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Impact of hospitalization on the functional capacity of the elderly: A cohort study

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Abstract

Objective: To verify the trajectory of the functional capacity of elderly persons hospitalized due to clinical conditions in a university hospital. *Method:* A descriptive, prospective cohort study was conducted between 2015 and 2016. Elderly patients admitted to the Hospital das Clínicas of Botucatu Medical School (Unesp), Brazil, were evaluated for the functional assessment of basic activities of daily living (BADL) using the Katz scale, nutritional status (body mass index (BMI)) and presence of the Frailty Syndrome (FS) (Fried criteria). A description of the trajectory of functional capacity was carried out at four times: 15 days before admission (T0), at admission (T1), at hospital discharge (T2) and 30 days after discharge (T3). *Results:* 99 elderly people with a mean age of 74 (±7.35) years, 59.6% of whom were male, were evaluated. Of these, 81.8% presented functional independence at T0, 45.5% at T1, 57.6% at T2 and 72.8% at T3. According to their functional trajectories, 28.2% of the elderly lost functional capacity between T0 and T3. There was an association between worsening of functional capacity between T0 and T3 and the FS (RR 4.56; 95% CI 1.70-12.26, p=0.003). *Conclusion:* Elderly patients have worse functional capacity at hospital discharge than before hospitalization. About 28.0% of the elderly had worse functional capacity 30 days after discharge than 15 days before admission. The elderly with Frailty Syndrome have a greater risk for worse functional capacity results 30 days after discharge.

Keywords: Frail Elderly. Hospitalization. Fragility. Functionality.

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INTRODUCTION

Population aging has resulted in an increase in the number of hospitalized elderly people. In 2016, 24.9% of those hospitalized in the Unified Health System in Brazil were aged over 60 years and 14.2% were over 70[1].

During hospitalization the elderly can experience loss of functional capacity, which may be due to the disease that determined the hospitalization, previous clinical conditions, the procedures to which the elderly person is subjected, the poor adaptation of the health system to aging and to frailty[2-4]. This condition is known as hospital acquired disability (HAD)[5] and can affect from 30 to 60% of hospitalized elderly persons[2,6]. Among the elderly, HAD can interfere with functional independence and quality of life and is a predictor of the greater use of resources and death[5].

Predictors of functional decline during hospitalization include advanced age, sociodemographic characteristics such as ethnicity, pre-existing disabilities, cognitive impairment, delirium, polypharmacy, history of falls, and comorbidity[3,7].

Functional capacity is defined as the ability of the elderly to perform a task that allows them to take care of themselves and to have an independent life in their environment through the performance of basic activities of daily living (BADL)[8]. It can be evaluated by the Katz Scale, even in a hospital environment, as described in a review of literature[9,10].

HAD has serious short-term consequences for patients and their families, as dependent patients require caregivers to live in the home. Studies of functional decline among hospitalized elderly persons are generally limited, as they perform the evaluation only during hospitalization and exclude post-hospital reassessment. Thus, the long-term prognosis of HAD after hospitalization is not fully understood[3].

As HAD has important implications for patients, caregivers and health policymakers, understanding the prevalence and risk factors for this condition among the elderly is important[6].

The present study aimed to verify the trajectory of functional capacity among elderly patients hospitalized in a university hospital by clinical conditions, and its associated factors.

METHOD

A prospective, cohort study was conducted at the Hospital das Clínicas da Faculdade de Medicina de Botucatu-Unesp (the Clinical Hospital of the Botucatu-Unesp Medical School) (HCFMB), a university hospital, from September 2015 to March 2016.

Both the study itself and the Free and Informed Consent Form were approved by the Research Ethics Committee of the Botucatu-Unesp Medical School (approval Nº: 1,140,569).

The following inclusion criteria were applied: patients aged 60 years or over at the time of admission, both genders, hospitalized for clinical conditions. The exclusion criteria were: hospitalization lasting less than 48 hours; situations where information was not obtained within 72 hours after admission; hospitalization in the previous six months; patients who could not maintain dialogue and had no one to provide the information for them, total dependence in BADL 15 days before admission.

The data were collected in three evaluations.

Assessment 1- On the day of inclusion, the data were collected at two time points: Time 0 (T0) - information regarding functional capacity 15 days before admission (baseline) and Time 1 (T1) - assessment of functional capacity, nutritional status, and frailty syndrome criteria. Sociodemographic, clinical and laboratory data were obtained from the patient along with their electronic medical records in relation to the present hospitalization.

