ORIGINAL ARTICLE

REVISTA ENFERMAGEM ATUAL IN DERME

FACTORS ASSOCIATED WITH THE HOSPITALIZATION OF LONG-LIVED ELDERLY PEOPLE IN THE FEDERAL DISTRICT – BRAZIL

FACTORES ASOCIADOS A LA HOSPITALIZACIÓN DE ANCIANOS LARGO RESIDENTES EN EL DISTRITO FEDERAL – BRASIL

FATORES ASSOCIADOS A HOSPITALIZAÇÃO DE IDOSOS LONGEVOS RESIDENTES NO DISTRITO FEDERAL – BRASIL

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ABSTRACT
The objective of this study was to analyze the factors associated with hospitalization of elderly people aged 80 years and over residing in the Federal District - Brazil. A total of 208 long-lived elderly (80 years and older) treated at an outpatient clinic of the Federal District between 2016 and 2018 were investigated. Cognitive screening, functional performance, frailty and standardized questionnaires tests were used. Hospitalization in the last year was associated with older age, lower education, higher prevalence of cognitive decline, and frailty criteria in the weight loss and handgrip strength. After adjustments according to the multiple logistic model, the variables schooling, frailty weight loss and number of medical appointments in the last year remained associated with hospitalization. In this way, to prevent hospitalization in advanced old age, investments in case management measures, health care qualification, screening and management of frailty are required.
Keywords: Ambulatory Care; Geriatric Nursing; Hospitalization; Aged; Aged, 80 and over.

RESUMEN
El objetivo del presente estudio fue analizar los factores asociados a la hospitalización de ancianos de 80 años y más residentes en el Distrito Federal - Brasil. Se investigaron 208 ancianos longevos (80 años y más) atendidos en un ambulatorio del Distrito Federal entre 2016 y 2018. Se utilizaron pruebas de tamizaje cognitivo, desempeño funcional, fragilidad y cuestionarios estandarizados. La hospitalización en el último año se asoció con mayor edad, menor escolaridad, mayor prevalencia de deterioro cognitivo y fragilidad en los dominios de pérdida de peso y fuerza de prensión manual. Después de los ajustes según el modelo logístico múltiple, las variables escolaridad, fragilidad, pérdida de peso y número de consultas médicas en el último año permanecieron asociadas a la hospitalización. En ese contexto, para prevenir la hospitalización en la vejez avanzada, es necesario invertir en medidas de manejo de casos, calificación de la atención a la salud, tamizaje y manejo de la fragilidad.
Palabras clave: Atención Ambulatoria; Enfermería Geriátrica; Hospitalización; Anciano; Anciano de 80 años o más.

RESUMO
O objetivo do presente estudo foi analisar os fatores associados a hospitalização de idosos com 80 anos e mais residentes no Distrito Federal - Brasil. Foram investigados 208 idosos longevos (80 anos e mais) atendidos em ambulatório do Distrito Federal entre os anos de 2016 a 2018. Utilizaram-se testes de rastreio cognitivo, desempenho funcional, fragilidade e questionários padronizados. A hospitalização no último ano foi associada a idade mais avançada, menor escolaridade, maior prevalência de declínio cognitivo, e possuir fragilidade nos domínios perda de peso e força de preensão manual. Após ajustes segundo modelo logístico múltiplo permaneceram associadas à hospitalização as variáveis escolaridade, fragilidade perda de peso e número de consultas médicas no último ano. Nesse contexto, para prevenção da hospitalização na velhice avançada faz-se necessário investimentos em medidas de gerenciamento de caso, qualificação da atenção em saúde, rastreio e manejo da fragilidade.
Palavras-chave: Assistência Ambulatorial; Enfermagem Geriátrica; Hospitalização; Idoso; Idoso de 80 anos ou mais.

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INTRODUCTION

Population aging and the needs of long-lived elderly people (80 years and over) have become a growing concern for managers, professionals, and academics. If, on the one hand, long-lived elderly individuals are an increasing number of successful survivors, on the other hand, the number of sick and dependent people who reach advanced old age is also increasing[1].

