Causes of hospital admissions and deaths among Brazilian elders between 2005 and 2015

Causas de internação hospitalar e óbito em idosos brasileiros entre 2005 e 2015

Causas de internación hospitalar y óbito en los adultos mayores brasileños entre 2005 y 2015

Caroline Rossetto[a] (iD)
Juana Vieira Soares[a] (iD)
Mayara Lindner Brandão[a] (iD)
Ninon Girardon da Rosa[a] (iD)
Idiane Rosset[a] (iD)

ABSTRACT

Objective: To analyze the ranking and percentage variation of the main causes of hospital admissions and death of Brazilian elders between 2005 and 2015, according to gender and age groups.

Method: Retrospective and temporal analysis study. The six main causes of hospitalization and death of elders were collected in *DATASUS* according to sex and age groups (60 ~ 79, ≥80) in 2017.

Results: Heart Failure (2005) and pneumonia (2015) were the two main causes of hospital admissions in both sexes and age groups, except for the younger group. Acute Myocardial Infarction was the main cause of death in 2005 and 2015. The second cause in the overall ranking was the Stroke in 2005 and Pneumonia in 2015.

Conclusion: Circulatory and respiratory diseases were the main causes of hospital admissions and death among the elderly, highlighting the impotant increase in pneumonia as a cause of morbimortality.

Keywords: Indicators of morbidity and mortality. Aged. Unified Health System.

RESUMO

Objetivo: Analisar o *ranking* e a variação percentual das principais causas de internação e óbito de idosos brasileiros entre 2005 e 2015, de acordo com sexo e grupos etários.

Método: Estudo retrospectivo, de análise temporal. As seis principais causas de internação e óbito de idosos foram coletados no DATASUS, segundo o sexo e grupos etários (60~79; ≥80), em 2017.

Resultados: A Insuficiência Cardíaca (2005) e a pneumonia (2015) foram as duas principais causas de hospitalizações em ambos os sexos e grupos etários, exceto em idosos mais jovens. O Infarto Agudo do Miocárdio foi a principal causa de óbito em 2005 e 2015. Já a segunda causa no ranking geral foi o Acidente Vascular Cerebral em 2005, e a Pneumonia em 2015.

Conclusão: As doenças do aparelho circulatório e respiratório foram as principais causas de hospitalização e óbito entre os idosos, destacando-se o significativo aumento da pneumonia como causa de morbimortalidade.

Palavras-chave: Indicadores de morbimortalidade. Idoso. Sistema Único de Saúde.

RESUMEN

Objetivo: Analizar el ranking y la variación porcentual de las principales causas de internación y muerte de adultos mayores brasileños entre 2005 y 2015, de acuerdo con sexo y grupos de edad.

Método: Estudio retrospectivo, de análisis temporal. Las seis principales causas de internación y muerte de adultos mayores fueron recogidas en el DATASUS, según el sexo y grupos de edad (60 ~ 79; ≥80), en 2017.

Resultados: La Insuficiencia Cardiaca (2005) y la neumonía (2015) fueron las dos las principales causas de hospitalizaciones en ambos sexos y grupos de edad, excepto en ancianos más jóvenes. El infarto agudo de miocardio fue la principal causa de muerte en 2005 y 2015. La segunda causa en el ranking general fue el accidente vascular cerebral en 2005 y la neumonía en 2015.

Conclusión: Las enfermedades del aparato circulatorio y respiratorio fueron las principales causas de hospitalización y muerte entre los ancianos, destacándose el significativo aumento de la neumonía como causa de morbimortalidad.

Palabras clave: Indicadores de morbimortalidad. Anciano. Sistema Único de Salud.

[a] Universidade Federal do Rio Grande do Sul (UFRGS), Escola de Enfermagem. Porto Alegre, Rio Grande do Sul, Brasil.

