

Original article

Hospitalization and mortality by fall among the elderly in Rio Grande do Norte – A time series study

Internação e mortalidade por quedas em idosos no Rio Grande do Norte – Estudo de série temporal

Racklayne Cavalcanti¹, Ana Carolina Patrício de Albuquerque Sousa¹, Lizie Brasileiro¹, Túlia Garcia¹

¹ Federal University of Rio Grande do Norte, Multicampi School of Medical Sciences, Caicó, Rio Grande do Norte, Brazil

* Corresponding: racklayne.r@gmail.com

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Abstract

Objective: checking cases of hospitalization and mortality from fall in the elderly, in Rio Grande do Norte / Brazil, from 2008 to 2018. **Methods:** an epidemiological time series study with data from hospital admission through the Unified Health System (SIH-SUS) and the Mortality Information System (SIM-SUS), accessed from August to October 2019. The analyzed records corresponded ICD 10 and codes W00 to W19, belonging to the category “fall”. **Results:** there was an increase of approximately 247% in the number of hospitalizations due to falls in the elderly during the period studied. Higher hospitalization rates (38.53%), costs (46.14%) and lethality (5.76 per 100 elderly) were in the age group of 80 years old or over. **Conclusion:** these results confirm the magnitude of the problem and point out to the importance of preventive strategies for the prevention of falls in the elderly population.

Keywords: health of the elderly; accidental falls; hospitalization; mortality.

Resumo

Objetivo: verificar os casos de internação e de mortalidade por quedas em pessoas com 60 anos ou mais, no estado do Rio Grande do Norte (RN), no período de 2008 a 2018. **Métodos:** trata-se de um estudo epidemiológico de série temporal, com dados do Sistema de Internação Hospitalar do Sistema Único de Saúde (SIH-SUS) e do Sistema de Informações sobre Mortalidade (SIM), acessados no período de agosto a outubro de 2019. Os registros analisados corresponderam aos códigos W00 a W19, referentes a quedas. **Resultados:** observou-se um aumento de aproximadamente 247% no número de internações por quedas em idosos no período estudado. Maiores taxas de internação (38,53%), custos (46,14%) e letalidade (5,76 a cada 100 idosos) foram na faixa etária de 80 anos ou mais. **Conclusão:** tais resultados confirmam a magnitude do agravo e apontam a importância de estratégias preventivas de quedas na população idosa.

Palavras-chave: saúde do idoso; acidentes por quedas; hospitalização; mortalidade.

Introduction

Population aging is a natural, irreversible, and worldwide phenomenon, defined as the change in the age structure of the population, with a proportional increase in people aged 60 years old or over¹. World life expectancy, according to the United Nations², reached 72.6 years old in 2019, reaching 77.1 years old in 2050. It is estimated that 20% of the total Brazilian population in 2050, is of elderly³.

The aging process encompasses structural, physiological, and functional changes in all systems of the human body, directly influencing the social and quality of life aspects of the elderly⁴. Such morphological and functional changes are attributed to the effects of the years on the body and, when associated with the presence of diseases or drug reactions, increase the chances of falls in this population^{5,6}.

The fall consists of the unintentional displacement of the body to a level lower than the initial position with the inability to correct in a timely manner, resulting from the loss of postural balance, which may be related to the sudden insufficiency of the neural and osteoarticular mechanisms involved in keeping posture^{7,8}.

Falls are associated with high morbidity and mortality rates, constituting the sixth cause of death in the elderly and representing one of the main reasons for hospitalizations and early institutionalization in Brazil, being characterized as a health problem on the rise^{9,10}.

It is known that the aging process brings with it an increase in the incidence of diseases, which associated with higher ambulatory frequency and longer periods of hospitalization, overload the health system and cause a strong financial impact at all levels of care¹¹. Thus, the present study aimed to verify the number of hospital and mortality hospitalizations, as well as the total and individual costs due to falls in the elderly, in the State of Rio Grande do Norte, from 2008 to 2018.

Materials and Methods

Epidemiological study, ecological type, and time series. The study population consisted of elderly individuals submitted to hospitalization and/or death from a fall in the State of Rio Grande do Norte (RN). There was selected the age group from 60 to 69 years old, 70 to 79 and 80 years old or over in all categories, as well as the year of care from January 2008 to December 2018.

The data collected had as a source of information the databases made available by the Information Department of the Unified Health System (DATASUS) on its website, accessed from August to October 2019. In the Mortality Information System (SIM) and the Hospital Admission System (SIH), information was obtained regarding hospitalization, hospitalization cost and deaths in the period studied, referring to the International Statistical Classification of Diseases and Health-Related Problems (Tenth Revision), ICD-10, code W00 to W19, belonging to the category "falls".

