STUDIA UBB EDUCATIO ARTIS GYMN., LXVII, 4, 2022, pp. 147-160
(RECOMMENDED CITATION)
DOI:10.24193/subbeag.67(4).43

FUNCTIONAL ASSESSMENT IN NEUROMOTOR REEDUCATION

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Received 2022 October 08; Revised 2022 November 21; Accepted 2022 December 05; Available online 2023 March 10; Available print 2023 March 30.

ABSTRACT. Today's neuromotor reeducation domain is filled up to the brim with all sorts of approaches. The only way of actually telling the good from the bad is conducting good and thorough studies, as well as having palpable evidence about the level of efficiency. The first step in doing that is having more specific tests that finely assess the motor function of a patient suffering from CNS lesions. This paper could be considered as a trial run for an even bigger step in terms of validating a supposed more specific tool of motor assessment. Two already validated and widely used tests in patients with stroke or in patients from the ICU are used, and the data collected is used to see if this new tool has a good, if any relationship with the previous. Apparently, in all three circumstances, primary, secondary and final assessment a strong relationship was found and the statistical significance was very promising. On a personal note, one specific and important difference between the already in clinical and scientific use and the new test was that the new test could detect motor improvement when SIAS failed to do so, and even more so than DEMMI could. That for the therapist is a very important aspect being able to finely tune their means of approach. Also, for the patients it could have better and more positive psychological outcomes, because now even if before when a regular test would not show them improvement at all, now even after a smaller amount of time but with targeted means of work, they have something to show for.

***Keywords**: Assessment; functional, neuromotor reeducation; FRA*

Introduction

In neuromotor reeducation, we have a multitude of tests that focus on either on the individual's resources or on a more functional level. When a say resources I mean of course qualities like strength, endurance, mobility, balance,

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control etc. But when we talk about a more functional level, and in rehab, the instruments used frequently, do not quite get the motor component as precise as it would be needed (Zwolińska, & Gąsior, 2020).

The most used tests today follow thresholds or milestones way too spread apart, and some are just missing, in order for you to have the nuances you need to detect an evolution in motor function (Saunders, et al., 2016).

This subject is a very bountiful and once pursued it can lead to a way that can increase the rhythm of progress, and also will help filter through the multitude of approaches in the field in terms of useful or less useful. Without a proper tool to more efficiently assess motor function, that way isn't that accessible. After almost 12 years of practice in the motor rehab, I have developed specific tool, and I will try and find out if it correlates to other tests that have be validated and used on a wider scale in the world today.

Included pathologies

We can group lesions in the central nervous system (CNS) after its location: cortical, in the basal nuclei, brain stem, cerebellar; vascular nature: hemorrhagic or ischemic stroke, hypoxic or anoxic; degenerative and so on. As long as we find an integral circuit through which we can introduce information to the cortex, and we get a response back from there, also said response should be reproducible and alterable through guidance (Mang, Campbell, Ross, & Boyd, 2013), the subjects can enter the study.

With a lot of these lesions, hypertonia can manifest itself. Just to have a clear understanding of what I mean by that, and also the types I consider when talking about that phenomenon: Spasticity – in which we meet resistance to a movement at a much higher speed or a sudden movement within its range of motion (ROM), or change in direction in the joints that it manifests in the limbs or trunk in a very specific manner (unidirectional); Dystonia – is a movement disorder that bring forth either prolonged or intermittent involuntary movements. It causes twist-like kind of movements within the axis of a joint or joints, repetitive movements, altered gait (asymmetrical most common); Rigidity – in contrast to spasticity the resistance manifested within mobilization of a joint, the segments have difficulty moving in more than one direction (antagonistic even). The angle or speed do not influence movement as much as changing direction. Movement can and is present but it has to be slowly executed. Changing direction leads to co-contraction (Sanger, Delgado, Gaebler-Spira, Hallett, & Mink, 2003).

The presence of dyskinesias obviously will mean delays in the reeducation programs (Siniscalchi, Gallelli, Labate, Malferrari, Palleria, & De Sarro, 2012), but the main focus in this study is to observe the correlation (if any) between a personal tool of evaluation and two other instruments already validated and widely in use.

Assessment

World Health Organization (WHO) proposed for a long time now ICFDH (International Classification of Functioning, Disability and Health), which defined components of function and disability and also a degree of participation. This later degree describes 9 subdomains of activity and participation like: learning and applying knowledge, general tasks and requirements, communication, mobility, self-care, home maintenance, interpersonal and human relationships, major life areas and of course a civic and social life within a community (Weimar et al., 2002).

