Incidence and risk factors for hospitalization in institutionalized elderly people

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Abstract

Objective: To evaluate the incidence of hospitalization and its risk factors in institutionalized elderly people during a 12-month follow-up in the city of Natal, RN, Brazil. *Methods*: Concurrent cohort study composed of elderly people aged 60 years or over and residing in the 10 Long-term Care Institutions for the elderly participating in the study. Of the 320 participants, data regarding sociodemographic conditions (i.e., age, marital status, children, health insurance plan, type of institutions, length of institutionalization and if it was due to illness, the ratio of the number of elderly people per caregiver, and health conditions), nutritional status (MAN), functional capacity (KATZ index), cognitive status (Pfeiffer test), and muscle weakness (dynamometer) were collected. A significance level of 5% (p<0.05) and a 95% confidence interval (CI) were considered in the bivariate and multivariate analyses. *Results*: 20.6% (95%CI: 16.5-25.4) of the total number of participants were hospitalized, with an average length of stay of 16.1 days (SD: 17.1) at the end of the 12 months. The main cause of hospitalization was lung disease (30.3%). The presence of malnutrition or risk of malnutrition (p=0.016, 95%CI: 1.17-4.96) and use of drugs for the cardiovascular system (p=0.003; 95%CI: 1.43-5.77) were risk factors for hospitalization, after adjusting for sociodemographic and clinical variables. *Conclusion*: Hospitalization had a high incidence among the elderly. Also, malnutrition or risk of malnutrition and the use of cardiovascular drugs were considered risk factors for hospitalization in the 12 months.

Keywords: Hospitalization. Frail Elderly. Homes for the Aged.

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INTRODUCTION

The hospitalization of old people involves, in addition to the treatment of acute illness or the acute worsening of chronic illness, the risk of a series of age-specific complications, affected by the risk of falls, malnutrition, dehydration and pressure ulcers[1].

Residents in nursing homes often suffer from multimorbidity, polypharmacy, as well as functional and cognitive impairment, with this, a higher frequency of hospital admissions when compared with residents in the community[2].

Old people are major users of the health system in Brazil and both the public and private systems suffer from these demands for services[3]. To minimize this fact, a greater knowledge of the profile of the institutionalized old people and of the risk factors for hospitalization can provide governmental actions based on public health policies, the planning of institutional strategies that improve pre-hospital care, the organization of services and therefore, reducing these demands. Likewise, it can facilitate the identification of the old people who require priority care and the type of assistance they need, giving priority to preventive actions, early diagnosis, treatment of chronic diseases and associated disabilities[4]. Therefore, knowing these risk factors can guarantee health care, as recommended by the Unified Health System and the Old People Statute.

The study of the institutionalized old people population is important because these old people are more vulnerable compared to those who are not institutionalized. It has already been found that non-institutionalized old people have a better quality of life compared to institutionalized ones[5]. Thus, LTCFs represent a challenge, as the changes inherent to aging and pre-existing diseases can be aggravated by the difficulties of adapting the old people to new living conditions and by the lack of motivation and encouragement common in this environment, making the old person vulnerable to fragility and functional decline[6].

In addition, a growth of between 100% and 500% is expected in the number of old people in need of non-family care in the next decade; thus, institutions will have to absorb a large part of this demand[7]. Therefore, it is important to carry out studies, similar to this one, that investigate this population, since there are still few Brazilian studies that have investigated the risk factors for hospitalization in institutionalized old people, in view of the growth of this demand in the coming years, most of which are restricted to cross-sectional data[8].

Given the above, this study aims to assess the profile of institutionalized old people, as well as the incidence of hospitalization and its risk factors in the 12-month follow-up in the city of Natal, RN.

METHOD

Concurrent prospective study. Of the 14 LTCFs registered with the Health Surveillance (VISA) in the city of Natal, RN, 10 (71.4%) agreed to participate in the study. The 4 LTCFs that refused to participate in the study were for profit. All old people aged 60 or over, who lived in institutions, were included in the study. Those who were not at the LTCF at the beginning of the research for hospitalization, terminally ill, coma or palliative care were excluded from the study in order to avoid bias in the data analysis.

The initial assessment was carried out between October 2013 and January 2015, by filling out a form prepared by the researchers. Information was collected on sociodemographic conditions, sex, marital status, children, health plan, type of LTCF, length of institutionalization and whether it was due to illness, ratio of the number of old people per caregiver and health conditions.

