

Research Article

Neurological and Quality of Life outcomes after Early Transdisciplinary Rehabilitation Post Stroke: Prospective 2-year Analysis in Buenos Aires, Argentina

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Abstract

The aim of this research was to evaluate the effectiveness of transdisciplinary neurorehabilitation initiated early in post-stroke patients in Argentina.

Methods: Consecutive patients with ischemic stroke were analyzed in which neurorehabilitation was initiated before 24 weeks of the acute episode and followed for at least 24 months after admission to the center. At baseline and every 3 months quality of life (SF-36 instrument) and Functional Impact (measured by FIM) were evaluated as outcome measures. Demographic and clinical variables were registered at study entry and during follow up (post-stroke disability, time in rehabilitation, age, sex, related caregiver, work status and educational level). Stepwise regression analysis and linear correlation was used to evaluate rehabilitation on outcome measures.

Results: 22 patients were included, mean age 62.7 ± 15 years, 6 (27.3%) women, mean time of follow-up 27 ± 3 months. Rehabilitation was significantly associated with an increase in the quality of life as well as the functional status independently of other variables ($p = 0.001$, $r = 0.85$ and $p = 0.005$, $r = 0.80$, respectively).

Conclusion: early transdisciplinary rehabilitation used in stroke patients was associated with a significant increase in quality of life and functional status independently of other variables in included patients.

Keywords: Neurorehabilitation; Transdisciplinary; Stroke; Cerebrovascular disease

Introduction

Stroke remains the third largest cause of mortality in many countries around the world [1,2]. Although the fatality rate has decreased in the last few decades, a large number of acute survivors still suffer functional disabilities that lead to the second largest loss of disability-adjusted life years [1,2].

Disability caused by stroke has enduring social and economic consequences, in part due to the burden on the healthcare system and the dependency on care givers for physical and financial assistance [3].

Early post-stroke rehabilitation tends to focus on the amelioration of impairments and activity restrictions so that basic mobility and self-care tasks can be achieved [4,5]. Surprisingly, research on the impact of early rehabilitation regarding mid and long-term effectiveness is still unclear and more research is underway to elucidate this issue [6-8]. To date, some observational studies have investigated the association between early initiation of rehabilitation and patient outcomes, however, this has not been evaluated in our environment. The aim of this study was to evaluate the effectiveness of transdisciplinary neurorehabilitation initiated early in post-stroke patients in Buenos Aires, Argentina.

Methods

Data source and participants

Patients were recruited from AlunCo Internacional between January 2014 and June 2015. Alunco is a center located in Buenos Aires, Argentina dedicated to the rehabilitation of neurological patients with physical and/or cognitive disabilities.

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To be included in the study, patients had to be older than 18 years and have suffered an ischemic stroke in the last 24 weeks before the initiation of rehabilitation. Informed written consent was obtained in all cases. Patients with communicative and cognitive deficits were eligible for recruitment to the study, provided a 'responsible person' granted written consent for participation. After inclusion, patients were followed during at least 24 months to evaluate clinical outcomes.

Intervention and procedures

After inclusion, patients were assessed at baseline and every three months during 24 months. Demographic and clinical variables were evaluated at baseline and included post-stroke disability, time in rehabilitation, age, sex, related caregiver, work status, educational level, past medical history and co-morbidities. In all patients a transdisciplinary rehabilitation process was implemented during the study process [9]. During the follow up, functional status, quality of life, depression, cognition and anxiety was measured every three months.

The functional status was measured using the Functional Independence Measure scale (FIM) [9]. FIM evaluates the level of independence that a person presents to perform living daily activities. At the same time, it possesses motor and cognitive items.

The Quality of Life was evaluated at study admission as a dependent variable by an evaluator blinded to the study objective through the generic health-related quality of life scale Short Form 36 (SF36), which was self-administered and has 36 items over 8 domains. All of them are estimated on a scale ranging from 0 to 100, with 100 representing the best possible state [10,11].

The presence of depression was measured by the self-completed questionnaire of Beck Depression Index II, a scale validated in our institution to measure and quantify depression in patients.

The cognitive status was assessed using the Montreal Cognitive Assessment (MoCA) scale, and the presence of anxiety was determined using the Hamilton Anxiety Scale.

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Table 1: Patients characteristics at baseline.

