# MORTALITY DUE TO FALLS FROM HOSPITAL BEDS: A RETROSPECTIVE STUDY

## MORTALIDADE POR QUEDAS DE LEITOS HOSPITALARES: ESTUDO RETROSPECTIVO

## MORTALIDAD POR CAÍDAS DE LECHOS HOSPITALARIOS: ESTUDIO RETROSPECTIVO

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Objective: To identify the prevalence and characterize deaths due to falls from hospital beds in Porto Alegre, Rio Grande do Sul, and Brazil. Method: It is a retrospective study carried out in 2015 using data from the Unified Health System's Informatics Department database (DATASUS). The ICD-10 was used: W06 – Fall involving bed. Relative frequency, sex ratio, and lethality rates were calculated. Results: In the distribution by age group, there was a higher number of deaths in people aged 60 years and older. The total number of deaths presented prevalence of females; but under 70 years of age, more men died. Lethality coefficients increased progressively in the three governmental spheres. Conclusion: Falls constitute a problem not only for the patients, but also for caregivers and hospital institutions. Therefore, the promotion of patient safety and, specifically, the prevention of falls from bed represent a challenge for health services and professionals.

Descriptors: Health Information Systems. Accidental Falls. Nursing.

Objetivo: identificar a prevalência e caracterizar os óbitos por quedas de leito hospitalar em Porto Alegre, no Rio Grande do Sul e no Brasil. Método: estudo retrospectivo, com dados do Departamento de Informática do Sistema Único de Saúde (DATASUS), realizado em 2015. Utilizou-se a classificação CID-10: W06 Queda de um leito. Calculou-se frequência relativa, razão de sexos e taxas de letalidade. Resultados: na distribuição por faixa etária, verificou-se maior número de óbitos a partir dos 60 anos. O sexo feminino predominou no número total de óbitos, mas até os 70 anos morreram mais homens. Os coeficientes de letalidade aumentaram progressivamente nas três esferas governamentais. Conclusão: as quedas não se caracterizaram como um problema exclusivo dos pacientes, mas também dos prestadores de cuidados e das instituições hospitalares. Por isso, a promoção de segurança do paciente e, especificamente, a prevenção de quedas do leito constituem-se em um desafio para os serviços e profissionais de saúde.

Descritores: Sistemas de informação em saúde. Acidentes por quedas. Enfermagem.

Objetivo: identificar la prevalencia y caracterizar las muertes por caídas de lecho hospitalario en Porto Alegre, Rio Grande do Sul, Brasil. Método: estudio retrospectivo, con datos del Departamento de Informática del Sistema Único de Salud, realizado en 2015. Se utilizó la clasificación CID-10: W06 Caída de un lecho. Se calcularon frecuencia relativa, proporción de sexos y tasas de letalidad. Resultados: en la distribución por grupo de edad, se

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*verificó mayor número de muertes a partir de los 60 años. El sexo femenino predominó en el número total de muertes, pero hasta los 70 años murieron más hombres. Los coeficientes de letalidad aumentaron progresivamente en las tres esferas gubernamentales. Conclusión: las caídas no se caracterizaron como problema exclusivo de los pacientes, sino también de cuidadores e instituciones hospitalarias. Por eso, la promoción de seguridad del paciente y, específicamente, la prevención de caídas del lecho se constituye en desafío para servicios y profesionales de salud.*

*Descriptores: Sistemas de Información en Salud; Accidentes por Caídas; Enfermería.*

## Introduction

The safety of patients admitted to health services is one of the main concerns when discussing quality assurance systems. Falls suffered by patients during the hospitalization period are important intercurrences that demonstrate the lack of patient safety. Literature reveals that this topic has been among the main focuses of research, study, and intervention in hospital institutions, whether public or private. According to the World Health Organization (WHO), a fall is defined as an event which results in a person coming to rest inadvertently on the ground or other lower level[1] and its prevention is one of the six international patient safety goals.

Falls are listed as one of the major adverse events in the hospital environment, accounting for two out of five care-related events[2]. They are characterized as multifactorial events, usually unexpected and involuntary, that may be recurrent in the same individual and often have consequences for the victim, caregiver, and society[3]. According to the WHO, falls are the second leading cause of accidental or unintentional injury deaths, second only to traffic accidents. Estimates show that 391,000 people died worldwide in 2002 because of falls[1].