Chronic diseases were classified according to the International Classification of Diseases and Related Health Problems (ICD-10)[9].

As for medication, the presence of drugs for daily use administered to the old people was recorded. The drugs were grouped according to the classification of the Anatomical Therapeutic Chemical classification system and the Defined Daily Dose (ATC/DDD) of the year 2013, recommended by the World Health Organization for studies on the use of medication, which are: Group A-medications for the alimentary and metabolic tract; Group B-medications for the

blood system; Group C-drugs for the cardiovascular system; Group M-drugs for the musculoskeletal system; N-group drugs for the nervous system[10].

Nutritional status was assessed using the Mini Nutritional Assessment (MNA), an instrument validated for the old people population[11]. BMI was calculated, an electronic scale was used to take the weight and the total height was obtained according to the average of two measurements, with a portable Exact Height stadiometer (precision of 1 mm). For bedridden, a scale with four weighing cells (Seca ®, model 985 - Bed scale and electronic dialysis with an equipment cart) was used, which were placed on each "foot" of the bed, with the weight of the old person being deduced by the pre-tare function. As for the height estimate, knee height was measured in duplicate with the aid of a 100 cm caliper, with the old person lying or sitting. The base of the equipment was positioned under the heel and the other base on the upper part of the patella[12]. The sum of the MNA scores allows classification in three different groups: individuals with adequate nutritional status (MNA ≥24 and ≤30), at risk of malnutrition (MNA ≥17 and ≤23.5); and with malnutrition (MNA <17)[13].

Functional capacity was assessed using the Katz Index, an instrument validated in Brazil, which contains 6 Basic Activities of Daily Living (BADL). The following classification categories were considered, which obey a hierarchy of complexity: grade A (independent), grade B (independent in all BADL, except one), grade C (dependent on bathing and in another function), grade D (dependent on bathing, dressing and another function), grade E (dependent on bathing, dressing, hygiene and another function), grade F (dependent on bathing, dressing, hygiene, transfer and another function), grade G (dependent on all 6 functions) and other (dependent on at least 2 functions, but not classified in C, D, E and F) [14].

Cognitive status was assessed using the Pfeiffer test, which assesses long and short-term memory, orientation, information about everyday deeds and mathematical ability. Such an instrument allows the classification of the old person in intact mental function, mild, moderate or severe cognitive decline, taking into account the education level of the subject (cut-off point 3 or more errors, in the case of people who know at least how to read and write, and 4 or more for illiterates)[15]. As for the assessment of mobility, the following states were considered: walking without assistance, walking with assistance, wheelchair users and bedridden. Old people with severe cognitive decline and/or inability to walk independently or being bedridden were already considered fragile and did not proceed to the next step.

For those with preserved cognitive ability (complete mental function, mild or moderate cognitive decline and who walked independently (without help), frailty was categorized considering the evaluation of the five criteria proposed by Fried et al.[16], with cut-off points for items that make up the frailty scale adapted to the studied population, since normative data are not yet available for the Brazilian population, according to the Brazilian consensus on frailty in old people[17]:

- Unintentional weight loss: identified by asking the following question: "In the last year, did you lose more than 4.5 kg unintentionally (ie, without diet or exercise)?".

- Muscle weakness: assessed by decreasing hand grip strength, using the Jamar® dynamometer, measured in kilograms-force (Kgf). Three measures were taken in the volunteer's dominant hand and the measure of greatest value was considered.

- Physical activity level: it was assessed using the short version of the International Physical Activity Questionnaire (IPAQ)[18]. The procedures described in the IPAQ Data Processing and Analysis Guidelines were used to calculate the physical activity scores, promoting the results in MET-minutes/week[19].

- Exhaustion: was assessed by self-reported fatigue according to questions 7 ("I feel that everything I did was very arduous") and 20 ("I feel discouraged") on the Center for Epidemiological Studies (CES-D) depression scale. The old people who answered "sometimes" or "almost always or always" in any of the two questions met the frailty criterion for this item.

- Slow gait speed: it was calculated by the gait time (in seconds) spent to cover a distance of 4.6 meters. The results for this item, transformed into the unit meter/second (m/s), were adjusted by the median height for men and women.

Thus, the old people received a point for each positive criterion, resulting in a frailty score that ranged from 0 to 5. Those with scores from 3 to 5 were classified as frail, 1 or 2 characterized pre-frail individuals and a score of zero, non-frail old person[16].