In this context, the adaptation of health systems to meet the growing number of elderly people who access health services becomes a challenge, which requires the design of long-term, specific, and complex health care[2]. Data from the Brazilian public health system, called *Sistema Único de Saúde* (SUS, Unified Health System), indicate that, in 2016, 24.9% of hospitalized people were 60 years of age or older and 14.2% were over 70 years of age[3].

In the gerontological literature, hospitalization in old age is classified as a negative health outcome[4], as it brings together a set of factors that lead to worsening health conditions, associated with predisposing conditions[5], such as age and sex; sociodemographic or enabling conditions, such as educational level, family income, and place of residence[6]; and health needs, including chronic diseases, needing assistance on activities of daily living, cognitive decline, and frailty[4-8] .

Data from the *Estudo Longitudinal da Saúde dos Idosos Brasileiros* (ELSI-Brasil, Longitudinal Study of the Health of Elderly Brazilians)[9], conducted with 9,389 participants aged 50 years and over, observed that the prevalence of hospitalization in the last 12 months was 10.2%, being associated with location (rural area) and region of Brazil (Midwestern and Northern regions). Of the factors associated with health needs, hospitalization was more evident among adults and the elderly who had limitations in activities of daily living and chronic diseases, in order of relevance: stroke, cardiovascular disease, cancer, diabetes, depression, and hypertension.

In advanced old age, some of these factors were also documented, with greater emphasis on the health profile and health needs of this population. The author[10], when longitudinally investigating 861 elderly Germans aged between 85 and 100 years, observed that there was a higher prevalence of hospitalization in the last six months among the elderly with a higher prevalence of depressive symptoms, functional dependence, chronic diseases, and greater social network. In this study, social networks moderated the relationship between functional decline and hospitalization, indicating that the greater the functional decline, the greater the contact networks and the prevalence of hospitalization. As in the study by author[11], no associations were observed between hospitalization and age, sex, income, and educational level, which may be related to equity in access in the investigated countries or to the effect of selectivity attributable to advanced old age.

Brazilian studies on the subject are scarce. It

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is the fastest-growing population in terms of proportion and, at the same time, with the greatest number of health needs[1]. Knowing the life, health, and hospitalization conditions of advanced old age can help prevention and management measures in the context of health care and gerontological nursing. In this context, the guiding question of this study was: What are the sociodemographic and health conditions associated with the hospitalization of long-lived elderly Brazilians, in order to guide prevention and case management actions? Thus, the aim of the present study was to investigate the factors associated with hospitalization of elderly people aged 80 years and over, residing in the Federal District, who reported having been hospitalized at least once in the year prior to the survey/assessment.

METHOD

Study location, design, and period

This is an observational, cross-sectional, descriptive, and quantitative study. It was conducted in the city of Brasília/DF between the 2016 and 2018, in the Administrative Region of Águas Claras where the *Universidade Católica de Brasília* (UCB, Catholic University of Brasília) is located. Within the scope of the UCB, the research was conducted in three locations: the UCB University Hospital, for clinical, cognitive, and self-reported health assessment; the Physical Assessment and Training Laboratory for functional and physical assessment; and the Laboratory for Clinical Analysis. These centers provide care to the population of Brasília, which is divided into 31 administrative regions, with a population of 2,570,160 inhabitants, 7.69% of whom are elderly[12]. The Human Development Index (HDI) is 0.824, the highest in the country according to the Ranking of the Brazilian Institute of Geography and Statistics[12].