■ INTRODUCTION

Populations grow old all over the world, though there are a few differences in the aging process between developed and developing countries. France had approximately 150 years to adapt to this phenomenon, while other countries such as Brazil, China and India age fast and intensely, having just over 20 years to perform the same adaptation. It is expected that between the years of 2015 to 2050 the world population over 60 years old will nearly double from 12% to 22%[1]. Alongside the elderly population growth is the extension of their longevity, with the accelerated expansion of elders over 80 years, increasing in number. In 2015 there were 125 million, while expectations for 2050 are 434 millions[2-3]. In 2018, the elderly population in Brazil, those at age 60 or above, represented around 13% of Brazilians. In 2060 this population will represent around 32% of the Brazilian population[4].

The accelerated populational aging occurs along with the epidemiologic transition, modifying the mobimortality profile. In Brazil there is a triple load of disease profiles, sustaining the incidence of some infectious and contagious diseases, along with the increase of morbimortality due to Noncommunicable Chronic Diseases (NCCD) and an expressive growth of external causes[1]. Elders also tend to use more healthcare services, presenting higher hospital admission rates when compared to other age groups[5-6]. The main causes of hospital admissions among elders found in Brazilian literature are related to brain and cardiovascular diseases, chronic respiratory diseases, constant increase of neoplasms and external causes, ostheomyoarticular diseases and to the gastrointestinal system[6-7]. Up until the year 2020 the NCCD represented 78% of deaths in the world, generating higher demands for hospital admissions, drug treatment, and rehabilitation[5-8]. Hospitalizations are sometimes necessary, although they can lead to risks to the elders' health integrity, aggravating some heath conditions and decreasing the functional capacity of the elderly.

Thus, knowing the causes of hospitalization and deaths is of great interest, specially to to strengthen the monitoring of those pathologies at the primary care level and to guide the public policies planning. Such results may be able to give support to health professionals in the implementation of health promotion and disease prevention actions, minimizing or avoiding unnecessary hospitalizations of the elderly population. Therefore, this study aimed to analyze the ranking and percentage variation of the main causes of hospital admissions and deaths of the Brazilian elderly from 2005 to 2015, according to gender and age groups.

■ METHOD

This is a retrospective study, with temporal analysis. Secondary data were used regarding the main causes of hospital admissions and deaths of Brazilian elders aged ≥ 60 years, from 2005 to 2015, considering the last decade of available information during the data collection period. Data were collected in 2017 at the Informatics Department of the Unified Health System (DATASUS) through the Hospital Information Systems (SIH) and the Mortality Information System (SIM). The SIH gathers 80% of the data regarding hospital admissions from the Hospital Admission Authorizations (AIH). The SIM uses death certificates to input information on mortality in the country. The admissions and deaths were classified using the categories from the International Classification of Diseases (ICD-10), according to gender and age groups (60-79 years old, ≥80 years old). The six main causes of morbidity and hospital mortality present in the first year of the study were classified in order to analyze the percentage variation, when compared to the last year of the study. Data tabulation referring to admissions and deaths was performed through the Tabwin software, version 32. To verify the data behavior, the percentage variation was calculated between the years analyzed, applying the following formula: (V2-V1)/V1×100), to assess the increase, decrease, or stability of the data. Afterwards, the data was transferred and organized in spreadsheets in Microsoft Excel and transported into the Statistical Package for the Social Sciences (SPSS), version 20.0, for analysis. For the sociodemographic characterization of the country, it was analyzed the estimation of the elder population in the analyzed years, the life expectancy at birth and at 60 years of age, and the illiteracy rate in elders ≥ 60 years. These data were collected from the Brazilian Institute of Geography and Statistics (IBGE). Only public domain data were used, without identification of the patients admitted or deceased, following ethical guidelines of the National Health Council resolution 466/2012 for researches involving human beings.

■ RESULTS

Table 1 shows Brazil's sociodemographic data during the analyzed period. The Brazilian elder population has grown, and life expectancy increased at birth and at age 60. The illiteracy rate among elders has increased during the period. However, when analyzed according to gender, male elders presented a higher rate when compared to female elders, which showed a decreased percentage.