The occurrence of hospitalization was recorded for a minimum of 24 hours in the 12-month follow-up period for each participant, considering illness, days of hospitalization, total number of hospitalizations and occurrence of death. The observation time regarding the hospitalization outcome was started for each old person from their initial assessment. These data were collected monthly from the medical records or the team's record book.

Data on chronic diseases and medications were collected from medical records. The other information was verified directly with the old person and, if this was impossible, the data were collected with health professionals.

This study is part of a project entitled "Human aging and health - the reality of institutionalized old people in the city of Natal/RN", with approval number 308/2012, from the Research Ethics Committee (CEP) of the Federal University of Rio Grande do Norte (UFRN). The Informed Consent Form (ICF) was signed by the resident or legal guardian, the caregiver and the director of the LTCF, following the assumptions defined in the Declaration of Helsinki.

The research team consisted of two doctoral students from the Graduate Program in Collective Health at UFRN and students from the undergraduate course in Physiotherapy and Nutrition at UFRN, who were properly trained in the use of the instruments. The physical examinations that make up the classification of the frailty phenotype were applied only by one researcher. The assessment of nutritional status was carried out by researchers trained in Nutrition. For quality control in the application of the instruments, meetings were held to train the physical tests to be applied. In addition, 50 questionnaires were applied to active old people in a community, in order to standardize the application among researchers and resolve possible doubts, and meetings were held to train the physical tests to be applied. In order to calibrate the evaluators and measure the reliability of measures, the Intraclass Correlation Coefficient (ICC) was applied, obtaining ICC>0.90 results for all variables analyzed.

The data obtained were tabulated, stored and submitted to descriptive and analytical statistical analysis. In the descriptive approach, categorical variables were described using absolute and relative frequencies and quantitative variables, using means and respective standard deviations (SD).

Then, a bivariate analysis of all variables was performed using the chi-square test or Fisher's exact test. For that, the variables with more than three categories were dichotomized, with the aim of better adjusting them to the results, considering their distributions or similar models in the literature. Afterwards, the Odds Ratio (OR) was verified, which was converted into relative risk (RR) for each of the independent variables in relation to the dependent variable.

To identify the factors associated with the occurrence of hospitalization, multiple logistic regression analysis of variables with a p-value equal to or less than 0.20 was performed, using the Stepwise Forward method. The permanence of the variable in the multiple analysis occurred through the Likelihood Ratio Test, absence of multicollinearity, as well as its ability to improve the model through the Hosmer and Lemeshow test. A significance level of 5% ($p < 0.05$), a power of 80% ($\beta = 0.20$) and a confidence interval (CI) of 95% were considered in the bivariate and multivariate analysis.

RESULTS

Of the 326 old people eligible for the study, residing in the 10 participating LTCFs, 6 (1.9%) individuals were excluded from the study: 5 (1.6%) who were already hospitalized in the collection period and 1 (0.3%) in the terminal phase. Of the total number of participants (n=320), there was an

average age of 81.4 years (SD: ±9.0), mean time of institutionalization was 63.3 months (SD: ±62.1) with a mean 8.1 (SD: ±5.2) residents per caregiver. Other characteristics in Table 1.

As for nutritional status, the old people, in their majority, were at risk of malnutrition 118 (36.9%). It was observed that the majority of participants were considered fragile 256 (80.0%), and had severe cognitive decline 190 (59.4%). Regarding functional capacity, only 87 (27.2%) were considered independent in the ADL's (72.8%). Other information can be seen in Table 2.

Among the diseases, there was a higher frequency of systemic arterial hypertension (SAH) (48.8%), diabetes (25.3%), dementia (24.4%), other mental illnesses (22.2%), dyslipidemia (17.2%) and stroke (15.6%). The types of drugs most consumed were, in decreasing order: 76.9% for the nervous system (Group N); 58.2% for the cardiovascular system (Group C); and 54.1% for the alimentary and metabolic tract (Group A).

In the 12-month follow-up, 20.6% (95% CI: 16.5-25.4) of the old people were hospitalized and most residents were hospitalized only once (83.3%), with the average stay of 16.1 days (SD: ±16.1). The main causes of hospitalization were: respiratory diseases (30.3%); hospitalization for falls and/or fracture of the femur (15.2%), diseases of the cardiovascular system (13.6%) and diseases of the digestive system (10.6%). There was a high prevalence of hospitalizations that did not have their cause defined (16.7%). Of the total number of hospitalized old people, it was found that 30.3% died in the hospital.