Research indicates that falls occur mainly from standing height, during the night shift, in the room or bathroom, often with the presence of a companion[2,4-5]. Factors associated with falls in the hospital include reduced muscle strength, visual deficit, high-risk classification in the Morse Fall Scale (MFS), age over 65 years, and multiple pathologies[6]. Impaired balance and decreased mental status are still reported in the literature as risk factors for falls[4].

In this context, it is possible to understand, from the beginning of hospital stay, how much the patients and family members are subject to the risk of suffering errors and preventable adverse events, considering that all professionals are responsible for the quality of care and their safety. Nevertheless, nurses play a greater part in care. Therefore, nursing professionals emerge as a liaison agent between the health system and the patient, having a fundamental role in promoting patient safety, if their attention is focused on the care of the patient rather than on correcting failures in care delivery. Nursing care for patients at risk for falls includes patient and family counseling about risks and prevention of falls, keeping elevated bed rails, the call button close to the patient, and the belongings within reach[7], besides the professionals vigilance. Nonetheless, this care does not replace the direct attention of the professional, which involves maintaining an adequate quantity of personnel for the demands of these patients. Such aspect is often underestimated by health institutions.

Vigilance by nursing professionals requires the mobilization and encouragement of proactivity and articulation to perform actions that improve the health system, with patient safety as goal. It is important to invest in a safety culture through the dissemination of concepts and non-punitive discussion of adverse events. The occurrence of these events brings several problems for nursing professionals, due to emotional stress, ethical precepts, and legal punishments to which they are exposed. In addition to the occurrence of adverse events, the context of the failure must be understood, which may involve work overload, lack of professional knowledge,

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lack of communication, and poor institutional infrastructure[8].

Monitoring adverse events, such as falls, through notifications enables the analysis of distribution of events and the delimitation of areas and groups at greater risk. It also favors the planning, management, and evaluation of nursing actions focused on patient safety[5]. In Brazil, Sentinela Network was created to construct a national service network prepared to notify adverse events and technical complaints of health products, guaranteeing the best products on the market and more safety and quality for patients and health professionals[9].

The relevance of this study is based on the current global discussion on patient safety and international goals, including reducing the risk for falls and pressure injuries, which points to the need of better planning nursing care to decrease the number of deaths. In this perspective, this article intends to answer the following question: How are the deaths due to falls from hospital beds distributed in Porto Alegre, Rio Grande do Sul, and Brazil, considering sex, age group, and historical series?

This study aimed to identify the prevalence and characterize deaths due to falls from hospital beds in Porto Alegre, Rio Grande do Sul, and Brazil.

With the results found in this research, we expect to contribute to inform and direct health professionals in health care planning and decision-making, to prevent falls, and improve the quality of care provided to users.

## Method

This is a retrospective study based on secondary data on mortality. The study population comprised victims of falls from hospital beds between 2003 and 2013. Chapter XX of the International Classification of Diseases tenth revision (ICD-10) was used, coded as W06 – Fall involving bed.

The study took place in the database of the Mortality Information System (SIM), the Hospital Information System of the Unified Health System (SIHSUS), the Unified Health System's

Informatics Department (DATASUS), and the Ministry of Health (MS). The variables selected in the database were: geographic area of Brazil, Rio Grande do Sul, and Porto Alegre; gender; age group; mortality by residence; mortality by falling from bed. Data on the number of hospital admissions were also used.

The temporal delimitation (2003-2013) was stablished due to the availability of data in the information systems consulted. Data from 2003 were intentionally used to compare the minimum period of 10 years, supporting a better data comparison and discussion.

Data collection occurred in September 2015. Crossed data was conducted and saved in the CSV file format. Data analysis was temporal, through secondary data, which were organized in a new Microsoft Excel spreadsheet to enable calculations of relative frequency, sex ratio, and lethality rates.

The relative frequency calculation was used for comparative purposes. The numerator is the total number of deaths per sex and the denominator, the total number of deaths due to falls from bed, according to geographic area. Sex ratio was calculated to better elucidate the situation, considering the numerator as the number of deaths due to falls from bed among males and the denominator, number of deaths due to falls from bed in females.

Using the number of hospital admissions, according to the year studied, the coefficient of lethality per fall from bed was calculated. The numerator is represented by the number of deaths per fall from bed and the denominator is the number of hospital admissions (population exposed).

