

Level of functional independence of patients after stroke assisted by a multidisciplinary team in a rehabilitation unit

Karina Ayumi Martins Utida¹, Adriane Pires Batiston², Laís Alves de Souza²

ABSTRACT

Objective: Evaluating the functional recovery of stroke patients assisted by multidisciplinary team in a Continuous Care Unit (UCCI) and identifying factors associated with the functionality gains. **Methods:** It is a cross-sectional study using secondary data from 34 patients assisted during one year in a rehabilitation unit, in which the team works in a comprehensive and humane way, providing functionality gains and rescuing autonomy. The medical records were investigated for sociodemographic data, lifestyle, type of stroke, duration of hospitalization and level of functional independence at the time of admission and of discharge based on the Barthel Index. **Results:** Most of the patients at admission presented whole or severe dependence (55.9%); at discharge, most patients presented mild dependence or full independence (55.9%). About total dependence, there was a significant decrease in the percentage of patients with such degree of dependence ($p < 0.001$). No relationship was observed between the functionality gain and the variables studied. **Conclusion:** The results showed that the proposed rehabilitation program has brought a positive outcome on functionality and the functionality gains were not associated with the variables studied.

Keywords: Comprehensive Health Care, Stroke, Activities of Daily Living, Rehabilitation

¹ Physiotherapist, Mastering at Universidade Federal de Mato Grosso do Sul - Brazil.

² Physiotherapist Doctor, Professor at the Universidade Federal de Mato Grosso do Sul - Brazil.

Mailing address:
Universidade Federal de Mato Grosso do Sul
Adriane Pires Batiston
Rua Robert Spengler, 69
CEP 79004-070
Campo Grande - MS
E-mail: apbatiston@hotmail.com

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INTRODUCTION

The cerebrovascular accident (stroke) is ranked as the second cause of mortality in the world and is likely to hold this tendency up until 2030.¹ It can occur in all ages, disabling patients of working-age, promoting a decrease in the workforce, and increasing the expenses in pension funds. For patients over 50 years of age, the incidence increases at every extra decade of life, bearing more severe sequelae and higher mortality rate.² The growth in the life expectancy, and consequently the aging of the population, combined with the developments of technology in the health area have outcome in an increase in life time of patients with stroke. Therefore, a larger number of patients, after hospitalization, return to the society with functional incapacities and dependence of care of others for performing the activities of daily living (ADL).^{3,4}

The stroke is caused by alterations in the cerebral circulation leading to definitive or transitory deficit in the function of one or more areas of the brain, what causes losses of neurologic function⁵ such as movement, balance, motor coordination, behavior, language, sensitivity, sphincter, and swallowing disorders as well as visual deficits.⁶ Consequently the self-esteem, self-image, and interaction with the family and society of these patients become compromised,⁷ what causes a decrease in the level of functional independence.⁸

The functional independence level depends on satisfactory motor and cognitive conditions for performing the ADL, and is also related to the challenges of the environment itself.⁹ According to Badriah et al.,¹⁰ the level of functional independence of patients with stroke depends not only on the beginning of the rehabilitation in a suitable time, during hospitalization, but also on the effectivity of rehabilitation after hospital discharge, which in turn depends on the prescription for rehabilitation continuation.

We live in a period of paradigmatic transition from the biomedical care model to the biopsychosocial model,¹¹ what is characterized by changes in the care demands, requiring a review on the role that is traditionally attributed and played by the healthcare professionals. The fragmented care offered by isolated professionals is not resolute any longer. Changes in designing and organizing the work of the multi-professional teams, overlooking the achievement of integral care for developing independence and quality of

life of the patient,¹² are required, due to the consequences of the actual strong specialization and partition of the interventions.

Once it is a problem that may result in severe sequelae, leading to dependence for executing the ADL, the investigation of the individual characteristics of stroke patients is highly relevant, once they can affect the functionality development. It is worthy to evaluate the level of functional independence and whether the integrality directed care given by a multi-professional team yield positive influence in their patients recovery.