Among the sociodemographic variables (table 1), it was found that the old people who did not have children and had no health insurance had 39.0 (95% CI:0.38-0.97) and 42.0% (95% CI:0.38-0.89), respectively, less incidence for hospitalization. As for the variables related to the institution, it was observed that the old people who lived in non-profit LTCF had 44.0% (95% CI: 0.37-0.87) less incidence for hospitalization (Tables 3 and 4).

Table 1. Sociodemographic characteristics of institutionalized old people, Natal, RN, 2016 (n = 320).

Variables	n (%)
Age (years)	
60-69	37 (11.6)
70-79	93 (29.0)
80-89	133 (41.6)
≥90	57 (17.8)
Sex	
Male	79 (24.7)
Female	241 (75.3)
Children	
Yes	154 (48.1)
No	158 (49.4)
Health plan	
Yes	118 (36.9)
No	201 (62.8)
Type of institution	
For-profit	116 (36.3)
Non-profit	204 (63.7)
Institutionalization due to illness	
Yes	36 (11.3)
No	284 (88.7)

Losses were not included.

Table 2. Characteristics related to the health conditions of institutionalized old people, Natal, RN, 2016 (n=320).

Variables	n (%)
Nutritional status	
Eutrophy	98 (22.5)
Risk of malnutrition	118 (36.9)
Malnutrition	72 (30.6)
Not applicable	32 (10.0)
Functional capacity	87 (27.2)
Grade A	24 (7.5)
Grade B	7 (2.2)
Grade C	9 (2.8)
Grade D	17 (5.3)
Grade E	72 (22.5)
Grade F	81 (25.3)
Grade G	23 (7.2)
Fragility	
Not fragile	10 (3.1)
Pre-fragile	54 (16.9)
Fragile	256 (80.0)
Cognitive state	
Intact	26 (8.1)
Slight decline	24 (7.5)
Moderate decline	64 (20.0)
Severe decline	190 (59.4)
Mobility	
Walks without help	124 (38.8)
Walks with help	65 (20.3)
Wheelchair	68 (21.2)
Bedridden	63 (19.7)
Fecal incontinence	
No	185 (57.8)
Yes	135 (42.2)
Falls in the previous 30 days	
No	299 (93.4)
Yes	21 (6.6)
Chronic diseases	
No	38 (11.9)
Yes	282 (88.1)
Medication	
No	17 (5.3)
Yes	303 (94.7)

Losses were not included.

Table 3. Bivariate analysis between the occurrence of hospitalization and the independent variables in institutionalized old people, Natal/RN, 2016 (n=320).

Variables	Hospitalization		*p*	RR (95%CI)
	Yes n (%)	No n (%)		
Children			0.036*	
No	24 (15.2)	134 (84.8)		0.61 (0.38-0.97)
Yes	38 (24.7)	116 (75.3)		1.00
Health plan				
No	33 (16.4)	168 (83.6)	0.014*	0.58 (0.38-0.89)
Yes	33 (28.0)	85 (72.0)		1.00
Cognitive state			0.037[a,*]	
Moderate or severe decline	60 (23.6)	194 (76.4)		2.36 (1.00-5.58)
Intact-Light Decline	5 (10.0)	45 (90.0)		1.00
Mobility				
Bedridden or wheelchair	35 (26.7)	96 (73.3)	0.025*	1.62 (1.06-2.50)
Walks with or without help	31 (16.4)	158 (83.6)		1.00
Fecal incontinence				
Yes	37 (27.4)	98 (72.6)	0.010*	1.74 (1.13-2.69)
No	29 (15.7)	156 (84.3)		1.00
Dyslipidemia				
Yes	18 (32.7)	37 (67.3)	0.015*	1.80 (1.14-2.85)
No	48 (18.1)	217 (81.9)		1.00
Group B: medication for the blood system				
Yes	25 (29.8)	59 (70.2)	0.011*	1.77 (1.15-2.74)
No	39 (16.7)	194 (83.3)		1.00