The data were analyzed using descriptive statistics (absolute and relative frequency, ratios), presented in tables and graphs, using the WPS program *Spreadsheets*. The number of hospitalizations, the total cost, and the number of deaths per fall were obtained in absolute numbers of occurrence for each year and age group, according to code W00 to W19. The individual cost of hospitalization per fall was obtained by dividing the total amount of hospitalization by fall by the number of hospitalizations per fall, for each year and age group. The lethality per fall refers to the number of deaths divided by the number of hospitalizations per fall, for year and age group, multiplied by 100.

The information obtained in this study came from secondary and public databases, justifying the release of submission of the project to the Ethics and Research Committee, according to resolution 510/16, of the National Health Council of the Ministry of Health.

Results

Table 1 shows the number of hospitalizations, total costs, individual cost, and lethality of hospitalizations per falls in the elderly for each year and age group studied, in the State of Rio Grande do Norte. According to the data obtained, in the period from 2008 to 2018 there were 16,593 hospital admissions for falls among the elderly. Of these hospitalizations, 30.45% corresponded to the age group from 60 to 69 years old, 31.01% to the elderly aged 70 to 79 and 38.53% to those 80 years old or over. Regarding the expenses with these hospitalizations, R\$ 23,889,820.04 were spent, 23.87% of which were related to hospitalizations of elderly people aged 60 to 69 years old, 29.99% for elderly people aged 70 to 79 years old and 46.14% for those aged 80 or older. It can also be observed that the ratio between the amounts paid and the number of hospital admissions increased progressively with age (Table 1).

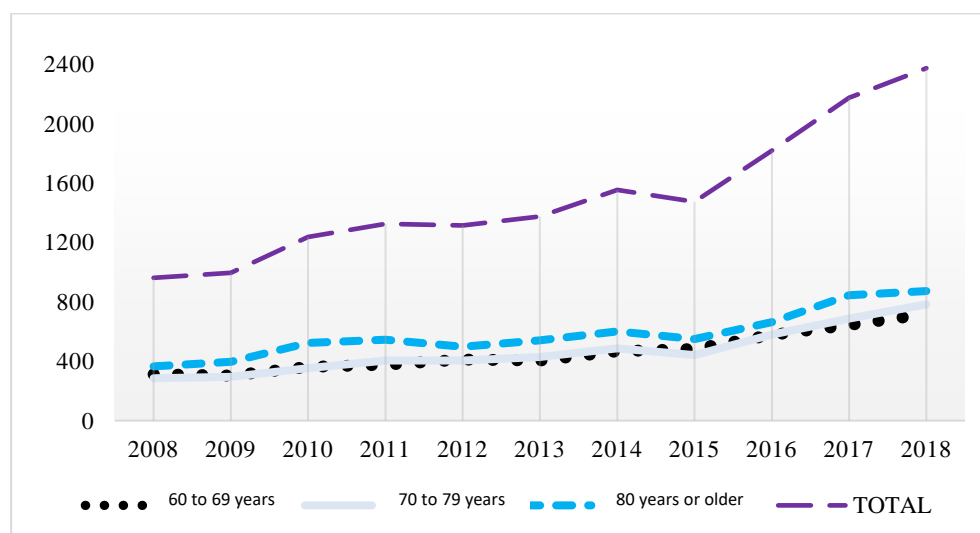
When observing the mortality of elderly people due to falls, it was observed that the number of deaths increased with advancing age. Thus, the lethality of hospitalization by falls was 1.72% for elderly aged 60 to 69 years old, 2.75% aged 70 to 79 and 5.76% for the elderly over 80 years old (Table 1).

