feet flat on the floor, forearms rest in 90° elbow flexion and pronation on a table in front of the patient, fingers in a relaxed extended and adducted position							
5. hand from knee (<i>starting position</i>) onto the table							
6. hand(palm) to mouth (elbow remains on the table)							
7. reach with correct orientation of fingers and wrist (as if to grasp) for a plastic bottle (cylinder; diameter 6 cm) standing on the table at arm's length in front of the patient's midline (trunk remains in the same position; grasping the bottle is not required)							
8. hand on top of the head (shoulder in abduction)							

TOTAL /40

SCORES:

◆ **Passive (scores: 0-1)**

- ⇒ **patient:** is asked to let the therapist perform the movement with the affected arm
- ⇒ **therapist:** performs the task slowly to evaluate the **adaptation of the tone** to the movement
 - 0 = no adequate adaptation of tone to the movement (**hyper-or hypotonia**)
 - 1 = adequate adaptation of tone (**normal tone**) to at least part of the movement

◆ **Assisted (scores: 2)**

- ⇒ **patient:** is asked to help perform the movement
 - ⇒ **therapist:** - assists the patient as much as needed to perform the movement normally
- feels if and how much the patient **actively contributes** to the movement in a normal way
- 2 = participation through normal muscle contraction in at least part of the movement

◆ **By him/herself (scores: 3-5)**

- ⇒ **patient:** performs the movement **without help**
 - ⇒ **therapist:** controls visually how far the patient can move in a normal way
- 3 = performs part of the whole movement normally
4 = completes the whole movement normally but performs it slowly or with great effort
5 = completes the whole movement normally at normal speed

MESUPES-hand

A. Range of Motion

ITEMS	SCORES	EXECUTION active		
		0	1	2
<i>STARTING POSITION</i> sitting on a treatment plinth, hips and knees in 90° flexion, feet flat on the floor, forearms rest in 90° elbow flexion and pronation on a table in front of the patient, fingers in a relaxed extended and adducted position				
1. pinch grip (<i>starting position</i> with abduction of thumb; <i>movement:</i> opposition thumb and index; thumb and index remain in contact with the table; take the shortest distance of thumb and index finger movements into account for scoring)				
2. wrist extension (do not allow hyperextension of the fingers; measure distance vertically from hand palm to table at the MCP-joint of the thumb)				
3. opposition thumb and little finger (<i>starting position:</i> reposition (abduction) of thumb; <i>movement:</i> thumb and little finger remain in contact with the table; take the shortest distance of thumb and little finger movements into account for scoring)				
4. selective extension of 3 rd finger				
5. starting position with fingers 4 and 5 slightly spread out; spread index and middle finger simultaneously, sliding on the table (measure distance between fingertips 2 and 3)				
6. selective extension of 5 th finger				

TOTAL /12

SCORES:

- ⇒ **patient:** performs the movement **without help**
 - ⇒ **therapist:** controls visually whether and how far the patient can PERFORM THE MOVEMENT in a **normal way**
- 0 = no movement
1 = movement amplitude < 2 cm
2 = movement amplitude ≥ 2 cm

B. Orientation

ITEMS	SCORES	EXECUTION		
		0	1	2
<p><i>STARTING POSITION</i> sitting on a treatment plinth, hips and knees in 90° flexion, feet on the ground, forearms rest in 90° elbow flexion and pronation on a table in front of the patient, abducted thumb and extended adducted fingers are relaxed</p> <p>The therapist places every object in the middle of an imaginary line connecting the distal joints of thumb and index finger</p>				
7. grip plastic bottle (cylinder, diameter 2.5 cm; height 8 cm) with tips of thumb and index finger and lift it 2 cm (forearm remains on the table)				
8. grip dice (1.5 x 1.5 cm) sideways with tips of thumb and index finger and rotate dice once around its vertical axis (keep the dice on the table)				
9. put tip of index finger on the dice and rotate dice once around its vertical axis with fingers 1 and 3 (keep the dice on the table)				

TOTAL /6

SCORES:

⇒ **patient:** performs the movement **without help**

⇒ **therapist:** controls visually whether the patient can **ORIENT one or more segments of the arm** throughout the movement in a normal way

0 = no movement or movement with abnormal orientation of fingers and wrist towards the object

1 = movement with normal orientation of fingers or wrist towards the object

2 = whole movement correct

Arm items total /40

Hand items total /18

TOTAL /58

Instructions for "Motor Evaluation Scale for Upper Extremity in Stroke Patients" (MESUPES-arm and MESUPES-hand)

1. GENERAL COMMENTS

In the scale, much attention is given on performing movements in a 'normal' way. In most cases, the movement can be compared to the contralateral side.

In the presence of an interfering pathology on that side, compare the movement to what is accepted to be a **normal movement** which means: painless, without tremor, executed with a normal range of motion using adequate muscle contraction and a normal orientation of the various body segments. No score is given when the performance was based on inadequate adaptation to tone, abnormal muscle contractions, synergic (flexor/extensor) or massive movement patterns.

2. TEST PROCEDURES

2.1. The **test** is divided in MESUPES-arm and MESUPES-hand.

For each subset, a specific starting position is described in the test. If a patient can not sit unsupported, give the patient a support in the back using a firm cubed cushion.

If a patient is still unable to remain in this supported sitting position in a normal way, these tasks are not assessable. In that case, no score is given. After each attempt, the therapist helps to reposition the upper extremity in the starting position. Move to the next attempt or task **only** when the tone is normalized again. If a relaxed starting position cannot be obtained, e.g. because of extreme hypertonia, the patient scores 0 on that item.