Observing and measuring the abilities of a patient is a complex task. If we assess more aspects within an area, we will get a more realistic status of motor function and we will find ourselves closer to a truthful functional state as a whole. Testing a singular area like motor function comes of course with its challenges, but this form of evaluation remains even at present the most important tool for having a good perspective of the bigger functional picture (Reiman & Manske, 2011).

So far, we are unaware of ways to permanently get rid of hypertonia induces by CNS lesions. The necessity of managing this condition is of the utmost of importance because otherwise, we risk muscle retractions and joint ankylosis is far too high especially when the patient stops or dramatically decreases the level of physical activity. Unfortunately, we do not have a significant number of studies that tackle the most effective ways of management, be it pharmacologically, conservative or combined when it comes to this subject but the great hope is to change this in a near future. If we have more specific and sensitive tools to properly assess, and we design double or single-blind, randomized controlled trials, we will be able to get closer to the afore-mentioned objective (Thibaut, Chatelle, Ziegler, Bruno, Laureys, & Gosseries, 2013).

Therapeutical approach

Assessment and therapy lie really close together. The therapeutical method regards the active engagement of the patient. Exclusion for this study will firstly consist of an incomplete neuromotor circuit. Meaning it is absolutely necessary to be able to introduce information within the system, and also to have motor responsiveness to the stimuli. If this phenomenon is present, no matter how small the response, then we have a subject of study. In translation, we have the receptors that take the information and move it through afferent pathways for it to get processed in the CNS, only for it to be lead back out as a response through efferent pathways to the effectors (muscles). If we take out any of the components of this integral system, the method will fail and thus not apply (Dayan & Cohen, 2011).

Therapy starts at the first developmental motor milestones at ground level, and fights gravity step by step, until it reaches orthostatic position and higher. The beauty of this global approach is that in order to get to a more advance stage of function, you have to check or get as many as possible of the previous stages before the one in discussion. Once we reach a higher point in the evolution of motor function, all the other steps will be maintained through the inertia of engagement in movement and continuous repetition (Bönstrup, Iturrate, Hebart, Censor, & Cohen, 2020).

We can skip a few steps, and then later come back and check them also, or we can skip stages whole, and still have independent higher motor function. The problem isn't with skipping stages. The problem will consist of a drop in the overall quality of higher motor function. The more stages we skip or leave unconsolidated (dependent on support), a drop will be fairly apparent in: balance, muscle tone fluctuation, coordination. Also, if the subjects have involuntary movements, these often lead to even more dysfunction and a deconditioning. But this need not be the case. We see an improvement within these aspects if the missing stages are addressed, acquired and consolidated. But you can also attribute an element of safety when taking this approach. Whenever patients have a sense of distress, they can reach lower stage and get to a safer place like sitting or getting down on the ground without the danger of falling and hurting themselves (Muratori, Lamberg, Quinn, & Duff, 2013).

A complete report of ROM in all joints is not necessary because once the patient is placed at a particular functional level, the faulty stages are outlined and the same goes for the stages that are missing, and for these, we can assess mobility and assess if prerequisites are met to go further. Joints and segments will be much more visible in this manner (Satariano et al., 2012).

Neuroplasticity can be defined as the ability of the CNS to respond to stimuli, both intrinsic or extrinsic, in order to reorganize its structure, its function and connections; it can be described on many levels: from molecular, to cellular, to systemic or behavioral. It takes place during a child's developmental timespan, as a response to the environment, as support for the learning process, as a response to sickness or it maybe even caused by therapy. Therefore, plasticity can be considered an adaptive trait when the results generate positive outcomes and maladaptive when it generates negative effects like dysfunction, or simply worsening a preexistent condition. However, a distinction must be made between adaptive plasticity and compensatory behavior. Those behaviors that already were in existence prior to getting CNS lesions (Cramer et al., 2011).

There is a bountiful display of evidence that suggest how physical therapy contributes through repetitive tasks, always carefully dosing either by volume or intensity of activity, and acquiring functional stages in the fight against gravity (Rietberg & Kwakkel, 2014).

