

ARTIGO ORIGINAL

Independência funcional em pessoas com lesões encefálicas adquiridas sob reabilitação ambulatorial

Functional independence in individuals with acquired brain injuries submitted to rehabilitation on an outpatient basis

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RESUMO

A lesão encefálica adquirida (LEA) pode provocar numa gama variada de deficiências e, questiona-se o resultado da reabilitação ambulatorial quando efetuada num longo período após sua instalação. O objetivo deste estudo foi avaliar os ganhos obtidos pelos pacientes com LEA sob reabilitação ambulatorial. Foram revisados os relatórios de alta de 118 pacientes atendidos na Divisão de Medicina de Reabilitação entre 1999 e 2001, nos quais a funcionalidade é sistematicamente registrada segundo a Medida de Independência Funcional (MIF), no momento da avaliação inicial, retornos médicos e alta. Foram comparados os valores médios de cada um dos itens da MIF no início e final do tratamento. O tempo mediano desde a instalação da lesão foi de 9 meses. Houve aumento da proporção de indivíduos independentes em todas os itens da MIF ao final do tratamento, bem como aumento significativo dos seus valores médios. Os resultados apresentados diferem daqueles observados em outros países nos quais a reabilitação ocorre na fase mais aguda. Isso pode decorrer de abordagens efetuadas antes da chegada do paciente ao centro de reabilitação cujo foco é maior em aspectos da deficiência física, sem levar em conta a importância da independência funcional. Os dados apresentados permitem concluir que, em nosso meio, os pacientes com LEA podem obter ganhos funcionais com a reabilitação, mesmo que ela seja iniciada tardiamente.

PALAVRAS-CHAVE

independência funcional, centros de reabilitação, acidente cerebrovascular, hemiplegia, cuidados ambulatoriais, prognóstico

ABSTRACT

The acquired brain injury (ABI) may induce a wide variety of impairments and the result of rehabilitation on an outpatient basis is questioned when performed long after its onset. The objective of this study was to evaluate the functional gain of ABI patients submitted to rehabilitation on an outpatient basis. Hospital discharge forms of 118 patients treated at the Division of Rehabilitation Medicine between 1999 and 2001 were reviewed. Functioning is systematically registered by the Functional Independence Measure (FIM™) at the first evaluation, medical appointments and upon discharge. Mean values of each FIM™ item at the first and last evaluations were compared. The median period from the onset of the impairment was 9 months. There was an increase in the proportion of independent individuals in all FIM™ items at the end of treatment, as well as a significant increase in their mean values. These results differ from those reported by centers in countries where rehabilitation is performed in the early phase after the onset of impairments. This may result from rehabilitation approaches that focus on the physical impairment, without taking the importance of functional independence into account. We conclude that in our country, patients with ABI may present functional gain even if rehabilitation is carried out at later periods.

KEYWORDS

functional independence, rehabilitation centers, cerebrovascular accidents, hemiplegia, ambulatory care, prognosis

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INTRODUCTION

The acquired brain injuries (ABI) treated at our national rehabilitation centers include mainly those caused by cerebral vascular accidents (CVA) and head trauma (HT). Other etiologies can also be observed as the cause of ABI, but presenting much lower incidences. The cerebrovascular diseases caused by systemic arterial hypertension correspond to 56% of the cases seen at the Division of Rehabilitation Medicine (DRM), whereas HT cases correspond to 11% of this population.

In the presence of a brain injury, the impairment usually exhibited by these patients is hemiplegia, i.e., the motor and sensory disorders of hemibody, with or without the involvement of cognitive functions. The expression of hemiplegia is wide-ranging and can be restricted to characteristics that are exclusively motor, sensory or cognitive in nature, according to the location and extension of the injury in relation to the encephalic parenchyma. Therefore, many cases present minimal or imperceptible sequelae, which cannot be disclosed without using the more sensitive tests, whereas other cases can manifest different degrees of weakness, comprehending one or more limbs.

