FUNCTIONALITY AND MORTALITY IN INDIVIDUALS WITH STROKE AFTER ONE YEAR OF HOSPITAL DISCHARGE

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ABSTRACT
Objective: To assess functionality and mortality in patients with stroke after one year of hospital discharge. Methods: Prospective longitudinal cohort study with patients admitted to the stroke unit and evaluated at three moments: admission, discharge from the unit and after one year of hospital discharge. Results: One year after discharge, the mortality rate was 23% and functionality improved in relation to the time of hospital discharge ($p<0.01$). Furthermore, functionality and muscle strength improved at hospital discharge compared to admission ($p<0.01$). Regarding the values of functionality and strength of patients who died after one year, they were worse at hospital discharge when compared to the same assessment of survivors ($p<0.01$). Conclusion: After one year of hospital discharge, post-stroke patients show progressive improvement in functionality and strength, but still with risk of death, especially during this period.

Keyworks: Stroke, Mortality, Functional status, Hospitalization, Cohort Studies.

FUNCIONALIDADE E MORTALIDADE EM INDIVÍDUOS COM ACIDENTE VASCULAR CEREBRAL APÓS UM ANO DA ALTA HOSPITALAR

RESUMO
Objetivo: Avaliar a funcionalidade e mortalidade em pacientes com AVC após um ano de alta hospitalar. Métodos: Estudo de coorte longitudinal prospectivo com os pacientes admitidos na unidade de AVC e avaliados em três momentos: admissão, alta da unidade e após um ano de alta hospitalar. Resultados: Após um ano da alta, a taxa de mortalidade foi de 23% e a funcionalidade melhorou em relação ao momento da alta hospitalar ($p<0,01$). Ainda, a funcionalidade e a força muscular melhoraram na alta hospitalar em comparação ao momento da admissão ($p<0,01$). Em relação aos valores de funcionalidade e força dos pacientes que vieram a óbito após um ano, eram piores na alta hospitalar quando comparado a mesma avaliação dos sobreviventes ($p<0,01$). Conclusão: Após um ano da alta hospitalar os pacientes pós AVC apresentam melhora progressiva da funcionalidade e força, porém ainda com risco de óbito principalmente nesse período.

Palavras-chave: Acidente Vascular Cerebral; Mortalidade; Estado funcional; Hospitalização, Estudo de coorte.

INTRODUCTION

It is estimated that stroke affects more than 13.7 million people worldwide, reaching one in four people over the age of 25 (1). Mortality varies in relation to the degree of socioeconomic development and about 90% of deaths occur in underdeveloped or developing

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countries. The hospital mortality rate is used as an indicator of the quality of care for patients with stroke (2).

In Brazil, stroke has a major impact on public health due to its high prevalence and morbidity. It is currently one of the main causes of death in the country, resulting in high costs, regarding treatments and rehabilitation processes (3,4). Much of this demand comes from the disabilities generated by this disease in adults of working age. Affected patients become unable to perform their activities of daily living due to limitations caused by neurological deficits (5).

An important portion of its survivors begins a new phase of life due to the disabilities generated by the stroke, thus, an assessment of functionality is essential for a better understanding of the impact of the disease on the lives of patients (6). Therefore, monitoring the individual after hospital discharge in relation to functional impairment becomes increasingly necessary for this population.

In this sense, this study aims to assess functionality and mortality in patients with stroke after one year of hospital discharge. Also, it has as secondary objectives to compare functionality and muscle strength at hospital discharge in relation to the time of admission, and to compare the same variables of patients who survived with those who did not survive one year after hospital discharge.

METHODS

This is a prospective longitudinal cohort study, carried out by analyzing the medical records of patients admitted to the Stroke Unit of the Irmandade da Santa Casa de Misericórdia de Porto Alegre, RS – Brazil. The data collected refer to hospitalizations from June to October 2017. Approved by the Ethics Committee for Research with Human Beings under protocol number 94008518.5.0000.5335 and in accordance with the Declaration of Helsinki. All participants signed the Free and Informed Consent Term (ICF) prior to data collection.

Population

Were included patients with a diagnosis of ischemic or hemorrhagic stroke, aged over 18 years, of both sexes, who underwent physical therapy during the period of hospitalization and who lived in Porto Alegre/RS. Patients with incomplete registration of data that made telephone contact impossible were excluded.

