

Intermediate steps towards the achievement of an official romanian translation of the Fugl-Meyer assesment scale specific forms

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Abstract

Introduction. The Fugl-Meyer assessment scale for the evaluation of neuro-sensory-motor deficits after stroke represents, by completeness and adequate folding, both conceptually and methodologically, on the physio pathological and clinical-evolutionary reality of disability in this type of pathology, a widely used quantification tool for international level and well appreciated in many works in profile literature.

Materials and methods. From the desire to implement the scale within the neurorehabilitation units in our country, some correspondence with the right holders of the use of the scale within the University of Gothenburg was initiated in 2019. Subsequently, the group proposed us to carry out an official translation according to an algorithm for achieving the unitary translation, agreed and recommended by the official administrators of the standardized forms of the scale, which will be included on the official website of the respective university along with other translations.

Results. Following the initial steps, a constructive correspondence was maintained with the official administrators of the University of Gothenburg and in accordance with the mutual agreement, we carried out the translation from English into Romanian of the specific forms on the official site. The translation included, at the recommendation of the Gothenberg collective, only the component used for measuring the motor functions for the upper and lower extremities. In addition, Prof. Dr. Roxana Carare was co-opted in the team of. Currently, the confrontation of the translation version of our team with the one made by her (forward from English to Romanian) is underway. Within the confrontation of forward translation, different shades of formulations were found at different levels.

Conclusions. In the later stages, the reverse confrontation from Romanian to English (backward) of the two translated variants is considered. At the same time, the coordinator of the administrators of the scale of the University of Gothenburg, Prof. Dr. Margit Alt Murphy, expressed her availability of assistance at all stages of the translation process.

Keywords: *Fugl-Meyer scale, stroke, assesment, hemiparetic patients, rehabilitation,*

Introduction

Cerebrovascular accidents represent a major cause of morbidity, mortality and disability in the adult population. After a stroke, many patients remain with a serious deficit including motor, sensory and balance, which affect their quality of life. To quantify these deficits, various tools have been created, such as the Fugl-Meyer assessment scale (FMA). It was elaborated in 1975 by Fugl Meyer and his colleagues, who observed the fact that there was a lack of exhaustive quantification of recovery progress in patients who suffered a stroke. The Fugl-Meyer assessment scale for the evaluation of neuro-sensory-motor deficits after stroke is a valid, reliable, responsive, and widely used standardized observational rating scale with ordinal data that assesses the reflex, sensorimotor, balance, joint pain and joint motion impairment. It represents, by completeness and adequate folding, both conceptually and methodologically, on the physio pathological and clinical-evolutionary reality of disability in this type of pathology, a widely used quantification tool for

international level and well appreciated in many works in profile literature.(2)

MATERIALS & METHODS: This paper is a try to extend the implementation of this scale in the inner neurorehabilitation units considering literature related resources (some updated too), aiming to supplement the assessment tools bundle to be availed; this would facilitate more complete evaluated cases in clinical studies. The scale comprises five domains: motor functioning (in the upper extremities maximum 66 points - upper extremity (0-36), wrist (0-10), hand (0-14), coordination/speed (0-6); in the lower extremity maximum 34 points for motor functioning: 0-28 and for coordination/speed:0-6); sensory functioning (maximum 24 points), balance (maximum 14 points), joint range of motion (maximum 44 points, but the less are the points identified aferent to this item, the better the clinical functional statement of the assesed patient) , joint pain (maximum 44 points). The rating is based on direct functional quantified observation of the motor performance at each item using a 3-point ordinal scale

(0 = cannot perform, 1 = performs partially, and 2 = performs fully). A particularity of this scale refers to the positive relation between functionality and its partial and global scores, and considers – very applied regarding the relation between reflexes evolutiv status and the one of the motor recovery, including passing through different standardised synergies patterns dynamics within the rehabilitation process. (1,2,4,5) **The maximum score that can be achieved is 226 points.** The time to be performed is about 45 minutes.(1,2,5,6)

Aiming to implement the scale within the neurorehabilitation units in our country, a correspondence with the right holders of the use of the scale within the University of Gothenburg was initiated in 2019. Subsequently, the group proposed us to carry out an official translation according to an algorithm for achieving the unitary translation, agreed and recommended by the official administrators of the standardized forms of the scale, which will be included on the official website of the respective university along with other translations.

RESULTS: Considering on one hand its above mentioned qualities, but on the other its rather chronophagic paradigm, we proposed, in a previous work, a splitting of its achievement in each tested by FMA patient of its specific measurement items between doctors and licensed kinesio-therapists – preliminary specific training based. In this purpose, we have initiated a detailed correspondence with the international professionals in charge of FMA use. Following the correspondence with the holders of the right of use and with those who drafted the standard evaluation form, although the use is free, we received, on one hand, the acceptance of using this ladder under the conditions requested by the respective group of the University of Gothenburg, and we understood that this scale can also be used by being broken down into components. Specifically, the balance section can be opt out (fact even recommended by the respective group), considering that grids or scales for this assessments such as Berg is preferable, which is why in their standardized forms it does not appear in the Balance section (existing in its original form since 1975). In the same conceptual trend we consider, also out of the need to save time to eliminate as many of the redundancies, that the Pain component can also be given up for evaluation, existing a much simpler and specific scale: VAS - Visual Analogue Scale (including with the variant VRS - Verbal Rating Scale). Following the initial steps, a constructive correspondence was maintained with the official administrators of the University of Gothenburg and in accordance with the mutual agreement, we carried out the translation from English into Romanian of the specific forms on the official site. The translation included, at the recommendation of the Gothenberg collective, only the

component used for measuring the motor functions for the upper and lower extremities. In addition, Prof. Dr. Roxana Carare was co-opted in the team of. Currently, the confrontation of the translation version of our team with the one made by her (forward from English to Romanian) was realized. Within the confrontation of forward translation, different shades of formulations were found at different levels, due to the transcultural differences, resulting in a pre-final version of translation. Then, according to the quite standardized translation and transcultural linguistic semantic adaptation of different assessment tools, we have proceeded to the backward translation – than achieved by a specialized in translation company. Currently our complex related endeavor is on going, i.e. we are now fulfilling the affective final version of the translation into Romanian of the FMA and afterword we shall promptly process to the enrollment – according to all the required Bioethics standards – of a lot and compassing (10-15 patients) in order to make a connected validation of the FMA Romanian version clinical study.