Since the present study worked with data provided by the Ministry of Health (MS), published on-line, and because there are no variables that allow the identification of the research subjects, it did not require the analysis from the Research Ethics Committee (CEP).

## Results

Data collection demonstrated the occurrence of 2,198 deaths due to falls from hospital beds

in Brazil in the period studied (2003-2013). The state of Rio Grande do Sul (RS) registered 101 deaths and Porto Alegre (POA), 26 deaths due to fall from bed. The total gender distribution of deaths (Table 1) reveals a higher number of deaths among females than in males, a tendency followed in the three geographic spheres studied.

**Table 1 –** Gender distribution of deaths due to falls from hospital beds according to the geographical variable. Porto Alegre, Rio Grande do Sul, and Brazil – 2003-2013

| Geographic variable | Male | | Female | |
|---|---|---|---|---|
| | N | Frequency (%) | N | Frequency (%) |
| Brazil | 1,082 | 49.23 | 1,116 | 50.77 |
| Rio Grande do Sul | 41 | 40.59 | 60 | 59.41 |
| Porto Alegre | 09 | 34.61 | 17 | 65.39 |

Source: Mortality Information System/DATASUS/MS.

The calculation of sex ratio allows to conclude that, in Brazil, 96 men die from a bed fall for every 100 women; in RS, 68 men die for every 100 women; and in POA, 52 men die for every 100 women.

In Brazil, the analysis of the total number of deaths due to falls from hospital beds distributed by sex shows a greater number of female deaths, even with a minimum difference (1,116 female deaths and 1,082 male deaths). However, in the analysis of the occurrence of deaths due to bed fall in the same period, distributed by age group and sex, according to Graphic 1, female deaths are not always predominant in Brazil. Under the age of 70 years, there is a higher number of deaths in males. But over the age of 80 years, there is a trend reversal, with a higher number of deaths among females.

**Graphic 1 –** Deaths due to falls from hospital beds distributed by sex and age group. Brazil – 2003-2013
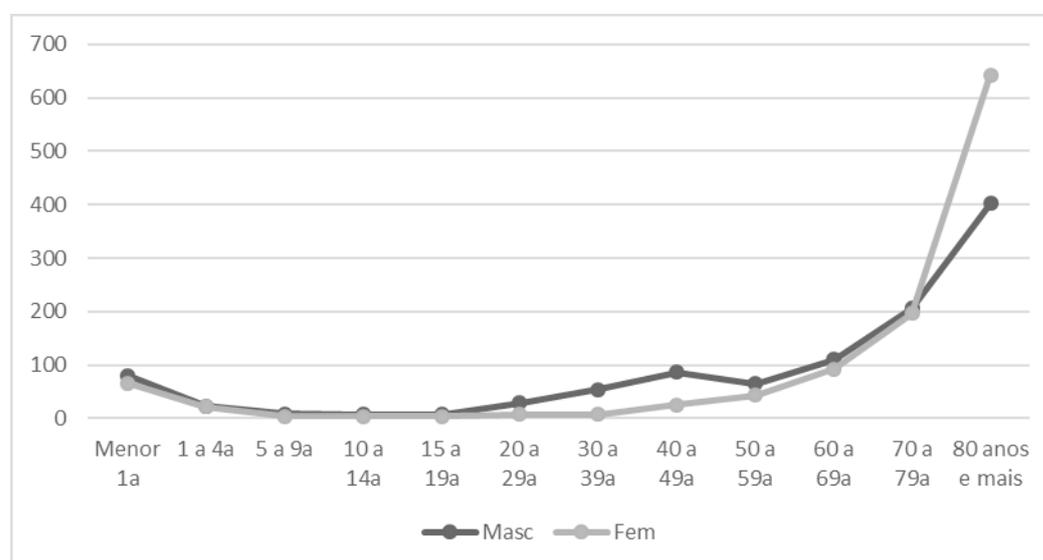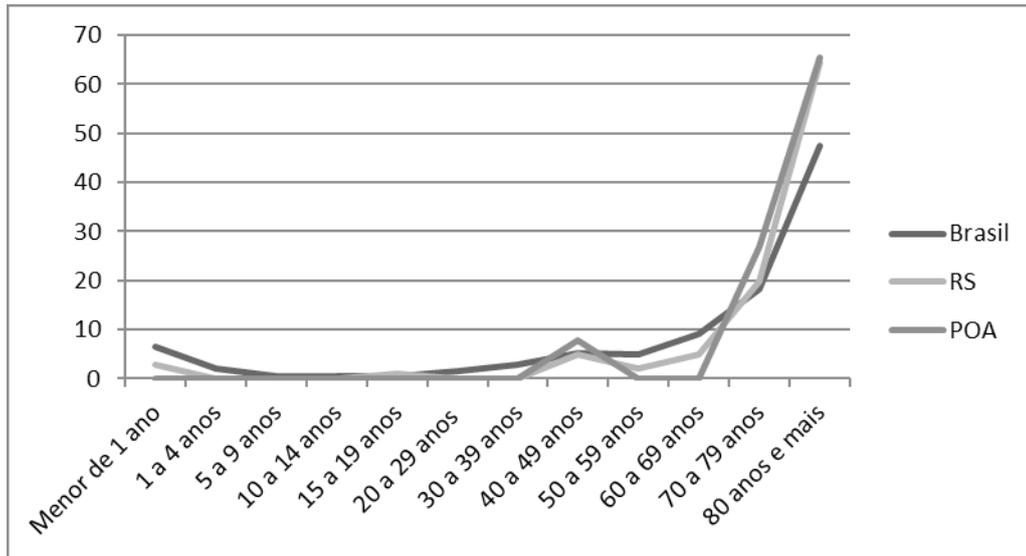


