

**Association between multimorbidity and fear of falling:
a cross-sectional study with hospitalized older adults**

**Associação entre multimorbidade e medo de cair:
um estudo transversal com idosos hospitalizados**

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ABSTRACT

The aim of this study was to analyze the association between multimorbidity and fear of falling among hospitalized older adults. This is a quantitative study with an analytical sectional design, conducted with 83 individuals aged 60 years or older, hospitalized for falls in a referral hospital for emergency treatment in Brazil. Data collection took place through the application of a questionnaire containing socioeconomic and health information as well as characteristics of the fall. The logistic regression analysis revealed that older people who reported multimorbidity are 3.16 times more likely to be afraid of falling than older people who did not report multimorbidity, regardless of sex, age, frailty, and the number of falls in the last year. These results could aid in improving hospital approaches in relation to multimorbidity and fear of falling, decreasing preventable hospitalizations due to falls.

Key-words: Accidental Falls, Fear, Multimorbidity, Hospital, Aged.

RESUMO

O objetivo deste estudo foi analisar a associação entre multimorbidade e medo de cair em idosos hospitalizados. Trata-se de um estudo quantitativo com delineamento transversal analítico, realizado com 83 indivíduos com 60 anos ou mais de idade, internados por quedas em um hospital de referência para atendimento de emergência no Brasil. A coleta de dados deu-se por meio da aplicação de um questionário contendo informações socioeconômicas e de saúde, bem como características da queda. A análise de regressão logística revelou que os idosos que referiram multimorbidade têm 3,16 vezes mais chance de ter medo de cair do que os idosos que não referiram multimorbidade, independentemente do sexo, idade, fragilidade e número de quedas no último ano. Esses resultados podem auxiliar na melhoria das condutas hospitalares em relação à multimorbidade e ao medo de cair, diminuindo as hospitalizações evitáveis por quedas.

Palavras-chave: Quedas acidentais, Medo, Multimorbidade, Hospital, Envelhecido.

1 INTRODUCTION

Chronic Noncommunicable Diseases (NCDs) are the main cause of the high global burden of diseases. With rapid population aging and increasing exposure to risk factors, the prevalence of multimorbidity (coexistence of two or more NCDs in the individual) is expected to increase worldwide.¹

The consequences of the increased prevalence of multimorbidity in older adults comprise greater use of health services, including recurrent hospitalizations, in addition to increased spending and the occurrence of negative outcomes.² In addition, multimorbidity has been listed as one of the main determinants of disability and frailty syndrome in older adults.¹⁻²

Despite methodological and conceptual differences, the literature shows that multimorbidity is highly prevalent among older adults, with values ranging between 24% and 90%.²⁻³

A study carried out with nationally representative samples of people aged 50 or over from 16 European countries found a prevalence of multimorbidity of 37.3%, in addition to a strong association of this condition with increasing age, greater use of health services, worse self-reported health status, depression, and disability.³

As with multimorbidity, the occurrence of falls among older adults is also associated with higher rates of hospitalization and negative health outcomes. Falls are the second leading cause of fatal injury and a considerable threat to the health and well-being of the older population worldwide. In addition to the physical consequences, adverse psychological effects are common and the necessary care is a burden on the family and the health system.⁴

A recent study, which aimed to analyze the morbidity and mortality from falls in older adults in Brazil, revealed an increasing trend in hospitalizations and mortality from falls in older adults in all regions of the country. The mortality rate due to falls increased 200% in Brazilian capitals, from 1.25 to 3.75/10.000 older people, with an increase of 15% per year between 1996 and 2012. The hospitalization rate went from 2.58 to 41.37 /10.000 older people in the same period.⁵

It is known that the occurrence of falls in older adults is associated with prolonged hospital stays and that the presence of multimorbidity is a risk factor for falls to occur, since individuals with multimorbidity present worse functional status.⁶