In purpose to overall accomplish this complex work, we have also elaborated a guiding synopsis/ design of it:

Study synopsis:

- **I. Introduction. Background** – including with the specification of the official administrators of the Fugl-Meyer Assessment (FMA) scale's preliminary approval, and further: proposal to initiate this endeavor and subsequent related counseling and support
- **II. Objectives:** transcultural translation and linguistic-semantic adaptation into Romanian of the FMA scale
- **III. Materials and Methods**
 - **Fulfillment of recommended** – including for previous such endeavors – steps/ **procedures to achieve the translation into Romanian of the FMA scale**, with its transcultural, semantic adaptation:
 - Forward translation into Romanian from English, by two independent translators good English speakers, reviewed by a quasi-equal Romanian and English speaker (living and working in the UK for about 25 years), and re-reviewed by the expert group, among the authors – thus resulting in the first into Romanian translation version of the FMA
 - Backward translation into English from Romanian, by an independent official translator – a prestigious company specialized in translations
 - 2nd revision of the first Romanian version of the FMA – including with linguistic-semantic check and adaptations – through crossed analysis by the expert group, among the authors – including with another independent quasi-equal Romanian and English speaker (living and working in the UK for about 25 years) – thus resulting in the second into Romanian

translation version of the FMA – with linguistic-semantic adaptations

- Initiation of the validation pilot study on hemiparetic post-stroke patients, entailing an additional preliminary revision (overall the 3rd version) of the into Romanian translation of the FMA – including with the related linguistic-semantic check and adaptations – thus resulting in the final into Romanian translation version of the FMA

▪ Validation pilot study

- Enrollment of a lot comprising 15 patients
- Fulfillment of the Bio-Ethics preliminary, rigorous, and complete, related procedures
- Patients selection

- Inclusion criteria: post-stroke subacute, subchronic or chronic – minimum three weeks since the acute cerebro-vascular accident (CVA)/ stroke/ brain attack – hemiparetic patients; ≥ 18 years old inpatients

- Exclusion criteria: poor/ unsteady general health (including neurological) state, sensory (tactile, proprioceptive – with related balance and coordination incurred by cerebellum damages, too –, eyesight and/or auditory) impairments, marked communication (aphasia with receptive elements) and/or (even mild) cognitive troubles, complete or segmentary absence of (a) limbs/(s), any other matter that could negatively affect the patient's collaboration to this kind of assessment

- **The clinical-functional instruments used to assess the enrolled patients with post-stroke hemiparesis: FMA – the translated into Romanian final version – standardized protocols for the upper extremity (UE) and respectively, for the lower extremity (LE); the modified Rankin scale (mRS – as source of overall disability status in each recruited patient); the Barthel index as reference/ "gold standard" for the concurrent validity testing of/ with the FMA; the Montreal Cognitive Assessment (MoCa – <https://strokengine.ca/en/> → <https://strokengine.ca/en/assessments/> → <https://strokengine.ca/en/assessments/montreal-cognitive-assessment-moca/>) for the cognitive state assessment**

- **Quantified evaluation of the enrolled patients – including in dynamics – by the above mentioned scales used, has been performed at admission at discharge (after about 4 weeks), through the following test/ re-test approach to assay the inter- and intra-rater reliability:**

- Specifically: each patient will be evaluated, at admission and at discharge, simultaneously (i. e. directly by one and indirectly by the other one) by two

knower of administering the FMA scale, licensed kinesi (physio) therapists, independently, during two days, consecutively; more precisely, one of them will effectively examine and score the patient through the FMA scale, while the other one will observe this evaluation, and based on the respective observation, will score the FMA scale for the same respective patient, without communication in between the two respective examiners neither at the moment of the assessment, nor later, and their results of the FMA will remain unknown for each of the two assessors. The next day the same examiners – i. e. the two knower of administering the FMA scale, licensed kinesi (physio) therapists – will proceed in the same way, but inverting their roles; it will result thus, on one hand, two scores obtained, for the same patient, through the evaluation of the same licensed kinesi (physio) therapist in two consecutive days (**intra-rater** assay) and also two independent scores obtained, consequent to the assessment of the same patient, obtained by the respective two examiners (**inter-rater** assay)

- **Statistical analysis afferent to the validation processing endeavors/ procedures:**

- the **Svensson method** – especially for paired ordinal data (<http://avdic.se/svenssonsmetod.html>) – preferable for objectifying and quantifying the intra- and inter-rater reliability – **will be used to determine the 'consensus level (PA = percentage of agreement)** between the first and the second observation (for each rater) and between the two different raters (during the same session) ... *estimated for each individual item of the FMA ... disagreement between raters ... evaluated by the Relative Position and the Relative Concentration* ... The Relative Position indicates the extent to which the distribution of scores from an assessment is systematically shifted towards higher or lower categories. The Relative Concentration shows whether the scores are more or less concentrated towards the central categories of the scale compared to the other assessment. The Relative Position and the Relative Concentration values can vary from -1 to 1, where 0 means no difference between raters. Values outside the range between -0.1 and 0.1 were considered as clinically relevant disagreements. The **Relative Rank Variation** indicates non-systematic disagreement caused by individual variability. A value <0.1 means that the difference is negligible. **Statistically significant disagreements in Relative Position and the Relative Concentration and Relative Rank Variation were indicated in cases when the 95% confidence interval that did not include the value zero.**' (Cecchi F et al. – Transcultural translation and validation of Fugl-Meyer assessment to Italian.

DISABILITY AND REHABILITATION
<https://doi.org/10.1080/09638288.2020.1746844>)

- **‘Intraclass Correlation Coefficient (ICC) for test–retest reliability’** and respectively, **standardized response mean (SRM) to test responsiveness**, and respectively, **Goodness-of-fit index (GFI)**– Roman N et al. (2020). Equal Opportunities for Stroke Survivors' Rehabilitation: A Study on the Validity of the Upper Extremity Fugl-Meyer Assessment Scale Translated and Adapted into Romanian. *Medicina (Kaunas, Lithuania)*, 56(8), 409

and also, respectively,

- (intrinsic/ internal) validity
 - **sensitivity** ...
 - **specificity** ...
 - **test efficiency** ...
 - (extrinsic/ external) validity
 - internal/ **construct validity** (“verified relationships between dependent and independent variables” – <https://litfl.com/validity-of-clinical-research/>)
 - **Somers** (95% confidence interval - c. i.) ...
 - **Spearman** (95% c. i.) ...
 - **α Cronbach** (95% c. i.) ...
 - **Kendall** (95% c. i.) ...
 - **Pearson** (95% c. i.) ...
- (measurement) validity – **‘concurrent validity** – compares measurements with an outcome at the same time (e.g. a **concurrent “gold standard” test result**)’ – <https://litfl.com/validity-of-clinical-research/>

V. Results – see below

VI. Discussion and Conclusions

CONCLUSIONS: We have a very good correspondence of the holders of the right of use. We are permitted to use the protocols free for non-commercial purpose. Additionally, being strongly impressed by our activity and they have also written: “If you have an official translation of the scale in your language done from the original protocol we are interested to see it and consider posting it officially on our webpage together with other translation.”

To be mentioned that the representative of the official holders of the FMA expressed also their kind availability to assist us along all our above presented complex academic endeavor.

For the validation clinical study we have chosen to compare FMA with the Barthel Index and the (Modified) Rankin Scale.

References:

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3. <https://www.sralab.org/rehabilitation-measures/fugl-meyer-assessment-motor-recovery-after-stroke>
4. https://neurophys.gu.se/sektioner/klinisk-neurovetenskap/forskning/rehab_med/fugl-meyer
5. <https://strokengine.ca/en/assessments/fugl-meyer-assessment-of-sensorimotor-recovery-after-stroke-fma/>
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**FUGL-MEYER ASSESSMENT
UPPER EXTREMITY (FMA-UE)
Assessment of sensorimotor function**
ID:
Date:
Examiner:

Fugl-Meyer AR, Jassko L, Leyman J, Olsson S, Stegling S: The post-stroke hemiplegic patient. A method for evaluation of physical performance. *Scand J Rehabil Med* 1975; 7:13-31.