Table 1 — Sociodemographic characterization of Brazilian elders between the years 2005 and 2015 — Brazil, 2017

Variables	2005 n (%)	2015 n (%)	V (%)
Elders ≥60 years old	16,367,881 (9)	23,940,885 (12)	(33)
Female	9,126,168 (55.7)	13,351,242 (55.7)	0
Male	7,241,713 (44.2)	10,589,643 (44.2)	0
Life expectancy at birth	71.9	75.5	5
Female	75.8	79.1	4.3
Male	68.2	71.9	5.4
Life expectancy at age 60	20.8	22.1	6.2
Female	22.3	23.8	6.7
Male	19.2	20.2	5.2
Elderly illiteracy rate	5,713 (3.34)	6,556 (3.42)	(2.3)
Female	3,387 (1.98)	3,738 (1.95)	(-1.5)
Male	2,326 (1.36)	2,818 (1.47)	(8)

Source: Instituto Brasileiro de Geografia e Estatística (IBGE).
V: percentage variation between the years 2005 and 2015.

In the year 2005 there were 2,304,544 (19.4%) hospital admissions among Brazilian elders, while in 2015 there were 2,852,393 (24.5%), showing an increased variation. Table 2 presents the ranking of main causes of elderly hospitalization according to gender and age groups, and the percentage variation between the analyzed years. In 2005, Heart Failure (HF) and Chronic Obstructive Pulmonary Diseases (COPD) were the two main causes of Brazilian elderly hospitalization, respectively, in both genders and age groups. Those were followed by Stroke, Pneumonia, Systemic Arterial hypertension (SAH), and Angina Pectoris — in the case of SAH, the classification changed by gender, while for the others, itchanged between age groups. In 2015 pneumonia took first place in the ranking and HF was the second highest cause of hospitalization in both genders, only altering the order within age groups. Strokes remained as the third cause, followed by COPD, Angina Pectoris, and finally SAH, which presented a significant decrease in the ranking. Only Stroke presented the same ranking for both genders as well as age groups.

Table 2 — Percentage variation of most frequent causes of elderly Brazilian admissions according to gender and age groups, from 2005 to 2015.

Causes of Admission	2005		2015		V (%)
	Ranking	N (%)	Ranking	N (%)	
Heart Failure	**1º**	219,238 (9.5)	**2º**	157,712 (5.5)	-42
Female	1º	110,495 (9.5)	2º	79,549 (5.6)	-41
Male	1º	108,743 (9.4)	2º	78,163 (5.4)	-42
60-79 years old	1º	160,064 (8.8)	1º	110,100 (5)	-43
≥80 years old	1º	59,174 (12)	2º	47,612 (7.1)	-40
COPD	**2º**	125,063 (5.4)	**4º**	73,834 (2.6)	-51
Female	2º	53,851 (5)	4º	33,988 (2.4)	-52
Male	2º	71,212 (6.1)	5º	39,846 (2.7)	-55

Causes of Admission	2005		2015		V (%)
	Ranking	N (%)	Ranking	N (%)	
60-79 years old	2º	94,756 (5.2)	5º	51,921 (2.3)	-55
≥80 years old	2º	30,307 (6.1)	6º	21,913 (3.2)	-47
Stroke/NS	**3º**	87,987 (3.8)	**3º**	104,736 (3.7)	-2,6
Female	3º	43,525 (4)	3º	50,757 (3.5)	-12
Male	3º	44,462 (3.8)	3º	53,979 (3.7)	-3
60-79 years old	3º	64,132 (3.5)	3º	74,290 (3.4)	-2
≥80 years old	4º	23,855 (4.8)	3º	30,446 (4.5)	-6
Pneumonia	**4º**	74,268 (3.2)	**1º**	169,791 (5.9)	84
Female	4º	37,160 (3)	1º	86,886 (6)	100
Male	4º	37,108 (3.2)	1º	82,905 (5.7)	78
60-79 years old	5º	48,827 (2.6)	2º	99,127 (4.5)	73
≥80 years old	3º	25,441 (5.1)	1º	70,664 (10.5)	105
Hypertension	**5º**	61,235(2.6)	**11º**	40,603 (1.4)	-46
Female	5º	36,832 (3)	11º	23,634 (1.6)	-46
Male	7º	24,403 (2.1)	16º	16,969 (1.1)	-47
60-79 years old	4º	49,381 (2.7)	13º	30,412 (1.3)	-51
≥80 years old	6º	11,854 (2.4)	11º	10,191 (1.5)	-37
Angina Pectoris	**6º**	40,287 (2.2)	**5º**	71,713 (2.5)	13.6
Female	6º	24,433 (2.1)	7º	30,738 (2.1)	0
Male	6º	25,854 (2.2)	4º	40,975 (2.8)	27
60-79 years old	6º	43,776 (2.4)	4º	62,965 (2.8)	16
≥80 years old	13º	6,511 (1.3)	13º	8,748 (1.3)	0