Correlation

We give to each consecrated assessment tool the variable X, and Y shall be used for the personal tool. For this study, we used a Pearson test to establish a correlation coefficient “r” with an absolute positive or negative value of ± 1, and 0 there is no correlation between variable. A coefficient “r” ≥ 0.7 suggests a strong correlation. The nature of this correlation is symmetrical. This means that we can predict a rise or drop in values from X to those of Y, and implicitly the same goes for vice-versa (Malgady & Krebs, 1986)

With a hypothesis like “if there is a rise in X there will be a rise in Y, the same goes for negative values”, there will need to be set a threshold of statistical significance. In scientific literature threshold is noted “p” and it should be set at ≤ 0.05, in other words with an incidence of occurrence for at least 5% or lower of possible cases (Hung, Bounsanga, & Voss, 2017).

The correlation diagram or the scatter plot, is a diagram in which we find along the course of two axes (x, y) with the total scoring visible for each one, just so the relation between the two variables can be visibly observed. In our scatter-plot we find the relation points between the analog values from each axis dispersed into 4 imaginary quadrants. If the direction is ascendent from the lower left quadrant to the upper right, there will be a positive relation. If the direction is descendent from de upper left quadrant to the lower right, there will be a negative relation (Friendly, & Denis, 2005).

Methods

Subjects

A number of 20 patients, stroke (cerebral) sufferers that were at different timelines away from the vascular accident, and they also find themselves at different functional levels at the moment of first assessment and during the course of intervention and evaluation over a time-span of 2 months. Out of these 4 strokes were hemorrhagic and 16 were ischemic. Less than half of these did not benefit from therapy right after the stroke or even short after that. Regardless of the functional level of the subjects, another essential condition for inclusion in this study was that they should be cardiovascular stabilized.

During this timeframe, all patients will undergo a number of 24 neuromotor reeducation sessions, each lasting 1 h. In other words, 3 session per week. We give homework to caregivers daily but no more than 2 or 3 exercises within the functional level in which the patient currently is. These homework exercises really speed up how patients reach the next micro-objectives or stage, on the hierarchical chain of stages in the progressive so-called fight against gravity. During the two monitored months, all other therapies have been placed on hold as to limit the external possible interferences. Also, within this period there were no changes in medication schemas, and those whom already were participating to psychological counselling, they continued to do so.

The EEGs were clean and did not show signs of chaotic discharges. Patients with degenerative disorders of the CNS did not take part of the study. Also, patients with aphasia, be it a problem of comprehending or expressing language, did not take part of the study. The general pool of subjects consisted of just adults, 10 male and 10 female. The average age within the subject pool is 63.9 years, with the lowest age 24 and the highest 83.

Assessment tools

I have chosen instruments that monitor motor function with a wider range than most and widely used. Out of these in searches the most prompted was „Stroke impairment assessment set" (SIAS) and „The de Morton Mobility Index" (DEMMI). SIAS – Stroke impairment assessment set, this tool (Liu, Chino, Tuji, Masakado, Hase, & Kimura, 2002) is designed to detect different levels of motor function as well as the degree of disability of post-stroke patients in clinical contexts. It is structured in 9 categories of motor function: tonus, sensory function, range of motion (ROM), pain, spatial and visual orientation, language, hearing (bilaterally). All these are arranged in 22 items of evaluation. The coding system is from either from 0 to 3 or from 0 to 5.

Each item is assessed in accordance with their performance during testing. It takes about 10 minutes to be completed without requiring special equipment. Because this tool is based on a more traditionally neurological type of examination, SIAS can be used by a wide array of specialists from the field or at least tangentially to it, without requiring an extensive training (Chino, Sonoda, Domen, Saitoh, & Kimura, 1996). This instrument, as you can see, follows motor function in lower and upper limb, muscle tone, osteo-tendinous reflexes, sensory function, ROM, pain level, functional level of axial musculature, cognitive function in relation with language and of course the unaffected side (Liu, Chino, Tuji, Masakado, Hase, & Kimura, 2002).

For a few cases as we can expect, patient found themselves to be right in the time that hypertonia started to manifest itself or was in effect (Katoozian, Tahan, Zoghi, & Bakhshayesh, 2018). For this test, seeing that it investigates ROM, pain level and control on lower and upper limbs, for some cases from the first test until the end period of two months you can detect a regress. Increase in involuntary muscle tone will decrease ROM and increase pain levels, but without necessarily decrease motor function. So having many more aspects tested in motor function, we don't always answer the question about motor function as a pure phenomenon if it actually decreased. A fully trained specially know these aspects and can plan the strategy accordingly as to increase motor function without having plateaus of stagnation or worse, decrease in motor function.