A. UPPER EXTREMITY, sitting position

Reflex activity		none	can be elicited	
Flexors: biceps and finger flexors (at least one)		0	2	
Extensors: triceps		0	2	
Subtotal I (max 4)				
II. Volitional movement within synergies, without gravitational help		none	partial	full
Flexor synergy: Hand from contralateral knee to ipsilateral ear. From extensor synergy (shoulder adduction/ internal rotation, elbow extension, forearm pronation) to flexor synergy (shoulder abduction/ external rotation, elbow flexion, forearm supination).	Shoulder retraction	0	1	2
	Shoulder elevation	0	1	2
	Shoulder abduction (90°)	0	1	2
	Elbow external rotation	0	1	2
	Elbow flexion	0	1	2
	Forearm supination	0	1	2
Extensor synergy: Hand from ipsilateral ear to the contralateral knee	Shoulder adduction/internal rotation	0	1	2
	Elbow extension	0	1	2
	Forearm pronation	0	1	2
Subtotal II (max 18)				
III. Volitional movement mixing synergies, without compensation		none	partial	full
Hand to lumbar spine hand on lap	cannot perform or hand in front of ant-sup iliac spine hand behind ant-sup iliac spine (without compensation) hand to lumbar spine (without compensation)	0	1	2
Shoulder flexion 0°- 90° elbow at 0° pronation-supination 0°	immediate abduction or elbow flexion abduction or elbow flexion during movement flexion 90°, no shoulder abduction or elbow flexion	0	1	2
Pronation-supination elbow at 90° shoulder at 0°	no pronation/supination, starting position impossible limited pronation/supination, maintains starting position full pronation/supination, maintains starting position	0	1	2
Subtotal III (max 6)				
IV. Volitional movement with little or no synergy		none	partial	full
Shoulder abduction 0 - 90° elbow at 0° forearm pronated	immediate supination or elbow flexion supination or elbow flexion during movement abduction 90°, maintains extension and pronation	0	1	2
Shoulder flexion 90° - 180° elbow at 0° pronation-supination 0°	immediate abduction or elbow flexion abduction or elbow flexion during movement flexion 180°, no shoulder abduction or elbow flexion	0	1	2
Pronation/supination elbow at 0° shoulder at 30°- 90° flexion	no pronation/supination, starting position impossible limited pronation/supination, maintains start position full pronation/supination, maintains starting position	0	1	2
Subtotal IV (max 6)				
V. Normal reflex activity assessed only if full score of 6 points is achieved in part IV; compare with the unaffected side		0 (IV), hyper	lively	normal
biceps, triceps, finger flexors	2 of 3 reflexes markedly hyperactive or 0 points in part IV 1 reflex markedly hyperactive or at least 2 reflexes lively maximum of 1 reflex lively, none hyperactive	0	1	2
Subtotal V (max 2)				
Total A (max 36)				

B. WRIST support may be provided at the elbow to take or hold the starting position, no support at wrist, check the passive range of motion prior testing		none	partial	full
Stability at 15° dorsiflexion elbow at 90°, forearm pronated shoulder at 0°	less than 15° active dorsiflexion dorsiflexion 15°, no resistance tolerated maintains dorsiflexion against resistance	0	1	2
Repeated dorsiflexion / volar flexion elbow at 90°, forearm pronated shoulder at 0°, slight finger flexion	cannot perform volitionally limited active range of motion full active range of motion, smoothly	0	1	2
Stability at 15° dorsiflexion elbow at 0°, forearm pronated slight shoulder flexion/abduction	less than 15° active dorsiflexion dorsiflexion 15°, no resistance tolerated maintains dorsiflexion against resistance	0	1	2
Repeated dorsiflexion / volar flexion elbow at 0°, forearm pronated slight shoulder flexion/abduction	cannot perform volitionally limited active range of motion full active range of motion, smoothly	0	1	2
Circumduction elbow at 90°, forearm pronated shoulder at 0°	cannot perform volitionally jerky movement or incomplete complete and smooth circumduction	0	1	2
Total B (max 10)				

C. HAND support may be provided at the elbow to keep 90° flexion, no support at the wrist, compare with unaffected hand, the objects are interposed, active grasp		none	partial	full
Mass flexion from full active or passive extension		0	1	2
Mass extension from full active or passive flexion		0	1	2
GRASP				
a. Hook grasp flexion in PIP and DIP (digits II-V), extension in MCP II-V	cannot be performed can hold position but weak maintains position against resistance	0	1	2
b. Thumb adduction 1-st CMC, MCP, IP at 0°, scrap of paper between thumb and 2-nd MCP joint	cannot be performed can hold paper but not against tug can hold paper against a tug	0	1	2
c. Pincer grasp, opposition pulpa of the thumb against the pulpa of 2-nd finger, pencil tug upward	cannot be performed can hold pencil but not against tug can hold pencil against a tug	0	1	2
d. Cylinder grasp cylinder shaped object (small can) tug upward, opposition of thumb and fingers	cannot be performed can hold cylinder but not against tug can hold cylinder against a tug	0	1	2
e. Spherical grasp fingers in abduction/flexion, thumb opposed, tennis ball, tug away	cannot be performed can hold ball but not against tug can hold ball against a tug	0	1	2
Total C (max 14)				

D. COORDINATION/SPEED , sitting, after one trial with both arms, eyes closed, tip of the index finger from knee to nose, 5 times as fast as possible		marked	slight	none
Tremor at least 1 completed movement	pronounced or unsystematic slight and systematic no dysmetria	0	1	2
Dysmetria at least 1 completed movement		0	1	2
Time start and end with the hand on the knee	at least 6 seconds slower than unaffected side 2-5 seconds slower than unaffected side less than 2 seconds difference	≥ 6s	2 - 5s	< 2s
Total D (max 6)				

H. SENSATION , upper extremity eyes closed, compared with the unaffected side		anesthesia	hypoesthesia or dysesthesia	normal
Light touch upper arm, forearm palmar surface of the hand		0	1	2
		less than 3/4 correct or absence	3/4 correct or considerable difference	correct 100%, little or no difference
Position small alterations in the position	shoulder elbow wrist thumb (IP-joint)	0	1	2
Total H (max 12)				

J. PASSIVE JOINT MOTION , upper extremity, sitting position, compare with the unaffected side		only few degrees (less than 10° in shoulder)	decreased	normal	J. JOINT PAIN during passive motion, upper extremity		
					pronounced pain during movement or very marked pain at the end of the movement	some pain	no pain
Shoulder Flexion (0° - 180°)	0	1	2	0		1	2
Abduction (0°-90°)	0	1	2	0		1	2
External rotation	0	1	2	0		1	2
Internal rotation	0	1	2	0		1	2
Elbow Flexion	0	1	2	0		1	2
Extension	0	1	2	0		1	2
Forearm Pronation	0	1	2	0		1	2
Supination	0	1	2	0		1	2
Wrist Flexion	0	1	2	0		1	2
Extension	0	1	2	0		1	2
Fingers Flexion	0	1	2	0		1	2
Extension	0	1	2	0		1	2
Total (max 24)					Total (max 24)		