The right hemiplegia is usually associated to pictures of aphasia, particularly motor aphasia, in which there is substantial preservation of the comprehension and speech fluency and production impairment. On the other hand, the left hemiplegia caused by injuries to the right brain hemisphere, is characterized by sensory motor impairment on the left side of the body and considerable preservation of the upper cortical functions. Due to the injury characteristics in HT cases, which is more diffuse as a result of the mechanisms of right and left trauma, the motor manifestations usually affect both hemibodies and the cognitive functions such as attention, memory, language and calculation are frequently impaired.

Due to the variability of the clinical manifestations presented by patients with ABI, it was necessary to select functional assessment tools that would analyze the several impaired features in these patients, such as loss of strength, sensory alterations and the quantification of memory, attention and thought disorders. However, as important as the quantification of the impairment is the assessment of the performance of activities of daily living (ADL), which reflect the impairment caused by these neurological function alterations. The amount of care needed to perform ADL, both motor and cognitive ones, can be assessed by the Functional Independence Measure (FIM), of which the Brazilian version was published by Riberto *et al*¹, presenting good reproducibility, both in the total values as well as in the motor and cognitive domains.

OBJECTIVE

The objective of the present study is to present the functional profile of hemiplegic patients submitted to rehabilitation on an outpatient basis in Brazil, according to the FIM results.

METHODS

The summarized hospital discharge data of all patients from the hemiplegia group of the Division of Rehabilitation Medicine (DRM) of Hospital das Clínicas of the University of Sao Paulo School of Medicine that completed the rehabilitation program between January 1999 and July 2001 were evaluated.

The DRM is a rehabilitation center with long-term experience in the outpatient treatment of people with ABI. In order to be included in a rehabilitation program, the person must fulfill some inclusion criteria at the triage process: the period between the impairment onset and the initial evaluation cannot be over 2 years, especially if the individual has been previously submitted to some type of rehabilitation measure; there must be no osteomuscular deformity that can prevent the rehabilitation work; the patient must be clinically stable and must present a cognitive level that allows the understanding of the rehabilitation program instructions, which are aspects of the psychological and social dynamics that prevent the adequate adherence to the training program, according to the standard procedures of the rehabilitation center. The patients that seek treatment at this rehabilitation center and who, for some reason, are not considered eligible for treatment are referred to other Rehabilitation Services according to the severity of the case and availability of means of transportation to get to the rehabilitation center.

The discharge forms used in this rehabilitation center contain demographic information used to identify the patient. Clinical aspects such as the etiology of the injury, affected hemibody and the presence of other types of impairment are recorded, especially the communication alterations, as well as the time since the onset of the impairment.

Functional data are obtained through the use of the Functional Independence Measure (FIM). The FIM is a tool developed to quantify the amount of care needed by the patient with some type of impairment. A total of 18 tasks are assessed, which include self-care, sphincter control, transferences, ambulation, communication and social cognition (Chart 1). For each task is attributed a score that varies from 1 to 7, being 1 related to a higher degree of dependence and 7 related to complete independence. The Brazilian version of the FIM, as well as the verification of its reproducibility properties have been previously published^{1,2}.

RESULTS

The hospital discharge data of 118 patients were assessed; however, the following data correspond to only 103 of them, as 15 patients' files showed incomplete data, especially regarding FIM score. The mean age was 54.3 ± 17.9 years, varying from 18 to 87 years. The proportion of female patients was 40% (42). Other data related to ethnicity, civil status and schooling are shown in Table 1. The median time since the onset of the injury was 9 months.