Table 1. Number of hospitalizations, total costs, cost/hospitalization ratio, deaths, and mortality rate due to falls of the elderly, in the State of Rio Grande do Norte, in the period from 2008 to 2018.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	TOTAL	%
NUMBER OF HOSPITALIZATIONS													
60 to 69 years old	311	303	362	376	410	405	467	483	576	643	717	5053	30,45
70 to 79	285	295	352	404	405	428	486	442	580	686	783	5146	31,01
≥ 80	365	396	523	545	498	540	600	549	662	844	872	6394	38,53
TOTAL	961	994	1237	1325	1313	1373	1553	1474	1818	2173	2372	16593	100
TOTAL COSTS													
60 to 69 years old	R\$385.103	R\$389.846	R\$375.871	R\$399.158	R\$522.683	R\$445.626	R\$508.002	R\$514.088	R\$670.796	R\$625.405	R\$850.575	R\$5.687.159	23,81
70 to 79	R\$485.955	R\$518.461	R\$561.271	R\$650.572	R\$635.890	R\$535.734	R\$671.597	R\$585.318	R\$683.033	R\$750.018	R\$1.069.618	R\$7.147.473	29,92
≥ 80	R\$816.225	R\$989.680	R\$1.072.577	R\$1.048.755	R\$1.022.563	R\$899.661	R\$963.630	R\$799.498	R\$864.085	R\$1.118.785	R\$1.399.711	R\$10.995.177	46,02
TOTAL	R\$1.687.284	R\$1.897.989	R\$2.009.721	R\$2.098.486	R\$2.181.137	R\$1.881.022	R\$2.143.230	R\$1.898.905	R\$2.217.916	R\$2.494.209	R\$3.319.905	R\$23.829.810	100
COST/ HOSPITALIZATION													
60 to 69 years old	R\$ 1.238	R\$ 1.286	R\$ 1.038	R\$ 1.061	R\$ 1.274	R\$ 1.100	R\$ 1.087	R\$ 1.064	R\$ 1.164	R\$ 972	R\$ 1.186	R\$ 1.125	-
70 to 79	R\$ 1.705	R\$ 1.757	R\$ 1.594	R\$ 1.610	R\$ 1.570	R\$ 1.251	R\$ 1.381	R\$ 1.324	R\$ 1.177	R\$ 1.093	R\$ 1.366	R\$ 1.388	-
≥ 80	R\$ 2.236	R\$ 2.499	R\$ 2.050	R\$ 1.924	R\$ 2.053	R\$ 1.666	R\$ 1.606	R\$ 1.456	R\$ 1.305	R\$ 1.325	R\$ 1.605	R\$ 1.719	-
TOTAL	R\$ 1.755	R\$ 1.909	R\$ 1.624	R\$ 1.583	R\$ 1.661	R\$ 1.370	R\$ 1.380	R\$ 1.288	R\$ 1.219	R\$ 1.147	R\$ 1.399	R\$ 1.436	-
DEATHS													
60 to 69 years old	7	2	4	7	8	6	7	10	6	10	20	87	15,18
70 to 79	9	10	11	16	16	13	16	7	18	13	13	142	24,78
≥ 80	23	25	30	28	23	37	25	29	37	42	45	344	60,03
TOTAL	39	37	45	51	47	56	48	46	61	65	78	573	100
LETHALITY RATE													
60 to 69 years old	2,25	0,66	1,1	1,86	1,95	1,48	1,5	2,07	1,04	1,56	2,79	1,72	-
70 to 79	3,16	3,39	3,13	3,96	3,95	3,04	3,29	1,58	3,1	1,9	1,66	2,75	-
≥ 80	6,3	6,31	5,74	5,14	4,62	6,85	4,17	5,28	5,59	4,98	5,16	5,36	-
TOTAL	4,06	3,72	3,64	3,85	3,58	4,08	3,09	3,12	3,36	2,99	3,29	3,45	-

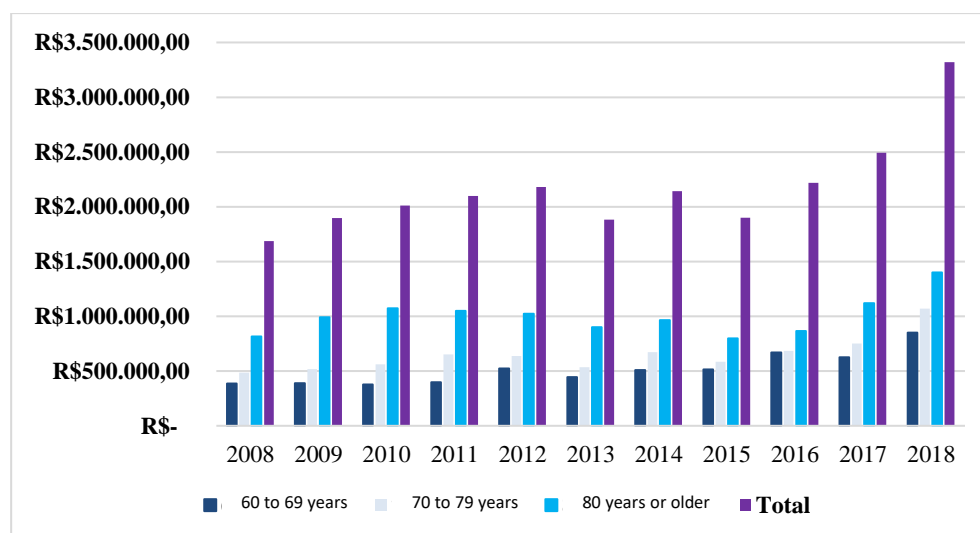
Figure 1 shows the number of hospitalizations due to falls in the elderly over the period investigated, revealing an upward trend in all age groups; so that the number of occurrences increased 247% from 2008 to 2018, in the State of Rio Grande do Norte. Figures 2 and 3 show the costs of total and individual hospitalization, respectively, for each year and age group, revealing that the costs were higher in the octogenarians. However, there was a tendency to reduce individual costs over the course of the year for all age groups.