A. UPPER EXTREMITY	/36
B. WRIST	/10
C. HAND	/14
D. COORDINATION / SPEED	/6
TOTAL A-D (motor function)	/66

H. SENSATION	/12
J. PASSIVE JOINT MOTION	/24
J. JOINT PAIN	/24

Fig. 1. Fugl-Meyer assessment scale upper extremity (3,4)

FUGL-MEYER ASSESSMENT

LOWER EXTREMITY (FMA-LE)

Assessment of sensorimotor function

ID:

Date:

Examiner:

Fugl-Meyer AR, Jansko L, Leyman I, Olsson S, Steglind S: The post-stroke hemiplegic patient. I, a method for evaluation of physical performance. *Scand J Rehabil Med* 1975, 7:13-31.

E. LOWER EXTREMITY		none	can be elicited
I. Reflex activity, supine position			
Flexors: knee flexors		0	2
Extensors: patellar, achilles (at least one)		0	2
Subtotal I (max 4)			
II. Volitional movement within synergies supine position		none	partial
Flexor synergy: Maximal hip flexion (abduction/external rotation), maximal flexion in knee and ankle joint (palpate distal tendons to ensure active knee flexion)	Hip flexion	0	1
	Knee flexion	0	1
	Ankle dorsiflexion	0	1
Extensor synergy: From flexor synergy to the hip extension/adduction, knee extension and ankle plantar flexion. Resistance is applied to ensure active movement, evaluate both movement and strength (compare with the unaffected side)	Hip extension	0	1
	Knee adduction	0	1
	Ankle extension	0	1
	Ankle plantar flexion	0	1
Subtotal II (max 14)			
III. Volitional movement mixing synergies sitting position, knee 10cm from the edge of the chair/bed		none	partial
Knee flexion from actively or passively extended knee	no active motion less than 90° active flexion, palpate tendons of hamstrings more than 90° active flexion	0	1
Ankle dorsiflexion compare with unaffected side	no active motion limited dorsiflexion complete dorsiflexion	0	1
Subtotal III (max 4)			
IV. Volitional movement with little or no synergy standing position, hip at 0°		none	partial
Knee flexion to 90° hip at 0°, balance support is allowed	no active motion or immediate, simultaneous hip flexion less than 90° knee flexion and/or hip flexion during movement at least 90° knee flexion without simultaneous hip flexion	0	1
Ankle dorsiflexion compare with unaffected side	no active motion limited dorsiflexion complete dorsiflexion	0	1
Subtotal IV (max 4)			
V. Normal reflex activity supine position, assessed only if full score of 4 points is achieved in part IV, compare with the unaffected side		hyper	lively
Reflex activity knee flexors, Patellar, Achilles,	2 of 3 reflexes markedly hyperactive 1 reflex markedly hyperactive or at least 2 reflexes lively maximum of 1 reflex lively, none hyperactive	0	1
Subtotal V (max 2)			
Total E (max 28)			

F. COORDINATION/SPEED, supine, after one trial with both legs, eyes closed, heel to knee cap of the opposite leg, 5 times as fast as possible		marked	slight	none
Tremor	at least 1 completed movement	0	1	2
Dysmetria	pronounced or unsystematic slight and systematic no dysmetria	0	1	2
Time start and end with the hand on the knee	6 or more seconds slower than unaffected side 2-5 seconds slower than unaffected side less than 2 seconds difference	≥ 6s	2 - 5s	< 2s
Total F (max 6)				

H. SENSATION, lower extremity eyes closed, compare with the unaffected side		anesthesia	hypoesthesia or dysesthesia	normal
Light touch	leg foot sole	0	1	2
		less than 3/4 correct or absence	3/4 correct or considerable difference	correct 100%, little or no difference
Position small alterations in the position	hip knee ankle great toe (IP-joint)	0	1	2
		0	1	2
		0	1	2
Total H (max 12)				

I. PASSIVE JOINT MOTION, lower extremity supine position, compare with the unaffected side		only few degrees (<10° hip)	decreased	normal
Flexion	0	1	2	
Abduction	0	1	2	
External rotation	0	1	2	
Internal rotation	0	1	2	
Knee Flexion	0	1	2	
Extension	0	1	2	
Ankle Dorsiflexion	0	1	2	
Plantar flexion	0	1	2	
Foot Pronation	0	1	2	
Supination	0	1	2	
Total (max 20)				

J. JOINT PAIN during passive motion, lower extremity		pronounced pain during movement or very marked pain at the end of the movement	some pain	no pain
Flexion	0	1	2	
Abduction	0	1	2	
External rotation	0	1	2	
Internal rotation	0	1	2	
Knee Flexion	0	1	2	
Extension	0	1	2	
Ankle Dorsiflexion	0	1	2	
Plantar flexion	0	1	2	
Foot Pronation	0	1	2	
Supination	0	1	2	
Total (max 20)				

Fig. 2. Fugl-Meyer assessment scale lower extremity(3,4)



Fig.3. Volitional movement



Fig.4. Wrist

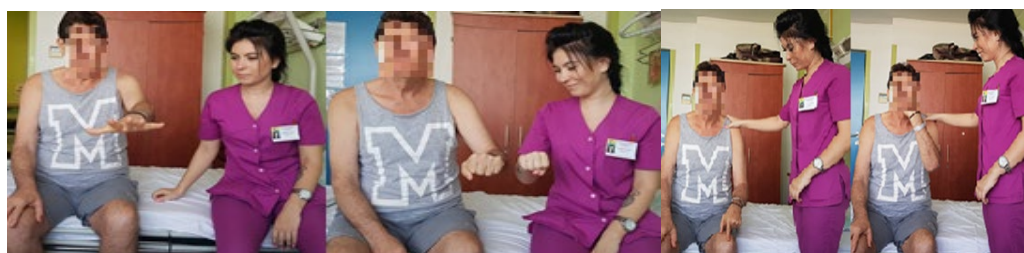


Fig.5. Hand coordination



Fig. 6. Hook grasp, thumb adduction, cylinder grasp, spherical grasp, pincer grasp