Among the various risk factors for falls described in the literature, the fear of falling stands out, defined as a constant concern about the possibility of falling, associated with negative physical and psychosocial health results, including depression and restriction in activities of daily living.⁷ The prevalence of fear of falling reported in different studies ranged between 36% and 80%.⁷⁻⁹ Regarding associated factors, there is evidence that the fear of falling is more common among female older adults and is associated with impaired functional capacity, anxiety, and depression.⁷

Although the negative impact of multimorbidity and falls on the health of older adults is well established in the literature, few studies have examined the association between multimorbidity and fear of falling among hospitalized older adults. In addition, as previously mentioned, there is a growing trend of hospitalizations for older adults due to falls, which reaffirms the theme as relevant and current. Better understanding of the relationship between multimorbidity and fear of falling is necessary for the proposition of assertive interventions that contribute to the prevention of falls and, consequently, of recurrent hospitalizations, as well as a reduction in hospital stay, which can improve the quality of life of older adults and help to reduce hospitalization costs.

Thus, the objective of the present study is to analyze the association between multimorbidity and fear of falling among hospitalized older adults.

2 METHODS

This is a quantitative study with an analytical sectional design, carried out with individuals aged 60 years or over, of both sexes, admitted to the Urgency and Emergency Hospital of Rio Branco (HUERB), with the occurrence of a fall as the reason for admission. The study included all older patients hospitalized due to falls in the period from October 4, 2017 to May 4, 2018, who agreed to participate in the research by signing the Informed Consent Form, totaling 83 individuals. This hospital is located in the central part of Rio Branco, capital of Acre, Brazil, being the reference for urgent and emergency cases in the state, and meeting the demand of all municipalities in Acre and some cities in adjacent states, such as Rondônia and Manaus.

Data were collected in the emergency hospital inpatient clinics. The older adults were screened daily, in the morning and afternoon, by consulting the sectoral records of the clinics, which contained data on the hospitalization of each individual, as well as their name and age, and the date and reason for hospitalization.

After conduction of a pilot test, data collection took place through the application of a questionnaire. The interviewers were previously trained and instructed in the details and application of the instruments.

The dependent variable of interest was fear of falling, evaluated through the question “After your fall (s), did you become afraid of falling again?”. This question is part of the questionnaire of the SABE Study - Health, Well-Being and Aging, a longitudinal study, of multiple cohorts, carried out with a representative sample of the older residents in the city of São Paulo.¹⁰

The independent variable of interest was multimorbidity¹¹, which is considered to be the co-occurrence of two or more chronic diseases self-reported by the individual.

The covariates of the study included: sex; age; schooling; marital status; current job; contribution to family income; living alone; continuous use of at least one medication (self-reported); difficulty in performing BADL (Basic Activities of Daily Living); difficulty in performing IADL (Instrumental Activities of Daily Living); and frailty. The elderly who perform all ADL and IADL without assistance were considered independent.

IADLs were evaluated using the Lawton & Brody Scale.¹² These tasks are more adaptive and developed with the community as part of an independent life, and include tasks such as using transportation, carrying out household chores (taking care of the house and preparing meals), making purchases, making phone calls, managing one's finances, and taking medicines.

To evaluate performance in BADLs, the Katz Scale was used.¹³ The basic activities of daily living consist of self-care tasks, evaluated based on Katz's independence index, which considers six functions: going to the bathroom, getting dressed, showering, moving, being continent (maintaining control over eliminations), and eating. Individuals classified as independent, both for IADL and BADL performance, were those with full execution of all functions, without assistance, supervision, or guidance from third parties.

Frailty was evaluated through questions related to the components of this syndrome: unintentional weight loss, reduced strength, reduced walking speed, low physical activity, and fatigue, using validated self-reported questions.¹⁴ Older adults who received a score for three or more components were considered “frail”, those who scored positively for one or two as “pre-frail”, and those who did not present any of the components as “non-frail”.