OBJECTIVE

Analyze the functional recovery of patients with diagnosis of stroke treated by a multi-professional team of a *Continuous and Integrated Care Unit* (UCCI) as result of a differentiated therapeutic approach.

METHODS

The study was executed in a UCCI of a backup hospital in the city of *Campo Grande, Mato Grosso do Sul* (MS), Brazil. It is a cross sectional study, of patient records data on which the functional recovery of patients with stroke diagnosis were analyzed.

This UCCI, built in *Campo Grande/MS* in October 2013, is a rehabilitation center that continues the therapies after the discharge from the tertiary hospital. It provides multi-professional care for dependent patients, aiming to improve the access of low income people to rehabilitation programs, to provide functionality, and to prevent and reduce disabilities, therefore reinforcing quality of life. Initially, the UCCI relied on professionals in medicine, physiotherapy, occupational therapy, phonoaudiology, nutrition, social services and infirmary. In 2014, a multidisciplinary residency program was implemented and the patients were additionally assisted by psychologists and pharmacists.

The centrality of the therapy is the team work, whose guide is the Singular Therapeutic Project (PTS), which is group of articulated therapeutic approaches, derived of a collective discussion among the multidisciplinary team, the patient and his or her family/caregiver.¹³ For developing the PTS, the team, the family/caregiver, and the patient agree on a hospitalization period of at most 60 days, depending

on the functional status, the psychosocial situation, and other ongoing demands. The objective is to grant a programmed and organized discharge, based on the family and the patient orientation, reinforcing the patient autonomy and the management of the continuous care in the healthcare system network.¹⁴

The rehabilitation program is designed according to the needs of each patient, provided with daily care of the medicine, infirmary, physiotherapy, nutrition, clinical pharmacy, social service and psychology, as well as occupational therapy, phonoaudiology, and odontology care, which occur twice a week, as demanded. Moreover, the team provides basic care orientation in the hospital, supporting its continuation at home.

For identifying the sample of patients of this study, a list of hospitalized patients from March 2014 to March 2015 was generated, based on the hospitalization system, from which the stroke patients were detected, as classified upon the International Classification of Diseases - ICD10, "I61" (intracerebral hemorrhage), "I63" (cerebral infarction), and "I64" (cerebrovascular accident, not specified as hemorrhagic nor ischemic). The data collected in the patients' records included sociodemographic status, life habits, stroke type, hospitalization period, Barthel Index (BI) scores at admission and discharge.

The BI is part of the evaluation protocol and is applied by the team at admission and discharge of all patients. Through this evaluation tool, the level of independence on ADL is evaluated in terms of feeding, personal hygiene, toilet use, bathing, dressing and undressing, sphincter control, mobility, transference from wheelchair to bed, and stairs climbing. In the original version, this scale is graded according to the performance on doing the activities either independently, with some help, or dependently, relying on the time and the necessary assistance, through a scale which ranges from 0 to 100, where 0 means the total dependence, and 100 means total independence.¹⁵ In this study, however, we applied the classification as proposed by Souza et al.,¹⁶ in which the scores are classified as follows: lower than 20, total dependence; from 20 to 35, severe dependence; from 40 to 55, moderate dependence; from 60 to 95, slight dependence; and 100 is total independence. Mahoney & Barthel¹⁵ stated that the objectives of the scale are to quantify and monitor the level of Independence of patients. The BI is of low cost, easy to be applied, it can be periodically

repeated and it requires little time to be filled, and it is broadly used, especially in hospitals, recovery units and rehabilitation centers. Moreover, it is considered the most suitable tool for evaluating the level of disability for performing the ADL.¹⁷

All stroke patients, eligible for continuing their rehabilitation, and admitted in the UCCI along the mentioned period were included. The patients with insufficient data and whose hospitalization period did not meet the proposed time, therefore being discharged upon their request, were excluded from the study.

The research project on this study was approved by the Ethics Review Board for Research of the Federal University of Mato Grosso do Sul + Brazil, receiving registration number 1.045.234. All the research ethical criteria were applied.

