

Analysis of the reasons for hospitalization of elderly people in the extreme north of Brazil

Adler Monteiro de Macedo Júnior¹, João Pedro Soares de Macedo², Thalia Inácia Araújo Cardoso³, Lilian Mara Vieira Monsalve Moraga⁴, Gabrielle Mendes Lima⁵, Audrey Stella Akemi Nogami⁶

ABSTRACT

Objective: to characterize the reasons for hospitalization of the elderly from 2015 to 2019 in Roraima, Brazil. **Methods:** descriptive epidemiological study, under a temporal analysis of data from the Hospital Information System regarding hospitalizations of the elderly. Age groups, length of stay, sex, rate of admissions, diagnoses and variations in the ranking of causes of the same were evaluated. **Results:** 23,844 hospitalizations among elderly people in the state were recorded. Diseases of the circulatory, respiratory and digestive systems represented the main groups associated with hospitalizations (44.2% of the total). The male population was predominant in hospitalizations and the population aged 80 years or more recorded the highest percentages of hospitalizations. Pneumonia, diabetes mellitus, heart failure and hospitalization for examinations and investigation were the diagnoses with the highest placement in the ranking of specific causes. **Conclusion:** There is a predominance of elderly men in hospitalizations, and a higher percentage of hospitalizations among many elderly people (over 80 years old). **Keywords:** Epidemiology, Descriptive, Hospitalization, Aged, Morbidity.

Universidade Federal de Roraima. Centro de Ciências da Saúde. Boa Vista, (RR), Brasil



Este é um artigo publicado em acesso aberto (Open Access) sob a licença Creative Commons Attribution, que permite uso, distribuição e reprodução em qualquer meio, sem restrições, desde que o trabalho original seja corretamente citado.

<https://doi.org/10.11606/issn.2176-7262.rmrp.2022.178718>

INTRODUCTION

The Brazilian population has gone through the process of demographic transition, in which there is an accelerated increase in the number of elderly people compared to the growth of younger age groups¹. From 1960 to 2008, the number of elderly people grew from 3 to 20 million, an increase of around 700%², and it is estimated that in the next 40 years the elderly population will represent a third of Brazilians (33.70%)³. This occurs mainly as a result of the reduction in fertility, birth and mortality rates, with the corresponding increase in life expectancy, which began in the 1960s in Brazil^{2,4}.

Such demographic change can generate an important economic impact on the Unified Health System (SUS)⁵. This is due to the fact that the elderly more often need hospital care and, occasionally, hospitalizations in these units. In addition, there is also a greater demand for beds in intensive care units (ICU) due to the presence of common comorbidities in this age group, such as hypertension, diabetes, heart disease and organic dysfunctions of respiratory, cardiac and neurological origin^{6,7}.

In association with the aging of individuals, it is common to find a transition in the profile of the types of disease in the population, from infectious diseases to non-communicable diseases (NCDs)⁷⁻¹⁰. Knowing the profile of the elderly, their comorbidities and the main causes that lead them to seek hospital care, it is possible to draw up a plan specifically aimed at improving their reception. Furthermore, it is possible to create plans in order to avoid unnecessary public spending and prepare for the increase in the population of elderly people that Brazil will have in the coming years^{1,8,9}.

Thus, taking into account the low production of scientific articles focused on this topic in the northern region of Brazil, this work aims to characterize the reasons for hospitalization of the elderly from 2015 to 2019 in Roraima. In this way, tracing an epidemiological profile associated with the main causes of these hospitalizations, analyzed by year, to have a better overview of the local reality and guide future measures.

METHODS

This is a descriptive epidemiological study, under a temporal analysis of secondary data

regarding the causes of hospitalization of the elderly (individuals aged 60 years and over) in Roraima, between the years 2015 to 2019. These data were obtained from the Information System Hospitals (SIH), which is managed by the Department of Informatics of the SUS (DATASUS), collected on May 24, 2020¹¹. For the analysis, individuals aged 60 years and over, of both sexes, with the form Authorization for Hospitalization (AIH) approved and registered with the SIH.

In the present research, the following variables were taken into account: 1) age group in groups (60 to 69 years old; 70 to 79 years old; and from 80 years old); 2) period of hospitalization (January 2015 to December 2019); 3) diagnosis of diseases according to the International Classification of Diseases (ICD-10). Except as shown in Table 1, the AIHs recorded by chapters XV (Pregnancy, childbirth and puerperium), XVI (Some conditions originating in the perinatal period) and XVII (Congenital malformations, deformities and chromosomal anomalies) were excluded from the calculations, as they were not considered likely to affect the age groups studied and, probably, reflect errors in its elaboration. These represent, however, only 0.04% of the total number of admissions recorded in the period.