Source: Created by the authors based on data collected in DATASUS.

Graphic 2 presents the age group distribution of deaths from bed fall between 2003 and 2013 in the three geographic spheres. It presents a trend of higher number of deaths from the age group of 60 years, along with the peak of deaths in the age group of 40 to 49 years. Deaths with unknown age were not presented in the graph, since they represented only 0.14% of deaths due to bed fall in Brazil.

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**Graphic 2 –** Deaths due to falls from hospital beds distributed by age group. Brazil, Rio Grande do Sul, and Porto Alegre – 2003-2013
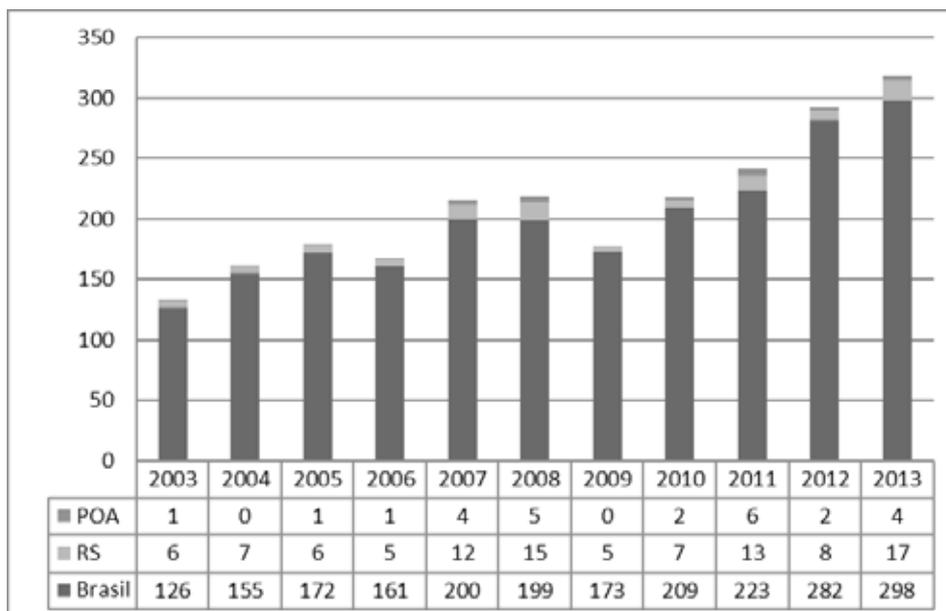


Source: Created by the authors based on data collected in DATASUS.

Graphic 3 presents the distribution of deaths from bed fall according to the year of occurrence. There is an increase in the number of deaths in 2007 and 2008, with a subsequent regression in 2009. As of 2010, in Brazil, there is a progressive increase in the number of deaths due to fall from bed. This trend is not observed at the state and local level, but it shows the same peak of deaths in 2007 and 2008. In 2011, there was also an increase in the number of deaths due to fall from bed. It is worth highlighting that, in the last year mentioned, there was a change in the Declaration of Death, allowing more detailed information, that influenced the results of this study.