The patients were classified regarding the impairment pattern according to the affected side of the body, as shown in Table 2. The number of patients affected by right hemiplegia was practically the same of the number of patients in the other categories. It

Chart 1
 Description of FIM tasks and functional levels

Tasks	Functional levels
A Feeding	7 Complete independence
B Personal hygiene	6 Modified independence
C Bath/showering	5 Supervision or preparation
D Dress upper half of the body	4 Minimal help
E Dress lower half of the body	3 Moderate help
F Bathroom use	2 Maximum help
G Bladder control	1 Total help
H Stool control	
I Transference to bed, chair and wheelchair	
J Transference to toilet bowl	
K Transference to shower / bathtub	
L Ambulation	
M Stairs	
N Comprehension	
O Expression	
P Social interaction	
Q Problem solving	
R Memory	

Table 1
 Demographic data of the patients from the hemiplegia group of the DRM (1999-2001), n = 103

Variable	
Age (μ±SD yrs)	54,3 ± 17,9
Schooling (μ±SD yrs)	9,5 ± 4,0
Female sex	42 (40%)
Ethnicity	
Caucasian	85 (82,5%)
Non-Caucasian	18 (17,5%)
Civil status	
Married	69 (67%)
Single	18 (18%)
Widowed	10 (10%)
Divorced	6 (5%)

Table 3
 Distribution of hemiplegic patients according to FIM scores regarding self-care and sphincter control at the start of the treatment (n=93).

Score	Feeding	Shower/Bath	Personal Hygiene	Dress upper half	Dress lower half	Bathroomuse	Bladder control	Stool control
1	4	24	15	23	28	31	13	5
2	4	17	10	19	21	5	1	2
3	3	6	14	10	6	5	1	0
4	1	14	9	13	8	2	6	2
5	61	3	10	1	1	2	8	2
6	17	24	29	22	21	35	5	8
7	3	5	6	5	5	12	57	73

Table 2
 Comparison of the patients with ABL according to the affected hemibody (n=103)

	Hemiplegia		
	Right	Left	Double
n	51	37	15
Age (yrs)	54,6 ± 16,7	60,0 ± 14,4	38,8 ± 21,5
Communication alteration	21 (41,2%)	1 (2,7%)	0
Time of impairment (months)*	7 (3,5-12)	6 (3-11,5)	15 (9-26)
Program duration (months)*	9 (5-15,3)	9 (4-13)	8 (5,5-15,5)
Initial motor FIM	57,4 ± 22,4	56,0 ± 22,4	46,9 ± 22,6
Initial cognitive FIM	23,3 ± 9,9	31,4 ± 4,5	26,3 ± 9,6
Total initial FIM	80,6 ± 28,5	87,4 ± 23,2	73,1 ± 29,9

* Expressed in median (25% and 75% percentile)

is noteworthy that the patients with right hemiplegia more often presented communication-associated disorders. It is also interesting to notice that the functional independence was more developed in patients with left hemiparesis, regarding the cognitive as well as the motor aspects.

Table 3 shows the number of hemiplegic patients at each one of the FIM scores regarding the activities of self-care and sphincter control at the start of the rehabilitation program. It can be observed that in the *Feeding* activity, 24 (23.3%) of the patients were independent, but the majority of the patients were concentrated at the score 5 (65.0%), which indicates the need for supervision, preparation or guidance. In the remaining self-care activities, the distribution of patients was more homogeneous. Regarding the *Toilet use*, it was observed a concentration of patients at the extremities of the score range, that is, 33.3% of patients scored 1 – indicating total dependence and 50.5% of the patients score 6 or 7, indicating independence. Bladder and stool control presented a concentration of patients at scores 6 and 7 (66.7% for bladder and 87.1% for stool).

At the end of the treatment it was possible to observe that the majority of the patients (61.3%) was still concentrated at score 5 for *Feeding*, despite the fact that the number of people who attained independence for this activity increased from 20 to 30.

With the treatment, there was an alteration in the functional dependence profile in such a way that at the end of the treatment,

Table 4
Distribution of hemiplegic patients according to FIM score regarding self-care and sphincter control at the end of the treatment (n=93).