Fig.7. Extensor, flexor synergy



Fig.8. Knee flexion, ankle dorsiflexion

A. EXTREMITATEA SUPERIOARĂ, în poziție șezând			
I. Activitate reflexă		absentă	poate fi provocată
Flexori: biceps și flexori degete (cel puțin unul)		0	2
Extensori: triceps		0	2
Subtotal I (max 4)			
II. Mișcare voluntară în cadrul sinergiilor, fără ajutor gravitațional		absentă	parțială
Sinergia de flexie: mâna (dusă) de la genunchiul contralateral la urechea ipsilaterală. De la sinergia de extensie (abducție/ rotație internă umăr, extensie cot, pronație antebraț) la sinergia de flexie (abducție/ rotație externă umăr, flexie cot, supinație antebraț)	Umăr retroducție ridicare abducție (90°) rotație externă Cot flexie Antebraț supinație	0 0 0 0 0 0	1 1 1 1 1 1
Sinergia de extensie: mâna dusă de la urechea ipsilaterală la genunchiul contralateral	Umăr abducție/rotație internă Cot extensie antebraț pronație	0 0 0	1 1 1
Subtotal II (max 18)			
III. Mișcare voluntară combinând sinergiile, fără compensare		absentă	parțială
Mâna (dusă) la nivelul cofanei vertebrale lombare	Nu poate performea sau mâna este în fața (anterior de) spinei iliac antero-superioare	0	
mâna în poală	mâna este în spatele (posterior de) spinei iliac antero-superioare (fără compensare)		1
Flexie umăr 0°-90°	abducție imediată sau flexia cotului	0	
cot la 0°	abducție sau flexia cotului în timpul mobilizării		1
Pronație-supinație 0°	flexie 90°, fără abducție umăr sau flexie cot	0	
Pronație-supinație cot la 90°	fără pronație/supinație, poziție de start		1
umăr la 0°	imposibilă pronație/supinație limitată, menține poziția de start		
Subtotal III (max 6)			
IV. Mișcare voluntară cu sinergie scăzută sau fără sinergie		absentă	parțială
Abducție umăr 0°-90°	supinație sau flexie de cot imediată	0	
cot la 0°	supinație sau flexie de cot în timpul mișcării		1
antebraț neutru	abducție la 90°, menține extensia și pronația	0	
Flexie umăr 90°-180°	abducție sau flexie de cot imediată		1
cot la 0°	flexie 180°, fără abducție de umăr sau flexie de cot		
Pronație-supinație 0°			2
Subtotal IV (max 6)			
V. Activitate reflexă normală: este evaluată numai dacă se obține un scor complet, de 6 puncte, în partea IV; se compară cu partea neafectată		hiperactivă	vii
Bicipital, tricipital, al flexorilor degetelor	2 din 3 reflexe marcat hiperactive 1 reflex marcat hiperactiv sau cel puțin 2 reflexe vii	0	1
Subtotal V (max 2)			
Total A (max 36)			

B. ÎNCHEIETURA MĂINII (articulația pumnului/ radio-carpiană)			
susținerea acesteia poate fi efectuată la cot pentru a lăsa sau susține poziția de start, fără susținere la nivelul încheieturii mâinii/ pumnului, verificăți amplitudinea de mișcare pasivă înainte de testare		absentă	parțială
Stabilitate la dorsiflexie 15°	mai puțin de 15°, dorsiflexie activă	0	
cot la 90°, antebraț pronat	dorsiflexie 15°, fără rezistență		1
umăr la 0°	menține dorsiflexia împotriva rezistenței		2
Dorsiflexie/ flexie volară repetată	nu poate performa voluntar amplitudine de mișcare activă	0	
cot la 90°	limitată		1
antebraț pronat	amplitudine de mișcare activă		2
umăr la 0°	completă, efectuabilă lin/ bine		
Stabilitate la 15° dorsiflexie	mai puțin de 15°, dorsiflexie activă	0	
cot la 0°	dorsiflexie 15°, fără rezistență		1
antebraț pronat	menține dorsiflexia împotriva rezistenței		2
Dorsiflexie/flexie volară repetată	nu poate performa voluntar amplitudine de mișcare activă	0	
cot la 0°	limitată		1
antebraț pronat	amplitudine de mișcare activă		2
umăr la 0°	completă, efectuabilă lin/ bine		
Circumducție	nu poate performa voluntar mișcare sacadată/ spsmodică/ tremurătoare sau incompletă	0	
cot la 90°	circumducție completă și lină/ bine efectuată		1
antebraț pronat			2
umăr la 0°			
Total B (max 10)			

C. MÂNA: susținerea poate fi efectuată la cot pentru a menține 90° flexie, fără susținere la nivelul încheieturii mâinii/ articulației pumnului, se compară cu mâna neafectată, obiectele se interpun, prehensiune/ prindere activă			
Flexie globală/ în bloc		absentă	parțială
din poziție de extensie completă activă sau pasivă		0	1
Extensie globală/ în bloc		0	1
din poziție de flexie completă activă sau pasivă			2

Prehensiune/ prindere			
a. Prehensiune/ prindere în cârlig	flexie în articulațiile interfalangiene proximale și distale (degetele II-V), extensie în articulațiile metacarpofalangiene II-V	nu poate performa	0
		menține poziția dar slab	1
		menține poziția împotriva rezistenței	2
b. Abducție police	prima articulație carpometacarpiană, metacarpofalangiană, interfalangiană la 0°, bucată de hârtie între police și a doua articulație metacarpofalangiană	nu poate fi performată	0
		poate ține hârtia dar nu împotriva tragerii acesteia	1
		poate ține hârtia împotriva forței de tragere a acesteia	2
c. Pensă/ prindere clește, opoziție pulpa	policelei față de pulpa degetului 2, se trage în sus un creion (ținut de pacient între degetele respective - n. n.)	nu poate fi performată	0
		poate ține creionul dar nu împotriva tragerii acestuia	1
		poate ține creionul împotriva forței de tragere a acestuia	2
d. Prindere/ pensă cilindru	obiect de formă cilindrică (cană mică) trasă în sus dintre police aflat în opoziție cu degetele	nu poate performa	0
		poate ține cana dar nu împotriva tragerii de aceasta	1
		poate ține cana împotriva forței de tragere a acesteia	2
e. Prindere sferică	degete în abducție/flexie, police în opoziție, minge de tenis, trasă în afară	nu poate performa	0
		poate ține mingea dar nu împotriva tragerii de aceasta	1
		poate ține mingea împotriva forței de tragere a acesteia	2
Total C (max 14)			

D. COORDONARE/ VITEZĂ, în poziție șezând, după o testare la (n.n.)			
ambele brațe (membre superioare - n. n.), ochii închiși, vârful indexului (deplasat) de la genunchi la nas, de 5 ori cât de rapid posibil		marcat	ușor
Tremor			nu există
(la) cel puțin o mișcare finalizată		0	1
Dismetrie			2
cel puțin (la) o mișcare pronunțată sau nesistematică ușoară sau sistematică fără dismetrie		0	1
			2
Timp		≥ 6s	2 - 5s
începere și terminare cu mâna pe genunchi		0	< 2s
cu 6 secunde sau mai mult, mai lent decât în partea neafectată			1
cu 2-5 secunde mai lent decât în partea neafectată			2
cu mai puțin de 2 secunde diferență			
Total D (max 6)			

TOTAL A-D (max 66)			
H. SENSIBILITATE, extremitatea superioară, ochii închiși, comparativ cu partea neafectată		anestezie	hipostezie sau disestezie
Atingere ușoară			normal
braț, antebraț față palmară a mâinii		0	1
		mai puțin de 3/4 corectă sau absentă	2
		3/4 corectă sau diferență considerabilă	2
		corectă 100%, diferență mică sau fără diferență	2