The Tabwin program - version 4.14 - was used to obtain the variables and Microsoft Excel 2016 to prepare the tables used. To calculate the hospitalization rate, data referring to the resident population estimated by the Brazilian Institute of Geography and Statistics (IBGE) for each year evaluated were used, and this information was also provided by DATASUS^{11,12}. To assess the variation in the causes of hospitalization by specific diagnoses, the calculation $\{[(V2-V1)/V1] \times 100\}$ was used in order to verify the behavior of the data - whether there was growth, reduction or if they remained stable. By 'V2', the percentage values of hospitalizations for specific causes of 2019 were assumed, while 'V1' represents the percentages of the year 2015.

Finally, public domain information was used, without any identification of individuals. Thus, there is no possibility of moral or physical damage in carrying out this research, thus complying with Ethical Guidelines Resolution No. 466, prepared in December 2012 by the National Health Council (CNS). Therefore, there was no need for submission to a Research Ethics Committee (CEP).

RESULTS

During the period evaluated, 205, 696 general hospitalizations were recorded in the State of Roraima, 23,844 of which were elderly, which represents approximately 11.6% of the total. Table 1 shows the absolute values and percentages of hospitalizations

according to ICD-10 Chapters. Diseases of the circulatory, respiratory and digestive systems represented, in that order, the three main groups of morbidities associated with hospitalizations, comprising together 44.2% of the total.

In Table 2, hospital admissions for the elderly are broken down according to age groups and the specific hospitalization rate for each of them in each year evaluated.

Table 1. Hospital admissions in the elderly according to the ICD-10 chapter in the State of Roraima, Brazil, from 2015 to 2019

ICD-10 Chapter	Hospitalizations (%)
I. Some Infectious and Parasitic Diseases	1106 (4,64%)
II. Neoplasms (tumors)	2228 (9,34%)
III. Blood disorders, hematopoietic organs, and some immune disorders	242 (1,02%)
IV. Endocrine, nutritional and metabolic diseases	1536 (6,44%)
V. Mental and behavioral disorders	37 (0,16%)
VI. Nervous system diseases	214 (0,90%)
VII. Diseases of the eye and appendages	36 (0,15%)
VIII. Ear and mastoid apophysis diseases	8 (0,03%)
IX. Circulatory system diseases	4167 (17,48%)
X. Respiratory system diseases	3770 (15,81%)
XI. Digestive system disease	2600 (10,90%)
XII. Skin and subcutaneous tissue diseases	940 (3,94%)
XIII. Osteomuscular and connective tissue diseases	402 (1,69%)
XIV. Diseases of the genitourinary system	2158 (9,05%)
XV. Pregnancy, childbirth and puerperium	3 (0,01%)
XVI. Some conditions originating in the perinatal period	1 (0,00%)
XVII. Congenital malformations, deformities and chromosomal abnormalities	7 (0,03%)
XVIII. Abnormal symptoms, signs and findings. of ex. clinic and lab., not classified elsewhere	468 (1,96%)
XIX. Injury, poisoning and some other consequences of external causes	2081 (8,73%)
XX. External causes of morbidity and mortality	4 (0,02%)
XXI. Factors influencing health status and contact with health services	1836 (7,70%)
TOTAL	23.844 (100%)

Source: DATASUS.

Table 2. Hospital admissions in the elderly by age group and hospitalization rate in the State of Roraima, Brazil, from 2015 to 2019

Year	Age range (years)	Population		Admissions		Hospitalization rate*
		Number	%	Number	%	
2015	60-69	20481	3,99	1893	49,33	9,24
	70-79	8521	1,66	1141	29,74	13,39
	80+	2977	0,58	803	20,93	26,97
	TOTAL	31979	6,23	3837	100	12,00
2016	60-69	21670	4,12	2255	48,75	10,41
	70-79	9046	1,72	1435	31,02	15,86
	80+	3103	0,59	936	20,23	30,16
	TOTAL	33819	6,43	4626	100	13,68
2017	60-69	23079	4,22	2549	46,25	11,04
	70-79	9625	1,76	1752	31,79	18,20
	80+	3227	0,59	1210	21,96	37,50
	TOTAL	35931	6,57	5511	100	15,34
2018	60-69	24735	4,29	2337	46,47	9,45
	70-79	10320	1,79	1603	31,88	15,53
	80+	3402	0,59	1089	21,65	32,01
	TOTAL	38457	6,67	5029	100	13,08
2019	60-69	26351	4,35	2304	47,70	8,74
	70-79	11085	1,83	1623	33,60	14,64
	80+	3574	0,59	903	18,70	25,27
	TOTAL	41010	6,77	4830	100	11,78

Source: DATASUS.

