ORIGINAL ARTICLE

SOCIAL ISOLATION AND HOSPITALIZATIONS OF OLDER ADULTS DUE TO FALLS IN AN EMERGENCY HOSPITAL: A CROSS-SECTIONAL STUDY

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Destaques: (1) Hospitalizations due to falls were prevalent during the years 2019 and 2020. (2) Social isolation contributed to reduced physical mobility during the pandemic. (3) Most accidental falls among older adults occur within the home environment. (4) There are seasonal effects and specific periods associated with the occurrence of falls. (5) The adoption of home-based exercises and adjustments to household structure should be considered as key interventions, even during periods of social isolation.

PRE-PROOF

(as accepted)

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ABSTRACT:

Objective: The aim of this study was to describe the profile of older adults hospitalized due to falls and to compare the prevalence of accidents during the period from January 2019 to December 2020. **Method:** This retrospective observational study was conducted through data collection from electronic medical records at the Emergency Hospital of Porto Alegre, Rio Grande do Sul, Brazil. **Results:** A total of 514 hospitalizations due to falls were recorded, 71.4% of which occurred in women. Of these cases, 75.3% were same-level falls, and 92% occurred within the patients' own homes. Among them, 93.3% were associated with fractures, with proximal femur fractures being the most prevalent (57.6%). The months with the highest prevalence of falls in 2019 were May, June, July, and September, showing a significant difference compared to the other months ($p = 0.004$). In contrast, during the pandemic year of 2020, the distribution of falls was homogeneous throughout the year ($p = 0.249$). **Conclusion:** The present study showed a relatively homogeneous distribution of falls during the COVID-19 pandemic; however, the frequency increased compared to previous years. It is likely that restrictions related to cold weather, home confinement, and reduced sun exposure influenced the occurrence of falls.

Keywords: Geriatrics; Health of the Elderly; Accidental Falls; Social Isolation; Hospitalization.

1. INTRODUCTION:

Falls represent an important factor contributing to increased morbidity and mortality among the older population. Approximately 30% of Brazilian older adults experience at least one fall per year, and the risk of falling increases with advancing age, reaching 50% among

those over 80 years old. Motor, sensory, and cognitive deficits lead to a decline in functionality — a natural process of aging. This process is influenced by environmental factors that may increase the risk of falling, particularly the physical environment of the older person's home [1]. Falls are associated with sex (female), marital status (living alone), the presence of rugs in the home, the use of grab bars, and overall health status (comorbidities) [2].

Among the intrinsic elements of the aging process, the reduction in muscle strength (*dynapenia*) and muscle mass (*sarcopenia*), balance impairments (such as visual loss, postural changes, and slowed vestibular responses), and decreased physical activity and exercise are noteworthy [3,4]. Extrinsic factors associated with fall risk include being single; however, living alone combined with an affective support network can act as a protective factor. Literacy and socioeconomic status have also been identified as high-risk factors for falls among older adults [5].

Social isolation resulting from the SARS-CoV-2 pandemic was a factor that may have contributed to decreased physical mobility, leading to loss of muscle strength and balance in older adults. In the absence of vaccines and effective antiviral treatments during the early stages of the pandemic, non-pharmacological measures were adopted by Brazilian states in an attempt to contain viral transmission and prevent the collapse of the healthcare system — including social distancing and, when necessary, isolation of older individuals [6].

There are individual and social aspects related to the risk of social isolation among older adults. Physical and mental health conditions, such as dependency and loss of bodily functions, hearing impairment, neurological disorders, and chronic diseases, play a key role. Environmental and social factors arising from inequities and vulnerabilities — such as being female, widowed or single, having low educational attainment, low income, limited health literacy, and smaller family networks — are also relevant. These conditions are linked to economic and social determinants expressed in the broader social determinants of health [7].

Since most falls occur in the home environment[8], the context of the COVID-19 pandemic may have negatively impacted functionality and the incidence of falls among older adults, who were required to remain confined to their homes due to the imminent threat of a severe disease. Therefore, the aim of the present study was to describe the profile of older adults hospitalized due to falls and to compare the prevalence of falls between the years 2019 and 2020.