Figure 1. Description of the number of hospital admissions per fall, by year and age group.



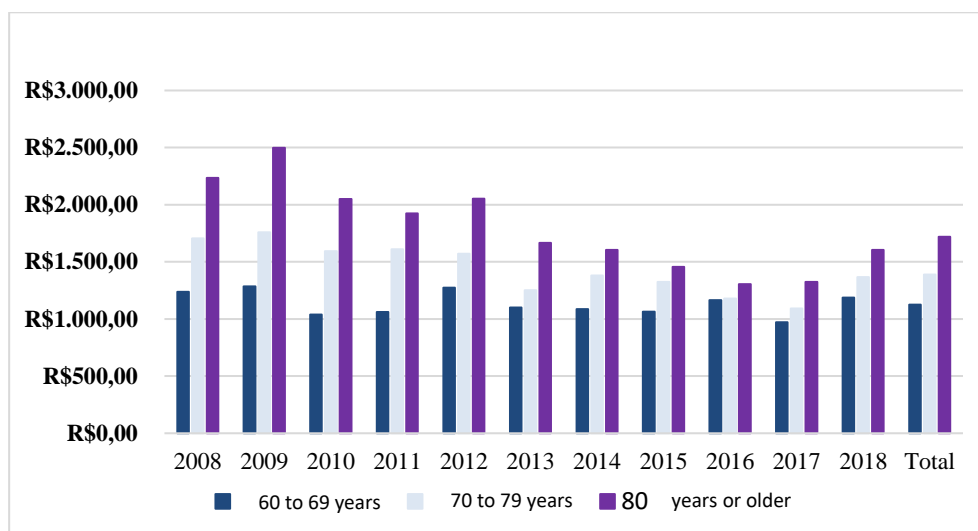
Source: Own elaboration from data from DATASUS, through the SIM and SIH system.

Figure 2. Cost of hospital admissions per fall, per year and age group.



Source: Own elaboration from data from DATASUS, through the SIM and SIH system.

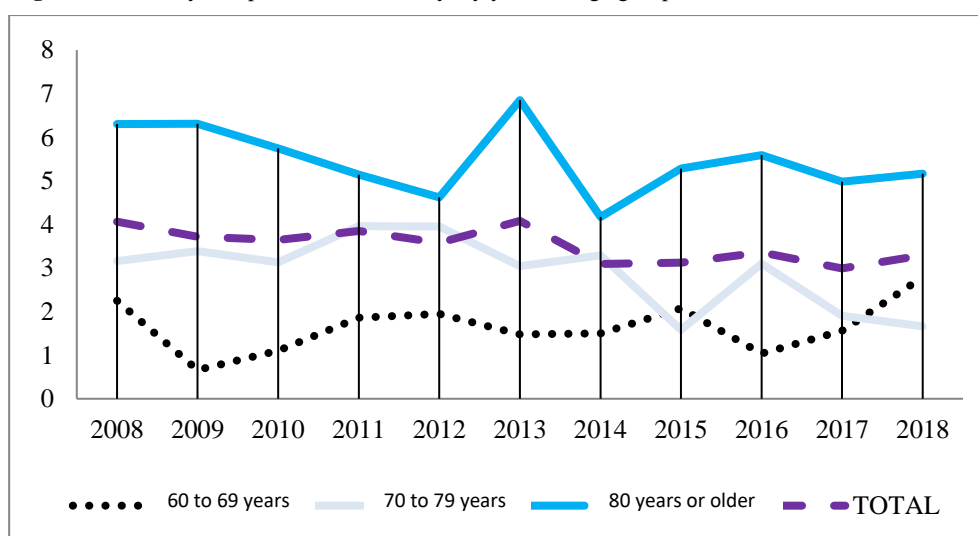
Figure 3. Cost of individual hospital admissions per fall, per year and age group.