Score	Feeding	Shower/Bath	Personal Hygiene	Dress upper half	Dress lower half	Bathroom use	Bladder control	Stool control
1	4	12	7	9	14	16	7	1
2	2	9	8	16	15	6	3	1
3	0	12	9	8	6	8	1	0
4	0	7	10	9	12	1	2	1
5	57	4	12	9	6	3	7	4
6	22	36	34	30	25	37	3	6
7	8	13	13	12	12	21	69	79

the scores 6 or 7 corresponded to 49 patients (56.6%) regarding *Shower/Bath*, 44 (47.3%) regarding *Personal Hygiene*, 42 (45.1%) regarding *Dressing the upper half of the body*, 37 (29.8%) regarding *Dressing the lower half of the body* and 58 (62.4%) regarding *Bathroom use*. The independence regarding *Bladder control* was attained by 10.7% more of the patients, whereas regarding *Stool control*, only 4.3% more of the patients reached such level of independence.

Table 5 shows a regular distribution of the patients according to FIM scores in relation to *Transferences* and *Ambulation*. It is important to stress that, for all these activities, the score 4 – minimal help – is the least frequent.

The comparison of data related to the end of the treatment regarding the *Transference* and *Ambulation* activities (Table 6) points out to a global displacement of patients from the lower score levels to the higher ones. The number of patients whose score was 1, 2 or 3 at the start of treatment was reduced to values between 48.6% (*Ambulation*) and 60% (*Transference to bed and chairs*), which were lower at the end of the treatment. Score levels of 4 and 5 remained the least frequent.

In cognitive activities, as shown in Table 7, at least 50% of the patients presented functional independence prior to the start of the treatment. However, the values in Table 8 indicate an increase in the number of patients at scores 5, 6 and 7 in these tasks, in values that varied from 10% (*Social interaction*) to 15% (*Expression and problem-solving*) at the end of the treatment.

There was a significant increase in the mean value of the score of patients at each FIM task, as well as the total scores called motor, cognitive and total FIM.

DISCUSSION

The choice of functional independence as a parameter for rehabilitation assessment is based on its importance for the individual, for the family and the society. At the individual level, independence can be defined as one person's capacity to define his or her choices and to have the autonomy in decision-making. It is noteworthy that during the human development, independence is regarded as a valuable feature, which is stimulated and reinforced throughout life. In opposition to that, dependence represents the person's dependence to someone else's conditions. Considering

Table 5
Distribution of hemiplegic patients according to FIM scores regarding transferences and ambulation at the start of the treatment (n=93).

Score	Transference to bed and wheelchair	Transference to toilet bowl	Transference to shower	Ambulation	Stairs
1	13	15	16	19	42
2	17	16	17	11	6
3	10	12	12	5	5
4	3	2	1	3	5
5	1	2	3	11	10
6	22	21	19	31	17
7	25	22	24	7	5

Table 6
Distribution of hemiplegic patients according to FIM scores regarding transferences and ambulation at the end of treatment (n=93).

Score	Transference to bed and wheelchair	Transference to toilet bowl	Transference to shower	Ambulation	Stairs
1	4	6	7	8	20
2	13	10	11	5	5
3	7	8	7	4	2
4	3	5	6	4	7
5	3	3	3	10	12
6	27	27	25	41	31
7	35	32	32	16	13

Table 7
Distribution of hemiplegic patients according to the FIM scores regarding communication and social cognition at the start of the treatment (n=93).

Score	Comprehension	Expression	Social Interaction	Problem solving	Memory
1	2	9	8	13	9
2	5	4	5	5	4
3	8	6	4	5	6
4	7	9	4	10	8
5	6	11	7	9	13
6	11	22	11	6	15
7	52	28	51	44	38

Table 8

Distribution of hemiplegic patients according to the FIM scores regarding communication and social cognition at the end of the treatment (n=93)

Score	Comprehension	Expression	Social Interaction	Problem solving	Memory
1	0	2	2	7	3
2	5	6	5	3	3
3	3	2	4	3	5
4	6	6	3	11	7
5	10	15	10	8	12
6	6	17	8	8	13
7	59	38	58	52	49

Table 9

Comparison between the initial and final mean values of scores in each functional activity evaluated at FIM, as well as the motor, cognitive and total FIM scores (n=93).