Sample and inclusion and exclusion criteria

A total of 208 elderly people aged 80 years or older agreed to participate in this study. The sample was obtained by convenience and recruited at the Geriatrics outpatient clinic of the UCB University Hospital, which has an outpatient care program for the elderly. The choice of the convenience sample was due to the possibility of selecting elderly people who could more easily access the study and because it is a quick method for data collection. The inclusion criteria were: being 80 years of age or older, residing in the Federal District or nearby, having been hospitalized in the last year, consenting to participate in the study, and being available to conduct social, physical, and laboratory assessments. In the case of elderly individuals with cognitive decline, an additional criterion was used: having a companion or family caregiver to assist in the responses. The exclusion criteria were: being bedridden, having severe hearing loss, uncontrolled psychiatric morbidities, and advanced-stage dementia syndrome.

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Data collection
Collection instruments

The assessment instruments used were: questionnaires with sociodemographic information and access to health services; criteria for the frailty phenotype according to the authors[13] adapted to Brazil[14]; global cognitive assessment[15]; basic[16] and instrumental activities of daily living[17]; self-reported chronic diseases; and polypharmacy (taking five or more medications).

Sociodemographic information comprised: age (quantified in years); educational level (quantified in years of formal education); sex (male or female); marital status (single, widowed, married, divorced, separated); family income (quantified by the sum of the monthly earnings of the entire family per month); and household setup (living alone, with spouse and sons/daughters, with sons/daughters, grandchildren, and great-grandchildren, and with other relatives and family members).

The global cognitive assessment was performed using the Mini Mental State Examination (MMSE), composed of 30 questions that assess orientation in time and space, episodic memory, immediate repetition, praxis, visuospatial functions, and language[15]. To classify the elderly with cognitive decline, a cutoff point was used in the MMSE: 17 points for the illiterate elderly; 22 points for elderly individuals with 1 to 4 years of education; 24 for those with 5 to 8 years of education; and 26 points for those with 9 years and over[14]. Regarding the variables related to functional performance, the following were used: absence or presence of difficulties in Basic Activities of Daily Living (BADL) related to self-care (using the bathroom, eating, moving around the house, walking, bathing, doing personal hygiene)[16]; and in the Instrumental Activities of Daily Living (IADL), which are: making food, taking transport, using the phone, shopping[17]. Elderly individuals with BADL or IADL limitations were classified as “with limitation” and those without any limitation as “independent.”

To assess frailty, a set of anthropometric and functional measures was used to compose the five criteria proposed by the authors[13]: unintentional weight loss, fatigue, weakness, slowness, and low rate of energy expenditure. These criteria were assessed as follows: 1) Unintentional weight loss was assessed by the question: “Have you lost weight unintentionally in the last 12 months?”. Affirmative responses with a loss of more than 4.5 kg or 5% of body weight met this study’s criteria. 2) Fatigue was assessed with the questions “I felt I had to make an effort to do everyday tasks” and “I couldn’t get my stuff done” extracted from the Center for Epidemiological Studies–Depression (CES-D) Scale[18], having filled in the fatigue criterion the elderly who answered always or most of the time to any of the two questions presented. 3) Muscle strength was assessed using the Handgrip Strength test (HS), verified by the mean of three

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consecutive measurements with one-minute intervals to return the grip strength of the dominant hand, measured in kilogram-force (kgf) on a hydraulic dynamometer (Jamar, Model 5030J1, Lafayette Instruments Inc.). In this criterion, the cut-off points proposed by the authors[13] and adjusted for Brazil according to sex and Body Mass Index (BMI = weight/height²)[14]. 4) Gait speed was obtained by the mean time spent in three consecutive measurements on a 4.6m path. To fulfill the slowness criterion, the cutoff points proposed by the authors[13] and adapted to Brazil, adjusted for sex and height, were adopted. 5) The participant's level of physical activity was assessed using the Minnesota Leisure Time Activities Questionnaire, with weekly energy expenditure cut-off points <270 kcal for women and < 383 kcal for men. Elderly people were considered frail if they met 4 to 5 of the aforementioned criteria, pre-frail if they met 1 to 3 criteria, and not frail any of the criteria.