2. METHOD

This was a retrospective observational study [9] conducted using data collected from electronic medical records at the Emergency Hospital of Porto Alegre (Rio Grande do Sul, Brazil), covering the period from January 2019 to December 2020. The analysis included individuals of both sexes aged over 60 years who were hospitalized due to a fall, with or without a resulting fracture of any type. Recruitment was based on the International Classification of Diseases and Related Health Problems (ICD-10) [10], using codes associated with falls (code W12). Due to missing or incomplete records, some patients had to be excluded, as their ICD codes met the inclusion criteria but the reported trauma did not correspond to a fall as defined in this study.

For the purposes of the study, information was collected regarding the type of fall (same level, from a lower height, or from a higher height), the location where the event occurred (home or public space), the resulting injury or fracture, existing comorbidities, and the patient's outcome. In addition, the distribution of falls throughout the months of the year was analyzed to determine the seasonality of these events.

Proximal femur fractures were defined as fractures of the femoral neck, trochanteric, transtrochanteric, and subtrochanteric regions. Unspecified femur fractures included cases where the exact fracture site was not described in the medical record, as well as those occurring in the distal third of the femur. Vertebral fractures included spinal cord injuries (SCI) and fractures in the cervical, thoracic, and lumbar regions. Upper limb fractures comprised injuries to the wrist, forearm, elbow, arm, and shoulder regions.

Medical records of all patients admitted to the institution who met the inclusion criteria were evaluated. A total of 250 patient records from 2019 were reviewed, of which 224 were included in the analysis; and 288 records from 2020, of which 261 were included — totaling 538 records evaluated and 485 included in the final analysis.

Data are presented as absolute and relative frequencies. The statistical tests used for comparisons between years included the Chi-square test, Fisher's exact test, and the Mann-Whitney test. A significance level of $p < 0.05$ was adopted. Statistical analyses were performed using the SPSS (Statistical Package for the Social Sciences), version 25.

The study was approved by the Ethics Committee of the Municipal Health Department of Porto Alegre under approval number 4.500.612, in accordance with the guidelines and regulatory standards for research involving human subjects (Resolution No. 466, December 12, 2012, of the National Commission for Research Ethics, and the Declaration of Helsinki V).

Data were handled in compliance with the Brazilian General Data Protection Law (Lei Geral de Proteção de Dados Pessoais – LGPD, Law No. 13.709/2018). Based on the ethical guidelines and the characteristics of the study, informed consent form was not required from participants, as data collection was carried out retrospectively from information available in electronic medical records.

All data collection took place in the hospital environment through the Hospital Information System (SIHO) and was conducted by physiotherapists previously trained according to the parameters of this research.

3. RESULTS

Initially, medical records from 538 patients were selected. A total of 53 patients were excluded for not meeting the selection criteria. Thus, 485 individuals were effectively included in the study, divided between the years 2019 (n = 224) and 2020 (n = 261). The sample selection flowchart is presented in Figure 1.

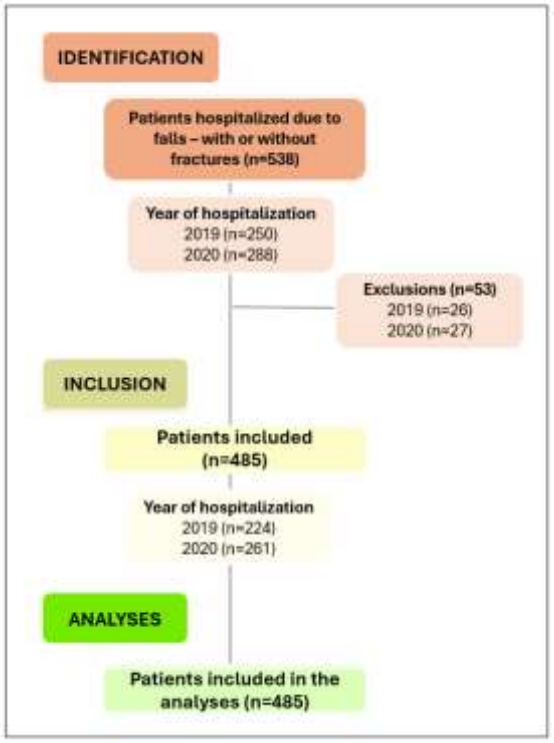

Figure 1. Flowchart of patient inclusion in the study.