Activity	Initial	Final	p*
Feeding	4,9 ± 1,2	5,2 ± 1,2	< 0,01
Personal hygiene	3,5 ± 2,1	4,5 ± 2,1	< 0,001
Bath/shower	4,1 ± 2,0	4,8 ± 1,8	< 0,001
Dress upper half of the body	3,4 ± 2,1	4,4 ± 2,0	< 0,001
Dress lower half of the body	3,2 ± 2,4	4,2 ± 2,1	< 0,001
Toilet bowl use	4,0 ± 2,5	4,8 ± 2,2	< 0,001
Bladder control	5,6 ± 2,2	6,1 ± 1,9	< 0,01
Stool control	6,4 ± 1,6	6,7 ± 1,0	< 0,01
Transference to bed, chair and wheelchair	4,4 ± 2,3	5,3 ± 2,0	< 0,001
Transference to toilet bowl	4,2 ± 2,3	5,2 ± 2,0	< 0,001
Transference to shower/bath tub	4,2 ± 2,4	5,1 ± 2,1	< 0,001
Ambulation	4,1 ± 2,2	5,2 ± 1,8	< 0,001
Stairs	3,1 ± 2,3	4,5 ± 2,2	< 0,001
· Motor FIM	54,1 ± 23,0	64,7 ± 21,3	< 0,001
Comprehension	5,8 ± 1,8	6,1 ± 1,5	< 0,01
Expression	5,1 ± 2,0	5,7 ± 1,6	< 0,001
Social interaction	5,6 ± 2,1	6,0 ± 1,7	< 0,001
Problem solving	5,1 ± 2,3	5,6 ± 1,9	< 0,001
Memory	5,2 ± 2,0	5,8 ± 1,7	< 0,01
· Cognitive FIM	26,2 ± 9,2	28,2 ± 8,4	< 0,01
· Total FIM	80,3 ± 27,6	92,9 ± 25,5	< 0,001

* Student t test for paired samples

the condition of submission to the caregiver's power and the limited enjoyment of a value that has been nurtured since childhood, dependence frequently implicates in the reduction of self-esteem, lack of motivation and depression.

The onset of impairment of a family member results in psychological and financial costs, in addition to the need for reorganization of the family structure and dynamics. The job or work restriction due to the impairment is one of the factors that

decrease family income; however, it is also necessary to consider that another family member will have to be displaced to fulfill the role of caregiver, or someone else will have to be hired to do it, which adds to the family's financial burden.

The functional independence was chosen as the rehabilitation outcome in several countries, due to its economical meaning. Similarly to our country, where the impairment of a family member can represent a financial burden to the family, in countries where the social security system provides caregivers or nursing homes for people who do not have a family, the onset of ambulation, self-care and basic cognitive activity limitations represents costs. According to this point of view, dependence is a source of financial burden for these social security agencies and thus, measuring it is a way to quantify the dimension of the necessary financial costs. Hence, more dependent people need full-time caregivers and can be referred to a nursing home, where there is constant supervision. On the other hand, people with intermediate levels of dependence might only need a part-time caregiver and might be able to live in their own houses, as long as they are supported when performing the activities that pose the most difficulty. Finally, a last group comprises those people that can live alone, without the need for help from part-time caregivers, but might eventually need some type of equipment, device or longer period to fulfill the activity. These are decreasing degrees of the need for care, representing lower costs that go from the most severe to the mildest dependence.

Considering the fact that the Brazilian rehabilitation services work predominantly with outpatients and that the access of these patients to rehabilitation usually occurs at later periods, the sample studied was rather representative of the group of patients that generally seek rehabilitation due to hemiplegia in Brazil, i.e., patients with stable injuries that presented to the outpatient rehabilitation service at a later period³⁻⁵. These circumstances are very different from those observed in the literature from other countries, where rehabilitation occurs predominantly in the acute phase and in the intrahospital environment.