The characteristics of the falls were also evaluated using questions from the SABE Study, which are: number of falls after the age of 60; number of falls in the last year; fall location; fall mechanism; consequence of the fall; and fracture site.¹⁰

The data were entered into the Excel program and analyzed using the Stata software version 13.0. In the descriptive analysis of the data, frequency distributions, means and standard deviations were estimated for the continuous variables of the study. For categorical variables, proportions were estimated. Differences between groups were estimated using Pearson's Chi-square, Fisher's Exact, and Mann-Whitney tests. In all analyzes, a significance level of 5% was used. The analysis of the association between multimorbidity and fear of falling was performed using multiple logistic regression. The

final model was adjusted for sex, age, frailty, and the number of falls in the last year, since the association between these variables and the fear of falling has been widely described in the literature.

The research was carried out after authorization from the general management of HUERB and the informed consent form signed by the patient or legal guardian. The study received a favorable opinion from the Research Ethics Committee (CEP) of the Acre State Hospital Foundation - FUNDHACRE, opinion number: 2.282.916 meeting the parameters of the resolution of the National Health Council (CNS) 466/2012.

3 RESULTS

The prevalence of multimorbidity in the sample studied was 69.88% and the fear of falling was 57.83%. Of the 83 older people hospitalized due to falls, the majority were female (68.67%), aged 80 years or over (39.76%), illiterate (59.04%), continuously using at least one medication (69.88%), independent for BADL (65.03%), dependent for IADL (66.27%), and frail (43.37%) (Table 1).

With regard to the characteristics of the falls, 49.40% of the older adults reported only one fall after 60 years of age and 81.93% only one fall in the year prior to the interview. Only 7.41% of the falls occurred outside the home, and the place where falls occurred most frequently was the bedroom (30.86%). Regarding the fall mechanism, 41.67% of the older adults reported slipping. The consequence of the fall for 83.13% of hospitalized older adults was a fracture and the most frequent fracture site was the femur (71.01%) (Table 2).

Regarding the relationship between socioeconomic characteristics, health, and fear of falling, there was a statistically significant difference only in the proportions of older people who reported or not fear of falling with regard to multimorbidity, with 83.33% of the older adults who are afraid of falling reporting multimorbidity, against 51.43% among those who are not afraid of falling (Table 3).

Table 1 – Distribution of older adults hospitalized due to falls according to socioeconomic and health characteristics. Rio Branco, 2018. (n=83)

Characteristics	Categories	N (%)
Sex	Feminine	57 (68.67)
	Masculine	26 (31.33)
Age – mean (SD)		77 (1.19)
Age group	60 – 69 years	23 (27.71)
	70 – 79 years	27 (32.53)
	80 and more	33 (39.76)
Schooling	Illiterate	49 (59.04)

	Secondary school	24 (28.92)
	High school	5 (6.02)
	Higher education or above	5 (6.02)
Currently working	Yes	14 (16.87)
	No	69 (83.13)
Largest contributor to family income	Yes	43 (51.81)
	No	40 (48.19)
Marital Status	With partner	24 (28.92)
	Without partner	59 (71.08)
Live alone	Yes	13 (15.66)
	No	70 (84.34)
Multimorbidity	No	25 (30.12)
	Yes	58 (69.88)
Continuous use of medication	Yes	58 (69.88)
	No	25 (30.12)
BADL ¹	Independent	54 (65.03)
	Dependent	29 (34.94)
IADL ²	Independent	28 (33.73)
	Dependent	55 (66.27)
Frailty	Non-frail	22 (26.51)
	Pre-frail	25 (30.12)
	Frail	36 (43.37)

¹BADL - Basic Activities of Daily Living; ²IADL - Instrumental Activities of Daily Living.