Table 1 presents the characterization of the sample, divided by year and total number of patients. More than two-thirds of the evaluated patients were female, while over one-third were aged between 80 and 89 years. In both years analyzed, most falls occurred from the same level and took place within the home environment. Regarding case outcomes, a higher proportion of discharges from the emergency department occurred in 2019 (26.8%) compared to 2020 (14.2%), whereas in 2020 there were more transfers to other institutions than in 2019 (70.1% and 60.7%, respectively).

In both years, proximal femur fracture was the most frequent injury, followed by traumatic brain injury (TBI) and upper limb fractures. In 2019, a higher incidence of vertebral fractures was observed compared to the following year (2019: 10.3%; 2020: 5.3%), whereas in 2020, a greater number of unspecified femur fractures were recorded compared to 2019 (2019: 7.6%; 2020: 14.9%).

More than 60% of the total sample presented at least one comorbidity. Systemic arterial hypertension (SAH) was the most prevalent in both years (2019: 42.4%; 2020: 36.4%).

Although there were discrepancies in the distribution of most data between the two years, the differences were not statistically significant.

Table 1. Sample characterization

Variable	2019 (N=224) n (%)	2020 (N=261) n (%)	Total (N=485) n (%)	p-value
Sex				0,968
Feminino	160 (71,4)	186 (71,3)	346 (71,3)	
Masculino	64 (28,6)	75 (28,7)	139 (28,7)	
Age *(grouped)*				0,936
60 I------70	53 (23,7)	56 (21,5)	109 (22,5)	
70 I------80	62 (27,7)	72 (27,6)	134 (27,6)	
80 I------90	80 (35,7)	99 (37,9)	179 (36,9)	
90 ou mais	29 (12,9)	34 (13,0)	63 (13,0)	
Types of falls				0,711
Same-level fall	168 (75,3)	197 (78,2)	365 (76,8)	
Fall from lower height	27 (12,1)	29 (11,5)	56 (11,8)	
Fall from higher height	28 (12,6)	26 (10,3)	54 (11,4)	
Not reported	1 (0,4)	9 (3,4)	10 (2,1)	
Fall location				0,754
Home	206 (92,0)	242 (92,7)	448 (92,4)	
Street	18 (8,0)	19 (7,3)	37 (7,6)	
Outcome				0,001
Emergency discharge	60 (26,8)	37 (75,3)	97 (20,0)	
Hospital discharge	19 (8,5)	37 (12,1)	56 (11,5)	
Death	9 (4,0)	4 (12,6)	13 (2,7)	
Transfer	136 (60,7)	183 (0,4)	319 (65,8)	
Fracture				0,08
Yes	109 (93,3)	253 (96,9)	462 (95,3)	
No	15 (6,7)	8 (3,1)	23 (4,7)	
Types of injuries				0,00
Proximal femur fracture	127 (56,7)	151 (57,9)	278 (57,3)	
Traumatic brain injury	49 (21,9)	47 (18,0)	96 (19,8)	
Unspecified femur fracture	17 (7,6)	39 (14,9)	56 (11,5)	
Upper limb fractures	23 (10,3)	21 (8,0)	44 (9,1)	
Vertebral fractures	23 (10,3)	14 (5,3)	37 (7,6)	
Comorbidades				0,55
Yes	155 (69,2)	23 (64,4)	323 (66,6)	
No	69 (30,8)	23 (35,6)	162 (33,4)	
Tipos de comorbidades				1,00
Systematic Arterial Hypertension	95 (42,4)	127 (36,4)	188 (38,8)	
Neurodegenerative diseases	30 (13,4)	49 (13,4)	65 (13,4)	
Diabetes Mellitus	29 (12,9)	17 (17,6)	75 (15,5)	
Cardiovascular diseases	27 (12,1)	23 (8,8)	50 (10,3)	
Neurovascular diseases	19 (8,5)	23 (7,3)	38 (7,8)	

Legend: n: total sample; %: relative sample

Table 2 shows the proportion of falls divided by month to illustrate the seasonality of these events. In 2019, a higher proportion of falls was observed in May, June, July, and September, with a significant difference compared to the other months (p = 0.004). In contrast, during the pandemic year, the distribution of falls was homogeneous throughout the year (p = 0.249).