Source: Hospital Information Systems (HIS). Ranking regarding all year's admissions.
COPD: Chronic Obstructive Pulmonary Diseases. Stroke/NS: Stroke – not specified. V: percentage variation between the years 2005 and 2015.

The SIM registered 589,943 (58.8%) deaths among the elderly in the year 2005 and 826,287 (65.5%) in the year 2015. Table 3 presents the main causes of mortality among the Brazilian elderly in the analyzed years. In 2005, Acute Myocardial Infarctation (AMI) and Stroke were the two main causes respectively for both genders and the age group 60-79 years of age. For the elders ≥80 years the order was inverted, being Stroke the main cause, followed by AMI. Following are the causes related to Diabetes Mellitus (DM), COPD, pneumonia, and HF, presenting different ranking positions for both genders as well as age groups. In the year 2015, AMI continued as the main cause of mortality among the elderly. However, Pneumonia was the second highest cause in the ranking, with an increased variation of 72% between the years of 2005 to 2015. DM continued as the third highest cause of mortality, followed by Stroke, COPD, and HF. All mortality causes when analyzed by gender and age groups presented different placements in the ranking.

Table 3 — Percentage variation of most frequent causes of death among the Brazilian elderly according to gender and age group, from 2005 to 2015 — Brazil, 2017.

Causes of Death	2005		2015		
	Ranking	N (%)	Ranking	N (%)	V (%)
AMI	**1º**	45,825 (7.7)	**1º**	67,511 (8)	3.9
Female	1º	20,644 (7.2)	2º	30,407 (7.3)	1.3
Male	1º	25,181 (8.2)	1º	37,104 (8.9)	8
60-79 years old	1º	32,002 (8.7)	1º	43,712 (9.3)	7
≥80 years old	2º	13,823 (6.1)	2º	23,799 (6.6)	8
Stroke/NS	**2º**	34,518 (5.8)	**4º**	35,590 (4.3)	-25
Female	2º	17,603 (6.1)	4º	17,698 (4.3)	-29
Male	2º	16,915 (5.5)	4º	17,698 (4.2)	-23
60-79 years old	2º	19,915 (5.4)	5º	18,324 (3.9)	-27
≥80 years old	1º	14,603 (6.4)	3º	17,266 (4.7)	-26
DM	**3º**	28.405 (4,8)	**3º**	40,445 (4.8)	0
Female	3º	16,835 (5.8)	3º	23,070 (5.6)	-3
Male	4º	11,570 (3.8)	5º	17,375 (4.1)	7.8
60-79 years old	3º	19,504 (5.3)	2º	25,377 (5.4)	2
≥80 years old	6º	8,901 (3.9)	5º	15,068 (4.1)	5
COPD	**4º**	25,694 (4.3)	**5º**	34,163 (4)	-6.9
Female	6º	10,099 (3.5)	5º	15,226 (3.7)	5.7
Male	3º	15,595 (5.1)	3º	18,937 (4.5)	-12
60-79 years old	4º	15,391 (4.2)	4º	18,405 (3.9)	-7
≥80 years old	5º	10,303 (4.5)	4º	15,758 (4.3)	-4
Pneumonia	**5º**	23,741 (4)	**2º**	57,210 (6.9)	72
Female	4º	12,680 (4.4)	1º	30,877 (7.5)	70
Male	5º	11,061 (3.6)	2º	26,333 (6.3)	75
60-79 years old	6º	10,346 (2.8)	3º	22,544 (4.8)	71
≥80 years old	3º	13,395 (5.9)	1º	34,666 (9.6)	62
Heart Failure	**6º**	22,212 (3.7)	**6º**	23,828 (2.8)	-24
Female	5º	11,935 (4.1)	6º	12,977 (3)	-26
Male	6º	10,277 (3.3)	8º	10,851 (2.6)	-21
60-79 years old	5º	11,397 (3.1)	7º	11,100 (2.3)	-25
≥80 years old	4º	10,815 (4.7)	7º	12,728 (3.5)	-25