DEMMI - De Morton mobility index (DEMMI) is designed for assessing mostly the elderly with a range starting from acute to chronic and in clinical setting. It checks out non-vestibular balance, dynamic and static posture from decubitus, sitting and orthostatism, strength. The average time for completion of said assessment is around 10 minutes and it does not require any special equipment. Evaluation can be made on the bad, side off bed and in the same room with the bed (De Morton, Davidson, & Keating, 2008).

The least most appreciated aspect of this instrument is for motor function for lover levels. Although the patient may have a positive evolution with notable acquisitions, DEMMI does not record them. The physical therapist might notice them but objectively he can't point them out. This can be in some instances quite the liability, taking away from the general compliancy to therapy (Braun, Grüneberg, Coppers, Tofaute, & Thiel, 2018). We are seeing the same problem as with SIAS. We need to maintain factors of internal motivation for patients through active approaches if we can lead them towards results. FRA – Functional rehabilitation assessment, is basically a defragmentation of human movement from the lowest level until we reach a dynamic orthostatism. It has set stages, which if you follow you can see are the same ones pediatricians evaluate in their basic motor assessment.

One important advantage of using this test is time. It takes only 3-4 minute to complete. Another advantage for this test is its main focus on the motor aspect. Stages are set as big milestones and then they are fragmented into individual items. Of course, they do not only check that the milestones are each reached by a patient, but the transition between them also must be assessed. We must understand that for each stage you need a certain amount of resourced to achieve execution either of sustaining a milestone or transitioning from one to the other. If for pathological reasons, we do not have enough of one particular resource (strength, endurance, mobility, balance, control) that does not mean that we can't reach function. The other resources can always compensate and a stage can be achieved. Afterwards if it's possible, you can come back and smooth out the compensation. Therefore, in this manner we don't not need to assess each individual resource of a patient every time we test.

As you can plainly observe in figure 1, all the stages and transitions follow the body's work against gravity from lying down to orthostatism and vice-versa, but in a way which is safe. For an experienced therapist this evaluation is done really fast. The patient starts from decubitus lying on the floor or on the bed and goes further from there. A patient can be stimulated and the movement may be facilitated, but if the assistance is too great, that will cost in the end scoring. If the movement does not happen even with assistance for one or a few close stages, then the assessment stops there.

Data: ....

Functional Rehabilitation Assessment (FRA)

Patient's name:

Age (years/months):

Diagnosis:

CODING:

0 – can't finish testing even if assisted
1 – does testing with deviations and assisted
2 – does testing with deviation independent
3 – does testing without deviation independent
X – can't execute testing (specify in observations)

Level	Date 1	Date 2	Date 3	Observation
Decubitus				
Dorsal				
Flexion head/neck				
Rotation head/neck left				
Rotation head/neck right				
Ventral				
Extension head/neck				
Rotation head/neck left				
Rotation head/neck right				
Forearm support				
Hand support				
Lateral				
Lateral flexion head/neck left				
Lateral flexion head/neck right				
Left forearm lateral support				
Right forearm lateral support				
Left arm lateral support				
Right arm lateral support				
Transition from left arm lateral support to sitting				
Transition from right arm lateral support to sitting				
Rolling				
DD to VD left				
DD to VD right				
VD to DD left				
VD to DD right				
Sitting				
Sitting				
Long stable sitting (hands support)				
Long sitting with just left-hand support				
Long sitting with just right-hand support				
Left side transition to all-fours				
Right side transition to all-fours				
All-fours				
Stable				
Three-point support				
Moving from A to B: all-fours/crawl/scooting				
Transition from VD				
Transition to „on knees" with hand support on high surface				
On knees				
Moving from A to B in closed cinematic chain to left				
Moving from A to B in closed cinematic chain to right				
Opening cinematic chain from hip level				
Transition to kneeling left				
Transition to kneeling right				
Kneeling				
Left				
Stable				
Rise in orthostatism with hand support on high surface				
Moving from A to B with hand support on high surface				
Right				
Stable				
Rise in orthostatism with hand support on high surface				
Moving from A to B with hand support on high surface				
Orthostatism				
Stable				
Transition from sitting				
Moving from A to B in closed cinematic chain forward				
Moving from A to B in closed cinematic chain backward				
Moving from A to B in closed cinematic chain lateral left				
Moving from A to B in closed cinematic chain lateral right				
Walking				
Forward				
Backward				
Lateral left				
Lateral right				
Lateral forward crossed left				
Lateral forward crossed right				
Lateral backward crossed left				
Lateral backward crossed right				
Ground – Orthostatism Transition				
Getting down				
Getting up				
Stairs				
Up				
Down				
Total max.180				

***Figure 1**. Functional Rehabilitation Assessment (FRA)*

Database

Please do not alter the formatting and style layouts that have been set up in this template document. As indicated in the template, papers should be prepared in single column format suitable for direct printing onto paper with trim size 192 x 262.

