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ORIGINAL REPORT

OUTCOMES DURING AND AFTER INPATIENT REHABILITATION: COMPARISON BETWEEN ADULTS AND OLDER ADULTS

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Objective: **To compare changes on biopsychosocial variables between adults (< 65 years) and older adults (≥ 65 years) during and after an inpatient rehabilitation program.**
Design: **Comparative study.**
Participants: **A total of 165 people 18 years and over admitted to an inpatient rehabilitation unit.**
Methods: **The participants were evaluated 3 times: at admission and discharge and 3 months later. Outcome measures were: Functional Autonomy Measurement System (SMAF), Modified Mini-Mental State Examination, Trail Making Test, Motor-Free Visual Perceptual Test, Visual Analogue Scale (VAS), Berg Balance Scale (BBS), Timed Up and Go (TUG), Jamar dynamometer, and General Well-being Schedule (GWBS).**
Results: **Both groups improved significantly between admission and discharge on the SMAF, BBS, TUG, VAS, Jamar dynamometer and GWBS. Although scores on many of the outcome measures differed at admission, the 2 groups improved similarly during rehabilitation. After 3 months, stability or a slight improvement was observed for both groups; however, younger participants improved more on mobility, balance, walking and grip strength.**
Conclusion: **Although older participants had more disabilities at admission, they benefited as much as younger people from an intensive rehabilitation program with a comparable length of stay. However, younger participants continued to improve 3 months later.**

Key words: aging, rehabilitation, geriatric units, functional independence, inpatient rehabilitation.

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INTRODUCTION

As a result of population aging in industrialized societies, there is an increase in pathologies causing impairments. This has led to increased demand for rehabilitation services for older adults, and efforts to adapt services to better meet the specific needs of this population.

The older age group requiring inpatient rehabilitation services is different from younger patients in many respects. In a review of the geriatric rehabilitation literature, Wells et al. (1, 2) described some of these differences, including co-morbidity, multifactorial causes of disability, frailty, and related cognitive, nutritional and depression problems. Older adults admitted to rehabilitation units often present several intercurrent medical conditions and comorbidities that require close medical supervision and simultaneous treatment (3–5). They more often have cognitive impairments that could compromise their ability to learn new skills (6).

The impact of age on inpatient rehabilitation outcomes has received a lot of attention in recent years. Some studies have suggested that older adults who have had a stroke show less improvement in functional independence after rehabilitation (5, 7, 8). However, even the very old can improve significantly, especially if the level of pre-morbid independence was good (9–10). Aging is also reported to have a negative impact on functional independence following a lower limb amputation but, here again, the great majority of older adults improve their functional independence during rehabilitation (11–13). Rehabilitation has also been shown to be effective with patients who have had a hip fracture (14–15), despite significant residual impairments (16).

However, few studies to date have examined the results of an inpatient rehabilitation program by age group for patients with varying reasons for admission. Hanks & Lichtenberg (17) compared functional independence improvements in 812 individuals aged 60 years and over admitted to a geriatric rehabilitation unit, stratified by 4 age groups. They concluded that age, even more than pre-morbid independence level, had a negative effect on improvement in functional independence at discharge. No previous study has considered a variety of important outcomes other than functional independence.

The aim of this study was to compare changes on biopsychosocial variables between adults (18–65 years) and older adults (> 65 years) during and after an inpatient rehabilitation program.

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METHODS

Participants

The participants were individuals admitted to the inpatient rehabilitation unit (IRU) of the University Institute of Geriatrics of Sherbrooke (UIGS). This was the only in-hospital unit (36 beds) for adults serving an area with approximately 300,000 inhabitants. Nearly 90% of the admissions are transfers from a short-term care university hospital. Services are delivered by an interdisciplinary team of physicians, nurses, physiotherapists, occupational therapists, speech therapists, nutritionists and neuropsychologists. The main reasons for admission are stroke, lower limb amputation, hip fracture, multiple or complex fractures, traumatic brain injury, and other diagnoses such as myelopathy, neuropathy or medical deconditioning. The admission process and criteria are the same for everyone, and the focus is on rehabilitation potential. To be admitted to the IRU, the individual must have a pathology that has the potential for improvement, and be able and willing to participate in a rehabilitation program. In the first few days after admission, patients are evaluated by members of the team and the rehabilitation process begins immediately. Therapies are offered on a daily basis, 5 days a week. Patients are discharged from the unit when their full potential has been reached or when they can continue their rehabilitation as an outpatient.

