Functional Index »Repty« – a scoring scale
for evaluation of ADL in hemiplegic patients

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Zusammenfassung

Es wurde eine Assessment-Skala zur Einschätzung der Aktivitäten des täglichen Lebens bei hemiplegischen Patienten entwickelt. Der funktionelle Index »Repty« stellt eine Modifikation des amerikanischen »Functional Independence Measure« dar. FIR besteht aus 15 Items, ist kürzer und einfacher als der FIM. In dieser Studie wurden nacheinander 60 Patienten nach ischämischem Schlaganfall mit dem Barthel-Index (BI) und dem funktionellen Index »Repty« untersucht. Die Interrater-Reliabilität rangierte beim BI zwischen 0,34 und 1,0, durchschnittlich 0,85, und im FIR zwischen 0,44 und 1,0, durchschnittlich 0,84. Die Übereinstimmung zwischen beiden Skalen betrug 0,93 am ersten Tag und 0,95 nach dreißig Tagen. Der FIR erwies sich als nützlich zur Messung des Outcome nach Rehabilitation hemiplegischer Schlaganfall-Patienten und zur Beurteilung der Disability.

Schlüsselwörter: Assessment-Skalen, Outcome, ADL, Disability, Handicap

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Abstract

A scoring scale for the evaluation of activities of daily living in hemiplegic patients has been developed. Functional Index »Repty« is the modification of the american Functional Independence Measure. FIR consists of 15 items, is shorter and simplier than FIM. In this study 60 consecutive patients after ischemic stroke were examined by means of the Barthel Index (BI) and the Functional Index »Repty« (FIR). The interobserver agreement in BI ranged from 0.34 to 1.0, average 0.85, in FIR from 0.44 to 1.0, average 0.84. Correlation between both scales was 0.93 on the first day and 0.95 – 30 days later. The FIR is useful for measuring outcome after rehabilitation in hemiplegic stroke patients and for evaluation of disability.

Key words: stroke scales, scoring scales, outcome measures, activities of daily living (ADL), disability, handicap

Introduction

Functional scales assess a broad range of activities of daily living (ADL). These scales can be important for the outcome measure of effects of treatment and rehabilitation after stroke. In the last decades various stroke scales have been developed. The best known functional scales are: Katz Activities of Daily Living Index (1963), Kenny self-care score (1965), Barthel Index (BI) (1965), Functional Independence Measure (1986) [4, 9, 10, 12, 14, 16, 21, 24, 25]. In this report a functional scoring scale named Functional Index »Repty« (FIR), a modification of the Functional Independence Measure (FIM), is presented. It is shorter and simpler, consisting of only 15 items. Three last items of FIM concluding »Social Cognition« (social interaction, problem solving, memory) have been rejected as unprecise. Instead of 1, 2, 3, 4, 5, 6 and 7 points (as in FIM) the scoring system is 1, 3, 5 and 7 points. The minimum and maximum scores range from 15 to 105 points (Appendix I).

Patients and methods

The study group comprised 60 patients who had an ischemic stroke not later then 6 months ago. 58 patients demonstrated symptoms of ischemia in the area of the carotid system, two patients had cerebellar inferior posterior artery syndrome. In 24 patients right hemiparesis was observed, in 36 patients left hemiparesis. There were 32 males and 28 females – age of 38 to 76 years, average 59 years (Table 1).

Two observers were scoring each patient independently two times using two scales: Barthel Index (BI) and Functional Index »Repty« (FIR). The first scoring was done on the first day after admission to the Reha Centre (1 to 6 months after stroke onset, average 3.7 month), the second scoring after 30 days of rehabilitation. There were five observers: the author examined all 60 patients, each of the other observers examined 15 patients. The interobserver agreement was calculated using κ statistic (kappa) in which $\kappa = (po-pe)/(1-pe)$,

(po=observed proportion of agreement, pe=proportion expected), and correlation **r** using Pearson's coefficient [2, 15].