It is important to consider that the delay in the rehabilitation treatment does not mean that these patients were completely neglected in terms of rehabilitation. Many hospitals have intrahospital physical therapy services in the acute phase after the onset of hemiplegia due to ABI; however, this intervention is predominantly aimed at maintaining joint range of motion (ROM) and the prevention of respiratory complications, as the impaired swallowing, cough reflex, pulmonary vital capacity and cognitive function are more intense and frequent in this period^{6,7}. Patients and caregivers rarely report receiving some type of rehabilitation information with emphasis on functionality during the acute phase, such as the regular change of decubitus aimed at preventing pressure ulcers, transference training, hygiene care or sphincter control.

Some patients are fortunate to be the receivers of homecare programs, which has been progressively increasing in our country and presents as an alternative to treatment at rehabilitation clinics, especially when patients that are clinically more fragile are involved or when architectural barriers and the distance to the rehabilitation centers are more significant impediments.

The therapeutic approach of the rehabilitation in these services is less homogenous than in the intrahospital intervention, as some services tend to concentrate on respiratory care, whereas others tend to focus on joint ROM maintenance and prevention of secondary complications – forgoing the functional approach. Therefore, it is not possible to infer the aftermath of these interventions on the patients' functionality, especially because these interventions have variable durations.

The consequences of directing the acute-phase and home rehabilitation at interventions without functional objectives is that, even long after the onset of the impairment, the gains can be notable⁸.

As physical therapy is, practically, the only type of rehabilitation intervention provided by the private health insurance plans or out of the rehabilitation centers, by the public healthcare system and as the training for transference and ambulation activities are those in which physical therapy has the greatest participation, it would be expected that, at least in these activities, the patients should present better performance when they come to the rehabilitation center. Thus, it is not surprising that the independence regarding *Transferences* (score 6 or 7) had been attained by at least 43 (46.2%) individuals from the sample. The independence regarding *Stairs and Ambulation* had been attained by 38 (40.9%) and 22 (23.7%) individuals, respectively (Table 5). These, however, were not maximum values observed in the sample, as at the end of the treatment the functional independence for *Transferences, Ambulation and Stairs* was observed in 62 (66.7%), 57 (61.3%) and 44 (47.3%) individuals, respectively (Table 6). Table 5 shows that 57 (61.3%) patients attained independence regarding ambulation at the end of the rehabilitation process, which is only a fraction higher than the results reported by Franzoi *et al*⁹, working with a sample that was, sociodemographically, very similar to ours, but with a longer time of impairment.

The skills involved with the mental capacity, particularly self-care and instrumental activities, are the target of occupational therapy approach¹⁰. Unfortunately, this therapeutic modality is not provided by the majority of the private health insurance plans, which prevents patients from having access to the benefits it can bring. Except regarding feeding, the self-care activities evaluated by the FIM present reduced scores in hemiplegic patients at the start of the treatment, which indicates an error in the rehabilitation focus before the patient's inclusion in a rehabilitation center (Table 3).

Many factors prevent the attainment of independence regarding these tasks; however, the lack of adequate directions to caregivers and family members must be emphasized. Even patients that present enough dexterity for such tasks as personal hygiene, taking a shower/bath and getting dressed usually have their initiative to perform these tasks repressed by the caregiver. The time is considered one of the main sources of stress for the caregiver^{11,12}, who can perceive the patient's capacity in performing the task, but ends up helping him or her to do it in order to save time and take care of other issues. This kind of attitude is interpreted by the FIM as dependence, as according to this instrument of functional evaluation, what is evaluated is what the patient *effectively performs* and not what he or she is *capable of doing*. The reason for that is, once it is observed that the