Source: Mortality Information System (MIS).

AMI: Acute Myocardial Infarction, Stroke/NS: Stroke – not specified, DM: Diabetes Mellitus, COPD: Chronic Obstructive Pulmonary Diseases, Ranking regarding total amount of deaths of the year, V: percentage variation between years of 2005 and 2015.

■ DISCUSSION

The results of this study expand knowledge on morbimortality among elderly Brazilians, contributing to plan actions on health issues and service management in order to prevent unnecessary hospitalizations for these reasons and avoid premature elderly mortality. There has been a significant increase in life expectancy in Brazil during the analyzed period, specially at age 60, evidencing expressive growth of that population in Brazil. The boost in life expectancy, specially among the elderly, corroborates the data presented by annual statistics on the global health report, which shows an increase in life expectancy nearly all over the world, particularly in developing countries[2]. In 2015 Brazil presented a life expectancy at birth of 75.5 years, ahead of countries such as Bolivia (70.7) and Paraguay (74), but behind Chile (80.5), Cuba (79.1), United States (79.3) and Uruguay (77)[9]. The increase in the elderly population is due to several elements such as scientific and technological breakthroughs in the health field, fertility decrease, reduced mortality and better sociodemographic conditions, among other factors[3]. The increase in the illiteracy rates among the elderly is due, in part, to the increase of life expectancy, accompanied by the socioeconomic context of this population, which is often still unfavorable. Considering government efforts for illiteracy reduction over the country, that rate has decreased in younger age groups, which possibly will result in a more educated elderly population in the future. However, there are not many initiatives to reduce that rate among the elderly population today[3].

The three major causes of elderly hospitalization in 2005 (HF, COPD, Stroke) do not show distinction in gender and age groups. The three are classified as NCCD which have high prevalence in the elderly population, since a lot of these illnesses are complications that come from other preexistent primary diseases, characterizing a comorbid condition. The risk factors are added into these situations such as tobacco and sedentarism, intensifying and complicating these pathologies, which often demand hospitalization in order to minimize the condition[10]. Through the Primary Care Report for Chronic Disease Care, the Ministry of Health (MH) addresses the four groups of NCCD of highest impact in the world (circulatory system diseases, diabetes, cancer, and respiratory diseases), which share some common risk factors: smoking, physical inactivity, unhealthy diet, and excessive alcohol consumption[11]. In 2015 the causes took different places in the ranking, where HF fell to second highest cause, and pneumonia rose as first cause of hospitalization among elders, except in the 60~79 age group, which inverts that classification. Hospitalizations

