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Rehabilitation programs monitored by functional independence measure: an observational study

Abstract

The Functional Independence Measure (FIM) is used in the Rehabilitation Centre of the Buerger Hospital Solothurn as a part of the sustainable quality development and maintenance. While FIM in the rehabilitation of stroke patients is well documented, its use in other rehabilitation patients is less common. The purpose of this study is to describe the FIM scores on admission and discharge of all patients discharged 1998 and to assess achieved improvements. The FIM was completed on admission and discharge by a nurse for every patient treated at the Rehabilitation Centre during 1998(N=250). The t-test for paired samples showed that the patients improved significantly ($p<0.005$) in all measured dimensions. These results indicate the usefulness of FIM in monitoring a large sample in this setting. The FIM provides differentiated measures of various treatment dimensions for all studied groups of patients. The results also indicate efficacy of rehabilitative treatment. Rehabilitation care as monitored by Functional Independence Measure

Volume 2 Issue 1 - 2017

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Received: June 18, 2017 | **Published:** November 03, 2017

Introduction

Functional independence is a relevant goal of treatment for patients in rehabilitation. The philosophy of evidence based medicine and nursing facilitates development of recognized standards in assessment in health care.[1,2] However, there still is a discussion regarding assumptions for assessing functional independence.[3] The Functional Independence Measure (FIM) is one of the most widely used, valid and reliable instruments for collecting observational data on the patients' degree of self reliance in various areas of everyday life.[4,5] The Functional Independence Measure (FIM) was introduced several years ago at the Rehabilitation Centre of the Medical Clinic, Buerger Hospital Solothurn, Switzerland, to assess the outcome of the rehabilitation. In measuring patients' functional independence on admission and discharge we were able to monitor any significant changes and improvements in different areas of everyday life and in various diagnostic groups of patients.

Methods

FIM is an 18 item observational sheet and interview schedule. It is a reliable and valid instrument for collecting data on the patients' degree of functional independence in various areas of everyday life. Each of the patient's activities (eating, grooming, bladder management, social interaction etc.) is rated between 1(totally dependent) and 7(fully independent). The FIM was completed by nurses for each and every patient without exception treated at the Rehabilitation Centre during 1998(N=250). Additional personal and socio demographic data were also collected. The observations were made on admission and discharge of the patients. They were collected as a part of the rehabilitation procedure and not a within an additional research project, as they are included in the clinical data. The Rehabilitation Centre provides stationary (24 bed unit) and semi stationary treatment (4 beds). It is adjoined to an acute hospital. The 250 patients were either post surgery (N=58,23.2%), or suffered vascular brain damage (N=72,28.8%), traumatic brain damage (N=6,2.4%), rheumatologic illness (N=44,17.6%), geriatric multi organ illness (N=21,8.4%) or other neurological illnesses (N=49,19.2%). There were 49.3% women, 50.7% men, mean age 65.3 (sd=16.5).

Results

The t-test for paired samples showed that the patients improved significantly ($p<0.005$) in all measured dimensions, reaching the largest effect size in walking or in moving around in a wheel chair (.45), then in walking on the stairs, in transfer from bed to chair, transfer to the toilet and in bathing. The patients reached the highest values in independent eating and drinking, bowel management and social interaction. The lowest values were in walking on the stairs and in lower body dressing (Table 1). The highest effect size was reached in locomotion (.44), transfer (.39), self care (.35), sphincter control (.26), communication (.21) and the lowest in social cognition (.12).

Table 1 All patients (N=250) (t-test for paired samples)

		Admission		Discharge		T	Effect size
		Mean	Std dev	Mean	Std dev		
	Self care:	27.63	10.43	31.33	9.78	-9.07**	0.35
A	Eating	5.7	0.45	6.1	1.22	-5.39**	0.28
B	Grooming	5.1	1.62	5.6	1.49	-7.15**	0.31
C	Bathing	4	1.97	4.7	1.86	-8.29**	0.36
D	Upper body dressing	5	1.8	5.6	1.63	-7.62**	0.33

Table Continued....