Potential participants in the study included everyone admitted to the IRU between November 2000 and January 2002. The inclusion criteria were that they had been in the unit for at least 3 weeks, had been discussed at least one interdisciplinary meeting, and spoke French or English. Participants who were transferred to an acute care hospital or presented major medical complications during the study were excluded from the analyses.

In the first week after admission, the research coordinator met with the patients to explain the study and ask them to participate. If they agreed, they had to sign a consent form.

Data collection procedure

A longitudinal design was used with 3 measurement times: admission (T1), discharge (T2) and 3 months after discharge (T3). A research nurse evaluated most of the variables being studied. Only 2 variables (functional independence and balance) at T1 and T2 were measured by professionals in their clinical practice. Also, the co-morbidity scale was completed by the attending physician at T1. At T3, functional dependence was evaluated by the same research nurse who completed the Functional Autonomy Measurement System (SMAF) (18) from the participants' answers. This was done in the participant's home or at the UIGS, whichever they preferred. At that time, the Berg Balance Scale (BBS) (19) was also completed by the nurse using direct observation of each task.

Variables and outcome measures

The variables and measures were chosen with the help of an interdisciplinary rehabilitation team on the basis of their psychometric properties and general characteristics. The outcome measures were administered to all participants regardless of their main diagnosis.

Sociodemographic and clinical variables. The participants' characteristics were described with the usual sociodemographic variables, such as age, gender, schooling, main occupation, length of stay and living environment (at admission and discharge). The clinical variables were the main diagnosis as well as co-morbidity, which was evaluated with the Co-morbidity Index developed by Charlson et al. (20) and modified by Bravo et al. (21) for an elderly population. This version includes 28 items weighted from 1 to 6 depending on the impact of the condition on survival.

Functional variable. Functional independence was evaluated with the SMAF (18). This tool assesses independence in 29 activities of daily living (ADL), mobility, communication, mental functions and instrumental ADL (IADL). Each of the 29 items is scored on a 5-point scale (0, 0.5, 1, 2, 3) and a total score out of 87 is obtained by adding the scores on each item. A higher score indicates more disabilities. A change of 5 points or more is considered metrically and clinically significant (22).

Cognitive variables. Overall cognitive functioning was measured with the Modified Mini-Mental State Examination (3MS) (23). The maximum score is 100. The higher the score, the better the cognitive functioning. Reference values vary by age and schooling (24).

Attention and executive functions were estimated with the Trail Making Test (TMT) (25). The time taken to complete each of the 2 parts is recorded in seconds and the number of errors is also recorded. A low score indicates a high performance. Reference values are available for adults and older adults (26).

The Motor-Free Visual Perceptual Test, vertical version, was used to measure *visual perception* (27). This tool comprises 36 boards focusing on 5 components of visual perception, for a maximum score of 36, indicating a better performance. Like the 3MS, performance varies with age and schooling (28).

Physical variables. Pain was estimated with the Visual Analogue Scale (VAS) (29). The subject is asked to indicate the intensity of the pain felt most often during the preceding 2 weeks. A score of 0 signifies the absence of pain while a score of 10 indicates unbearable pain.

Balance was measured with the BBS (19). This scale assesses a subject's performance on 14 common items in everyday life. The items evaluate the ability to maintain positions of increasing difficulty by decreasing the base of support. Each item is graded on a 5-point scale (from 0 to 4) and the optimal total score is 56. Older adults who score 45 or lower are at greater risk of falling (30).