Materials and procedures

All hospitalized patients diagnosed with stroke in the respective period were screened. After reviewing the data, the researchers contacted the patient or closest family member in order to clarify the purpose of the research and to request the address for sending the informed consent by mail (a sealed envelope was also sent to facilitate its return). After returning the informed consent, data collection was carried out through the application of the research instrument via telephone interview. The following information was extracted from medical records: clinical and demographic data (gender, age, comorbidities, clinical diagnosis, procedures), length of hospital stay and in-hospital outcomes.

Assessments

Functionality

Functionality was evaluated using the Modified Rankin Scale (mRankin) and the Perme score. The mRankin scale measures functional status, incorporating limitations to activity and participation, in addition to the presence of deficits related to body functions (7). This scale was applied at three moments: at patient admission, at hospital discharge and one year after discharge.

The Perme scale consists of 7 categories, and these are subdivided, totaling 15 items to be evaluated, with a maximum score of 32 points. The higher the score on the scale, the higher the patient's (8). Perme was assessed at patient admission and discharge.

Peripheral muscle strength

Peripheral muscle strength was assessed during hospitalization through the Medical Research Council (MRC). The degree of muscle strength of each muscle group was qualified in values ranging from 0 (total paralysis) to 5 (preserved muscle strength). The total score can range from 0 (complete quadriplegia) to 60 (normal muscle strength). Values below 48 points are indicative of significant muscle weakness and those with 36 points or less are classified as severe muscle weakness (9). MRC was assessed at patient admission and at hospital discharge.

Mortality

Mortality was assessed by counting deaths during the hospital period and one year after discharge, by telephone.

Statistical analysis

Analyzes were performed using the Statistical Package for the Social Sciences program (SPSS; ver. 22.0 for Windows; SPSS Inc., Chicago, IL, USA). Categorical variables were presented as absolute number and frequency, and continuous variables as mean and standard deviation or as median and interquartile range according to distribution. Fisher's exact test was used to compare proportions. For analysis of continuous variables, Student's t test or Mann-Whitney test was performed when the data set was not homogeneous. The Kruskal-Wallis test was used to compare the follow-up at three moments: admission, hospital discharge and follow-up after 1 year. P values less than 0.05 were considered statistically significant.

RESULTS

A total of 202 medical records were consecutively selected, of which 35 were included in the study, with a predominance of males (60%) and users of the Brazilian Unified Health System (SUS—Sistema Único de Saúde) (57%). The mean age was 70±14 years and most patients developed ischemic stroke (91%). Six patients used thromboembolic treatment and the median length of hospital stay was 6 [4-10] days. Table 1 shows the characterization of the sample.

Table 1 - Demographic and clinical characteristics of patients at hospital admission

Variables	N=35
Male, n (%)	21 (60)
Age, years (mean ± SD)	70±14
Hospitalization by SUS, n (%)	20 (57)
Previous stroke, n (%)	9 (26)
Type of stroke, n (%)	
Ischemic	32 (91)
Hemorrhagic	2 (6)
Transitory ischemic attack	1 (3)
Thrombolysis, n (%)	6 (17)
Length of hospital stay, days (median [IQR])	6 [4-10]

Data presented by frequency (%), mean ± standard deviation (SD) or median and interquartile range (IQR). SUS: Brazilian Unified Health System (SUS—Sistema Único de Saúde).

After one year of hospital discharge, the mortality rate was 23%, of which 75% were related to cardiovascular diseases (systemic arterial hypertension and congestive heart failure) and 25% to respiratory infections (pneumonia, bronchoaspiration).

Regarding functionality and muscle strength, we can observe that all variables improved significantly at hospital discharge in relation to the time of admission. Table 2 shows the variables of functionality and strength, before and after hospital admission.