		Admission		Discharge		T	Effect size
		Mean	Std dev	Mean	Std dev		
F	Toiletting	4.1	2.48	4.9	2.31	-7.68**	0.32
	Sphincter control:	10.32	3.78	11.82	3.19	-6.32**	0.26
G	Blader management	5.2	2.24	5.7	1.9	-6.00**	0.22
H	Bowel management	5.7	1.71	6.1	1.43	-5.64**	0.33
	Transfer:	13.58	6.01	15.92	5.14	-9.48**	0.39
I	Bed/chair/WC	4.7	1.99	5.5	1.68	-9.53**	0.4
J	Toilet	4.7	2.04	5.5	1.96	-8.92**	0.39
K	Tub/shower	4.2	2.12	4.9	3.61	-8.15**	0.33
	Locomotion:	7.79	4	9.56	1.69	-10.50**	0.44
L	Walk/WC	4.5	2	5.4	1.69	-9.38**	0.45
M	Stairs	3.3	2.27	4.2	2.21	-9.55**	0.4
	Communication:	10.57	3.4	11.28	2.88	-5.84**	0.21
N	Comprehension	5.4	1.67	5.7	1.4	-5.88**	0.18
O	Expression	5.2	1.84	5.6	1.6	-5.20**	0.22
	Social cognition:	15.86	4.87	16.44	4.32	-3.71**	0.12
P	Social interaction	5.8	1.5	6	1.28	-3.15*	0.13
Q	Problem solving	4.8	1.9	5	1.75	-2.86*	0.11
R	Memory	5.3	1.83	5.5	1.66	3.58**	0.11

** p<0.001

* p<0.005

The analysis indicated some differences in gain of functional independence among patients with different diagnoses. Although it has been reported that adding ICD-9-CM codes does not greatly improve the prediction of the length of stay of the patients[6] the various degree of independence in different diagnostic groups must be considered. The patients with vascular brain damage (n=72) improved their independence in all areas of everyday life in a highly significant manner (p<0.005) (Table 2). They reached the highest effect size values in locomotion (.43) and in self-care (.39). The post surgery patients (N=58) also improved in all dimensions except in communication. However, their rating of communication on admission was higher than the rating of communication of the vascular brain damage patients on discharge (Table 3). Their highest effect size was in locomotion (.72) and in transfer (.66). This group of patients improved most of all patients. Patients with rheumatologic illness (N=44) improved their functional independence in self-care, sphincter control, transfer, locomotion, communication, but not in social cognition (Table 4). They also reached the highest effect size in locomotion (.32) and in transfer (.29). Finally, the patients with geriatric multi organ illness (N=21) improved significantly in the motor items but not in the cognitive items (Table 5). Their highest effect sizes were .54 for locomotion and .43 for transfer.

Table 2 Patients with vascular brain damage (N=72) (t-test for paired samples).

	Admission		Discharge		T	Effect size
	Mean	Std dev	Mean	Std dev		
Self care(6 items):	25.69	10.7	29.81	10.07		39
Sphincter control(2 items):	10.08	4.38	11.49	3.82		32
Transfer(3 items):	12.78	6.21	15.08	5.56	-4.95**	37
Locomotion(2 items):	7.43	3.98	9.14	3.97	-5.52**	43
Communication(2 items):	9.36	3.53	10.51	2.64	-5.20**	33
Social cognition(3 items):	14.49	4.97	15.39	4.02	3.44**	18

** p<0.001

Table 3 Post surgery patients (N=58) (t-test for paired samples)

	Admission		Discharge		T	Effect size
	Mean	Stddev	Mean	Stddev		
Self care:	25.53	9.36	30.95	8.96	-5.69**	0.58
Sphincter control	10.76	3.25	11.85	3.08	-3.03*	0.34
Transfer:	11.62	5.87	15.47	4.71	-7.07**	0.66
Locomotion:	6.47	3.8	9.22	3.17	-6.94**	0.72
Communication:	11.35	3.06	11.67	3.12	-1.38	0.1
Social cognition	16.09	4.27	16.98	4.49	-2.52+	0.21

** p<0.001

* p<0.005

+ p<0.05

Table 4 Patients with rheumatologic illness (N=44) (t-test for paired samples)