Walking performance and changes in direction were evaluated with the Timed Up and Go (TUG) (31). The subject gets up from a chair, walks 3 m, turns and returns to sit down again. The full circuit is timed. A time over 17 sec is a useful predictor of functional decline in basic activities of daily living, and over 14 sec predicts functional decline in IADL in community-dwelling older people (32).

Grip strength was measured with a Jamar dynamometer. Two measures were taken alternately for each hand, starting with the dominant or "better" hand, and the mean was used. Reference values have been developed by age and gender for adults (33) and older adults (34).

Psychosocial variable. The General Well-Being Schedule (GWBS) (35) was used to evaluate the feeling of well-being and symptoms of distress experienced. Its 18 items measure 6 dimensions: anxiety, depression, positive well-being, emotional control, vitality and general health. A 6-level (0–5) ordinal scale that varies with each question is used to answer the first 14 items. For the last 4 items, an analog scale from 0 to 10 with opposite feelings at each end of the scale is used. A higher score (maximum of 110) indicates the highest level of well-being. According to the author, a score < 60 suggests severe distress, a score between 61 and 72 moderate distress, and a score > 72 positive well-being.

Data analyses

First, the participants' characteristics by age group (< 65 years vs ≥ 65 years) are reported by mean and standard deviation for the continuous variables and by frequency and percentage for the categorical variables. The *t*-test for independent samples or χ^2 test, depending on the type of variable, was used to compare the 2 groups at T1 on the sociodemographic and clinical characteristics and outcome measures. Changes in the participants' condition between T1 and T2 as well as T2 and T3 were analyzed using the *t*-test for paired data or its non-parametric equivalent, the Wilcoxon signed rank test, depending on the data distribution. Then the T2–T1 and T3–T2 differences in the scores of the 2 groups were compared using the Mann-Whitney U test.

RESULTS

During the data collection period, 230 people were admitted to the inpatient rehabilitation unit. Of these, 56 were not eligible or were excluded during the study. Of the others (n = 174), 165 (< 65 years: n = 50; ≥ 65 years: n = 115) agreed to participate in the study, but not all agreed to or could be evaluated on all the measurement instruments, resulting in unequal sample sizes for the different variables. Among them, 163 were reevaluated at T2 (2 declined to continue in the study). Three months after discharge (T3), 138 remained in the study (16 dropped out, 6 died, 3 were hospitalized). There was no differential drop-out between the groups. A comparison of the scores on the outcome measures at T2 suggests that the 25 non-participants at T3 did not differ significantly from the remaining 138 participants (p-values 0.15–0.92).

The participants' clinical and sociodemographic characteristics at admission to the IRU are presented by age group in Table I. The average length of stay of the subjects in the 2 groups is comparable (p = 0.54). Table I shows that the characteristics of the groups vary on different aspects. The < 65 years age group was made up mainly of married men, with a high school education, still active work-wise, who lived at home prior to admission and returned home after discharge. Conversely, the ≥ 65 years age group was composed mainly of widows, retired, with a primary or high school education, who lived at home or in a private residence for seniors and, for the most part, returned to their previous living environment after discharge. The diagnoses of the older group of participants were stroke, amputation, hip fracture and other orthopedic problems. For the younger group, the main diagnoses were lower limb amputation or stroke.

The comparison of scores on the outcome measures at T1 is presented in Table II. Compared with the older group, the younger group showed a higher level of functional independence at admission (ADL, IADL and total score), better scores on the cognitive measures and greater grip strength.