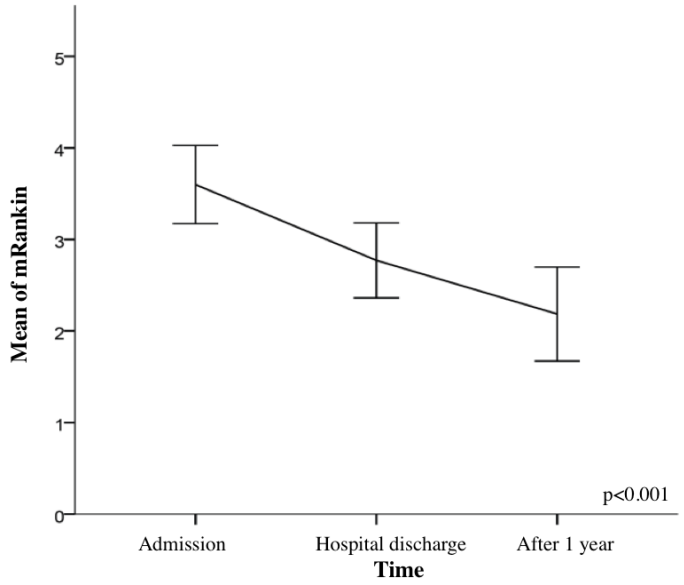
Table 2 - Comparison of strength and functionality before and after hospital admission in patients hospitalized for stroke. (N=35)

Variables	**Admission**	**Hospital discharge**	**Δ (CI 95%)**	***P***
MRC	43±14	49±11	6 (4-8)	<0.001
Perme	18±9	24±7	6 (5-8)	<0.001
mRankin	4±1	3±1	-1 (0,5-1)	<0.001

Data presented as mean ± standard deviation or delta (95% confidence interval - CI). MRC: Medical Research Council; Perme: Perme Intensive Care Unit Mobility Score; mRankin: Modified Rankin Scale.

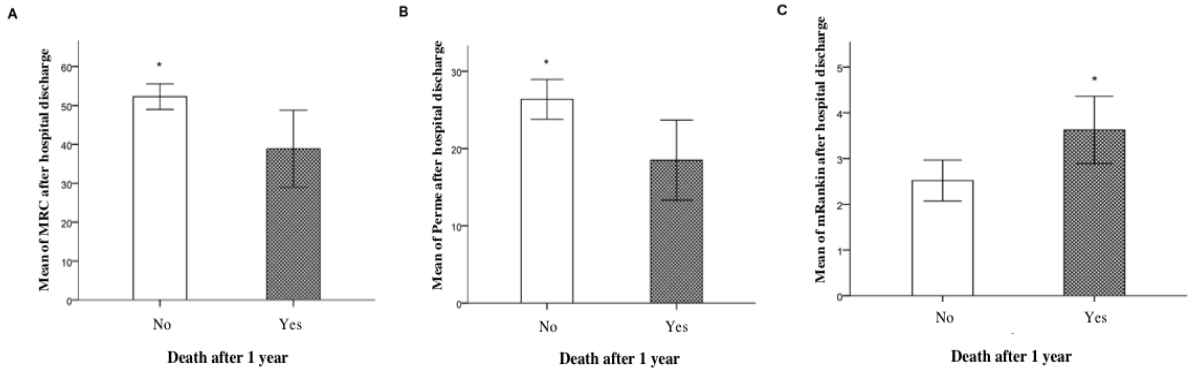
We can also see that the functionality assessed by mRanking continued to improve one year after hospital discharge. Figure 1 shows the evolution of the mRanking score in the 1-year segment.

Figure 1 - Evolution of the mRanking score in patients during admission (4±1), hospital discharge (3±1) and follow-up after 1 year (2±1) p=0.001



Analyzing the variables in relation to patients who survived and those who died one year after hospital discharge, it was observed that the MRC and Perme values of patients who died were lower at hospital discharge when compared to patients who survived (MRC = 39±14 vs. 52±9, p=0.002 respectively and Perme = 18±7 vs. 26±7, p=0.008 respectively). When the mRankin score was evaluated, patients who died had higher values at hospital discharge when compared to those who survived (3±1 vs. 2±1, p=0.024 respectively), demonstrating worse functionality. Figure 2 shows the variables of functionality and strength, one year after hospital discharge.

Figure 2 - Comparison of the relationship of baseline functional aspects at the time of hospital discharge between living and dead patients in the one-year follow-up. A, MRC; B, Perme; C, mRankin



DISCUSSION

In this study, we observed that patients with lower functionality and muscle strength at hospital discharge were more likely to die one year after the event. The mortality of our sample was 23%, mainly related to cardiovascular complications. Such findings are in agreement with the world mortality rates after 30 days of the first ischemic stroke, estimated between 16 and 30% (10,11).