Data analysis

The evaluation of the association between the severity of the dependence, per BI, and the evaluation time was performed by the McNemar test. The comparison between the hospital admission and discharge, related to the partial scores of each item and the total score of BI was executed by the Wilcoxon test, once the samples were not considered normal in the Kruskal-Wallis test (marital status) or in the Mann-Whitney (all other variables). The other results of this study were presented as descriptive statistics or as tables and graphics. The statistical analysis was fulfilled with the statistical pack SigmaPlot, version 12.5, at a significance level of 5%.

RESULTS

From March 2014 to March 2015, 36 patients with diagnosis of stroke were admitted at the UCCI. Two of them were excluded due to their request for discharge before reaching the hospitalization time previously dealt with the team. Eventually, 34 patient records were analyzed, regarding patients from 20 to 86 years of age and mean age of 56.62 ± 2.66 (mean \pm standard error of the mean).

The baseline characteristics of the patients on sociodemographic status, life habits, stroke type and hospitalization time is presented in Table 1. In general, most of the patients were above 40 years of age (82.4%) and were female (52.9%). Nearly half of the patients were married or stable union (47.1%). Most of the patients had secondary school level, complete

or incomplete (73.5%), whereas 41.2% were retired. Most of the patients evaluated in this study reported being supplied with a minimum wage (52.9%), non-smoking (73.5%), non-alcoholic (85.3%), and sedentary (97.1%). On the stroke type, 94.1% had hemorrhagic stroke. The hospitalization period ranged from 15 to 60 days, resulting in a mean time of 32.15 ± 1.84 days, whereas 55.9% of them were hospitalized from 16 to 30 days.

The Figure 1 presents the distribution of patients according to their dependence level, as assessed by BI, at admission and at hospital discharge. At admission, most of the patients reported total or severe dependence (55.9%), whereas at discharge, most of the patients reported slight or total independence (55.9%). Specifically concerning the total dependence, there was a significant decrease in the proportion of patients with total dependence between the admission and the discharge (McNemar test, $p = 0.002$).

The partial score results of each BI item, as well the total Index, at hospital admission and discharge, are presented in Table 2. Except for the bathing item, all the other scores included in the BI increased significantly between the admission and discharge (Wilcoxon test, where p -value varied between < 0.001 and < 0.005). It was also observed in relation to the total Index, which went from 36.47 ± 5.75 points at admission to 61.18 ± 5.04 points at discharge ($p < 0.001$). Overall, there was a mean improvement in BI, between hospital admission and discharge, of 24.71 ± 3.70 points.

No correlation between the gain of BI, between hospital admission and discharge, and the variables age, sex, marital status, educational background, family income, life habits and type of stroke (Kruskal-Wallis test or Mann-Whitney test, and p -value varying from 0.315 to 0.691). These results are shown in the Table 3.

DISCUSSION

In our study, the BI was the chosen tool by the UCCI team, either for monitoring the functional independence level of the patients or to design the therapeutic approach. The BI is an evaluation scale for assessing neurological abnormalities with evidences of reliability and satisfactory applicability in the Brazilian population.¹⁸ The choice of this tool agrees with the team objective, who looks forward to

adopting effective and appropriate interventions as to allow the patient with functional dependence to achieve and maintain the widest possible autonomy and functional capacity, as well as the patients' social inclusion and participation. Mediated by the BI evaluation, our results have shown that nearly all the evaluated patients had some degree of functional dependence at admission (94.1%). In a similar study, some type of dependence was found in 76% of the patients in the subacute phase of stroke, and, after physical rehabilitation, 54% remained dependent.¹⁶ Other studies have found even higher proportions of patients with severe or total dependence, also in the subacute phase of stroke, ranging from 78% to 100%,^{3,19} what confirms the functional implications of this pathology and the requirement of continuous care, overlooking the achievement of better autonomy.