2.2. The patient must be meticulously **instructed**.

Use the following steps:

- Explain the task verbally and demonstrate to make the commands more understandable.
- Ask the patient to perform the task with the non-affected side first, to make sure that the task is well understood.

2.3. **Repeat** the test with a maximum of 3 attempts if the patient performs the task inadequately and make the patient aware of the abnormal component(s) of the movement.

Performing all the movements in a normal way means that **no compensation** is allowed in any part of the body (for example: extra movement of the trunk,...).

2.4. The tasks in **MESUPES-arm** are performed in three consecutive phases:

phase 1: the task is performed in a passive way (scores 0-1),

phase 2: the therapist assists the patient during the movement (scores 2),

phase 3: the patient performs the task by him/herself (scores 3-5).

Start always with phase 1. If the patient's highest possible score is 0-1, proceed immediately to the next item. If not, go to phase 2. If the patient obtains a highest possible score of 2, go on with the next item. If not, move on to phase 3 and give a score between 3 and 5. Scoring as well as carrying out the test has to be done by the same therapist. For each task only one score is given which is the highest score that the patient obtains during that test item.

Scores 0-1

0 - no adequate adaptation of tone to the movement (abnormal tone: hyper- or hypotonia)

- A relaxed starting position cannot be obtained, e.g. because of extreme hypertonia or pain
- A relaxed starting position can be obtained but arm cannot be moved, e.g. because of pain
- The tone increases immediately during passive movement (extreme hypertonia)
- The whole weight of the patient's arm has to be carried by the therapist ('floppy' arm - extreme hypotonia)

1 - adequate adaptation of tone (normal tone) to at least part of the movement

- The tone is increased in only part of the passive movement
- There is a limited range of motion, e.g. because of pain, but a normalised tone within the limited range of motion
- Normal tone throughout the complete range of the passive movement

Scores 2

2 - participation through normal muscle contraction in at least part of the movement

When the patient can perform the movement but not in a normal way, you evaluate the quality of movement with the arm supported.

Scores 3-5

3- performs part of the whole movement normally

4- completes the whole movement normally but performs it slowly or with great effort

5- completes the whole movement normally at normal speed

Only that part of the movement is scored as "normal" where every joint, necessary to perform the movement, is participating in a normal way and every muscle tone is normal.

2.5. In **MESUPES-hand**, the patient performs all the tasks by him/herself.

In **RANGE OF MOTION test**, 'movement amplitude' is measured. The '**absolute**' value of the distance attained during the movement is scored and not the comparison with the other side.

Use a wooden bloc marking a distance of 1 and 2 cm or two separate wooden sticks (1 cm and 2 cm).

Assign a score in **ORIENTATION test** according to the 'joint orientation' during the exercise on the affected side compared to the normal orientation. The performance of the movement is evaluated **as such** and not in comparison with the non-affected side.

3. SPECIFIC COMMENTS

MESUPES-arm

Item 1-2: Some patients lift their elbow to reach their stomach, others don't (compare to the other side for strategy used). Support elbow and hand (fingers included) for the assisted and passive movement.

Make sure the arm is in a relaxed position before performing item 2!

- Item 3-4:** The arm has to slide on the plinth. If the plinth is not large enough put a regular table next to the plinth. Support elbow and hand (fingers included) for the assisted and passive movement.
Make sure the arm is in a relaxed position before performing item 4!
 The range of motion can be limited because of shoulder dysfunction (capsular pattern, shoulder pain, ...). Therefore the patient can start the movement from a position less than 90° if needed, however only for item 4. In this case scores 4 or 5 can never be obtained since these are given when a patient reaches the entire range of motion.
- Item 5:** The elbow needs to move backwards and forwards during a continuous movement. Therefore, put the table **close** to the patient.
- Item 6:** Hand to mouth should be performed with elbow flexion and forearm supination in order to orient palm of the hand towards the mouth. Elbow gliding from the table indicates that the patient can only perform part of the movement (score 3).
- Item 7:** The hand has to be well oriented towards the bottle during the active movement. Support the patient's hand and elbow during the passive and assisted attempt.
- Item 8:** For scoring the whole movement, wrist and fingers are included. If the patient performs the test without shoulder abduction on the non-affected side regardless the instructions, compare the quality of movement on the affected side with the contralateral side. To obtain a score of 3, the patient has at least to lift his elbow from the table. Shoulder pain can limit the completion of the entire range of movement.

MESUPES-hand

RANGE OF MOTION test

- Item 1:** Measure the movements of thumb and index finger separately and take the shortest distance of the two movements into account for scoring. For example: thumb moves 2 cm, index finger moves 1.5 cm; the patient scores "movement amplitude less than 2 cm".
- Item 2:** Do not allow hyperextension of the fingers during wrist extension. Measure distance at the metacarpophalangeal (MCP)-joint of the thumb.
- Item 3:** Measure the movements of thumb and little finger separately and take the shortest distance of the two movements into account for scoring. For example: thumb moves 2 cm, little finger moves 1.5 cm; the patient scores "movement amplitude less than 2 cm".
- Items 4:** No co-contraction of other fingers is allowed. The wrist remains in contact with the table.
- Item 5:** It is normal that people build up flexion tone in the wrist to perform this movement. Compare flexion tone with the other side.
- Items 6:** No co-contraction of other fingers is allowed. The wrist remains in contact with the table.

ORIENTATION test

- Item 7-9:** No specific comments.