Assessment 2- Time 2 (T2) - at hospital discharge or 24 hours before or 48 hours after the same, with assessment of functional capacity.

Assessment 3- Time 3 (T3) – thirty days after hospital discharge, by telephone, regarding functional capacity.

Functional capacity, measured through BADL, was evaluated by the Katz Scale[9], which includes actions related to self-care (bathing, personal hygiene, dressing, feeding oneself, transferring and continence). The total score is formed by the sum of the number of 'yes' answers, where the person is independent. Patients are considered independent when they have 5 and 6 points, partially dependent with 3 or 4 points and highly dependent with 0, 1 or 2 points[11].

Body mass index (BMI) was calculated after measuring weight and height (BMI= weight (kg)/ height (m^2)). BMI was classified according to the Pan American Health Organization: low weight ≤23 kg/ m^2, normal>23 and <28kg/m^2; overweight ≥28 kg/ m^2 and <30 kg/m^2 and obese ≥30 kg/m^2[12].

Frailty was evaluated by the Fried Frailty Phenotype[13], which is composed of five domains: loss of body mass, reduction of energy, muscle weakness (represented by the decrease of grip strength), low level of physical activity, reduction in muscle resistance or endurance. The patient was considered frail if positive for three of the domains, pre-frail when positive for one or two and robust when positive for none.

For each time point (baseline - T0, hospitalization - T1, discharge - T2 and 30 days after discharge - T3), the overall BADL score was created and defined as the number of BADL in which the patient was independent.

Patients were classified into one of seven functional trajectories, based on the evolution of functional capacity, depending on whether they maintained, lost or lost then recovered functionality between baseline and 30 days after hospital discharge. Functional decline between baseline and 30 days after discharge was defined as being independent in fewer BADL 30 days after discharge than at baseline (Figure 1).

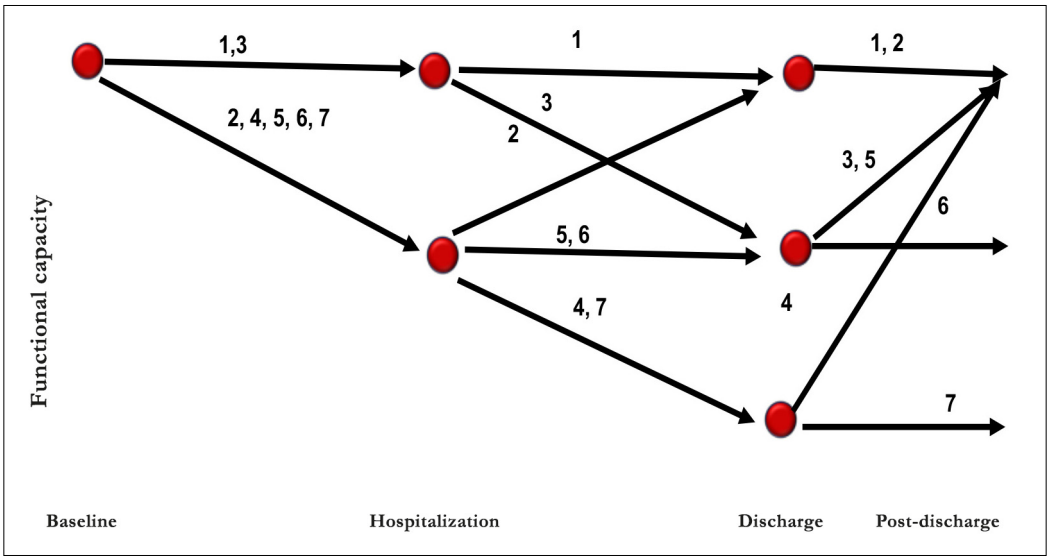


Figure 1. Trajectories of the functional capacity of the sample of elderly patients hospitalized at the HCFMB, São Paulo, 2016.

The first five trajectories included patients who had no decline between baseline and 30 days post-discharge.

The first trajectory included patients who had stable function capacity throughout the period (with no decline through baseline, hospitalization, discharge, and 30 days following discharge)

The second trajectory included patients whose functional capacity decreased between baseline and hospitalization but recovered by discharge and was maintained 30 days after discharge.

The third trajectory included patients who had stable function capacity between baseline and hospitalization, followed by a reduction on discharge which was recovered 30 days after discharge.

The fourth trajectory included patients whose functional capacity for BADL declined between baseline and hospitalization, continued to decline at discharge but had recovered thirty days after discharge.