Note: *Admission rate was calculated by the number of age-specific hospitalizations divided by their specific population and multiplied by 100.

Throughout the period, the 60-69 age group was responsible for the majority of hospitalizations, followed, in that order, by the 70-79 age group and the 80-year-old group or older. However, when it comes to hospitalization rates, this order is reversed, with the population over 80 years old having the highest percentages in all years, with the highest value occurring in 2017 (37.50). There was also a progressive increase in hospitalizations of the elderly, reaching a peak in 2017 and then a progressive decrease until 2019, when there were fewer hospitalizations (11.78). This pattern is repeated in relation to the absolute number of hospitalizations, with the exception that the lowest number of hospitalizations was recorded in 2015 (3,837). Finally, the absolute and relative growth of the elderly population in Roraima stands out, which was present during all the years evaluated.

As for the specific causes of hospitalization, Table 3 describes the ranking, absolute values and percentages of the ten major causes of hospitalization in 2015 and 2019, in addition to the relative variation of such causes between the beginning and the end of the study period.

There was a negative variation only for pneumonia, heart failure (HF), skin/subcutaneous tissue infections and cholelithiasis/cholecystitis (the greatest relative decrease (-30.42%) corresponded to this group). Pneumonia and diabetes mellitus (DM) remained, respectively, as the first and second leading causes of hospitalization from the beginning to the end of the period. However, CI, third in the ranking in 2015, was surpassed by the group of elderly people hospitalized for examinations and investigation - this being the group responsible for the highest positive variation (98.14%). There was also an increase of 6.15% in the variation corresponding to the global sum of the ten causes evaluated, which meant that in 2019 they were responsible for more than half of the computed hospitalizations.

Data regarding hospitalizations according to the sex of the elderly are detailed in Table 4. During all the years studied, there was a predominance of hospitalizations in males. In 2015, the most discrepant ratio between the sexes was recorded, with about 1.44 hospitalizations of men for each one of women.

Table 3. Variation of causes of hospitalization in the elderly by specific diagnoses in the State of Roraima, Brazil, between 2015 and 2019

Causes of hospitalization	2015		2019		Variação (%)*
	Ranking	N (%)	Ranking	N (%)	
Pneumonia	1º	500 (13,03%)	1º	589 (12,19%)	-6,45
Diabetes mellitus	2º	267 (6,96%)	2º	349 (7,23%)	3,88
Cardiac insufficiency	3º	223 (5,81%)	4º	274 (5,67%)	-2,41
Skin and subcutaneous tissue infections	4º	147 (3,83%)	7º	165 (3,42%)	-10,70
Cholelithiasis and cholecystitis	5º	145 (3,78%)	10º	127 (2,63%)	-30,42
People in contact with serv. health exam invest.	6º	124 (3,23%)	3º	309 (6,40%)	98,14
Cerebral infarction	7º	123 (3,21%)	5º	195 (4,04%)	25,86
Other urinary tract diseases	8º	115 (3,00%)	6º	181 (3,75%)	25,00
Other trauma. reg. spec. not spec. and multiple body	9º	102 (2,66%)	8º	144 (2,98%)	12,03
Renal insufficiency	10º	101 (2,63%)	9º	135 (2,80%)	6,46
TOTAL		1.847 (48,14%)		2.468 (51,10%)	6,15

Source: DATASUS.

Note: * The percentage variation was calculated according to the formula $[(V2-V1)/V1] \times 100$, with 'V2' being the percentage values of hospitalizations due to a specific cause in 2019 and 'V1' the percentages for the year of 2015.