Poziție alterări ușoare ale poziției			
umăr	0	1	2
cot	0	1	2
încheietura mâinii (articulația pumnului/ radio-carpiană)	0	1	2
police (articulația interfalangiană)	0	1	2
Total H (max 12)			

I. MOBILITATE ARTICULARĂ PASIVĂ, extremitatea superioară, poziție șezând, comparativ cu partea neafectată			
calea grade (mai puțin de 10° în umăr)		scăzută	normală
Umăr			
Flexie (0° - 180°)		0	1
Abducție (0°-90°)		0	1
Rotație externă		0	1
Rotație internă		0	1
Cot			
Flexie		0	1
Extensie		0	1
Antebraț			
Pronație		0	1
Supinație		0	1
Încheietura mâinii (articulația pumnului/ radio-carpiană)			
Flexie		0	1
Extensie		0	1
Degete			
Flexie		0	1
Extensie		0	1
Total (max 24)			

J. DURERE ARTICULARĂ în timpul mobilizării pasive, extremitatea superioară	
durere pronunțată în timpul mișcării sau durere foarte marcată la sfârșitul mișcării	
durere ușoară	
fără durere	
Total (max 24)	

A. EXTREMITATEA SUPERIOARĂ	/36
B. ÎNCHEIETURA MĂINII (articulația pumnului/ radio-carpiană)	/10
C. MÂNA	/14
D. COORDONARE/VITEZĂ	/6
TOTAL A-D (funcție motorie)	/66
H. SENSIBILITATE	/12
I. MOBILITATE ARTICULARĂ PASIVĂ	/24
J. DURERE ARTICULARĂ	/24

Fig. 9. Fugl-Meyer assessment scale translated from English to Romanian (forward)- upper extremity

**EVALUAREA FUGL-MEYER
EXTREMITATEA INFERIOARĂ (EFM-EI)**
Evaluarea funcției senzitivomotorii

Identitate Pacient:
Data:
Examinator:

Fugl-Meyer AR, Jankin L, Leyman I, Olsson S, Stegling S. The post-stroke hemiplegic patient. A method for evaluation of physical performance. *Scand J Rehabil Med* 1973; 7:13-31.

E. EXTREMITATEA INFERIOARĂ					
I. Activitate reflexă, decubit dorsal					
		absentă	poate fi provocată		
Flexori: flexorii genunchiului (noiceptiv de triplă flexie: întepătură în talpă – n. n.)		0	2		
Extensori: rotulian, ahilian (cel puțin unul)		0	2		
Subtotal I (max 4)					
II. Mișcare voluntară în cadrul sinergiilor decubit dorsal					
		absentă	parțială	completă	
Sinergia de flexie: Flexie maximă a soldului (abducție/rotație externă), flexie maximă în articulațiile genunchiului și gleznei (se palpează distal tendoanele pentru a se asigura de flexia activă a genunchiului).	Sold	flexie			
	Genunchi	flexie	0	1	2
	Glezna	dorsiflexie	0	1	2
Sinergia de extensie: De la sinergia de flexie până la extensia/adducția soldului, extensia genunchiului și flexia plantară a gleznei. Se aplică rezistență pentru a se asigura de mișcarea activă, de evaluat atât mișcarea cât și forța (comparativ cu partea neafectată)	Sold	extensie	0	1	2
	Genunchi	adducție	0	1	2
		extensie	0	1	2
Glezna	flexie plantară	0	1	2	
Subtotal II (max 14)					
III. Mișcare voluntară combinând sinergiile, sezut, genunchiul la 10 cm de marginea patului/scanului					
		absentă	parțială	completă	
Flexia genunchiului de la genunchi extins activ sau pasiv	fără mișcare activă flexie activă mai puțin de 90°, se palpează tendoanele ischiogamblierilor („hamstrings”) flexie activă mai mult de 90°	0	1	2	
Dorsiflexia gleznei în comparație cu partea neafectată	fără mișcare activă dorsiflexie limitată dorsiflexie completă	0	1	2	
Subtotal III (max 4)					
IV. Mișcare voluntară cu sinergie scăzută sau fără sinergie					
		absentă	parțială	completă	
Flexia genunchiului la 90° sold la 0°, sprijinit pentru echilibru este permis	fără mișcare activă sau flexie imediată, simultană a soldului flexia genunchiului sau/si flexia soldului mai puțin de 90° în timpul mișcării flexia genunchiului cel puțin 90° fără flexie simultană a soldului	0	1	2	
Dorsiflexia gleznei în comparație cu partea neafectată	fără mișcare activă dorsiflexie limitată dorsiflexie completă	0	1	2	
Subtotal IV (max 4)					

V. Activitate reflexă normală din decubit dorsal, este evaluată numai dacă se obține un scor complet de 4 puncte în partea IV, se compară cu partea neafectată				
	hiperactiv	vii	normale	
Activitate reflexă flexorii genunchiului, calcetel, ahilian	2 din 3 reflexe marcat hiperactiv 1 reflex marcat hiperactiv sau minimum 2 reflexe vii maximum 1 reflex viu, nici unul hiperactiv	0	1	2
Subtotal V (max 2)				
Total E (max 28)				

F. COORDONARE/VITEZĂ, în decubit dorsal, după o festare cu ambele picioare, ochii închiși, călcăiul la rotula membrului inferior de parte opusă, de 5 ori cât de rapid posibil				
	absentă	parțială	completă	
Tremor	(a) cel puțin o mișcare finalizată	0	1	2
Disimetrie	pronunțată sau nesistematică ușoară și sistematică fără disimetrie	0	1	2
Timp	Cu minim 6 secunde mai încet fata de partea neafectată Cu 2-5 secunde mai încet fata de partea neafectată Diferența mai mica de 2 secunde	0	1	2
Subtotal F (max 6)				

H. SENSIBILITATE, extremitatea inferioară, ochii închiși, comparativ cu partea neafectată				
	anestezie	hipoestezie sau distezie	normal	
Atingere ușoară	picioară talpă	0 1	2 2	
Poziție alterări ușoare ale poziției	sold genunchi gleznă haluce (articulația interfalangiană)	mai puțin de 3/4 corectă sau absentă 0 0 0 0	3/4 corectă sau diferență considerabilă 1 1 2 2	corectă 100%, diferență mică sau fără diferență 2 2 2 2
Subtotal H (max 12)				

I. MOBILITATE ARTICULARĂ PASIVĂ, extremitatea inferioară, în decubit dorsal, comparativ cu partea neafectată				
	doar câteva grade (<10° în sold)	scăzută	normală	
Sold	0	1	2	
Flexie	0	1	2	
Abducție	0	1	2	
Rotatie externă	0	1	2	
Rotatie internă	0	1	2	
Subtotal I (max 12)				

J. DURERE ARTICULARĂ în timpul mișcării pasive, extremitatea inferioară				
	durere pronunțată în timpul mișcării sau durere foarte marcată la sfârșitul mișcării	durere ușoară	fără durere	
Genunchi	0	1	2	
Flexie	0	1	2	
Extensie	0	1	2	
Glezna	0	1	2	
Dorsiflexie	0	1	2	
Flexie plantară	0	1	2	
Picioară	0	1	2	
Pronație	0	1	2	
Supinație	0	1	2	
Subtotal J (max 20)				

E. EXTREMITATEA INFERIOARĂ	/28
F. COORDONARE/VITEZĂ	/6
TOTAL E-F (funcție motorie)	/34

H. SENSIBILITATE	/12
I. MOBILITATE ARTICULARA PASIVA	/20
J. DURERE ARTICULARA	/20

FUGL-MEYER ASSESSMENT

Patient Identifier:

UPPER EXTREMITY (FMA-UE)
Assessment of sensorimotor function

Date:
Examiner:

Fugl-Meyer AR, Jankin L, Leyman I, Olsson S, Stegling S. The post-stroke hemiplegic patient. A method for evaluation of physical performance. *Scand J Rehabil Med* 1973; 7:13-31.

performance. *Scand J Rehabil Med* 1993; 7:13-21.