The fifth trajectory included patients whose BADL functionality declined between baseline and hospitalization and remained poor at discharge but had recovered 30 days after discharge.

The next two trajectories included patients whose BADL functionality declined between baseline and 30 days after discharge.

The sixth trajectory included patients whose BADL functionality declined between baseline and hospitalization and did not recover at discharge or 30 days after discharge.

The seventh trajectory included patients for whom BADL functionality declined between baseline and hospitalization, worsened at discharge and did not recover 30 days after discharge.

The sample was determined using a confidence level of 95% and an accuracy of 5%, based on a prevalence of 7% of elderly patients with worsened functionality during hospitalization identified in a previous study[14]. The sample size was 100 patients.

The data obtained from the application of the instrument and from the medical records were initially described in terms of discrete and continuous quantitative variables. Descriptive analysis was carried out by constructing tables with means and standard deviation for the quantitative variables, due to the normal distribution identified, and tables with frequency and percentage distributions for the qualitative variables.

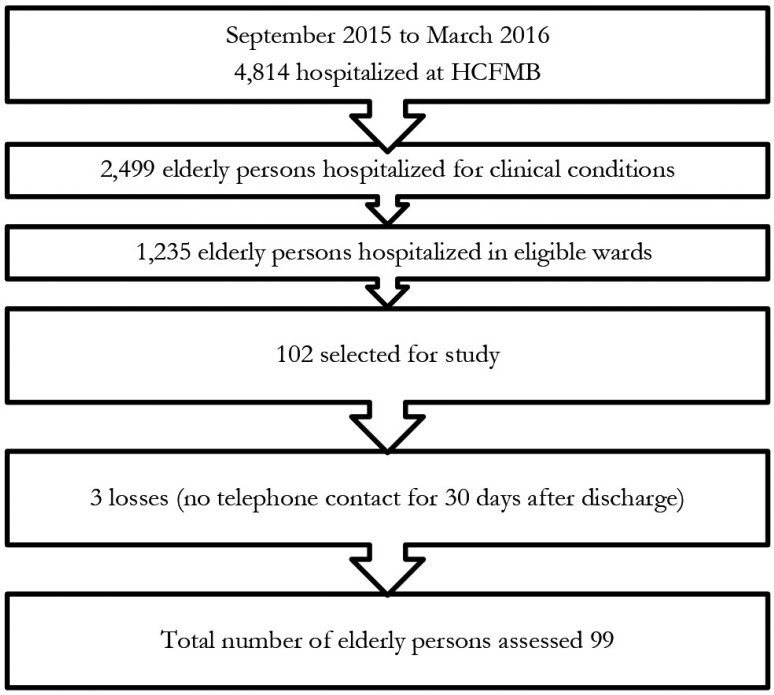
The chi-squared, Anova and Tukey tests were used for comparative analysis between the means of the age groups and the time of hospitalization and the type of functionality trajectory.

The analysis examined the association between loss of functionality and variables transformed into binaries: BMI (<or> 22.9 kg/m^2); frail vs. non-frail (Fried score <3 vs≥ 3); robust vs. non-robust (Fried score <1 vs> 1); use of five more drugs; albumin (<or> 3.5 g/dL); adequate grip strength for BMI and gender. Variables were tested for association by the chi-squared test and the relative risk (RR) test with the outcomes of a declining trajectory between baseline and post-discharge (trajectories 6 and 7). Only the variables whose effect was significant (p<0.05) for the occurrence of the event were maintained. Multivariate analysis with logistic regression was performed using a Stepwise criterion of variable selection. A p value of 0.05 was considered statistically significant.

RESULTS

During the study, 4,814 elderly people were admitted to HCFMB, according to Figure 2, and of these 102 elderly participants were selected. The survey was carried out with 99 elderly people due to three losses in the final evaluation.

The mean age of the 99 individuals assessed was 74 (+7.35) years and 59.6% of the sample was male. The mean length of hospital stay was 5.3 (+3.2) days. The mean BMI was 24.7 (+5.1) kg/m^2, with 38.4% of the sample considered underweight and 39.4% normal weight, and 38.4% were frail (Table 1).



Source: CIMED, 2016.

Figure 2. Patients hospitalized at HCFMB. Botucatu, São Paulo, 2016.