due to pneumonia increased over the last years, specially in children under five years of age and in the elderly, more specifically in the population over 80 years old[12-13]. Aging is marked by physiological changes, including the immune system and, when associated with frailty, it makes the elderly person vulnerable to the emergence of opportunistic diseases, such as pneumonia. Pneumonia symptoms can be silent and may not receive the proper clinical attention. In order to reduce these hospitalizations, in addition to the already available pneumococcal vaccine as a prevention method, also health professionals have to perform a thorough physical exam, have an expanded clinical offer and qualified hearing, specially in populations at risk[12]. Stroke remains the third highest position, showing stability during that period. This result highlights that actions developed to prevent this illness, initiative of public policies such as the Stroke patient line of care, research and non-governmental organizations — like the Stroke Brazil Network — might be influencing the reduction in the number of cases of this disease, which frequently causes disabilities to the elderly[14]. SAH and COPD have presented a decrease in around 50% of hospitalizations of both genders and age groups, however, studies show that the population with SAH still have higher blood pressure than recommended. Data from Argentina, Brazil, Colombia, and Chile showed that only 18% of people with hypertension had their blood pressure under control. Studies also show that SAH affects both men and women equally[15-16].

In both 2005 and 2015, AMI was presented as the main cause of mortality, except for the age group above 80, in which it was classified in the second highest position in the ranking in both years — and in 2015, for the female gender. Circulatory system illnesses along with respiratory disorders were the main causes of elderly mortality in Brasil. Not only do these causes represent high costs to the health system, but they are also diseases that lead to incapacities and affect elderly autonomy[7]. As previously discussed, AMIs are also considered complications that comes from the presence of NCCD, such as uncontrolled hypertension, along with risk factors like high cholesterol and triglycerides levels, sedentarism, unhealthy diet and use of tobacco and alcohol. The NCCD are among the main causes of mortality in the Americas, and in 2012 they were responsible for nearly 4.8 million deaths[9]. Deaths by pneumonia presented significant increase of percentage variation during the period, rising three positions in the ranking and classifying as the second highest mortality cause. Studies performed in Europe and North America on pneumonia showed around 4 million new cases every year. Besides being the fourth highest cause of mortality in the

world and the first among infectious illnesses, it was considered one of the most frequent causes for hospitalization and mortality within the elderly population, aggravated when associated to another NCCD. A research done in Brazil showed that after vaccine campaigns, mortality rates by pneumonia were reduced[17-18]. The two causes that presented a substantial decrease in mortality during the years were HF and Stroke. Findings in other studies corroborate this, since the mortality rates by cardiovascular conditions have reduced in other countries of the Americas, decreasing 21% between 2000 and 2010 (23% in women and 20% in men)[19]. The World Health Organization (WHO) has shown that the main causes of death in the Americas were due to DM, ischemic heart diseases, cardiovascular diseases, hypertensive diseases, and respiratory diseases[10]. Aging in Brazil is a current fact and, although many advances have been achieved, it still requires time, planning, and effective public policies. For the elderly to live with more autonomy and independence, it is necessary to give a greater attention to the health of this population through professional and health system qualification[20]. The limiting factors of this study were the secondary source of data, prone to errors or absence of data, and its ecological design, with clustered data availability, as well as the difficulty to compare it with other studies due to shortage of recent research that show these tendencies in developed and developing countries.

■ CONCLUSION

The analysis of the profile of the main causes of hospital admission and deaths among elderly Brazilians allowed us to identify that circulatory and respiratory system diseases are the leading causes of morbimortality in that age group. The challenge for public policies consists in managing the burden of these diseases, qualify health professionals, and organize services in a way that prioritizes disease prevention and health promotion, early diagnosis and effective treatment. Thus, the nurses as members of the health team perform a fundamental role, since they also act on the prevention and control of risk factors of those morbimortalities and the monitoring of that population regarding primary health care. The population aging brings along significant changes in the way people live, acquire diseases, and die. A hospital and disease-centered health system, designed to address acute and infectious diseases of the population, when in fact there are different epidemiologic and demographic profiles, becomes now insufficient to meet to demands of chronic diseases of a population that rapidly grows old. Thus, it is necessary to reorganize the health system, rethink the models and service network from the perspective of comprehensive, equitable and person-centered care, that address the current needs of the elderly population. Further researches regarding hospitalization causes and elderly population mortality are recommended, in order to understand the dynamics and epidemiologic profile changes of this population and to support decision making.

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■ **Corresponding author:**

Juana Vieira Soares
E-mail: soares.juana@gmail.com