A. UPPER EXTREMITY, in sitting position				
I. Reflex activity		none	can be elicited	
Flexors: biceps and finger flexors (at least one)		0	2	
Extensors: triceps		0	2	
Subtotal I (max 4)				
II. Volitional movement within synergies, without gravitational aid		none	partial	full
Flexor synergy: hand (moved) from contralateral knee to ipsilateral ear. From extensor synergy (shoulder adduction/ internal rotation, elbow extension, forearm pronation) to flexor synergy (shoulder abduction/ external rotation, elbow flexion, forearm supination)	Shoulder retraction	0	1	2
	elevation	0	1	2
	abduction (90°)	0	1	2
	external rotation	0	1	2
	Elbow flexion	0	1	2
	Forearm supination	0	1	2
	Shoulder adduction/ internal rotation	0	1	2
	Elbow extension	0	1	2
	forearm pronation			
	Subtotal II (max 18)			
III. Volitional movement mixing synergies, without compensation		none	partial	full
Hand (moved) to lumbar spine	cannot perform or the hand is in front of (anterior to) the anterior-superior iliac spine, the hand is behind (posterior to) the anterior-superior iliac spine (without compensation), the hand (moved) to lumbar spine (without compensation)	0		
Hand on the lap			1	
				2
Shoulder flexion 0°-90°	immediate abduction or elbow flexion	0		
Elbow to 0° pronation-supination 0°	abduction or elbow flexion during movement 90° flexion, no shoulder abduction or elbow flexion		1	2
Pronation-supination	no pronation/supination, impossible starting position	0		
Elbow to 90°	limited pronation/supination, maintains the starting position		1	
Shoulder to 0°	full pronation/supination, maintains the starting position			2
Subtotal III (max 6)				
IV. Volitional movement with little or no synergy		none	partial	full
Shoulder abduction 0°-90°	immediate elbow supination or flexion	0		
Elbow to 0°	elbow supination or flexion during movement		1	
Forearm neutral	abduction to 90°, maintains extension and pronation			2

Shoulder flexion 90°-180°	immediate elbow abduction or flexion	0	1	2
elbow to 0°	elbow abduction or flexion during movement			
pronation-supination 0°	flexion 180°, no shoulder abduction or elbow flexion			
Pronation/supination	no pronation/supination, starting position impossible	0	1	2
elbow to 0°	limited pronation/supination, maintains starting position			
shoulder to 30°-90° flexion	full pronation/supination, maintains starting position			
Subtotal IV (max 6)				
V. Normal reflex activity: assessed only if a full score of 6 points is achieved in part IV; compare with the unaffected side				
	hyperactive	lively	normal	
Bicipital, tricipital, of fingers flexors	2 of 3 reflexes markedly hyperactive 1 reflex markedly hyperactive or at least 2 reflexes lively Maximum of 1 reflex lively, none hyperactive	0	1	2
Subtotal V (max 2)				
Total A (max 36)				

B. WRIST (first/radiocarpal joint) support may be provided at the elbow to take or hold the starting position, no support at the wrist/ fist level; check the passive range of motion before testing				
	none	partial	full	
Stability at 15° dorsiflexion	less than 15°, active dorsiflexion	0	1	2
elbow at 90°, forearm pronated	dorsiflexion 15°, no resistance tolerated maintains dorsiflexion against resistance			
Shoulder at 0°				
Repeated dorsiflexion/ volar flexion	cannot perform volitionally	0	1	2
elbow at 90°	limited active range of motion			
forearm pronated	full active range of motion, smoothly/ well realizable			
shoulder at 0°, slight finger flexion				
Stability at 15° dorsiflexion	less than 15°, active dorsiflexion	0	1	2
elbow at 0°, forearm pronated	dorsiflexion 15°, no resistance tolerated maintains dorsiflexion against resistance			
slight shoulder flexion/abduction				
Repeated dorsiflexion/ volar flexion	cannot perform volitionally	0	1	2
elbow at 90°	limited active range of motion			
forearm pronated	full active range of motion, smoothly/ well realizable			
slight shoulder flexion/abduction				
Circumduction	cannot perform volitionally	0	1	2
elbow at 90°	jerky/ spasmodic/ trembling movement or incomplete			
forearm pronated	complete and smoothly/ well done			
shoulder at 0°	circumduction			
Subtotal B (max 10)				

Fig. 10. Fugl-Meyer assessment scale translated from English to Romanian (forward)- lower extremity

C. HAND: support may be provided at the elbow to keep 90° flexion, no support at the wrist/fist joint level, compared with the unaffected hand, the objects are interposed, active prehension/grasp		none	partial	full
Mass/in block flexion from full active or passive extension position		0	1	2
Mass/in block extension from full active or passive flexion position		0	1	2
Prehension/grasp				
a. Hook prehension / grasp	cannot be performed	0	1	2
flexion in the proximal and distal interphalangeal joints (digits II-V), extension in the metacarpophalangeal joints II-V	maintains the position but weakly maintains position against resistance			
b. Thumb adduction	cannot be performed	0	1	2
first carpometacarpal, metacarpophalangeal, interphalangeal joint at 0°, scrap of paper between thumb and the second metacarpophalangeal joint	can hold the paper but not against a tug			
c. Pincer/grasp, opposition	cannot be performed	0	1	2
pulp of the against the pulps of 2 nd finger, pencil (held by the patient between the respective fingers-our note) tugged upward	can hold the pencil but not against a tug			
d. Cylinder grasp/pinch	cannot be performed	0	1	2
cylinder-shaped object (small cup) tugged up from between the thumb that is in opposition to the fingers	he/she can hold the cup but not against a tug			
e. Spherical grasp	cannot be performed	0	1	2
fingers in abduction/flexion, thumb in opposition, tennis ball, tugged away	can hold the ball but not against a tug			
Total C (max 14)				

D. COORDINATION/SPEED, in sitting position, after one trial with (our note) both arms (upper limbs – our note), eyes closed, tip of the index finger (moved) from knee to nose, 5 times as quickly as possible		marked	slight	none
Tremor	(to) at least one completed movement	0	1	2
Dysmetria	pronounced or unsystematic slight or systematic no dysmetria	0	1	2
Time start and finish with the hand on the knee	at least 6 seconds slower than on the unaffected side	0	1	2
Total D (max 6)				