Initiale pacienti	varsta	sexul	SIAS	SIAS	SIAS	DEMMI	DEMMI	DEMMI	FRA	FRA	FRA
V.A.	68	m	34	32	40	20	27	27	14	43	53
T.G.	47	m	50	55	56	27	27	27	49	67	77
P.B.	83	m	57	60	64	27	30	30	89	108	123
L.I.	79	m	54	57	60	30	33	44	82	101	125
V.L.	61	m	55	59	62	30	41	48	79	100	124
R.E.	66	m	21	62	65	0	48	57	7	124	169
M.A.	59	m	68	71	73	57	62	74	135	167	177
R.A.	24	m	70	73	74	67	85	100	165	179	180
D.G	46	m	54	64	65	27	33	36	112	136	138
M.I.	64	m	25	46	55	0	33	44	8	69	133
S.E.	67	f	73	75	76	74	85	100	173	178	180
P.I.	55	f	70	72	73	74	85	100	167	173	178
D.E.	63	f	63	65	65	53	62	62	162	167	169
L.E.	72	f	27	34	37	0	15	15	11	26	45
D.Z.	79	f	58	62	65	53	53	57	85	130	158
O.V.	52	f	74	75	75	57	67	67	169	176	177
R.O.	71	f	65	68	71	27	36	48	103	127	144
P.C.	66	f	71	72	74	67	67	74	163	172	179
C.D.	82	f	17	41	62	0	15	27	5	25	67
U.O.	74	f	63	68	72	57	62	67	155	169	176

***Figure 2.** Excel database – with color-coding*

An initial assessment takes place with all three instruments. Same assessment will take place at one-month distance and another one after two months. The tests used will be SIAS, DEMMI and my own personal test FRA (Functional recovery assessment). The total scores from each instrument, will be registered within Excel spreadsheets following analysis, through which a correlation coefficient and the statistical significance can be determined. Yellow will be used for the initial assessment, green for the one-month one and finally blue for final assessment.

Correlations

Six relationships will be established between SIAS / FRA and DEMMI / FRA during the initial, intermediate and final evaluation. For each of these we shall find out the correlation coefficient "r" and the statistical significance "p". The data analysis took place in excel as you can see in figure 3. After we have found the required data, we kept the color coding yellow for initial, green for intermediate and blue for final like we see in figure 4. Verifying how strong the relationship between two or more variable is one of the most used statistical procedures out there. Correlation methods in research have found a wide area of applicability for quite a range of circumstances. Firstly, to determine if a positive or negative correlation exists between the designated variables. Secondly, to measure the degree of statistical significance associated to the correlation in cause. Thirdly, to find out the level of variability, for which the independent variable can be explained by the dependent variable. Lastly, to establish the performance with which the linear regression can estimate the logged data.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.942645285
R Square	0.888580133
Adjusted R Square	0.88239014
Standard Error	6.345517506
Observations	20

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	26.78924944	2.639090113	10.1509415	7.088E-09	21.24472685	32.333772	21.24472685	32.33377202
X Variable 1	0.275848428	0.023023284	11.9812805	5.175E-10	0.227478302	0.3242186	0.227478302	0.324218554

Figure 3. *Excel data analysis*

	PROPRIU 1	PROPRIU 2	PROPRIU 3
SIAS 1	r: 0.943 p: 5.175E-10 (0.0005)		
DEMMI 1	r: 0.935 p: 1.486E-09 (0.0001)		
SIAS 2		r: 0.952 p: 1.072E-10 (0.00071)	
DEMMI 2		r: 0.903 p: 4.858E-08 (0.0005)	
SIAS 3			r: 0.884 p: 2.425E-07 (0.0002)
DEMMI 3			r: 0.854 p: 1.683E-06 (0.0002)

Figure 4. *"r" and "p" with color-coding*

Results

SIAS - FRA

The results from the initial, intermediary and final assessment between SIAS and FRA are of a positive correlation. Correlation coefficient "r" is 0.943 and "p" is less than 0.0005 for the initial set. From the intermediary data, the results are again with a strong "r" of 0.952 and a "p" of 0.0001. As opposed to the first to sets of results, in the final assessment results with got an "r" of 0.884 and a "p" of 0.0002. The relation is still a strong one but less strong than the other two. From speculation, we could attribute this happening to the defragmentation of motor function into smaller stages in FRA and after two months, there could be more variability due to that.