Table 2. Monthly distribution of fall-related hospitalizations

Variable	2019 (N=224) n (%)	2020 (N=261) n (%)	Total (N=485) n (%)	p-value
Mês				0,157
January	10 (4,5)	19 (7,3)	29 (6,0)	
February	8 (3,6)	23 (8,8)	31 (6,4)	
March	20 (8,9)	19 (7,3)	39 (8,0)	
April	19 (8,5)	12 (4,6)	31 (6,4)	
May	**23 (10,3)**	28 (10,7)	51 (10,5)	
June	**27 (12,1)**	20 (7,7)	47 (9,7)	
July	**27 (12,1)**	32 (12,3)	59(12,2)	
August	19 (8,5)	21 (8,0)	40 (8,2)	
September	**28 (12,5)**	25 (9,6)	53 (10,9)	
October	11 (4,9)	21 (8,0)	32 (6,6)	
November	17 (7,6)	24 (9,2)	41 (8,5)	
December	15 (6,7)	17 (6,5)	32 (6,6)	
p-value				
	0,004	0,249		

Legend: n: total sample; %: relative sample

4. DISCUSSÃO

The profile of patients most affected by falls is consistent with the majority of national and international studies on the subject [11],[12],[13],[14]. The data indicate a higher prevalence among older women with multiple comorbidities who experienced same-level falls at home. The predominance of falls among women, both in the pre-pandemic year and during the pandemic, may be explained by several factors, as described by Santos (2021) [14]. The female elderly population is larger, spends more time at home, and is more actively involved in domestic activities compared to men, in addition to having different societal roles and distinct functional activities between genders.

Regarding recommendations for staying at home during the pandemic, the prevention of health complications, and the use of healthcare services, women appear to be more engaged in these aspects, which tends to increase the female elderly population. The constant presence of a partner in the household may also have increased the workload, as well as the physical and emotional fatigue caused by changes in routine. In addition, the reduction in estrogen levels after menopause is associated with greater osteomuscular fragility, contributing to this outcome [15].

The association between advanced age and falls is well established in the literature, ranging from 34% among older adults aged 65–80 years, 45% among those aged 80–89 years, and 50% among those over 90 years. Approximately half of these individuals will experience another fall within the following 12 months [16]. As age progresses, the presence of sarcopenia and decreased bone density leads to balance impairments, gait instability, and a higher propensity for falls [17].

In this study, the most frequent injury observed was proximal femur fracture, also known as hip fracture. The injury mechanism is generally due to low-energy, direct trauma to the lateral aspect of the joint against the ground. Hip fractures are associated with a mortality rate of approximately 30% among older adults within the first year after the injury, making them the leading cause of trauma-related death in individuals over 75 years of age. Factors such as advanced age, presence of comorbidities, time elapsed between fracture occurrence and surgery, and length of hospitalization after the surgical procedure — which particularly increases the risk of respiratory infections — are associated with this outcome, rendering hip fractures potentially fatal [18]. Treatment is predominantly surgical, with the possible need for partial or total hip arthroplasty. Without appropriate treatment, older adults may remain immobilized for prolonged periods, which can lead to functional disability, decreased autonomy and independence, as well as a significant reduction in quality of life and life expectancy [18,19].

The presence of multiple comorbidities in older adults is associated with polypharmacy, which can lead to drug interactions and harmful adverse effects. In the studied population, systemic arterial hypertension (SAH) was the most prevalent comorbidity, and the use of antihypertensive medications — along with antipsychotics, sedatives, antidepressants, and benzodiazepines — may increase the risk of falls and is associated with fear of falling [20].

Neurodegenerative diseases, such as Parkinson's and Alzheimer's, are also linked to a higher incidence of falls due to postural instability, increased reaction time, cognitive deficits, and greater dependence on activities of daily living, demonstrating increased fragility in these individuals [21].

In our sample, there were more emergency discharges in 2019 than in 2020, which may be related to higher case resolution or less severe injuries in one year compared to the other. Additionally, in 2020 there were more transfers to other hospitals. Within the context of this hospital, such transfers indicate injuries requiring complex surgical intervention not available at the trauma center, confirming that injuries were more severe than in the previous year [21].