[a] Fisher's exact test;* $p < 0.05$

Regarding health conditions, it was identified that the old people with moderate or severe cognitive decline and malnutrition or risk of malnutrition, had, respectively, 136.0% (p=0.037; 95% CI: 1.00-5.58) and 89.0% (p=0.016; 95% CI: 1.04-3.41) higher incidence for hospitalization. Those who were bedridden or in wheelchairs and had fecal incontinence had 62.0% (p=0.025; 95% CI: 1.06-2.50) and 74.0% (p=0.010; 95% CI: 1.13-2.69) risk for hospitalization. Among chronic diseases, it was found that the old people with dyslipidemia had 80.0% (p=0.015; 95% CI: 1.14-2.85) risk for hospitalization. Specifically regarding continuous use medications, a risk for hospitalization increased by 77.0% (p=0.011; 95% CI: 1.15-2.74) and 94.0% (p=0.003; 95% CI: 1.17-3.23), respectively, was identified among those who used drugs for the blood and cardiovascular system (Tables 3 and 4).

In the final model for risk factors for hospitalization in institutionalized old people, it was found that the presence of malnutrition or risk of malnutrition and using drugs for the cardiovascular system increased, respectively, by 141.0% (p=0.016; 95% CI: 1.17-4.96) and 187.0% (p=0.003; 95% CI: 1.43-5.77) the risk for hospitalization, adjusted for age, sex and type of institution (Table 4). The Hosmer-Lemeshow test value was 0.996.

Table 4. Final model for risk factors for hospitalization in institutionalized old people, Natal/RN, 2016 (n=320).

Variables	Reference	*p*	RR $_{\text{not adjusted}}$ (95% CI)	RR $_{\text{adjusted}}$ (95% CI)
Age ≥83 years	60-82 anos	0.090	1.29 (0.83-1.99)	1.74 (0.91-3.33)
Sex Male	Female	0.381	1.23 (0.77-1.97)	1.37 (0.67-2.80)
Type of institution Non-profit	For-profit	0.403	0.56 (0.37-0.87)	0.73 (0.40-1.44)
Nutritional status Risk of malnutrition/malnutrition	Eutrophy	0.016*	1.89 (1.04-3.41)	2.41 (1.17-4.96)
Group C: medicines for the cardiovascular system Yes	No	0.003*	1.94 (1.17-3.23)	2.87 (1.43-5.77)

Hosmer-Lemeshow Test= 0.996; * $p< 0.05$

DISCUSSION

This study found a high incidence of hospitalization in a population that had severe cognitive decline and total functional dependence, also occurring a high rate of death among those hospitalized where the main risk factors for this hospitalization were malnutrition, risk of malnutrition and the use of medication for the cardiovascular system.

Our data were similar to those found by Duca et al.[20], noting that 23.9% of the old people residents in the LTCF of Pelotas-RS were hospitalized within 12 months, a higher rate of hospitalization when compared to community residents (14.5%).

Still in the same study, it was identified that, in the 24 LTCFs studied, the old people with functional incapacity to perform ADLs were 2.5 times more likely to be hospitalized than those without incapacity to perform these activities[20]. In the present study, 80% were considered fragile, thus, one can associate the high rate of hospitalization with the frailty of these old people.

These findings may also justify the longer-lasting stay among the old people hospitalized in this study, given the high proportion of participants with severe cognitive decline and total functional dependence, representing, respectively, 59.4% and 25.3% of the total.

A Portuguese study[21] pointed out that the rates and duration of hospital stay were higher in old people, when compared to other age groups. Some data indicated that more than a third of the total number of hospital discharges corresponded to people over 65 years of age, with approximately 53% having hospitalization periods longer than 20 days, where the main causes of hospitalization are due to decompensations of chronic diseases, such as those of the respiratory and circulatory systems, corroborating our findings, with lung diseases (30.3%) and circulatory system (13.6%) being the main causes.

Carvalho et al.[22], on the other hand, evaluated the functional capacity of hospitalized old people in Brazil, identified that the average length of stay was 5.3 (+3.2) days, which is less than the present study, as they did not include old people with total dependence. The main causes of hospitalization according to the ICD-10 were diseases of the circulatory system (23.2%).

In the present study, respiratory disease was identified as the main cause of hospitalization, due to changes in lung function being more pronounced in aging. According to Fernandes et al.[23], during aging, physiological and anatomical changes and reorientation of elastic fibers in the lung occur. Regarding respiratory activity, there is a weakening of the expiratory and inspiratory muscles and

changes in the cough reflex. In addition, old people have reduced pulmonary cilia and hypertrophy of the bronchial glands further complicating the ability to excrete. These losses can result in adverse clinical events that worsen quality of life and favor hospital admission[23].