	Admission		Discharge		T	Effect size
	Mean	Std dev	Mean	Std dev		
Self care:	37.14	5.92	38.73	5.22	-2.85+	0.27
Sphincter control	13.25	1.56	13.57	1	-2.26+	0.21
Transfer:	18.25	3.71	19.34	2.98	-3.13*	0.29
Locomotion:	11.18	2.87	12.09	2.65	-3.85**	0.32
Communication:	12.23	2.24	12.68	1.81	-2.89+	0.2
Social cognition	19.05	2.85	18.91	2.73	0.76	-0.05

** p<0.001

* p<0.005

+p<0.05

Table 5 Patients with geriatric multi organ illness (N=21) (t-test for paired samples)

	Admission		Discharge		T	Effect size
	Mean	Std dev	Mean	Std dev		
Self care:	26.1	9.68	29.1	8.59	-2.83+	0.31
Sphincter control	10.52	3.86	11.48	3.19	-2.12+	0.25
Transfer:	13.57	5.14	15.76	4.02	-3.28+	0.43
Locomotion:	6.67	3.98	8.81	3.2	-4.78**	0.54
Communication:	10.05	3.54	10.43	3.25	-1.63	0.11
Social cognition	15.76	4.53	16.29	3.94	1.71	0.12

** p<0.001

+ p<0.05

Discussion

Using Functional Independence Measure in stroke patients and, generally, in patients with vascular brain damage is an established outcome measurement procedure. There are reports on the values these patients reach[7]on their FIM gain and on the structure of these measures.[8] The admission FIM in patients after stroke (>70), together with several other variables, such as age (<60), being married

Citation: Valach LK, Selz B. Rehabilitation programs monitored by functional independence measure: an observational study. *Int Phys Med Rehab J.* 2017;2(1):173–178. DOI: 10.15406/ipmrj.2017.02.00039

and living at home prior stroke predicts whether the patients are discharged home.[9] Others indicate that a discharge FIM score of 80 or above had a high specificity and sensitivity with patients‘ discharge to their home.[10] Mokler et al.[11] found that three admission FIM variables (bladder management, toilet transfers, memory) and three discharge FIM variables (upper body dressing, bed/chair tranfers, comprehension) were associated with discharge destination with up to 75% accuracy. The admission FIM total has been reported as best predicting discharge FIM self care thus suggesting that dependency in physical activities of daily living after stroke is primarily determined by degree of motor impairment.[12]

Goldsmith et al.[13] report that FIM motor function scores at admission (along with age and geographic region) best predicted rehabilitation length of stay in patients after stroke. Gupta et al.[14] reported that all the parameters improved significantly at the time of discharge as measured by FIM for acquired brain injury patients. It has also been indicated[15] that FIM helps in predicting retourn to work in acquired brain injury patients. The FIM score at rehabilitation admission was significantly associated with return to driving in traumatic brain injured patients.[16] Feder et al.[17] Maintain that there is no difference in average total FIM scores when patients are divided by side of damage by stroke (left or right hemisphere). It also is suggested that patients after stroke without substantial impairment reduction show disability decline during rehabilitation. Thus, as rehabilitation has an independent role in improving function beyond that explained by neurologic recovery, the FIM as a measures of disability is an important indicator of rehabilitation progress.[18] FIM can also be used to create benchmarks in order to guide development and quality improvement and in establishing patients goals in stroke rehabilitation.[19] Additionally, it has been indicated that lower FIM scores correlate with higher depression scores.[20]

There also are some critical voices indicating that a specific rehabilitation is not well represented by FIM such as the improvement of the upper limb function after stroke.[21] It has been suggested that the International Classification of Functioning, Disability and Health (ICF) is probably more comprehensive than FIM in describing both capacity and performance in stroke patients.[22] FIM seems to be only of limited value in assessing functional change on a follow-up. Discharge and follow-up total FIM™ scores are highly correlated indicating that collection of the follow-up FIM may not provide additional information after a patient has been discharged from inpatient rehabilitation.[23]