patients is capable of performing the task him or herself, he or she will start performing it alone and the caregiver will be dismissed. Another characteristic that determines dependence for the performance of tasks of self-care is the safety impairment represented by insufficient balance, which can be an obstacle regarding the care of the lower limbs¹³. In part, that is the reason why the activities of *Bath/Showering* and *Dressing the lower half of the body* are the ones with the lowest initial scores. Our data show that the mean score of *Dressing the lower half of the body* is only higher than that of *Stairs* at the start of the rehabilitation program, but that at the end, it is the lowest (Table 9), due to the complexity involved and variety of the necessary skills to perform the activity, such as the organization of the motor activity – praxia, balance, lower limb (LLLL) strength, joint range of motion in the LLLL, dexterity of the upper limbs (UULL), in addition to the cognitive aspects of the adequate choice of clothing. In a study that compared the degree of difficulty for the attainment of functional independence in different European countries, it was possible to observe that, together with the tasks *Stairs, Transference to shower/bathtub and Ambulation*, the task of *Dressing the lower part of the body* was one of the activities that presented higher impairment in hemiplegic patients, but it is necessary to stress that, in these countries, the use of bathtubs, instead of showers, might have been an important factor to place this activity at such level of difficulty¹⁴.

Among the activities of self-care comprehended by the FIM, *Feeding* presents the highest means in the start as well as at the end of the program, indicating that it is the activity in which independence is affected faster. This has also been observed by other authors, and given the importance of nutrition for survival, it can be understood why it is rapidly affected. The same is observed in patients with spinal cord injuries in our country⁸. However, the closer assessment of Tables 3 and 4 shows that most of the patients are concentrated in Score 5, i.e., Supervision, Guidance or Preparation, whereas in all other self-care activities, especially at the start of the rehabilitation program, the score 5 is less usual. The experience of the authors is that, when they arrive at the Rehabilitation Center, the patients are already able to feed themselves with one hand, but it is necessary to have the food prepared by others, especially to cut the meat, butter the bread and serve liquids. In other self-care tasks, the Preparation and Supervision can be common during the rehabilitation program, but at the end Preparation becomes less common and the caregiver is expected to let the patient perform the tasks alone and without guidance.

The existence of three transference activities in the FIM has been criticized by authors that submitted this tool to the construct and internal consistency verification¹⁵. The measurement of the amount of care for the transference to the shower/bath, toilet bowl, bed and chair seems redundant and can overestimate the capacity/deficiency of the LLLL, i.e., in those patients with the capacity to sit down and stand up, the final motor FIM score would be skewed upwards due to a repeated body weight of these activities. At the end of the rehabilitation program in our service it was possible to observe a significant improvement in all transference activities and ambulation (Table 9).

Regarding the sphincter control, most of the patients presented independence regarding the bladder and stool control at the start of the rehabilitation program, which means absence of accidents with urine or stool and the autonomous performance of all excretion activities, sometimes only with the need for longer periods, medications or laxatives. The fact that a large number of the patients was independent regarding these activities might be related to the triage that selects the patients for the rehabilitation program at the Division of Rehabilitation Medicine, as the patients with more severe cognitive impairment present worse sphincter control^{16,17} and are directed, during the triage, to supervision activities and not to multidisciplinary rehabilitation program, a tendency to select patients with a better performance in sphincter control might have occurred.

Nonetheless, at the end of the rehabilitation program it was possible to observe an increase in the number of patients that presented bladder and stool control (Tables 3 and 4), reinforcing the aforementioned aspect of progressive gain, even in the chronic phase. Although significant gains were observed in the mean values of all the cognitive activities, the attainment of independence, i.e., the number of individuals that reached score 6 or 7 was less significant in Communication (Comprehension and Expression) than in any other evaluated activity. Again, the criteria for the selection of patients at the service influenced these values; however, a noteworthy aspect is the significant increase of functional independence for Problem-solving and Memory (Tables 7 and 8). The social interaction provided by the experience of the Rehabilitation Center, as well as the constant cognitive stimulation, either by specific therapy or by the effort related to the learning of motor tasks might have been responsible for such improvement.

On the other hand, the counseling of family members regarding the patients' capacities and the need to stimulate their autonomy seems, to the authors, to be a very relevant determinant factor. At the FIM assessment of the task Problem-solving, it can be observed up to what point the individual effectively identifies problems that take place in daily living, such as elementary needs like asking for a warmer coat when one is cold or ask for food and drink when one is hungry or thirsty. It is not unusual to hear comments about the patient such as "he/she eats when I set up the table" or "I know what he/she likes", preventing the patient from having any autonomy regarding the conduction of the basic aspects of daily life. The same occurs when, for instance, the patient with more severe cognitive impairment is overdressed for the cold, without being asked about his or her cold/heat perception.