**Graphic 3 –** Deaths due to falls from hospital beds distributed by year of occurrence. Brazil, Rio Grande do Sul, and Porto Alegre – 2003-2013



| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ POA | 1 | 0 | 1 | 1 | 4 | 5 | 0 | 2 | 6 | 2 | 4 |
| ■ RS | 6 | 7 | 6 | 5 | 12 | 15 | 5 | 7 | 13 | 8 | 17 |
| ■ Brasil | 126 | 155 | 172 | 161 | 200 | 199 | 173 | 209 | 223 | 282 | 298 |

Source: Created by the authors based on data collected in DATASUS.

The lethality coefficient for falls from bed was calculated considering the number of hospital admissions presented in Table 2. It was concluded that, in Brazil, the lethality rate increased progressively in the years studied, from 1.08/100,000 hospital admissions in 2003 to 2.66/100,000 hospital admissions in 2013.

In Rio Grande do Sul, the lethality rate increased from 0.79/100,000 hospital admissions in 2003 to 2.28/100,000 hospital admissions in 2013. Porto Alegre had the highest increase in lethality rate, from 1.02/100,000 hospital admissions in 2003 to 3.95/100,000 hospital admissions in 2013.

There was no defined trend identified in the historical series of Porto Alegre. The highest lethality rate was verified in 2011, with 6.52/100,000 hospitalizations.

**Table 2 –** Historical series of lethality rate due to falls from hospital beds per 100,000 hospitalizations. Brazil, Rio Grande do Sul, and Porto Alegre – 2003-2013

| Year | Brazil | Rio Grande do Sul | Porto Alegre |
|------|--------|-------------------|--------------|
| 2003 | 1.08 | 0.79 | 1.02 |
| 2004 | 1.34 | 0.92 | 0 |
| 2005 | 1.5 | 0.81 | 1.01 |
| 2006 | 1.41 | 0.67 | 1.03 |
| 2007 | 1.76 | 1.64 | 4.8 |
| 2008 | 1.85 | 2.1 | 5.42 |
| 2009 | 1.55 | 0.68 | 0 |
| 2010 | 1.84 | 0.96 | 2.05 |
| 2011 | 1.97 | 1.85 | 6.52 |
| 2012 | 2.54 | 1.11 | 2.03 |
| 2013 | 2.66 | 2.28 | 3.95 |

Source: Created by the authors based on data collected in DATASUS.

## Discussion

Study carried out with elderly people verified a higher number of falls among women, highlighting the higher life expectancy associated to this gender, thus corroborating the findings of this research[10]. It is worth noting that some articles indicate a greater number of falls from hospital beds among men[4-5,11-12].

The identification of the age group of elderly people (over 60 years of age) with the highest number of deaths due to fall from bed expresses the population aging that is taking place in the country. Several studies carried out in different institutions also point to the same fact: higher number of deaths due to fall from bed among the elderly[2,5,11].

Falls can be addressed as a "geriatric syndrome", given their higher occurrence in the elderly. The fact that the highest number of deaths due to falls is concentrated in this age group raises concern and demonstrates that the consequences of this type of accident in the elderly have a relevant repercussion and constitute a challenge for the health services[3,6]. In addition to the elderly being more prone to fall, this group also presents lower defenses when falling, both due to movement limitations and reduced reflexes and sensory acuity[3].

In emergency units, it is verified that most of the elderly who seek the service suffered falls. In the analysis of the outcome of these falls, it is observed that elderly people present the most serious injuries, such as intracranial lesions[13]. Nevertheless, there are reports of more frequent falls in patients aged less than or equal to 57 years[4]. It is also pointed out that the age group from 40 to 59 years had the second largest number of falls in a university hospital in the South of Brazil, corroborating the data found in this study[5].

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Observing the historical series enables to verify that the number of deaths due to falls from hospital beds, at the national level, has increased progressively. Longitudinal study conducted in a hospital in Portugal, between 2007 and 2009, also demonstrated a progressive increase in the number of falls, being justified by the awareness of health professionals about the relevance of reporting falls[6].