Table 1. Socio-demographic, nutritional and clinical data of 99 elderly patients hospitalized at HCFMB. Botucatu, São Paulo, 2016.

	mean (±sd)
Age (years)	74 (7.35)
BMI (kg/m^2)	24,7 (5.1)
Length of hospitalization (days)	5,3 (3.2)
	n (%)
Gender	
Male	59 (59.6)
Marital status	
Married	61 (61.6)
Profession	
Retired	72 (72.7)
Body Mass Index Classification	
Underweight	38 (38.4)
Normal	39 (39.4)
Overweight	8 (8.1)
Obese	14 (14.1)
Frailty Syndrome (Fried Phenotype)	
Robust	8 (8.1)
Pre-frail	53 (53.5)
Frail	38 (38.4)

The main causes of hospitalization according to ICD-10 were diseases of the circulatory system (23.2%) followed by neoplasia (16.2%), those of the respiratory system (9.1%) and genitourinary diseases (9.1%).

Regarding degree of dependency for BADL, 81.8% of the elderly were functionally independent 15 days before hospitalization; 45.5% at admission (T1); 57.6% at hospital discharge (T2) and 72.8% 30 days after discharge (T3). A total of 10.1% were dependent when hospitalized, 12.1% at T2 and 5.1% at T3.

The prevalence of the trajectories of functional capacity were Trajectory 2 in 31.4% of cases (lost function between T0 and T1 and recovered it at T2 and T3) and Trajectory 6 in 26.3% of cases (BADL functional capacity declined between baseline and hospitalization and was not recovered at discharge or 30 days after discharge). Trajectory 1 had a frequency of 8.1% (n=8), Trajectory 3 10.1% (n=10), Trajectory 4 3% (n=3) and Trajectory 5 20.2% (n=20), while Trajectory 7 had a prevalence of 2% (n=2).

In terms of the analysis of functional trajectory, it was observed that 28.3% of the evaluated elderly persons lost functionality at T3 in comparison with T0 (Trajectories 6 and 7) and that of the 81 who were independent at T0 12.3% evolved to dependence in BADL at T3.

Bivariate analysis of a worsening of functional capacity between T0 and T3 (Trajectories 6 and 7) found an association with frailty (RR 2.27, 95% CI 1.30-3.97) and elderly persons with BMI <22.9 kg/m^2 (RR 1.79, 95% CI 1.10-2.91). In multivariate regression analysis there was an association between a decline in functional capacity and loss between T0 and T3 and grip strength (RR 4.56, 95% CI, 1.70-12.26). (Table 2).

Table 2. Association by bivariate and multivariate analysis of trajectories with worsening of functionality between T0 and T3 in elderly persons hospitalized at HCFMB. Botucatu, São Paulo, 2016.

Decline in functional capacity							
		Bivariate analysis*			Multivariate analysis**		
	n	Relative Risk	CI 95%***	*p*-value	Relative Risk	CI 95%***	*p*-value
Non-robust	91	0.87	0.81–1.00	0.06			
Frail	38	2.27	1.30–3.97	0.001	4.56	1.70–12.26	0.003
BMI* <22.9 kg/m^2	38	1.79	1.10–2.91	0.001	2.51	0.94–6.73	0.06
Albumin <3.5 g/dL	43	0.89	0.32–2.42	0.82			
Inadequate grip strength ****	59	1.85	0.93–3.71	0.05			
Polypharmacy	84	1.08	0.37–3.12	0.88			

*Chi-squared test; **Stepwise criteria for selection of variables; ***CI 95% - Confidence interval of 95%; ****Grip strength inadequate for body mass index and gender.

It was observed that of the 38 patients who were frail at hospitalization 50% lost functional capacity between T0 and T3, and of the 28 who suffered a decline in functional capacity, 19 (67%) were frail. These aspects may explain the high CI for frailty presented in Table 2.

DISCUSSION

This is the first study to evaluate the functional capacity of hospitalized elderly persons in Brazil 30 days after discharge from hospital. Previous Brazilian studies have evaluated this aspect through a cross-sectional approach[15] or at the time of discharge[16].

Most participants (81.8%) were independent at baseline (T0). Previous studies found independence rates between 15 and 73% at this time point[5,16,17]. The rates can differ depending on the population studied and the research location, as was found in a study that found a prevalence of independence in BADL of 75% in patients aged over 55 years[5] and another that evaluated the elderly aged over 65 years and

found that 64% suffered functional decline before hospitalization[14].

The results show that more than one third of the elderly experienced a decline in functional capacity at the time of hospitalization in comparison with their previous state. This finding is similar to previous studies, which showed that 35% to 43% of the elderly lost functionality at the moment of hospitalization, regardless of the causes of such hospitalization and the place of evaluation (general hospital or specialized geriatrics ward)[2,5,16].