Table I. *Sociodemographic and clinical characteristics of the participants in the 2 groups at admission*

	< 65 years (n = 50)	≥ 65 years (n = 115)
Continuous variables (mean (SD))		
Age (years)	49.4 (12.1)	78.4 (7.3)
Length of stay (days)	55.0 (25.1)	58.6 (30.3)
Co-morbidity Index	3.3 (2.0)	3.2 (1.8)
Categorical variables (frequency (%))		
Gender (women)	16 (32.0)	66 (57.4)
Marital status (married)	29 (58.0)	40 (34.8)
Widowed/separated/divorced	11 (22.0)	62 (53.9)
Single/religious order	10 (20.0)	13 (11.3)
Schooling		
Primary school	12 (24.0)	47 (40.8)
High school	23 (46.0)	45 (39.1)
Post-secondary	14 (28.0)	22 (19.1)
Missing data	1 (1.0)	1 (2.0)
Main occupation		
Retired	10 (20.4)	106 (93.0)
Outside work	23 (46.9)	5 (4.4)
Homemaker	5 (10.2)	1 (0.9)
Other	11 (22.5)	2 (1.8)
Missing data	1	1
Main diagnosis		
Stroke	10 (20.0)	40 (34.8)
Lower limb amputation	12 (24.0)	15 (13.0)
Hip fracture	–	24 (20.9)
Other types of fracture	6 (12.0)	24 (20.9)
Traumatic brain injury	5 (10.0)	3 (2.6)
Other	17 (34.0)	9 (7.8)
Living environment at admission		
Home	49 (98.0)	88 (76.5)
Private residence for seniors	–	24 (20.9)
Other	1 (2.0)	3 (2.6)
Living environment at discharge		
Home	38 (76.0)	64 (55.6)
Private residence for seniors	2 (4.0)	27 (23.5)
Nursing home	3 (6.0)	14 (12.2)
Other		4 (3.5)
Missing data	7 (14.0)	6 (5.2)

SD: standard deviation

Table II. *Inter-group comparison of outcome measures at admission (T1)*

	< 65 years mean (SD)	≥ 65 years mean (SD)	p-value†
Functional variables			
Functional autonomy (SMAF) (n = 50 vs 115)[1]			
ADL (/21)	6.0 (5.1)	7.9 (5.1)	0.027
Mobility (/18)	9.8 (4.3)	11.0 (3.5)	0.080
Communication (/9)	0.6 (0.9)	0.7 (0.9)	0.560
Mental functions (/15)	2.0 (2.7)	2.5 (2.9)	0.310
IADL (/24)	18.7 (3.6)	20.0 (3.4)	0.028
Total (/87)	37.1 (11.8)	42.0 (12.4)	0.018
Cognitive variables			
Overall cognitive functioning (3MS; /100) (n = 40 vs 93)[1]	88.6 (10.8)	81.2 (14.5)	0.002
Attention (Trail Making Test)			
Duration (sec)			
Part A (n = 34 vs 86)	91.6 (124.6)	120.6 (81.0)	0.110
Part B (n = 27 vs 49)	133.4 (76.8)	252.2 (142.1)	< 0.001
Number of errors			
Part A (n = 34 vs 86)	0.4 (0.9)	0.5 (0.8)	0.390
Part B (n = 27 vs 49)	1.1 (1.5)	2.2 (1.9)	0.007
Visual perception (MVPT-V; /36) (n = 39 vs 87)[1]	30.4 (5.1)	25.8 (6.1)	< 0.001
Physical variables			
Pain (VAS; /10) (n = 40 vs 95) [1]	4.5 (2.9)	4.7 (2.9)	0.650
Balance (BBS; /56) (n = 34 vs 90)[1]	26.0 (19.3)	22.2 (15.8)	0.230
Walking (TUG; sec) (n = 17 vs 42)[1]	34.7 (20.0)	38.1 (21.3)	0.550
Grip strength (Jamar; kg)			
Right hand (n = 40 vs 95)[1]	26.4 (14.4)	19.5 (11.0)	0.002
Left hand (n = 36 vs 90)[1]	23.3 (15.0)	18.3 (10.3)	0.023
Psychosocial variable			
General well-being (GWBS; /110) (n = 34 vs 80)	60.1 (21.5)	63.7 (19.7)	0.340

†p-value associated with the t-test for independent groups.
[1]Sample size of the < 65 age group vs sample size of the ≥ 65 years age group.
SMAF: Functional Autonomy Measurement System; 3MS: Modified Mini-Mental State Examination; ADL: activities of daily living; IADL: instrumental ADL; BBS: Berg Balance Scale; VAS: Visual Analogue Scale; TUG: Timed Up and Go; GWBS: General Well-being Schedule; MVPT-V: motor-free visual perception test, vertical version; SD: standard deviation.