Considering that the stroke is an unexpected event in life and that, for those who belong to the patient social network, the family role for providing the patients care become evident.²⁰ For this reason, since the admission, the multidisciplinary team at the UCCI, encourages the family/caregiver to participate in the rehabilitation therapies, in the assistance for feeding and bathing, in the administration of medicine, among other activities, and provides basic instructions, aiming to prepare them for continuing the assistance at home. Appraising that the family involvement in the role of a caregiver catalyzes the recovery of the stroke patient,²¹ his or her inclusion in the planning and execution of the rehabilitation activities is crucial for yielding the best possible results concerning functional recovery and social integration.

Concerning each item of the BI, the patients achieved significant functional improvements between the admission and the discharge, agreeing with the findings of the other studies,^{22,23} except for the bathing item, once 64.7% of the patients were classified as totally dependent in this item at discharge. This finding is paired with Morone et al.,³ suggesting that this task requires longer rehabilitation period, and stronger training focus, considering the complexity of the necessary movements. It is also possible that the bathing training is jeopardized due to the need to expose the body of the patient, inducing embarrassment for the patient and caregiver. Moreover, the stroke can generate balance deficit,⁵ causing the patient to be afraid of falling and therefore not feeling safe for independently performing

Table 1. Distribution of the patients according to the sociodemographic characteristics, life habits, stroke type and hospitalization

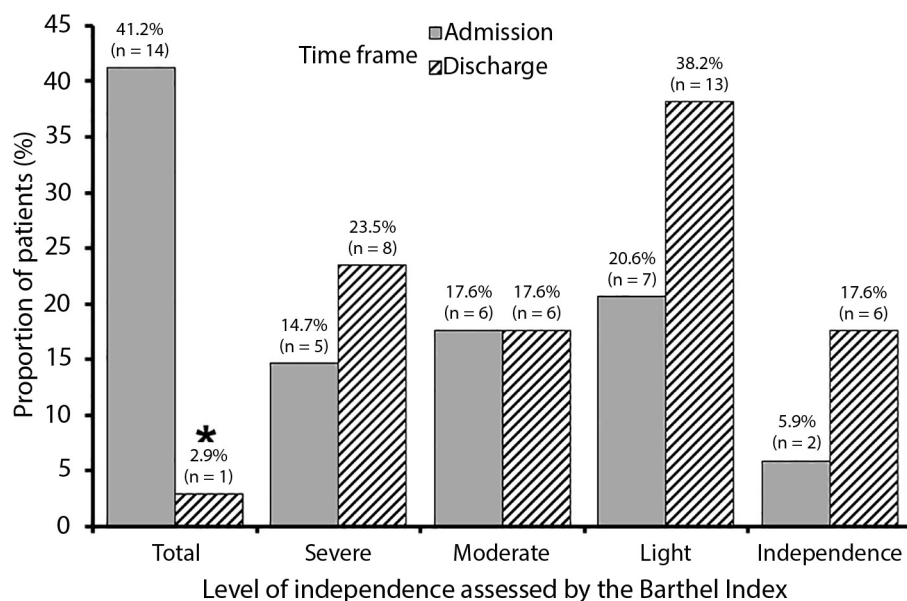
Variable	n (%)
Age (years)	
Under 20	1 (2.9)
Between 21 and 40	5 (14.7)
Between 41 and 60	10 (29.4)
Between 61 and 80	16 (47.1)
Above 80	2 (5.9)
Sex	
Female	18 (52.9)
Male	16 (47.1)
Ethnicity	
Brown	16 (47.1)
White	14 (41.2)
Black	4 (11.8)
Marital status	
Married or stable union	16 (47.1)
Divorced	7 (20.6)
Widow(er)	6 (17.6)
Single	5 (14.7)
Educational background	
Illiterate	2 (5.9)
Primary school (complete and incomplete)	25 (73.5)
Secondary school (complete and incomplete)	4 (11.8)
College (complete and incomplete)	3 (8.8)
Occupation	
Retired	14 (41.2)
Housewife	4 (11.8)
Construction worker	3 (8.8)
House maid	2 (5.9)
Others	11 (32.4)
Family income (minimum wages)	
Less than 1	4 (11.8)
1	18 (52.9)
More than 1 and less than 2	8 (23.5)
More than 2	4 (11.8)
Smoking	
Yes	25 (73.5)
No	9 (26.5)
Alcoholic	
No	29 (85.3)
Yes	5 (14.7)
Sedentary	
No	1 (2.9)
Yes	33 (97.1)
Stroke type	
Ischemic	32 (94.1)
Hemorrhagic	2 (5.9)
Hospitalization period (days)	
Up to 15	2 (5.9)
Between 16 and 30	19 (55.9)
Between 31 and 45	9 (30.6)
Between 46 and 60	4 (11.8)