At the time of discharge (T2), a third of the patients had suffered a decline in functional capacity for BADL in comparison with their pre-hospitalization state (T0). This decline is described by authors as hospital acquired disability (HAD)[4,5,18]. Previous data show that on average 35% of the elderly do not recover functionality at time of hospital discharge, regardless of the population evaluated and the place of hospitalization[2,16,19,20].

After 30 days of discharge (T3) 28.2% of the elderly had lost functionality and did not return to their previous functional status. A study found that 33% of elderly women experienced functional decline following this period[3].

The factors associated with a worsening of functionality between T0 and T3 in the bivariate analysis were frail elderly individuals and those with a BMI of <22.9 kg/m^2, while multivariate analysis found an association with frailty.

The presence of frailty is described as a risk factor for loss of functional capacity, hospitalization and death in the elderly living in the community[21,22] and death in hospitalized elderly persons[23]. Gregorevic et al.[24], using the Clinical Frailty Scale (CFS) in the evaluation of frailty in hospitalized elderly persons, observed that frail elderly individuals had a greater risk of functional loss, post-discharge institutionalization and death. Similar results were found in a retrospective study of the elderly in England featuring evaluation by the same instrument in which frailty was associated with reduced functionality at hospital discharge[25]. The analysis of the Women's Health and Aging Study I found that frailty, evaluated by the Fried phenotype criteria, was associated with a loss of functional capacity[3]. A study that evaluated the elderly based on two sets of criteria, the CFS and Fried, found that frailty was related to a loss of functional capacity and worse outcomes, such as hospital readmission and death[23]. As in previous studies, it was observed that frailty, evaluated by the Fried criteria, was associated with a loss of functionality.

The causes of functional loss in hospitalized elderly persons are multifactorial and cumulative and include factors such as the cause of hospitalization; advanced age[4,26]; entry diagnosis; previous functional situation; bed rest (resulting in decreased mobility); medical procedures; medicines; cognitive deficit; an acute confusional state and malnutrition[16,18]. There is great variability in the studies in terms of the evaluation of the elderly based on the location of hospitalization: geriatric wards[16] and general hospital[5], reassessment three months after hospital discharge[20], the use of indexes of comorbidity and evaluation of instrumental activities of daily living[2,3,26].

It should be noted that the variables analyzed in the present study are not sufficient to fully understand the functional capacity of the hospitalized elderly, and it is necessary to investigate other unacknowledged domains that make up a broader geriatric evaluation, such as cognitive status; depressive symptoms; nutritional aspects; self-reporting of health; ethnicity; and educational level, among others[7,27]. Another limitation of the present study was the place of hospitalization, a university hospital, where the complexity of hospitalized patients is greater.

An important aspect of the study was the non-exclusion of patients hospitalized with specific diseases.

The medical team assessing the care needs of patients, such as functionality, during hospitalization and the post-discharge period should be aware that many patients will not be able to perform basic self-care or BADL at hospital discharge and after a further 30 days to the same extent as they were before hospitalization.

A randomized clinical trial showed that group exercise and individual physiotherapy reduced functional loss as measured by transference and ambulatory capacity in hospitalized elderly persons[28].

A systematic review has shown that multidisciplinary intervention including exercise can increase the proportion of patients who are discharged to the home and reduces the time and cost of hospitalization for elderly patients[29]

It is important that all health staff observe situations that can limit the mobility of elderly patients such as the prolonged use of catheters and venous access, physical restrictions, prolonged stays in the bed, fear of falling, actions that interrupt nocturnal sleep and the use of psychoactive drugs. Measures such as early ambulation, physiotherapy during hospitalization, early discharge programs, post-discharge hospital care and orientation should be implemented by care services for the elderly[18].

The results obtained in this study pose a series of questions for future research. The causes of HAD are not clarified and it is vital that the etiology of this problem is established. It is important to assess whether the loss of functional capacity acquired in the hospital environment can be prevented with multi-component interventions. The loss of functional capacity prior to hospitalization may be important as a contributor to HAD, and its role must be determined.

CONCLUSION

The present study showed that the functional capacity of elderly patients is worse at discharge from hospital than it is prior to hospitalization. About 28% of the elderly had worse functional capacity 30 days after discharge than 15 days prior to hospitalization. Elderly patients who are frail at admission have a higher risk of worse functional results 30 days after discharge.

It is recommended that the health team assesses functionality during hospitalization and following discharge.

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