Source: Own elaboration from data from DATASUS, through the SIM and SIH system.

Figure 4 shows the mortality rate of hospitalizations per fall over the period investigated, revealing a decrease in lethality in the State of Rio Grande do Norte, despite the peak observed in 2013.

Figure 4. Mortality rate per fall in the elderly, by year and age group.



Source: Own elaboration from data from DATASUS, through the SIM and SIH system.

Discussion

There was a 246.8% increase in the number of hospitalizations due to falls in the elderly population in the State of Rio Grande do Norte, from 961 hospitalizations in 2008 to 2,372 hospitalizations in 2018. The progressive increase in elderly people over 60 years of age is one of the reasons for the upward curve in the number of falls in this population^{12,13,14,15,16}.

Since population aging is a worldwide phenomenon, the number of injuries due to several factors affects the elderly population, among these, falls have contributed to the increase in hospital admissions, producing a high hospital cost with care and management of public health resources, besides leading to negative outcomes for the elderly^{17,18}.

It is noticed that, in all the years studied, the number of hospitalizations was higher in the age group of 80 or older, reflecting higher hospitalization costs. Several authors report that advanced age is one of the main risk factors that

determine the occurrence of falls^{10,19,20,21,22,23} and this is due to structural and functional changes that occurred during the aging process, which can affect the performance of motor skills, agility, reaction time, balance and muscle strength, making the elderly more susceptible to falls^{10,21}.

It is known that the increasing number of occurrences of falls among the elderly can compromise their health and negatively impact their quality of life²⁴. In addition to fractures, head injuries and risk of death, falls cause restrictions on daily life activities and functionality, decrease quality of life and increase the occurrence of hospitalization^{19,25}. This results in high economic and social costs for the health system, especially when there is a compromise of the individual's independence and the need for specialized care at home or in long-term institutions¹⁰.

When evaluating the costs resulting from hospital admissions due to falls in the elderly population in the State of Rio Grande do Norte, 46.14% of the expenses evidenced were in the age group of 80 or older, which shows a direct relationship with the number of hospitalizations computed in this period. The increase in expenditure on the health of the elderly is not explained by the increase in the costs of procedures, but by the frequency of hospitalizations²⁵.

Considering the lethality rate of the elderly due to falls, over the years there was a decline, from 4.06 to 3.29, suggesting slight improvements in health care measures. However, when analyzed according to age group, it can be observed that the mortality rate increases as age increases. The same was evidenced in other studies^{18,26}, who found a higher lethality rate due to falls in elderly aged 80 or older.

It is notepoint that, in hospitalizations of the elderly, functional loss associated with multicomorbidities is linked to increased length of hospital stay and mortality, requiring greater multiprofessional care, starting from rehabilitation programs to home care, resulting in greater use of services and, consequently, in high health costs¹⁸.

Falls are one of the main causes of morbidity and mortality in the elderly population²¹. These are recurrent events, with harmful impacts on the health of the elderly and significant repercussions for the health system, often resulting in recurrence of falls, functional declines, increased risk of institutionalization and consumption of care services^{21,27}.

Due to these circumstances, some authors^{17,25,28,29} emphasize that a public health policy that turns its attention to reducing hospitalizations due to falls in the elderly, through investment and support to health promotion and prevention programs, would be able to reduce the prevalence of falls, as well as the corresponding costs, within the scope of the SUS. Actions of popular and permanent education, in addition to the identification of the population groups at higher risk and environmental factors that favor the occurrence of falls, can also contribute to the reduction of the occurrence of this event¹⁷.

Population aging not tied to the necessary infrastructure changes and other preventive measures that promote a better quality of life for the population may be a triggering factor for the growing number of elderly people who suffer some episode of fall. Certain risk factors are preventable, and it is up to managers and health professionals to invest in preventive programs capable of minimizing the risk of falls in this population¹⁷.

Conclusion

This study presented some limitations. The variation in the quality of records of information systems over the years studied may have influenced the observed results. In the study, it was observed that the number of hospitalizations and the rate of lethality per falls in the elderly were higher in the age group of 80 or older, which also reflected in higher hospitalization costs. Therefore, it is of great importance that management and health professionals contribute through prevention and health promotion programs, aiming to foster attitudes and implement activities to control preventable risk factors.

Conflict of interest: The authors stated that there was no conflict of interest.

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