this task. It is important to emphasize, however, that the BI has only two punctuation possibilities for the items “grooming” and “bathing”: 0 for dependent and 5 for independent, and this low sensitivity of the evaluation tool may have underestimated the functionality improvements, once the necessity of help by the caregiver may have been reduced, but not eliminated.

The lack of association among the results of this study and the life conditions of the patients reveals that the outcome resulted from the multidisciplinary therapeutic approach, what coheres with a study performed in Portugal.²⁴ This study used the same patient evaluation tool and similar team approach of the UCCI, the ECCL - *Home Based Continuous Care Team* - in which they found significant improvement in all the BI items, nonetheless with lower difference for bathing, grooming and bowel after 20 sessions delivered along 10 weeks.²⁴ The steep improvement on the global motricity or in physical domains were also found by Costa,²² Carvalhido and Pontes,²³ evidencing that emotion related domains may take longer time to recover.

A previous study which used the BI for evaluating the level of functional independence of patients with stroke sequelae before and after three months of physical rehabilitation has found similar results, however the rehabilitation was applied by physiotherapy, occupational therapy and phonoaudiology professionals only.³ Referring to that, it is important to emphasize that the hospitalization time at the UCCI covers not only function, but also the psychosocial and environmental aspects. It is understood that patients who are subjected to stroke require time and professional advice, so that they can prepare their homes for returning and reintegrating their social environment. For this reason, the team also supports the family onto that, and, the physical rehabilitation time and the psychosocial rehabilitation time are not always coincident.

Attempting to ensure the adhesion of patients and caregivers/family to the rehabilitation process, to provide a horizontal care, and to magnify the co-responsibility in the treatment, motivating the patients main role in the process, the team adopts guidelines and instructions from the National Humanization Policy¹² which goes beyond the Singular Therapeutic Project (PTS), such as: reception, ambience, adapted and shared clinic, and open visitation. It is understood this manner yields broader confidence relation construction, commitment, and attachment by recognizing



* Significant difference as compared to the time of hospital admission (McNemar test, $p = 0.002$)

Figure 1. Proportion of patients according to their degree of dependence, as assessed by the Barthel Index, at hospital admission and discharge.

Table 2. Results of the BI separate scores, and the total Index, at hospital admission and discharge

Variable	Time frame		p-value
	Admission	Discharge	
Feeding	3.68 ± 0.71	7.35 ± 0.57	< 0.001
Bathing	1.18 ± 0.37	1.77 ± 0.42	0.156
Dressing	3.97 ± 0.51	6.18 ± 0.37	< 0.001
Grooming	2.21 ± 0.43	3.82 ± 0.37	0.005
Bowel	5.44 ± 0.80	7.91 ± 0.69	0.004
Bladder	4.27 ± 0.85	6.62 ± 0.72	0.002
Toilet use	3.09 ± 0.67	5.74 ± 0.64	< 0.001
Transfers	6.47 ± 0.93	10.00 ± 0.76	< 0.001
Mobility	3.97 ± 0.99	7.50 ± 1.02	< 0.001
Stairs	2.21 ± 0.67	4.56 ± 0.74	< 0.001
Total	36.47 ± 5.75	61.18 ± 5.04	< 0.001

The results are presented as mean ± standard error of the mean. P-value in the Wilcoxon test.

in their counterpart the legitimate and unique health necessity, allowing shared and committed decisions on the autonomy and health of the patient to be taken.