Appendix I	Functional Index »Repty«
A. Selfcare	1. Eating 2. Grooming 3. Bathing 4. Dressing upper body 5. Dressing lower body 6. Toilet use
B. Sphincter control	7. Bladder management 8. Bowel management
C. Mobility	9. Transfer from bed to chair/wheelchair 10. Transfer to toilet 11. Transfer to tub/shower
D. Locomotion	12. Walk/wheelchair 13. Stairs
E. Communication	14. Comprehension 15. Expression
Scoring 7 points 5 points 3 points 1 point	full independence (timely, safety) modified dependence (supervision, using devices) moderate assistance (needs help) total dependence

	age range	mean age	total
males	38–68	55	32
females	49–76	63	28
total	38–76	59	60

Table 1: Age and gender

	Barthel Index		Functional Index »Repty«	
	from–to	mean	from–to	mean
day 1	5–95	59.1	21–103	65.4
day 30	20–100	78.4	33–105	83.0
improvement	5–50	19.3	2–40	17.6

Table 2: Barthel Index and Functional Index »Repty«

	day 1 r	day 30 r
A. Eating	0.70	0.75
B. Bed/Chair/Wheelchair	0.91	0.96
C. Tub (Shower)	0.77	0.74
D. Walk/Wheelchair	0.88	0.81
E. Stairs	0.71	0.86
F. Bladder Management	0.83	0.87
G. Bowel Management	0.83	0.87
Average	**0.93**	**0.95**

Table 3: Correlations between Barthel Index and Functional Index »Repty« in the same items occurring in both scales

Results

Table 2 shows scores in BI and FIR on the first day after admission and after 30 days.

The average correlation between FIR and BI **r** was 0.93 at the beginning of the rehabilitation and 0.95 after 30 days (table 3). Table 4 shows the interrater validity of both scales.

	BI		FIR	
	day 1	day 30	day 1	day 30
A. Eating	6.0	7.2	4.3	5.2
B. Bed/Chair/Wheelchair	9.6	13.1	4.7	6.0
C. Tub (Shower)	0.7	1.7	2.9	4.4
D. Walk/Wheelchair	8.7	12.9	4.0	5.8
E. Stairs	4.0	6.7	2.9	4.6
F. Bladder Management	8.2	9.2	5.5	6.3
G. Bowel Management	8.7	9.6	5.8	6.5

Table 4: Interrater validity of Barthel Index and Functional Index »Repty«

Obs.	1 v. 2		1 v. 3		1 v. 4		1 v. 5	
day/item	1	30	1	30	1	30	1	30
1	0.72	0.86	0.77	0.84	0.87	1.00	0.67	0.55
2	0.90	1.00	0.91	1.00	0.89	0.84	0.72	0.48
3	0.87	0.80	0.73	1.00	1.00	1.00	1.00	1.00
4	0.57	1.00	1.00	1.00	0.80	1.00	0.90	1.00
5	0.81	0.70	1.00	1.00	1.00	1.00	1.00	1.00
6	0.89	0.68	0.72	0.75	0.90	1.00	0.72	0.73
7	0.73	0.86	0.65	1.00	0.72	1.00	0.78	0.89
8	0.62	0.71	1.00	1.00	1.00	0.79	0.79	1.00
9	0.84	1.00	0.48	0.76	0.54	1.00	1.00	1.00
10	0.84	1.00	0.34	1.00	0.71	1.00	1.00	0.63

Table 5: Interobserver agreement κ of Barthel Index

The interobserver agreement κ ranged from 0.34 to 1.0, average 0.85 for BI and 0.44–1.0, average 0.84 for FIR, and was usually high (table 5, 6). Locomotion, measured in FIR (item number 12), appeared more independent after 30 days of rehabilitation (table 7). The independence after rehabilitation was significantly higher (final score in FIR divided by 15): after 30 days 34 patients were fully independent, when on day 1 only 14 were independent (table 8).