Our study with Swiss patients, using a German version of the FIM informs us about the FIM values we obtained with patients with vascular brain damage. The effect sizes indicate that our patients improve mostly in locomotion, self-care and in transfer and also show substantial improvement in communication and in sphincter control. In contrast to FIM studies with patients after stroke there are fewer studies with rehabilitation patients after surgery. The predictive value of the FIM was not consistent in patients with amputation.[24] However, the predictability of rehabilitation success was high in patients with high FIM at admission. It has been indicated that discharge FIM score for traumatic amputees is well predicted by medical comorbidity and for vascular amputees by stump comorbidity (an inverse relationship in both).[25]

Rush et al.[26] pointed out that the admission FIM score does not predict successful prosthetic rehabilitation in lower extremity amputee patients as it does not correlate with the Houghton Scale for prosthetic use. Morrison et al.[27] maintain that FIM may not be useful in detecting changes in follow up measure for early lower limb amputees but that it is suitable for measuring changes during the inpatient stage of rehabilitation. FIM as an outcome measure in post surgery patients proved to be an excellent indicator of rehabilitation progress in our sample as the FIM on discharge vs. FIM on admission show the highest effect size from all diagnosis groups.

Using FIM as an outcome measure in geriatric rehabilitation has been reported in a number of studies. As the geriatric multi organ illness patients tend to be older than other rehabilitation patients it is important to know whether FIM is also a valid and reliable measure in older patients. Pollak et al.[28] studied forty nine residents and found that FIM is useful as a functional assessment instrument for people who are 80 or more years old. The motor activity and its independence from the cognitive functions in the geriatric group of patients attracted some interest Ruchinskas et al.[29] maintain that although cognitive measures predict total FIM scores on admission and discharge, they do not predict FIM ambulation score. In our study we found no significant improvement in cognitive functions as represented by FIM in geriatric multi organ illness patients but a significant improvement in FIM motor score. However, it has been reported that geriatric patients with higher FIM social cognitive items are more often discharged home.[30] Diamond et al.[31] indicate that geriatric patients with cognitive dysfunction should be considered for rehabilitation if functional gains will affect their quality of life. It is also important to note that patients of geriatric rehabilitation units classified as depressed at discharge have lower FIM scores at admission and at discharge.[32] FIM scores, including FIM gain of elderly patients were significantly lower than those of middle-aged patients.[33] It has been proposed,[34] that in patients with a dementia diagnosis the FIM-gains and thus the rehabilitation success, should be measured by the motor subscale of the FIM, rather than the total FIM score, or the gain relative to the maximal FIM score.

Although outcome measures are used in rehabilitation of patients with rheumatologic and musculoskeletal illnesses the functional independence as operationalized in and monitored by FIM is not often addressed. Although FIM has been reported as one of the mostly used standardized outcome measure in rehabilitation settings in UK[35] there are other instruments such as SF-36, HAQ (Health Assessment Questionnaire[36] or WOMAC. Our study shows that some improvement in the patients with rheumatologic illness could be represented by FIM. We found significant improvement in all subscales but in social cognition and effect sizes between 0.20 and 0.32. In methodical terms, this clinical study differs from a study which employes blind rating and a control group for treatment and care intervention. However, there are some data indicating that, as far as outcomes are concerned, the results of this assessment may be identical with the results provided by such a methodically rigorous study.[37,38] Consequently, it can be maintained that the patients in all diagnoses groups are significantly better off in their functional independence on discharge than they were on admission.

Acknowledgements

The authors are in debt to all patients and nurses of the Rehabilitation Centre, Buerger Hospital Solothurn, Switzerland, for their participation in this study.

Conflict of interest

The author declares no conflict of interest.

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Citation: Valach LK, Selz B. Rehabilitation programs monitored by functional independence measure: an observational study. *Int Phys Med Rehab J.* 2017;2(1):173–178. DOI: 10.15406/ipmrj.2017.02.00039

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Citation: Valach LK, Selz B. Rehabilitation programs monitored by functional independence measure: an observational study. *Int Phys Med Rehab J.* 2017;2(1):173–178. DOI: 10.15406/ipmrj.2017.02.00039