The comparison of the differences in scores for the 2 age groups between admission (T1) and discharge (T2) on the variables measured is presented in Table III. Some participants could not walk at T1. Therefore, only the scores obtained from the ambulatory participants at T1 were used for the TUG, which explains the low sample size in each group. The subjects in both groups statistically improved their functional independence (except for communication and mental functions in the older group), visual perception, pain, balance, walking, grip strength and general well-being. Despite this improvement, their scores stayed below the reference values for their age, schooling and gender. The non-significant *p*-values between the groups suggest that the improvements observed during rehabilitation were similar for both groups, with the exception of a greater recovery in independence in IADL in the youngest participants ($p = 0.004$).

Three months after discharge from rehabilitation, the improvement was maintained or there was further improvement on most of the variables in both groups (Table IV). The only statistically significant decline was observed in the ≥ 65 years age group on the mental functions and communication sections of the SMAF and on visual perception. Also, the youngest participants improved more on the mobility section of the SMAF, balance, walking and grip strength.

Table III. *Inter-group comparison of differences on the outcome measures between admission (T1) and discharge (T2)*

	Differences between T1 and T2* Mean (SD)		
	< 65 years	≥ 65 years	*p*-value**
Functional variables			
Functional independence ($n = 49$ vs 114)[1]			
ADL (/21)	3.4 (3.0)§	3.5 (2.9)§	0.97
Mobility (/18)	4.3 (3.6)§	4.3 (3.6)§	0.92
Communication (/9)	0.0 (0.4)	0.0 (0.4)	0.94
Mental functions (/15)	0.4 (1.1)†	0.2 (1.3)	0.27
IADL (/24)	4.0 (4.1)§	2.1 (2.9)§	0.004
Total (/87)	12.1 (8.6)§	10.1 (7.7)§	0.21
Cognitive variables			
Overall cognitive functioning (/100) ($n = 40$ vs 93)[1]	1.9 (5.8)	1.0 (9.8)	0.20
Attention			
Duration (sec)			
Part A ($n = 34$ vs 86)[1]	24.7 (84.4)	21.3 (50.1)	0.44
Part B ($n = 27$ vs 49)[1]	10.3 (51.7)	48.9 (106.0)	0.08
Number of errors			
Part A ($n = 34$ vs 86)[1]	–0.1 (0.8)	0.1 (0.8)	0.21
Part B ($n = 27$ vs 49)[1]	0.1 (1.8)	0.2 (2.3)	0.86
Visual perception (/36) ($n = 39$ vs 87)[1]	1.1 (2.1)‡	1.8 (3.9)§	0.50
Physical variables			
Pain (VAS; /10) ($n = 40$ vs 86)[1]	1.3 (3.1)‡	1.0 (3.0)‡	0.25
Balance (BBS; /56) ($n = 34$ vs 90)[1]	11.2 (11.0)§	11.0 (9.3)§	0.75
Walking (TUG; sec) ($n = 17$ vs 42)[1]	5.4 (5.8)‡	8.7 (15.9)‡	0.44
Grip strength (kg)			
Right hand ($n = 40$ vs 95)[1]	2.7 (5.7)†	1.0 (4.0)†	0.31
Left hand ($n = 36$ vs 80)[1]	2.3 (5.0)†	1.4 (3.5)§	0.39
Psychosocial variable			
General well-being (/110) ($n = 34$ vs 80)[1]	11.7 (19.7)‡	10.6 (14.6)§	0.90

*A positive difference indicates an improvement on the variable.
p-value associated with the Wilcoxon signed-rank test (intra-group; < 65 years): †$p < 0.05$; ‡$p < 0.01$; §$p < 0.001$.
p-value associated with the *t*-test (intra-group; ≥ 65 years): †$p < 0.05$; ‡$p < 0.01$; §$p < 0.001$.
***p*-value associated with the Mann-Whitney *U* test for independent groups.
[1]Sample size of the < 65 age group vs sample size of the ≥ 65 years age group.
ADL: activities of daily living; IADL: instrumental ADL; VAS: Visual Analogue Scale; TUG: Timed Up and Go; SD: standard deviation.