In relation to the causes of death, our screenings identified cardiovascular complications and respiratory infections as their main etiologies. Swanson et al.(12) reported that most hospital readmissions and mortality are attributed to pre-stroke factors and not necessarily to the event. In addition, in the retrospective cohort by Abreu et al.(13), they evaluated hospital readmissions and deaths at 1 year after stroke, with such patients having more comorbidities (hypertension, atrial fibrillation, congestive heart failure) and pre-stroke functional dependence.

Our results showed that the degree of functional impairment, assessed by the mRankin scale, of patients at discharge revealed greater disability than after one year of hospital discharge. According to a prospective population-based cohort, patients scored better on the mRankin scale at 3 months and 1 year after the ischemic event. Functional improvement after one year was rarer and less likely for patients with lacunar ischemic stroke (14).

When the results of the MRC tests and the mRankin scale were analyzed and correlated at all three moments, they indicated that the greater the peripheral muscle strength, the greater the functionality and, consequently, the lower the chances of death. In the clinical trial by Wang et al.(15), patients with ischemic stroke were randomized to early rehabilitation at 24 to 48 hours versus standard rehabilitation, which started at 72 and 96 hours. Patients in

the early rehabilitation group had better scores on the mRankin scale (0-2 points) at 3 months after stroke. In the prospective study by McHutchison et al.(16), patients were followed up at 1 and 3 years after stroke, with 37% of the sample reporting some degree of disability (mRankin ≥2).

In the evaluation of functionality performed by the Perme scale, it was observed that the scores obtained progressively increased throughout the hospitalization in the stroke unit until the moment of hospital discharge, but no patient presented the maximum score. This progressive increase may be related to the improvement of the clinical condition, the optimization of early mobilization and continued rehabilitation after discharge. In the clinical trial by Pinheiro et al.(17) 20 post-stroke patients were randomized to the group that performed cycle ergometer versus conventional physical therapy. Their analyzes showed that the Perme scale and mobility scores progressively increased with treatment, with the most significant increase for the intervention group.

Our patients at hospital discharge showed impaired ability and independence to perform daily activities, although the MRC and Perme scores showed an increase when compared to admission to the stroke unit. In the population cohort by Luengo-Fernadez et al.(18), when compared to the level of disability, patients show a reduction in 1 month to 5 years from the event, reflecting a balance between deaths of patients with severe disabilities and the development of new disabilities. The study also brings as results that in 5 years after stroke, approximately 47% evolve to death and more than a third of patients are disabled.

In the studied sample, they had physical sequelae and functional dependence at hospital discharge, but there was a high percentage of patients who did not undergo physical therapy after hospital discharge, even with a medical prescription in some cases. The reasons were varied, however, it was evidenced that the most frequent factors were financial difficulties and lack of access to public health services, which may have been an aggravating factor for the evolution of the clinical condition.

Physical dysfunction is often the focus of clinical practice after stroke and the lack of attention to factors related to immobility leads to cardiovascular complications, recurrent stroke and consequently death. The American Heart Association (AHA) and American Stroke Association (ASA) (19) developed a strategy to improve the quality of stroke care, which includes guidance to professionals to reduce the health impact and optimize the multiple dimensions of care, including prevention measures, drug treatment, rehabilitation, patient

education and counseling. These measures can reduce hospital readmissions, improve quality of life and reduce costs to health services.

Our limitations were the small sample size, since it is a prospective study, with inevitable losses throughout the study, mainly due to death. Other studies are needed in order to assess the chronic effects of functionality and muscle strength assessments in the follow-up of patients with stroke sequelae after hospital discharge.

CONCLUSION

Stroke patients in this study have a mortality rate of 23% at one year after hospital discharge, and a steady improvement in strength and functionality at discharge and after hospital discharge. However, patients who died had worse values of functionality and muscle strength at the time of hospital discharge. Further studies are needed in order to assess the chronic effect of these interventions.

Our findings have implications for motivating and rehabilitating stroke patients in clinical practice, thus focusing on restorative therapies and understanding functional recovery. Thus, seeking strategies to reduce the incidence of death after hospital discharge.

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