TOTAL A-D (max 66)	
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I. PASSIVE JOINT MOTION, upper extremity, sitting position, compared to the unaffected side		only few degrees (less than 10° in the shoulder)	low	normal	pronounced pain during movement or very marked pain at the end of the movement	slight	no pain
Shoulder							
Flexion (0° - 180°)		0	1	2	0	1	2
Abduction (0°-90°)		0	1	2	0	1	2
External rotation		0	1	2	0	1	2
Internal rotation		0	1	2	0	1	2
Elbow							
Flexion		0	1	2	0	1	2
Extension		0	1	2	0	1	2
Forearm							
Pronation		0	1	2	0	1	2
Supination		0	1	2	0	1	2
Wrist (first/radiocarpal joint)							
Flexion		0	1	2	0	1	2
Extension		0	1	2	0	1	2
Fingers							
Flexion		0	1	2	0	1	2
Extension		0	1	2	0	1	2
Total (max 24)							

A. UPPER EXTREMITY	/36
B. WRIST (first/radiocarpal joint)	/10
C. HAND	/14
D. COORDINATION/SPEED	/6
TOTAL A-D (motor function)	/66

H. SENSATION	/12
I. PASSIVE JOINT MOTION	/24
J. JOINT PAIN	/24

H. SENSATION, upper extremity, eyes closed, in comparison to the unaffected side		anesthesia	hypoesthesia or dysesthesia	normal
Light touch	upper arm	0	1	2
	forearm, palmar surface of the hand	0	1	2
Position slight alterations in the position		less than 3/4 correct or absent	3/4 correct or considerable difference	100% correct, little or no difference
	shoulder	0	1	2
	elbow	0	1	2
	wrist (first/radiocarpal joint)	0	1	2
		0	1	2
Total H (max12)				

FUGL-MEYER ASSESSMENT PROTOCOL (FMA)	Rehabilitation Medicine, University of Gothenburg (Gothenburg University)
– LOWER EXTREMITY (LE)	
FUGL-MEYER ASSESSMENT	Patient identifier:
LOWER EXTREMITY (FMA-LE)	Date:
Evaluation of sensorimotor function	Examiner:
Fugl-Meyer LE, J Rehabil Med 1997; 30: 1-13.	

E. LOWER EXTREMITY		none	partial	full
I. Reflex activity, dorsal decubitus				
Flexors: knee flexors (inocclusive of triple flexion: sting in the foot sole –our note)		0	1	2
Extensors: patellar, calcaneal (at least one)		0	1	2
Subtotal I (max 4)				
II. Volitional movement within synergies, dorsal decubitus				
Flexor synergy:				
Maximal hip flexion (abduction/external rotation), maximal flexion in knee and ankle joint (palpate distal tendons to ensure active knee flexion is present)	Hip flexion	0	1	2
	Knee flexion	0	1	2
	Ankle flexion	0	1	2
Extensor synergy: 1/From flexor synergy to hip extension/adduction, knee extension and ankle plantar flexion. Resistance is applied to ensure the active movement is present, to evaluate both movement and strength (compared to the unaffected side)	Hip extension	0	1	2
	Knee extension	0	1	2
	Ankle extension	0	1	2
Subtotal II (max 14)				
III. Volitional movement mixing synergies, sitting position, knee at 10 cm from the edge of the bed/chair				
Knee flexion from activity	no active motion	0	1	2
or passively extended knee	less than 90° active flexion, palpable on hamstrings tendons			
Ankle dorsiflexion	more than 90° active flexion	0	1	2
compared with the unaffected side	no active movement			
	limited dorsiflexion			
	full dorsiflexion			
Subtotal III (max 4)				
IV. Volitional movement with little or no synergy				
Knee flexion to 90°	no active movement or immediate, simultaneous hip flexion	0	1	2
hip at 0°, balance support is allowed	less than 90° knee flexion and/or hip flexion during movement			
	at least 90° knee flexion without simultaneous hip flexion			
Subtotal IV (max 4)				
Total E (max 28)				

Ankle dorsiflexion	no active movement	0	1	2
compared to the unaffected side	full dorsiflexion			
Subtotal IV (max 4)				
V. Normal reflex activity: in dorsal decubitus, assessed only if a full score of 4 points is achieved in part IV, compared to the unaffected side				
Reflex activity	2 of 3 reflexes markedly hyperactive	hyperactive	lively	normal
knee flexors,	1 reflex markedly hyperactive or at least 2 reflexes lively	0	1	2
patellar,	maximum 1 reflex lively, none hyperactive			
calcaneal				
Subtotal V (max 2)				
Total F (max 6)				

F. COORDINATION/ SPEED, in dorsal decubitus, after one trial with both legs, eyes closed, heel to kneecap of the opposite leg, 5 times as quickly as possible		none	partial	full
Tremor	(to) at least one completed movement	0	1	2
Dysmetria	pronounced or unsystematic slight or systematic no dysmetria	0	1	2
Time start and finish with the hand on the knee	at least 6 seconds slower than on the unaffected side	0	1	2
	2-5 seconds slower than on the unaffected side			
	less than 2 seconds difference			
Total F (max 6)				

H. SENSATION, lower extremity, eyes closed, compared with the unaffected side		anesthesia	hypoesthesia or dysesthesia	normal
Light touch	leg	0	1	2
	foot/sole	0	1	2
Position	hip	0	1	2
	knee	0	1	2
slight alterations in the position	ankle	0	1	2
	great toe (interphalangeal joint)	0	1	2
Total H (max12)				

I. PASSIVE JOINT MOTION, lower extremity, dorsal decubitus, compared to the unaffected side		only few degrees (<10° in the hip)	low	normal	pronounced pain during the movement or very marked pain at the end of the movement	slight	no pain
Hip							
Flexion		0	1	2	0	1	2
Abduction		0	1	2	0	1	2
External rotation		0	1	2	0	1	2
Internal rotation		0	1	2	0	1	2
Knee							
Flexion		0	1	2	0	1	2
Extension		0	1	2	0	1	2
Ankle							
Dorsiflexion		0	1	2	0	1	2
Plantar flexion		0	1	2	0	1	2
Foot							
Pronation		0	1	2	0	1	2
Supination		0	1	2	0	1	2
Total (max 20)							

E. LOWER EXTREMITY	/28
F. COORDINATION/ SPEED	/6
TOTAL E-F (motor function)	/34

H. SENSATION	/12
I. PASSIVE JOINT MOTION	/20
J. JOINT PAIN	/20

Fig. 12. Fugl-Meyer assessment scale translated from Romanian to English (backward)- lower extremity

Pending on the outcome of the above mentioned correspondence, hopefully we could succeed to enhance FMA applying, but in a reasonable time framing within clinical rhythm and considering the unfortunate actual period of COVID-19 pandemic.

Fig. 11. Fugl-Meyer assessment scale translated from Romanian to English (backward)- upper extremity