Table IV. *Inter-group comparison of differences on the outcome measures between discharge (T2) and 3 months later (T3)*

	Difference between T2 and T3 Mean (SD)*		
	< 65 years	≥ 65 years	*p*-value**
Functional variables			
Functional independence ($n = 37$ vs 101)[1]			
ADL (/21)	0.1 (1.6)	–0.1 (2.0)	0.23
Mobility (/18)	1.1 (1.9)‡	0.5 (2.1)†	0.05
Communication (/9)	–0.0 (0.4)	– 0.2 (0.7)†	0.63
Mental functions (/15)	–0.1 (1.1)	– 0.5 (1.5)§	0.59
IADL (/24)	1.8 (3.4)‡	1.3 (2.9)§	0.41
Total (/87)	2.8 (5.9)‡	0.1 (5.2)	0.09
Cognitive variables			
Overall cognitive functioning (/100) ($n = 31$ vs 83)[1]	2.8 (5.7)†	1.5 (5.7)†	0.54
Attention			
Duration (sec)			
Part A ($n = 26$ vs 71)[1]	7.3 (20.7)	7.5 (37.1)	0.65
Part B ($n = 21$ vs 42)[1]	17.7 (71.2)	2.6 (96.1)	0.24
Number of errors			
Part A ($n = 26$ vs 71)[1]	0.0 (0.7)	0.0 (0.8)	0.78
Part B ($n = 21$ vs 42)[1]	0.0 (1.9)	0.2 (2.2)	0.98
Visual perception (/36) ($n = 30$ vs 78)[1]	0.7 (5.4)	–0.9 (3.3)†	0.10
Physical variables			
Pain (/10) ($n = 21$ vs 79)[1]	0.0 (2.3)	0.1 (2.5)	0.84
Balance (/56) ($n = 22$ vs 64)[1]	4.0 (7.9)†	–1.2 (6.9)	0.004
Walking and changing direction (sec) ($n = 22$ vs 60)[1]	17.2 (38.3)‡	4.2 (6.8)§	0.024
Grip strength (kg)			
Right hand ($n = 31$ vs 84)[1]	2.8 (6.2)‡	0.5 (2.7)	0.036
Left hand ($n = 28$ vs 83)[1]	2.3 (5.0)†	0.3 (3.2)	0.047
Psychosocial variable			
General well-being (/110) ($n = 27$ vs 72) [1]	2.7 (15.5)	–1.8 (14.3)	0.16

*A positive difference indicates an improvement on the variable.
p-value associated with the Wilcoxon signed rank test (< 65 years): †$p < 0.05$; ‡$p < 0.01$; §$p < 0.001$.
p-value associated with the *t*-test (≥ 65 years): †$p < 0.05$; ‡$p < 0.01$; §$p < 0.001$.
***p*-value associated with the Mann-Whitney *U* test for independent groups.
[1]Sample size of the < 65 years age group vs sample size of the ≥ 65 years age group.
ADL: activities of daily living; IADL: instrumental ADL; SD: standard deviation.

DISCUSSION

The main aim of this study was to compare the impact of an inpatient rehabilitation program on a range of biopsychosocial variables between adults (18–65 years) and older adults (≥ 65 years) and to compare changes in these variables 3 months after discharge. From the analysis of the results, statistically and clinically significant improvements were observed for both groups in functional independence, pain, balance, walking and changes of direction, grip strength and general well-being between admission to and discharge from rehabilitation. However, their scores remained low compared with reference values. The degree of improvement during rehabilitation was comparable between the groups for an average length of stay and equivalent access to professional resources, despite the varying diagnoses at admission.