According to the FIM assessment, the functional independence for motor activities can be easily understood by the amount of energy spent by the caregiver for the task to be completed; thus, the patient that performs all aspects of the task alone, without the need for supervision, preparation or guidance will score 6 or 7. When the intervention of another person is necessary, then the score is ≤ 5 . However, in the cognitive activities, the concept of functional independence is distinct. The first aspect to be considered is the cognitive activity content, being necessary to differentiate the simple and everyday aspects from those defined as complex, with the latter

receiving a score of 6 or 7. When the patient is independent only for comprehension, expression or problem-solving regarding self-care and other simple issues described in the manual, his/her score is 5 or lower. The score will also be lower than 5 if the caregiver's interference is necessary for the activity to be performed; the more frequent the caregiver's interference is, the lower the score.

The patients followed at our service presented an excellent cognitive performance, as it can be observed in Table 7. According to this table, the patients were independent at rates that varied from 54.3% (problem-solving) to 69.2% (comprehension). This might be due to the triage process to which the patients are submitted before the start of the treatment. The triage in our service aims at selecting individuals for treatment among those with a better prognosis regarding improvement and adherence. Hence, patients with a worse performance at the triage are referred to interventions in groups that aim at providing guidance to family members. These groups provide guidance about the care of these patients and depending on the patient's evolution, he or she can be returned to the interdisciplinary treatment. The present study includes only patients that participated in the interdisciplinary therapeutic program, thus being previously selected, which explains the high level of independence in these activities. The comparison of the number of individuals that scored 6 or 7 – independent – at the start and the end of the rehabilitation program (Tables 7 and 8) allows the observation of a significant increase of independent individuals after the treatment.

However, 9 individuals became independent for the task Memory and 10 for the task Problem-solving, being these two cognitive activities the ones that presented the most gain. While in the other cognitive activities the development of independence is mostly related to the neurological improvement, with a decrease in the impairment, in these two activities the environment factor is much more significant; thus, the guidance provided to family members and caregivers so that the solutions of everyday or complex problems can be shared or delegated to the patients themselves and the fact that the patient is left in charge of the activities of remembering people and recalling appointments and routines stimulate the patients' performance, increasing the score. According to the FIM, what must be assessed is not the individual's capacity, i.e., his or her skill in performing an activity, but the performance, represented by what he or she actually performs in his or her environment.

It was also possible to observe that there was a statistically significant gain in all motor and cognitive activities during the time comprised between the start and the end of the observation period, reinforcing the previous finding of our service that the FIM is a useful and sensitive tool to follow patients in non-acute outpatient rehabilitation therapy in Brazil⁸. This finding, dissimilar from that observed in other countries, is due to the fact that the rehabilitation carried out outside the rehabilitation centers and thus, in the most acute phases, is more restricted to the prevention of secondary deficiencies, such as deformities and pressure ulcers and not to the attainment of skills to independently perform activities.

Regarding this last aspect, it is noteworthy the fact that restoring the behavior patterns as close as possible to the normal ones or, to the state of the patient before the impairment onset, is always the

most desirable. However, a more pragmatic view can be adopted as a way to obtain an objective, measurable and acceptable rehabilitation outcome, such as the functional independence.

CONCLUSION

These results allow us to state that patients with ABI of the central nervous system that are treated at an outpatient basis in our country present some degree of independence, as early as the start of the rehabilitation program; however, the majority presents intermediary values, that go from moderate dependence to modified independence regarding motor activities and modified independence regarding cognitive activities. The rehabilitation program showed to be efficient in improving the motor and physical performance of these individuals, even when started at a later date, when the gains are usually described as lower and non-identifiable by the FIM.

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