Home confinement and the limitation of outdoor physical activities or gym attendance during the pandemic year contrasted with a healthy lifestyle and aging, leading to physical deconditioning and decreased functionality in this age group. One study observed that home-based strength and balance exercise programs can significantly reduce the risk of falls in patients who had already experienced a fall in the previous year, demonstrating that exercise, even when performed at home, has a positive effect on overall health and promotes reduced morbidity and mortality in older adults, representing a solution to the new conditions imposed by the pandemic [13,22].

In the state of Rio Grande do Sul, there is a marked distinction between the seasons in terms of climate, temperature, and humidity. A 2015 study [23] observed a higher incidence of falls during the winter months, findings that are consistent with the results of the present study for the year 2019. Inadequate lighting and wet or slippery floors are extrinsic risk factors that contribute to the increased number of falls during this period, compounded by restricted mobility in older adults due to wearing multiple layers of clothing and joint stiffness caused by the cold [23].

Seasonal differences in fall incidence similar to those found in the present study have also been reported elsewhere. Although conducted in Japan, patients experienced more falls from October to February, which correspond to the winter months in the Northern Hemisphere. It was also noted that these falls occurred more frequently at night or early in the morning while patients were going to the bathroom, confirming that low lighting and smooth floors negatively influence falls during colder seasons [24].

Furthermore, staying at home also represents an important risk factor for falls, as observed in 2020, when the distribution of falls was homogeneous throughout the year. Inadequate home environments contribute to the occurrence of such events, including slippery floors, absence of non-slip mats, lack of safety grab bars, poor lighting, steps at room exits, irregular surfaces, or the presence of objects on the floor [8]. This finding from our study may also be related to reduced sun exposure and lower vitamin D synthesis due to home confinement, which contributes to the development of osteopenia and osteoporosis in older age [25].

According to a study analyzing adherence to social distancing and other protective measures against coronavirus among individuals over 50 years old in Brazilian municipalities, a large proportion of participants left home once or twice to perform essential activities such as purchasing medications or food. The study also found that the older the participants, the more isolated they were, reinforcing the idea that older adults were more compliant with social distancing and that home confinement may have influenced the risk of accidents within the domestic environment [26].

Another factor contributing to the vulnerability of the older population during the pandemic was the feelings of sadness, loneliness, and anxiety caused by the lack of interaction with family and friends. Romero et al. report that older adults who adhered more strictly to social isolation more frequently experienced these depression-related feelings, and that loneliness can lead to decreased functional capacity and increased mortality in this population [27].

Although there were more hospitalizations due to falls in 2020, the difference was not statistically significant compared to 2019. This finding may be related to changes in hospital operations, as the facility is a trauma referral center. During periods of overcrowding caused by coronavirus infections, it admitted patients with acute respiratory syndrome, occupying a substantial portion of emergency, ward, and ICU beds that would normally be available for trauma patients.

Another hypothesis is that older adults may have sought tertiary healthcare services less frequently due to media reports highlighting high hospital demand and lack of available beds, representing a serious public health crisis and generating fear among the population.

Regarding the limitations of this study, it was noted that, due to the retrospective extraction of data from medical records, there may be underreporting of information relevant

to the research. Barriers within the home environment, such as the presence of rugs, uneven surfaces, slippery floors, and absence of safety grab bars, among others, could not be assessed due to the study design, although they may have contributed to the occurrence of traumatic events at home. Another limiting factor was the lack of data on patients' financial status, engagement in physical exercise, and occupational activity, which would have allowed for a more precise determination of factors related to the incidence of falls.

Considering these limitations, further studies are needed to analyze these variables and evaluate the true impact of social isolation on the incidence of events such as falls among older adults.

5. CONCLUSION

The study aimed to describe the profile of older adults hospitalized due to falls, highlighting a higher incidence among elderly women, particularly those aged 80–90 years with comorbidities.

When comparing the prevalence of falls between 2019 and 2020, same-level falls were the most common type, with an increase observed in 2020. The home was the primary location for these events in both years, resulting in fractures, which more than doubled in number in 2020. Among these, proximal femur fractures were the most prevalent in both years, with transfers representing the most frequent outcome.

During the pandemic year, the occurrence of falls was distributed homogeneously throughout the year, suggesting that staying at home is an important incapacitating factor and a significant risk for trauma among older adults.

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