Table 4. Hospital admissions in the elderly by sex in the State of Roraima, Brazil, from 2015 to 2019

Year	60 to 69 years		70 to 79 years		80+		TOTAL (%)	
	F*	M*	F*	M*	F*	M*	F*	M*
2015	716	1177	467	674	389	414	1572 (40,97%)	2265 (59,03%)
2016	973	1282	600	835	443	493	2016 (43,58%)	2610 (56,42%)
2017	1114	1435	765	987	553	657	2432 (44,13%)	3079 (55,87%)
2018	952	1385	640	963	557	532	2149 (42,73%)	2880 (57,27%)
2019	896	1408	664	959	434	469	1994 (41,28%)	2836 (58,72%)
TOTAL	4651	6687	3136	4418	2376	2565	10163 (42,64%)	13670 (57,36%)

Source: DATASUS.

Note: * 'F' indicates female and 'M' indicates male.

There was an approximation of the percentages from 2015 to 2017, with a subsequent increase in the male preponderance both in 2018 and in 2019. Of the hospitalizations considered, in a universal way, 57.36% occurred in male elderly and 42.64% were in the feminine. Furthermore, an overall decrease in the discrepancy between the sexes was observed the higher the age group evaluated.

DISCUSSION

In Roraima, during the period studied, diseases of the circulatory, respiratory and digestive systems represented, in that order, the three main groups of morbidities associated with hospitalizations. This result is consistent with what was found in an analysis of hospitalizations in the North region of Brazil, where the same three morbidity groups were the most frequent causes of hospitalizations, maintaining their respective positions throughout the period between 2005 and 2015⁴. Another national study identified diseases of the circulatory and respiratory system as the major causes of hospitalization and lethality among elderly Brazilians in the same period¹⁰. Such causes are known to be costly to the health system, and may also result in poor prognosis, disability and reduced independence and autonomy of the elderly patient¹³. Managing the burden of these conditions, with adequate prevention and early therapeutic management, represents, therefore, a challenge to health management in Brazil¹⁰.

In developed regions such as the South and Southeast of Brazil, for example, the main causes of hospitalization were diseases of the circulatory and respiratory system and neoplasms⁴. This is probably due to differences that may be related to the sociocultural context and local economic development or to different life expectancies in the national scenario. This may be due to a geographic and social polarization in health, which translates into uneven standards of care to which different populations are submitted - an expression of the lack of equity in the country¹⁴.

In this study, a higher rate of hospitalization was identified, proportionally increasing with age, where for the age group of 60-69 years, hospitalizations occurred in 11.8% of the sample, and among the elderly aged 70-79 years, it was 17.7% and those over 80 years old was responsible for 24.2%¹.

In Roraima, the same increasing pattern was identified according to age, in agreement with the literature.

This probably reflects that the State of Roraima has followed the development that Brazil has gone through in the last two decades, with greater vulnerability to hospitalize the elderly. However, as it does not have the same socioeconomic level as states in the South and Southeast, it appears to be still a little late in the transition process from infectious and contagious diseases to non-communicable or chronic degenerative diseases and conditions, especially when the data are compared with studies. Most recent studies carried out in Brazil^{4,10}. In the same study conducted by Loyola Filho¹, in 2001, the pattern of the main causes of hospitalization of the elderly was the same as those currently in Roraima: diseases of the circulatory, respiratory and digestive systems.

This delay in the epidemiological transition process is demonstrated when analyzing the specific diagnoses of hospitalization, since the maintenance of pneumonia was perceived as the first major cause of hospitalization in elderly people from Roraima. In a study conducted in Brazil, this morbidity changed from fourth to first place in the national ranking of hospitalizations for the elderly in the period 2005-2015¹⁰, with Roraima following the pattern and maintaining hospitalizations for this cause in high numbers, despite the variation negative that can be seen in Table 3.

Elderly people are in the risk group for the development of the disease and, in addition to age, there are still other comorbidities, such as chronic obstructive pulmonary disease (COPD), cerebrovascular disease, bronchial asthma, among others that frequently affect this sector of the demographic¹⁵⁻¹⁸. In addition, pneumonia represents the main complication of the flu and is also responsible for the highest number of hospitalizations and deaths in Brazil and in the world due to this infection¹¹.

Diabetes mellitus (DM) and heart failure (HF) are both classified as NCDs and have a high prevalence in the surveyed population, being the 2nd and 3rd leading cause of hospitalizations, respectively, in 2015. In 2019, DM remained the 2nd leading cause of hospitalizations. Hospitalizations while IC dropped to 4th place. This high rate associated with the presence of risk factors can result in exacerbations and complications of these pathologies, requiring hospitalization in many cases to control the condition¹⁹.