In the health questionnaire, the number of self-reported chronic diseases was collected [0 to 1; 2 or + (heart disease, hypertension, stroke, cancer, rheumatoid arthritis, lung disease, depression, and osteoporosis)] and polypharmacy (less than five drugs and more than five drugs taken). Regarding the use and access to health services, the questions were analyzed: "About last year, did you need to be hospitalized?", "Did you go to a medical appointment last year? If yes, how many?", "What type of health service are you looking for?" and "Do you have any difficulties in accessing the health service?" The answers to these questions were categorized and the occurrence of hospitalization (yes or no), number of medical consultations, type of service (SUS, health insurance or private medical appointment) and the prevalence of difficulties in accessing services were obtained (answered with yes or no).

Data collection procedures

Data collection was conducted in three stages: Initially, the elderly and their companions were invited to participate in the study and instructed on the objectives, procedures, guarantee of anonymity, and voluntary participation, as described and detailed in the Informed Consent Term (ICT). Those who wished to participate in the study signed the ICT and were referred to an individual interview to collect their sociodemographic data.

Subsequently, the participants were referred to a geriatrician for clinical and health assessment purposes. At the end of the consultation, each elderly person received a voucher for blood collection and were sent to the university's physical assessment laboratory to conduct measurements of handgrip strength, gait, bone densitometry, and other anthropometric data. After these steps, the participants were invited to see the doctor again for further assessments, referrals, and feedback regarding their health status. All answers electronically collected using Google Forms and sent to the database spreadsheet of the study.

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Analysis of Results

Data were analyzed quantitatively, through comparisons of means between groups, performed by non-parametric tests (Mann Whitney or Kruskal-Wallis for continuous quantitative variables and Chi Square or Fischer for categorical quantitative variables). The variables with a *p* value below 0.10 in the bivariate associations were ranked to compose a multiple logistic regression model. The final model was built using Wald's Forward Stepwise method, with adjustments for sociodemographic variables, functional dependence, and use and access to health services, composed of variables with $p<0.05$. The dependent variable was categorized into 0 and 1, with 0 corresponding to elderly people who were not hospitalized in the last year and 1 to those who were hospitalized in the last year. For all analyses, a significance level of 5% was used, or $p\leq0.05$.

Ethical aspects

The project was approved by the Research Ethics Committee of the UCB, under opinion nº 1.290.368 and Certificado de Apresentação para Apreciação Ética (CAAE, Certificate of Presentation for Ethical Appreciation) No. 50075215.2.0000.0029, in accordance with the requirements of Resolution 466/12 of the Brazilian National Council of Health, which provides for regulatory norms and guidelines for research involving human beings.

RESULTS

Of the 208 elderly people assessed, 26.9% of the sample (n=44) reported being hospitalized in the previous year. In the bivariate analyses, the long-lived elderly who were hospitalized in the last year were even longer lived, had lower educational levels, lived predominantly with their sons/daughters, grandchildren, and great-grandchildren; had a higher prevalence of cognitive decline, and two of the frailty criteria (weight loss and decreased handgrip strength) (Table 1).

Although there were no significant differences regarding functional performance, polypharmacy and chronic diseases, hospitalization in the previous year was associated with a greater number of medical appointments (Table 2). In the final multiple logistic regression model, after using Wald's Forward Stepwise method, educational level, frailty (weight loss), and number of medical appointments in the previous year remained significant (Table 3).

Table 1 - Sociodemographic characterization of long-lived elderly people according to hospitalization in the previous year, Federal District - Brazil, 2016-2018.