	N= 22
Age	62.7 ± 15
Female sex, N (%)	6 (27.3%)
Education level	
Primary, N (%)	9 (40.9)
Secondary, N (%)	5 (22.7)
University level, N (%)	7 (31.8)
Follow up time, months	27 ± 3
Time since stroke to rehabilitation, weeks	18 ± 7
Working status	
Working, N (%)	15 (68.2)
Unemployed, N (%)	4 (18.2)
Caregiver	
Family, N (%)	15 (68.2)
Friend, N (%)	3 (14.3)
Professional, N (%)	3 (14.3)

Statistical analysis

The data was recorded and stored in an electronic database specially designed for the purpose of the investigation. Analyses included descriptive statistics (mean, SD, frequencies). Quality of life (SF-36 instrument) and functional impact was evaluated as outcome measures. Stepwise regression analysis and linear correlation was used to evaluate the role of rehabilitation on outcome measures during the follow-up. The statistical program STATA 10.1 was used for all statistical analysis. A p value of 0.05 was used to assess significance.

The research was approved by the independent ethics committee of the Austral University Hospital. All patients gave their informed consent for the study.

Results

A total of 22 post-ischemic stroke patients were included in the study. The mean age of the sample was 62.7 ±15 years, and 6 (27.3%) patients were female. The mean time of follow up was 27±3 months, and no patients were lost during the follow up. At baseline 15 (68.2%) were employed. The demographic and clinical characteristics of the sample at baseline are presented in Table 1.

Transdisciplinary rehabilitation was applied to all patients in the same manner. The impact of rehabilitation on different aspects of functional status and quality of life was analyzed in univariate analysis. There was a significant increase in the quality of life in the patients during follow-up (p 0.03), as well as an increase in the functional status measured by FIM (p 0.01) and the MoCA scale (p 0.001). The rest of the variables are presented in Table 2.

The multivariate analysis was carried out to evaluate the impact of rehabilitation on the quality of life and the functional impact as prespecified by adjusting for clinical and demographic co-variables. The

Table 2: Univariate analysis during the follow-up of patients with cerebrovascular disease.

	Baseline	M6	M12	M18	M24	P*
Quality of life	63	65	67	66	66	0.03
FIM scale	96.3	99	101	101	102	0.01
Depression scale	11	9	8	7	7	0.09
MoCA scale	19	19	20	22	24	0.001
Hamilton scale	7.2	4	4	4	4.5	0.07

FIM = functional impact scale; MoCA= Montreal cognitive assessment

Table 3: Multivariate analysis adjusting for co-variables and impact of rehabilitation on quality of life in patients with stroke and transdisciplinary rehabilitation.

	P	r
Age	0.23	-0.13
Sex	0.17	-0.19
Quality of life	0.01	0.80
FIM scale	0.005	0.88
Depression scale	0.06	-0.55
MoCA sscale	0.05	0.57
Hamilton scale	0.15	-0.23

FIM = functional impact scale; MoCA= Montreal cognitive assessment
rehabilitation was significantly associated with an increase in the quality of life as well as the functional status, independently of the impact of other variables (p 0.01, r 0.85) (Table 3).

Discussion

In our study we observed that early transdisciplinary rehabilitation was associated with and increase in the quality of life as well as in functional status in patients who suffered a cerebrovascular stroke independently of other variables.

Recent consensus guidelines recommend early intervention for acute stroke patients [12], but little evidence exists regarding the effectiveness of early intervention for acute stroke patients. Our findings are in line with previous research published. In an observational study by Musicco et al. [13], delayed initiation of rehabilitation after 7 days since onset doubled the odds of a severe Activity of Daily Living (ADL) deficit 6 months after admission. Matsui et al. investigate the association in Japan between Very Early Intervention (VEI) and patient outcomes at discharge [2]. They found that VEI for acute stroke patients was significantly associated with a lesser degree of disability at discharge. VEI even improved the chance of reducing disability by 15.3% (p < 0.001). There was no significant association between VEI and in-hospital mortality, suggesting that VEI was not likely to lead to an adverse outcome. In another study, Bai et al. [3] found that early rehabilitation improved the recovery of ADL and motor function of patients with hemorrhagic stroke. Several mechanisms are presumably involved in the positive effect of early intervention on functional outcome, such as neural plasticity and cortical reorganization enhanced by early intervention [5]. The genes responsible for neuronal growth and synaptogenesis are expressed at their highest levels during early brain development and decline with age, but a stroke event re-initiates the increased expression of these genes for a limited period after stroke [14,15]. Another explanation is that early rehabilitation could also prevent disuse syndrome and related conditions such as pneumonia and decubitus ulcers, which may also lead to a better chance of functional recovery [16].

There are several limitations in our research. First is the low number of affected patients included; nonetheless, a short interval of assessment provides confidence on evaluations performed. Second, more prolonged effects of rehabilitation on functional status should be studied beyond 24 months even after the training ends. Thus, future studies with greater assessment times are needed to confirm and expand the current findings.

In summary, our study shows that early transdisciplinary rehabilitation used in stroke patients was associated with a significant increase in quality of life and functional status independently of other variables in the patients followed. The present findings provide further evidence for advancing the use of early rehabilitation as an effective treatment for patients with cerebrovascular disease.

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