In a study conducted in Roraima, with diabetic patients treated by the SUS in the capital Boa Vista, it was found that, of the patients interviewed, 44.70% did not know the type of DM they had and 59.40% were unable to maintain adequate glycemic control²⁰. This exposes an alarming reality in which there are failures to prevent potentially avoidable hospitalizations.

In our research, the number of AIHs diagnosed with hospitalizations for examinations and investigation was considerable, which went from the sixth largest cause in 2015 to the third largest in 2019, accounting for the largest variation analyzed (Table 3). This finding differs from other similar studies and may reflect a local behavior in filling out the AIHs, which makes it difficult to understand the true cause or diagnostic suspicion of the hospitalization of the elderly. For example, in work by Teixeira et al.⁹, the CID XXI, responsible for this category, was only responsible for the 16th place in the causes of hospitalization. In other studies, this chapter, despite being considered for the analysis, is not cited or tabulated at any time^{10,21}. There were also those who preferred to group it in the category "other causes" or "others" because it was not statistically significant^{1,4,22}. It is therefore important to carry out additional analyzes in future studies in order to ascertain the causes of such a situation.

In addition, a higher prevalence of male hospitalizations was also identified, which is compatible with what was found by Loyola Filho¹ in 2004 and in more recent literature with a similar methodology²². It also occurred in studies focused on a specific cause, such as the rate of hospitalization aggression²³, mental and behavioral disorders²⁴, or conditions sensitive to primary care (ICSAP)²⁵. This can be explained by the fact that the female elderly population has a longer life expectancy at birth as well as a longer life expectancy at age 60. Furthermore, while the illiteracy rate of the female elderly population decreases, the same rate of the male elderly population increases¹⁰. The presence of the highest number of male elderly people in Roraima in the studied period is also noteworthy¹².

The present study has limitations arising from the origin of the data used, common to those using secondary data. First, due to the eventuality of error in filling out the AIHs, thus generating the need to remove chapters that would probably not be associated with the age group studied (XV-XVII).

Another limitation is the possibility of altering the data due to updates as registered on the DATASUS portal itself. In addition, there is no way to know whether or not more than one AIH has been completed for the same individual in the event of longer hospitalization, readmissions or transfers. Finally, there is still the financial logic that can guide institutions to obtain remuneration through AIHs, compromising the reliability of the data.

However, it should be noted that many studies have been carried out in recent years with secondary data from the SIH in epidemiological analyses, and the volume of data managed by DATASUS is notorious, providing unparalleled coverage of hospitalizations in Brazil^{1,22}. Furthermore, the use of data from this system for publications can serve as an incentive for the gradual improvement of the platform through the aforementioned criticisms and limitations.

CONCLUSION

Disorders of the circulatory, respiratory and digestive systems represented the three main groups of morbidities associated with hospitalizations of the elderly in Roraima, in line with other regional and national data. Furthermore, the characterization of the profile of hospitalizations made it possible to identify that pneumonia, DM, HF and hospitalizations for investigation and examinations portray particularities specific to the scope of geriatric health in Roraima. Thus, they represent a challenge for managers and health professionals in a State that coexists with both infectious and contagious diseases and NCDs. This epidemiological scenario should guide future measures, with targeted prevention and health education, reduction of risk factors and efficient therapy. In this way, strategic and systematized plans will be made possible, avoiding unnecessary public spending and providing health and quality of life to the elderly in Roraima. Finally, it is worth mentioning the relevance of carrying out additional analyzes on hospitalizations in the elderly in Roraima in future studies. Investigating local specificities and epidemiological dynamics is a concrete way of ratifying decisions that directly impact the lives of the population.