Table 2 – Distribution of older adults hospitalized for falling according to the characteristics of the fall. Rio Branco, 2018. (n=83)

Characteristics	Categories	N (%)
Number of falls after 60 years of age	One	41 (49.40)
	Two	29 (34.94)
	Three or more	13 (15.66)
Number of falls in the last year	One	68 (81.93)
	Two	9 (10.84)
	Three or more	6 (7.23)
Location of fall	Bathroom	8 (9.88)
	Bedroom	25 (30.86)
	Kitchen	11 (13.58)
	Living room	8 (9.88)
	Yard	20 (24.69)
	Stairs	6 (7.41)
	The road	3 (3.70)
Fall mechanism	Slip	30 (41.67)
	Stumble	17 (23.61)
	Dizziness	10 (13.89)
	Syncope	2 (2.78)
	Weakness	9 (12.50)
	Others	4 (5.56)
	Consequence of the fall	Fracture
Pneumothorax		2 (2.41)
Cranial injury		7 (8.43)
Others		5 (6.02)
Fracture site	Femur	49 (71.01)
	Radius/ humerus	13 (18.84)
	Tibia	3 (4.35)
	Hip	2 (2.90)
	Wrist	1 (1.45)
	Vertebra	1 (1.45)
Fear of falling	Yes	48 (57.83)
	No	35 (42.17)

The multiple logistic regression analysis revealed that older people who reported multimorbidity were 3.16 times more likely to be afraid of falling than older people who did not report multimorbidity, regardless of sex, age, frailty, and number of falls in the last year (Table 4).

Table 3 – Relationship between socioeconomic and health characteristics related to falls and fear of falling among older people hospitalized due to falls. Rio Branco, 2018. (n=83)

		Fear of Falling		p
		No N (%)	Yes N (%)	
Sex	Feminine	22 (62.86)	35 (72.96)	0.329
	Masculine	13 (37.14)	13 (27.08)	
Age – mean (SD)		79.9 (12.2)	77.9 (13.0)	0.230
Age group	60 – 69 years	9 (25.71)	14 (29.17)	0.142
	70 – 79 years	8 (22.86)	19 (39.58)	
	80 and over	18 (51.43)	15 (31.25)	
Schooling	Illiterate	20 (57.14)	29 (60.42)	0.975
	Secondary school	11 (31.43)	13 (27.08)	
	High school	2 (5.71)	3 (6.25)	
	Higher education or above	2 (5.71)	3 (6.25)	
Currently working	Yes	8 (22.86)	6 (12.50)	0.213
	No	27 (77.14)	42 (87.50)	
Largest contributor to family income	Yes	18 (51.43)	25 (52.08)	0.953
	No	17 (48.57)	23 (47.92)	
Marital status	With partner	13 (37.14)	11 (22.92)	0.158
	Without partner	22 (62.86)	37 (77.08)	
Live alone	Yes	7 (20.00)	6 (12.50)	0.353
	No	28 (80.00)	42 (87.50)	
Continuous use of medication	Yes	22 (62.86)	36 (75.00)	0.234
	No	13 (37.14)	12 (25.00)	
BADL ¹	Independent	24 (68.57)	30 (62.50)	0.567
	Dependent	11 (31.43)	18 (37.50)	
IADL ²	Independent	14 (40.00)	14 (29.17)	0.303
	Dependent	21 (60.00)	34 (70.83)	
Frailty	Non-frail	12 (34.29)	10 (20.83)	0.373
	Pre-frail	10 (28.57)	15 (31.25)	
	Frail	13 (37.14)	23 (47.92)	
Number of falls after 60 years of age	One	15 (42.86)	26 (54.17)	0.282
	Two	12 (34.29)	17 (35.42)	
	Three or more	8 (22.86)	5 (10.42)	
Number of falls in the previous year	One	28 (80.00)	40 (83.33)	0.066
	Two	2 (5.71)	7 (14.58)	
	Three or more	5 (14.29)	1 (2.08)	
Consequence of the fall	Fracture	28 (80.00)	41 (85.42)	0.903
	Pneumothorax	1 (2.86)	1 (2.08)	
	Cranial injury	4 (11.43)	3 (6.25)	
	Others	2 (5.71)	3 (6.25)	
Multimorbidity	No	17 (48.57)	8 (16.67)	0.002
	Yes	18 (51.43)	40 (83.33)	
Total		35 (42.17)	48 (57.83)	

¹BADL - Basic Activities of Daily Living; ²IADL - Instrumental Activities of Daily Living.