A high rate of hospital death was identified in the present study, in which one in 3.3 institutionalized old people who were hospitalized died in the hospital, considering that the majority of the sample was considered fragile, an integrative review found in the main factors related to fragility the highest mortality rate, where higher values in fragility scores are able to predict in-hospital mortality[24].

Among the sociodemographic variables related to the institution and health conditions, only the presence of malnutrition or risk of malnutrition, and use of medication for the cardiovascular system remained with a strong association for the occurrence of hospitalization.

In relation to malnutrition and its risk, Lázaro et al.[25], identified a high number of dependent old people at risk of malnutrition in the institutionalized geriatric population. These authors[25] stated that weight loss is a factor inherent to age, favoring fragility, sarcopenia, low body mass index (BMI) and worsening chronic diseases, which led to deterioration in quality of life. Still in the same study[26], there was a significant relationship between the level of dependence and nutritional status, so that greater dependence increased the risk of malnutrition (p <0.0001).

However, often, those old people at risk of malnutrition are not diagnosed and treated and, as a result, receive nutritional support at a late stage. Therefore, the diagnosis and individualized treatment of this population becomes extremely important, especially in the LTCFs and hospitals, where there is a higher rate of frail old people[25].

As for the continuous use of medications, it was found in the present study that the old people who used medications for the cardiovascular system were at risk for hospitalization (RR: 2.87; 95% CI: 1.43-5.77; p=0.003). These medications are useful for controlling symptoms, preventing cardiovascular events or prolonging life[26]. For a healthy old person, all three objectives of these medications are applicable. However, symptom control may be the only goal for an old person with advanced age and severe cognitive decline[27].

In the old people population, the increase in the prevalence of chronic diseases, as an example of cardiovascular diseases, may explain the increase in the need for continuous use of medications, since this type of therapy is the main intervention. Therefore, the risks involved in the consumption of medications are greater among old people, especially those who are frail, due to the fact that they present different responses to medications compared to those presented by younger people. The situation arises from the pharmacokinetic and pharmacodynamic changes typical of aging, which make this population contingent more vulnerable to interactions between drugs, side effects and adverse drug reactions[27,28].

In addition, the use of such drugs may indicate a greater burden of chronic diseases, geriatric syndromes and frailty and, potentially, have a significant influence on the occurrence of hospitalization[27,28]. Therefore, in frail old people with multiple morbidities and functional limitations, it is important to prioritize the objectives of drug treatment, analyzing the possible interactions with other drugs in use[26].

Despite the present study pointing out the drugs for the cardiovascular system as a risk factor for hospitalization, it is known that the old people population uses other medications and that these combinations of drugs generate harmful effects to the body, which can cause hospitalization and death[29].

The representativeness of the sample, the longitudinal design of the study and the low percentage of refusals and data losses were positive points of the present study. In addition, frailty, which can be an important confounding factor for hospitalization in old people, was examined in this study. And, in order to avoid errors in classification of nutritional status, BMI, arm circumference, calf circumference and knee height were not self-reported, but measured by trained professionals.

Among the limitations, the collection of some data from medical records and through reports is

subject to a measurement bias. The Pfeiffer test is not yet validated in Brazil. Its choice was due to its easy and fast application, and due to the low difficulty and demand of the questions, thus presenting itself as an adequate tool to assess the cognitive capacity in this sample. In addition, some chronic diseases may have been underdiagnosed or underreported. However, medical records were researched and professionals from the institutions were interviewed to collect the maximum amount of information possible. Finally, it is important to carry out a multicenter study in order to investigate more institutionalized old people with broader characteristics and confirm our findings.

CONCLUSION

Hospitalization had a high incidence (20.6%) among institutionalized old people, with high rates of fragility and functional and cognitive decline also standing out. In addition, malnutrition or risk of malnutrition and the use of cardiovascular medications were considered risk factors for hospitalization in 12 months and, therefore, it is suggested to create action plans with greater attention to the nutritional level of this population, as also evaluative and preventive measures regarding the need to use cardiovascular medications. At the end of the study, the most important findings of the study were made available to the LTCF managers, as an aid to future action plans.

Therefore, it is considered extremely important to develop more research with the same approach, considering the few studies found and the need for data comparative with our findings.

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