SIAS - FRA

The results from the initial, intermediary and final assessment between DEMMI and FRA are also of a positive correlation. Strong relation from the initial set with an "r" of 0.935 and "p" of 0.0001. The results after one month of therapy will show a strong correlation with an "r" of 0.903 and a "p" value of 0.0005.

Breaking down into smaller stages in FRA especially for higher function made it possible to detect even the more subtle of changes in motor function. Even thou a patient clearly has made some changes either after the one-month marker or at the two-month marker, we can observe that for DEMMI the same like with SIAS, function stagnates or we might even observe a regress, but motor wise that is simply not the case. Even if the last set of results are not as great as the first two, the relation is still strong with an "r" of 0.854 and a "p" value of 0.0002.

Discussion

We have to notice the specificity and efficiency of the three tests in being able to monitor motor function. In FRA, we could observe a progress in both intermediary and final evaluation. SIAS is the second runner up getting really close to appreciating motor function having just one regress and two stagnations. And lastly, out of the three observed was DEMMI where we registered a total of 9 stagnations. As we could see from all six analyzed circumstances, the correlations between SIAS and FRA or the later and DEMMI exist and are strong. By using two widely used instruments to verify if a relation exists, we could reduce the instrumental noise, a phenomenon observed in more than one setting.

Although it is not yet a validated product, it is, nonetheless one of extreme importance in medical and sports rehab, to be more specific in physical therapy, where motor function is the main focus. A specific tool was missing, a tool which could address exactly this function. Without such an instrument, through which we could measure and quantify progress or regress in a more objective manner, the capacity of making assertions or predictions concerning the potential of reaching certain objectives or results will be somewhat faulty.

If one specific instrument like FRA could gain ground, it could open the possibility in verifying the impact we actually have, using all the different approaches out there. We could get more data from more patients, where we can keep score of even more variables, clinical significance, predictability and so on. Having these elements to rely on, a doorway for even more interdisciplinary work will be created, which would finally help in obtaining a clearer picture of motor function and its importance when the wellbeing of people is in discussion.

Too often clinicians argue almost like a mantra about the lack of a more specific approach, because most specialist work with patients for a limited timeframe of one or several weeks. In such a short collaboration, one can simply can't reach the end goal, functional independence. I side with them in a sense that one can't obtain big acquisitions or reach the final objective in a short amount of time, but that is still no reason to change my mind about the approach selected. If the number of specialists would treat motor function with a more similar perspective was bigger, it would not matter if the patient would change the therapist or city or clinic, and the patient will in the end reach the end goal. An assumption can be made that the objective of independence can be achieved faster this way than with endless compromises that will in fact lead to sequalae, decompensations and deconditioning.

Of course, this assumption can be scrutinized and accompanied with many questions regarding the conditions through which a specific instrument came to be or objective was set. The hope is that we as a community have surpassed that point in time were we just place our trust in one specialist even if that particular individual is really good and has a vast experience in his field. No denying that specialist is a valuable resource, but the evidence from a researched area or at of intersections of multiple areas will outweigh the opinion of said specialist.

Conclusions

This study wanted to undergo of verifying if a not yet validated instrument for assessing motor function had any relationship with two others that are validated and widely used. In the data analysis, a strong relationship could be observed.

FRA defragments motor function into more items at a finer scale, thus we could observe motor function progress were the other two fail to detect any change or even worse a regress. This is an important factor not just for the sake of scoring patients but for internal motivational aspects. It is not rare when patients get demotivated when they get retested and see no positive changes. With this new tool, we can more objectively assess and convince patients of their work's worth. It is important that when they draw a line that they would be at a win.

The possibilities of expanding research will be able to grow considerably, and the results of such research could help us in developing and also filtering through the multitude of approaches already out there, in the field of rehabilitation.

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