Variables		Hospitalized n=44	Not hospitalized n=164	*P* value
Age	M (SD)	85.02 (± 4.59)	83.45 (±4.18)	*0.003*$^{+}$
Family income		3.730.05 (±4.190.15)	4.545.74 (±4.872.14)	0.086^{+}
	(%)			

Sex	Female	61.4	65	0.653*
	Male	38.6	35	
Educational level	Illiterate	44.2	20.6	*0.000**
	1 |- 4 years	27.9	16.9	
	4 |- 8 years	20.9	41.2	
	8 years or over	7.0	21.2	
Household setup	Lives alone	29.8	24.9	0.496*
	Lives with spouse and sons/daughters	23.4	20.7	0.691*
	Lives with spouse, grandchildren, or great-grandchildren	4.3	1.8	0.318*
	Lives with sons/daughters, grandchildren, or great-grandchildren	19.1	6.5	*0.008**
Marital status	Married	9.1	8.0	0.516*
	Single	34.1	38	
	Separated	4.5	11	
	Widowed	52.3	42.9	

+ Mann Whitney test; *Chi-square test – p>0.05.
Source: The authors

Table 2 - Characterization of functional performance, health status, and use and access to health services by long-lived elderly people, according to hospitalization in the previous year, Federal District - Brazil, 2016-2018.

Variables		Hospitalized n=44 (%)	Not hospitalized n=164 (%)	P value
Chronic diseases	None	2.5	3.6	0.837*
	One or two	50	46.4	
	Three or over	47.5	50	
Polypharmacy (% sim)		56.4	48.6	0.387*
MMSE (% cognitive decline)		66.7	44.6	*0.012**
BADL (% difficulties)		34.1	28	0.429*
IADL (%difficulties)		59.5	45.0	0.350*
Frailty Phenotype (% frail)	Weight loss	40	16.4	*0.002**
	Physical activity	95.5	80.4	*0.017**
	Fatigue	16.2	19.7	0.630*
	Handgrip strength	16.7	13.5	0.654*
	Gait	30	15.6	0.069*
Difficulty using health services (% of affirmative answers)		59.6	56.4	0.695*
Number of medical appointments in the previous year (Mean and Standard Deviation)		6.0 (±5.17)	3.75 (±3.41)	*0.003*+
Type of service (%)	SUS	68.1	60.4	0.317*
	Health insurance	21.3	24.9	

	Private doctor	10.6	14.8

+ Mann Whitney test; *Chi-square test – p>0.05.
Source: The authors

Table 3 – Multiple Logistic Regression – Final Model – Forward Stepwise Method

Final Model – Hospitalization in long-lived elderly people*	B (SE)	OR	CI (95%)	p-value
Educational level (4 years |- +)	-1.56 (0.44)	0.20	0.08-0.49	*0.000*
Weight loss (affirmative answers)	1.12 (0.45)	3.08	1.26-7.53	*0.014*
Medical appointments	0.11 (0.05)	1.12	1.01-1.24	*0.024*
Constant (B0)	-1.52 (0.39)			*0.000*

* Final model: Chi-square of the model with 29.93, degrees of freedom: 3, p.0.000. R2=0.249. The reference condition for "Educational level" was the category "0 |- 4 years of education". For "Weight loss," the category "affirmative answers." The "Medical Appointments" variable was analyzed as continuous. B = beta. SE = Standard error. OR = Odds ratio. CI = Confidence interval.

Source: The authors

DISCUSSION

In the present study, there were bivariate associations between hospitalization in the previous year and age, educational level, household setup, cognitive decline, frailty criteria (weight loss and handgrip strength), and a greater number of medical appointments. However, after adjustments according to the multiple logistic regression model, only educational level, frailty (weight loss), and number of medical appointments in the previous year remained associated with hospitalization. These findings indicate that both enabling conditions such as educational level, as well as health needs and frailty (weight loss criterion), are associated with hospitalization in long-lived elderly Brazilians[6].

Regarding the association between educational level and hospitalization, the findings confirm previous studies that indicate a higher prevalence of hospitalization among the elderly with lower educational levels[6-8]. This is probably because elderly individuals with lower educational levels tend to have less access to goods and services, lower income, inhabit regions with greater social vulnerability[19] and have differences in lifestyle-related variables[2]. However, international studies conducted with long-lived elderly people did not find associations between sociodemographic conditions and hospitalization, which indicates that conditions of equity in access to health can moderate these associations[10-11]. In Brazil, with a population or generation of long-lived elderly people exposed to social inequalities, it remains to be seen how these variables interact with each other throughout their lives.