For Silva & Fonseca,²⁵ the conception of the human being who determines the health operation offered as to achieve the objective of producing health is inscribed in the PTS: cherish, enlarge the understanding and the apprehension of the process of health-disease and improve the quality of life of the users

(patients). Moreover, it refers to the contribution of several professions, as a mean to incorporate the interdisciplinary notion.²⁶ Campos & Amaral²⁷ discuss the demand for changes in the intervention methods, either diagnostical or therapeutic, considering that dealing with people is a challenge for the health systems in general, due to, not only the biological, but also the social and subjective dimensions of the subject. The UCCI team, by applying the PTS, searches for obtaining a diagnosis which

is real, individualized, sensitive to the vulnerabilities, and, therefore, they struggle each time to integrally assist the patient, observing all the variables of his or her health condition, not restraining the therapy on medical drugs and the use of hardened technologies, but also managing the therapeutic resources of listening and speaking, the strength of health education and the psychosocial support. It is understood these are the fundamental tools for achieving the initial objectives of the team: provide the autonomy, improve the functionality of the dependent patient and promote the readaptation, and family and social reintegration.

A positive reflex of this new manner to offer healthcare was evidenced in our results on functionality, given the patients presented significant improvement in the level of functional independence along the hospitalization at the UCCI ($p < 0.001$). Despite the improvements in the functionality, a part of this patients has returned to their homes with some degree of dependence, an observation that endorses the relevance of the care continuity, as to provide wider improvements in autonomy for the ADL, readaptation to the new condition, risk prevention, acquisition of new functional abilities and a possible return to the workforce.

CONCLUSION

No relation was found between the improvements in BI, from admission to discharge, and the variables assessed (age, sex, marital status, educational background, family income, life habits and type of stroke), what can be explained by the proposed assistance model, in which every patient receives a unique care, according to their real needs, and by the limitation of the evaluation tool. A relevant fact is that the functionality profile of the patient sample advanced from total dependence to slight dependence, showing the importance of the integrality based team work.

It is necessary to develop other studies on this matter, as a mean to evaluate and monitor the proposed assistance and to understand the functionality profile of patients with stroke, benefitting the progression of this patients along the healthcare network and avoiding new cases. We acknowledge, as the study weakness, the absence of previous data so that we could compare our findings on quality of assistance to the time when the multidisciplinary team was smaller and the assistance less structured.

Table 3. Comparison between the variables age, sex, marital status, educational background, family income, life habits, and type of stroke and the improvement of BI measured at hospital admission and hospital discharge

Variable/categories	Barthel Index improvement	p-value
Age		
Below 60 years (n = 16)	22.50 ± 21.76	0.580
Above 60 years (n = 18)	26.67 ± 5.15	
Sex		
Female (n = 18)	22.78 ± 5.09	0.568
Male (n = 16)	26.88 ± 5.51	
Marital status		
Married or stable union (n = 16)	32.19 ± 6.34	0.425
Divorced (n = 7)	19.29 ± 7.02	
Widow(er) (n = 6)	14.17 ± 6.11	
Single (n = 5)	21.00 ± 5.79	
Educational background		
Complete primary education (n = 27)	23.33 ± 4.34	0.315
Secondary to complete college (n = 7)	30.00 ± 6.64	
Family income		
Up to 1 minimum wage (n = 22)	26.59 ± 4.98	0.691
More than 1 minimum wage (n = 12)	21.25 ± 5.26	
Smoking		
No (n = 25)	26.20 ± 4.48	0.544
Yes (n = 9)	20.56 ± 6.59	
Alcoholic		
No (n = 29)	24.14 ± 4.05	0.678
Yes (n = 5)	28.00 ± 9.95	
Stroke type		
Hemorrhagic (n = 2)	12.50 ± 2.50	0.485
Ischemic (n = 32)	25.47 ± 3.89	

The results are presented as mean ± standard error of the mean. P-value in the Kruskal-Wallis test (marital status) or the Mann-Whitney test (all the other variables).

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