Improving functional independence is one of the main goals of all rehabilitation programs (36). The improvements observed (over 10 points on the SMAF) are highly significant in both the youngest and oldest participants (22), although the latter presented a greater loss of independence at admission. Both groups increased their scores on the GWBS substantially. According to the author's classification (35), our groups were considered to be distressed at admission. After rehabilitation, they were at the lower limit of the positive well-being category.

Regarding changes 3 months after discharge from the program, improvements were maintained among the oldest participants while the youngest participants continued to improve, especially in mobility. The latter had greater physiological reserves and probably more opportunity to maximize their potential. This result is in agreement with reported findings concerning the impact of age on rehabilitation (16). Although statistically significant declines were observed in the ≥ 65 years age group on the mental functions and communication sections of the SMAF and for visual perception, these declines were small and not clinically significant.

One of the characteristics of the rehabilitation of older adults is the prevalence of concomitant cognitive problems (1, 2, 6). This study supports this observation. Scores on the 3MS at admission were lower in the older participants, although this is partly attributable to normal aging when compared to the available norms (24). Although a slight increase in the visual perception scores was noted in both groups, their cognitive status remained stable. This stability could be attributable to the relatively mild cognitive deficits observed at admission.

Another characteristic of geriatric rehabilitation is the presence of co-morbid conditions (3–5). In the present study, it was surprising that the scores on the co-morbidity index were similar in the 2 age groups (3.3 < 65 years, 3.2 ≥ 65 years). Also, we should point out that these scores are high because they are comparable to those of a population 65 years and older in long-term care facilities (21). The younger group also had quite a large percentage of individuals with vascular disease (amputation, stroke), which had a substantial impact on the Charlson index weighting.

According to Feigenson et al. (37), gender has no impact on functional outcome with stroke. A more recent study (38) concluded that women with stroke have a mildly unfavorable prognosis. In our study, women accounted for 57% of the older group, compared with 32% of the younger group. In spite of this difference, both groups improved to a similar extent, reducing the impact of gender on outcomes.

Strengths and limitations

This study was carried out with valid outcome measures, chosen with the help of a group of rehabilitation clinicians. Recently, Demers et al. (39) assembled a toolkit to measure geriatric rehabilitation outcomes. This toolkit includes 8 measurement instruments related to mobility, basic activities of daily living, independent living, leisure, physical functioning, psychological functioning, social functioning, and caregiver status. Four of the measurement instruments proposed in this toolkit were used in the present study (SMAF, TUG, 3MS and GWBS). This study had an original design since, unlike a previous study (17), it compared groups with a much wider mean age range. Younger people are traditionally considered to benefit more from rehabilitation services. Our study did not support this position because it demonstrates that even old people with lower physiological reserves can improve substantially. Instead of comparing young-old with old-old people, as in previous studies, we compared relatively young people (mean age 48 years) with old ones (mean age 78 years).

This study also has some limitations. The first relates to the sample size, the number of people under 65 years being about the half the number of those over 65 years. In addition, our participants were not evaluated on all the outcome measures, since some were unable or refused to do certain tasks. The power to detect differences between groups was therefore reduced for some measures. It would have been interesting to present the results by diagnosis, but the limited sample size for each diagnosis made this impossible. Educational level was different between the 2 groups, but there are very few available data on the impact of this factor on rehabilitation outcomes. Only one study, carried out more than 30 years ago, was found (40). This study suggested that people who have had a severe stroke and have a lower level of education are less likely to improve during rehabilitation, which was not found in our study. Also, the temporal stability of some outcome measures might be attributable to low initial deficits, which removed or limited the likelihood of improving over time. Finally, because there was no control group, the changes during rehabilitation cannot be attributed to the program alone.

In conclusion, the geriatric population makes up an increasing percentage of rehabilitation inpatients. The results of this study gainsay the traditional defeatist attitude towards the rehabilitation potential of older adults. Although they constitute a heterogeneous group with varying needs and treatment goals, inpatient rehabilitation has substantial benefits and allows them to return to their previous living environment in the majority of cases.

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