The analysis of the historical series of lethality rates has shown an increase in recent years. Nonetheless, based on official data, it can be verified that both the state and the municipality of São Paulo present values close to those found in Rio Grande do Sul and Porto Alegre. The state of São Paulo presents lethality rate due to bed fall of 2.6/100,000 hospitalizations, while the municipality presents 3.61/100,000 hospitalizations[14]. Despite finding similar values in other places, it can be inferred that the care quality in the three governmental spheres has decreased, since falls are predictable and avoidable events.

In a study carried out in the United States of America, between 1999 and 2000, the analysis of death certificates of elderly people showed that the lethality rate for falls increased by 43% in the period studied[15]. To reduce the number of falls in hospitalized patients, private health and insurance plans in some countries are not passing on the values generated by fall incidents or their consequences for the patient. The costs are covered by the hospital institution that caused the adverse event. This study highlights that such action has already impacted the number of falls in hospitalized patients, decreasing their occurrence and injuries[16].

The importance of nurses to identify the patients at risk for falls is emphasized, since their evaluation at the moment of hospital admission and the prescribed care after this evaluation allow a significant reduction in the number of falls when compared to patients who were not evaluated and prescribed[17]. Furthermore, it is observed that the falls assisted are likely to cause fewer injuries and occur in a smaller number in the patients identified[12].

Study conducted with nurses identified the need to incorporate scientific evidence in nursing practice, seeking to guarantee the provision of safe and harmless care supported by the best actions translated into quality of care. There have been barriers in promoting patient safety, such as lack of materials and equipment, and nurses work overload[18]. We report the absence of statistical significance between the safety variables of the individual use environment and the occurrence of falls, thus highlighting the vigilance of professionals involved in care, as well as health education for both patients and caregivers[19].

Moreover, study indicates that several factors, such as the relationship between doctors and nurses, organizational support and hospital management, education to improve the quality of care, participation in the decision-making process, and the adequacy of resources, influence the occurrence of adverse events. It also emphasizes the need to discuss the current nursing process in hospital institutions[20].

As a limitation of this study, we mention that only falls that occurred from hospital beds were evaluated, thus not covering other types of falls that patients may suffer in the hospital, such as falling from standing height and falling from a chair. In the discussion, it was verified that most of the studies related to this question address the profile of patients who fall, but not of the patients who evolve to death due to the fall.

It is also important to consider the limitations regarding the quality of the data recorded in the SIM, which does not invalidate its analysis and the contribution of this study to the knowledge about the health situation of the population. The values presented and calculated may be influenced by the quality of the information registered in the Declarations of Death (DD).

## Conclusion

Results found in this study reveal the importance of using the statistical data generated by official health care agencies, both for the

knowledge on the health situation of the community and for subsidizing public policies.

This study demonstrated that, in the analysis of the total number of deaths due to falls from hospital beds, there is a predominance of females. But when crossing sex data with age group, a higher number of deaths in men under 70 years of age is verified in Brazil, and the age group over 60 years of age presents the highest occurrence of deaths due to fall from bed. Considering the lethality rates, there was an increase in their values, with special reference to the results from Porto Alegre, which went from 1.02 deaths per 100,000 hospitalizations in 2003 to 3.95 deaths per 100,000 hospitalizations in 2013.

It is concluded that falls constitute a problem not only for the patients, but also for caregivers and hospital institutions. For this reason, promoting patient safety and specifically the prevention of falls from bed are a challenge for health services and professionals. Considering that bed falls are predictable and preventable events, nursing emerges as a fundamental factor to evaluate the patient risk for falls and to adopt measures aimed at avoiding this negative outcome.

We hope that the results of this study stimulate health professionals to incorporate practices aimed at identifying the conditions that represent risk factors for bed falls, correcting what is amenable to treatment, and guiding patients and family, to improve the quality of care and prevent the most number of deaths as possible.

## Collaborations

1. conception, design, data analysis and interpretation: Amanda Bierhals Bausch, Graciele Fernanda da Costa Linch, Adriana Aparecida Paz and Alísia Helena Weis Pelegrin;

2. drafting of the article, relevant critical review of the intellectual content: Amanda Bierhals Bausch, Roberta Waterkemper, Graciele Fernanda da Costa Linch, Adriana Aparecida Paz and Alísia Helena Weis Pelegrini;

3. final approval of the version to be published: Amanda Bierhals Bausch, Roberta Waterkemper and Alísia Helena Weis Pelegrini.

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