Conclusion

There is high correlation between Functional Index »Repty« and Barthel Index. The advantage of the FIR scale results from evaluation of verbal communication and a more extended scoring system.

Discussion

According to the manual of the World Health Organization there are three main consequences of disease: impairment, disability and handicap [26]. During the last 30 years many instruments have been constructed to quantify clinical data such as severity of symptoms, graduation of sickness and comorbidity. Clinimetrics, a term introduced in 1983 by *Feinstein* and developed by *Asplund* [1], should be regarded as the measurement of clinical and patient relevant phenomena. Clinimetrics is a specific domain of knowledge that focuses on the construction and evaluation of clinical indexes. The weights of the individual stroke scale items are related to the functional state of the patient's health [18].

Obs.	1 v. 2		1 v. 3		1 v. 4		1 v. 5	
day/ item	1	30	1	30	1	30	1	30
1	0.67	0.84	0.89	1.00	0.79	1.00	0.87	0.45
2	0.66	0.75	0.91	0.91	0.90	1.00	0.91	1.00
3	0.62	0.79	0.90	0.64	1.00	1.00	0.91	1.00
4	0.54	0.71	0.80	1.00	0.91	1.00	0.73	0.80
5	0.58	0.89	0.90	1.00	0.90	1.00	1.00	0.90
6	0.91	0.69	1.00	1.00	1.00	1.00	1.00	1.00
7	0.80	0.83	0.80	0.84	0.86	0.81	1.00	0.87
8	1.00	0.81	0.79	0.64	0.81	0.77	1.00	0.84
9	0.81	1.00	0.90	1.00	0.53	0.84	0.91	0.77
10	0.91	0.87	0.91	1.00	0.90	1.00	1.00	1.00
11	0.58	0.79	0.70	0.90	0.72	0.89	0.80	0.80
12	0.73	0.77	0.90	0.57	1.00	0.88	0.72	0.88
13	0.71	0.80	0.79	0.63	0.53	1.00	0.64	0.90
14	0.81	1.00	0.57	1.00	1.00	1.00	1.00	0.63
15	1.00	0.72	0.59	0.61	1.00	1.00	0.44	1.00

Table 6: Interobserver agreement kappa of Functional Index »Repty«

Walking	FIR (p.12)	day 1	day 30
bed	1	11	0
needs help	3	15	9
supervision, devices	5	11	19
independent	7	23	32

Table 7: Locomotion after rehabilitation (n = 60)

	av. FIR	day 1	day 30
complete dependence	1.0–2.0	9	1
moderate dependence	2.1–4.0	16	7
modified independence	4.1–6.0	21	18
full independence	6.1–7.0	14	34

Table 8: Level of the independence after rehabilitation

The »ideal« scale should be sensitive, valid, reliable, repetitive, graded, simple, easy to use and homogenous. It should also be able to show most changes in health status. ADL scores are more useful for evaluation of functional state than impairment scales [5, 11, 17, 19, 20, 23]. In *Haan's* elaboration the impairment scales could explain about 45% of the observed variability in the ADL scores [9].

In this study four of the better known functional scales have been mentioned. *Donaldson* gathered 25 ADL scales [5]. The most popular in Europe is still Barthel Index (BI), though Functional Independence Measure (FIM) is much more precise. There are various reports on comparison of functional scales with regard to activities of daily living (ADL). Most of them showed good correlation between scales. As for interobserver agreement there are differences depending on items. Many authors stressed the usefulness of the ADL scores for evaluation of stroke rehabilitation [6, 7, 13]. Almost all authors stated the utility of the functional scales for evaluation of disability [8, 22]. *Vanclay* defined the relation between improvement in function and functional score at discharge [23]. A little more complicated is the evaluation of motor testing in hemiplegia – it is necessary to mention Brunnström testing, Fugl-Meyer Assessment, Rivermead Mobility Index and Södring evaluation in this regard [3, 27].

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