Table 4 – Association between multimorbidity and fear of falling among older people hospitalized for falling. Rio Branco, 2018. (n=83)

		OR crude	OR adjusted ¹	CI95%	p
Multimorbidity	No	1.00	1.00		
	Yes	4.72	4.16	1.41-12.26	0.010

¹Model adjusted for sex, age, frailty, and occurrence of falls in the last year.

4 DISCUSSION

The results of this study demonstrate that the presence of multimorbidity increases the chances that the hospitalized older person is afraid of falling. The association between multimorbidity and fear of falling was also observed in a longitudinal study carried out in Spain with 640 older people aged over 75 years, and the results revealed that older people with comorbidities, depressive symptoms, and disability were twice as likely to be afraid of falling compared to the other individuals.⁷

The presence of multiple diseases can lead to frailty and greater physical vulnerability¹⁵, increasing insecurity, fear, and, consequently, the chances of falls in older adults, which reinforces the importance of recognizing the mechanisms that lead to falls, as well as the characteristics of the target population of this traumatic event.

The high prevalence of multimorbidity found (69.88%) is similar to that observed in other studies^{2,16}, as well as the high prevalence of fear of falling (57.83%).^{8,9}

Both the presence of multimorbidity and the fear of falling can lead to the occurrence of falls, and the association between these factors can potentiate the occurrence of adverse events, especially during hospitalization. This is because these conditions are related to the restriction of activities that lead to a downward spiral of inactivity, physical deconditioning, loss of confidence, and an increased risk of falling.^{17,18}

In the current study, the majority of the older adults who experienced a fall episode were female, corroborating with other studies^{19,20}, which is justified by the fact that women are more exposed to the risk of falls as they are mainly responsible for domestic activities, in addition to having a longer life expectancy, and a higher prevalence of frailty and some chronic diseases than men.²⁰

With respect to age, the characteristics of the population in this study are similar to those of other studies. It is worth mentioning that age is a risk factor for falls and for fear of falling, since, the older the age, the greater the prevalence of NCDs, mobility difficulties, and use of medications, including polypharmacy^{18,20}, in addition to sensory

alterations, loss of stability and joint function, and decreased muscle mass and strength.^{21,22}

Regarding education, a higher proportion of illiterate older people was observed, which has also been associated with a higher occurrence of falls in previous studies.^{23,24} It was also observed that the majority of the older people did not carry out any work activity, did not have a partner, and did not live alone, which may be related to the occurrence of falls, since these older people spend most of their time at home and, in the absence of a partner, have no one to share household chores with and, therefore, are more exposed to the risk of falling.²⁵

With respect to multimorbidity, continuous use of medications, frailty, dependence for BADL and IADL, and the high proportion of older people in this research with these conditions is in accordance with studies that point out the presence of diseases, use of medications, frailty, and dependence as important factors for the risk of falls.^{26,27}

Regarding the characteristics of the falls of the participants in the current study, it was observed that they are similar to the characteristics found in another study conducted in Brazil^{28,29}, as well as and in a study conducted in South Korea³⁰, both with hospitalized individuals. These studies revealed that the majority of falls occur from the faller's own height and in the bedroom, which makes it possible to target preventive measures, especially environmental measures.

5 CONCLUSION

An association was observed between multimorbidity and fear of falling in the analyzed sample, which demonstrates the need to improve hospital management in relation to multimorbidity and fear of falling, reducing avoidable hospitalizations due to falls.

The limitations of the current study include the non-probabilistic sampling and use of the question "After your fall (s), did you become afraid of falling again?", to evaluate the fear of falling. Although other studies also use dichotomous questions for this purpose^{7,31}, the use of the Falls Efficacy Scale (FES) may be more sensitive.

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