Regarding the association between hospitalization and frailty, multiple studies highlight that hospitalization is an outcome of

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frailty[20-23], associated with worse health status and that can worsen depending on the clinical status and after hospital discharge[20]. Associations between the BMI, frailty syndrome, and functional worsening after hospital discharge were observed in a Brazilian study with hospitalized elderly people[20]. In the literature, the criterion of frailty for weight loss is associated with depression, loss of muscle and bone mass, decreased inflammatory response, and general health status[21]. When frailty and weight loss coexist, they are associated with increased mortality[21-22]. For this reason, measures to prevent nutritional risk in healthy and long-lived elderly people are necessary, given that weight loss represents one of the main causes of pathophysiology of frailty[21].

It is possible that the group of individuals who were hospitalized in the previous year, despite having a similar prevalence in the number of chronic diseases in relation to the non-hospitalized long-lived elderly, is clinically more complex. For this reason, a possible consequence would be a hyper-attendance of elderly people to hospital care and complex health care services, which could be minimized if there was a long-term care network compatible with their needs, including rehabilitation, prioritization of chronic health conditions, and care management[23-24].

In this study, although it was not possible to detect the causes of hospitalization, the findings highlight the need to implement health policies aimed at this population, focusing on the qualification of health professionals, the design of educational interventions for the family and community, and the use of assessment protocols to the establishment of clinical guidelines for the care of hospitalized elderly people[24].

Despite the similar prevalence in the functional performance of BADL and IADL in this study, other studies emphasize that hospitalization is associated with a greater functional dependence as it increases the demands for care[25]. It is possible that, due to the high prevalence of functional limitations, it was not possible to observe a significant relationship between functional performance and hospitalization. In this sense, further studies with more detailed measures of functionality in long-lived elderly people are justified.

According to the data presented, a considerable number of these elderly people referred to themselves as “SUS-dependent.” In this context, the challenge of assistance to advanced old-age people becomes even greater. Articulating the service network with assistance and care demands has been the target of health care policies for the elderly, through the implementation of lines of care and qualification of health teams. More investments are needed and more programs must be designed in order to integrate a network of social assistance and comprehensive care for the elderly.

This study has the following limitations: a convenience sample obtained in an outpatient setting and restricted to the context of the Administrative Region of Águas Claras (Brazil) where the UCB is located, with its own cultural diversity as it is a metropolitan region with many migrants from different locations in Brazil; in

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some cases, the family member, caregiver, or respondent may have exacerbated the situations of dependency of the elderly, which can configure an important response bias in terms of data related to functional dependency and to the use and access to health services; a large sample loss while conducting assessments was related to the frailty criterion, due to the significant number of wheelchair users and the high prevalence of disabilities in the investigated sample, individuals who were unable to perform gait tests; and, finally, the research protocol did not include questions about the quality of the interaction between the members of the household.

Regarding the contributions to nursing, the present study contributes as a reflection on the implementation of prevention and case management measures, raising the need to track health needs and sociodemographic conditions associated with a higher prevalence of hospitalization in long-lived elderly people. The assessment of functional performance and frailty criteria (especially nutritional risk), associated with greater articulation and effectiveness in primary and secondary health care, can contribute to the development of a more resolute health system. In the context of gerontological nursing, it is necessary to train and sensitize the nursing team for the proper assessment, screening, and management of cases, with a view to developing a health system that is integrated to the biopsychosocial needs of long-lived elderly patients.

CLOSING REMARKS

By analyzing the factors associated with the hospitalization of long-lived elderly people living in the Federal District and hospitalized in the previous year, a sample with lower educational levels, higher nutritional risk, and a higher number of medical consultations in the previous year is identified. Taken together, these findings support the need to adopt case management measures, as well as prevention and management of frailty in the long-lived elderly, to guide proper care and prevent hospitalization.

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