REFERENCES

- Loyola Filho AI, Matos DV, Giatti L, Afradique ME, Peixoto SV, Lima-Costa MF. Causas de internações hospitalares entre idosos brasileiros no âmbito do Sistema Único de Saúde. *Epidemiologia e Serviços de Saúde*. 2004 out/dez;13(4):229-238.
- Melo LA, Ferreira LM, Santos MM, Lima KC. Fatores socioeconômicos, demográficos e regionais associados ao envelhecimento populacional. *Rev Bras Geriatr Gerontol* 2017;20(4):494-502.
- Rodrigues MM, Alvarez AM, Rauch KC. Tendências das internações e da mortalidade de idosos por condições sensíveis à atenção primária. *Rev Bras Epidemiol* 2019;22:e190010. Disponível em: <https://doi.org/10.1590/1980-549720190010>
- Barbosa TC, Moro JS, Junior JN, Yanes CY, Ribeiro ER. Causas de internações hospitalares em idosos por regiões do Brasil: série histórica de 10 anos. *Rev Saúde Públ Paraná* 2019 Jul;2(Supl 1):70-81.
- Ribeiro PC. A psicologia frente aos desafios do envelhecimento populacional. *Gerais: Revista Interinstitucional de Psicologia* 2015 dez;8(2):269-283.
- Silva JB, Pedreira LC, Santos JL, Barros CS, David RA. Perfil clínico de longevos em uma unidade de terapia intensiva. *Acta Paul Enferm*. 2018;31(1):39-45.
- Medeiros KK, Pinto Júnior EP, Bousquat A, Medina MG. O desafio da integralidade no cuidado ao idoso, no âmbito da Atenção Primária à Saúde. *Saúde Debate* 2017 set;41(3):288-295.
- Medeiros KK, Coura AS, Ferreira RT. O aumento do contingente populacional de idosos no Brasil e a Atenção Primária à Saúde: uma revisão de literatura. *Arq Cienc Saúde UNIPAR* 2017 set/dez;21(3):201-207.
- Teixeira JJ, Bastos GC, Souza AC. Perfil de internação de idosos. *Rev Soc Bras Clin Med* 2017 jan/mar;15(1):15-20.
- Rossetto C, Soares JV, Brandao ML, Rosa NG, Rosset I. Causas de internação hospitalar e óbito em idosos brasileiros entre 2005 e 2015. *Rev Gaúcha Enferm*. 2019;40:e20190201. Disponível em: <https://doi.org/10.1590/1983-1447.2019.20190201>
- Brasil. Ministério da Saúde. DATASUS. Disponível em: <http://www2.datasus.gov.br/DATASUS/index.php> (Citado em 2020 Mai 24).
- Brasil. Instituto Brasileiro de Geografia e Estatística. Projeção da População do Brasil e das Unidades da Federação [Internet]. Disponível em: <https://www.ibge.gov.br/apps/populacao/projecao/index.html> (Citado 2020 Mai 24).
- Dantas IC, Pinto JEP, Medeiros KKAS, Souza EA. Perfil de morbimortalidade e os desafios para a atenção domiciliar do idoso brasileiro. *Kairós Gerontol*. 2017;20(1):93-108.
- Araújo JD. Polarização epidemiológica no Brasil. *Epidemiol. Serv. Saúde* [Internet]. 2012 Dez [citado 2020 Jun 16];21(4):533-538. Disponível em: <http://dx.doi.org/10.5123/S1679-49742012000400002>
- Michelin L, Weber FM, Scolari BW, Menezes BK, Gullo MC. Mortalidade e custos da pneumonia pneumocócica em adultos: um estudo transversal. *J Bras Pneumol* 2019;45(6):e20180374. Disponível em: <https://doi.org/10.1590/1806-3713/e20180374>
- Bordon JM, Fernandez-Botran R, Wiemken TL, Peyrani P, Uriarte SM, Arnold FW, et al. Bacteremic pneumococcal pneumonia: clinical outcomes and preliminary results of inflammatory response. *Infection*. 2015;43(6):729-38.
- Cillóniz C, Torres A, Manzardo C, Gabarrus A, Ambrosioni J, Salazar A, et al. Community-acquired pneumococcal pneumonia in virologically suppressed HIV-infected adult patients. *Chest*. 2017;152(2):295-303.
- Garrouste-Orgeas M, Azoulay E, Ruckly S, Schwebel C. Diabetes was the only comorbidity condition of invasive pneumococcal infection in ICU patients: a multicenter observational study from the Outcomerea research group. *Infection*. 2018;46(5):669-77.
- Pan American Health Organization (US). Core indicators: health situation in the Americas: 2016. Washington, D.C.: PAHO, OMS; 2016 (Citado 2020 Jun 11).
- Hirakawa TH, Costa WC, Nakahima F, Ferreira AIC, Ribeiro LB, Ticianeli JG et al. Conhecimento dos pacientes diabéticos usuários do Sistema Único de Saúde acerca da retinopatia diabética. *Rev. bras. oftalmol.* [Internet]. 2019 [citado 2020 Jun 16];78(2):107-111. Disponível em: <https://doi.org/10.5935/0034-7280.20180106>
- Jobim EF, Souza VO, Cabrera MA. Causas de hospitalização de idosos em dois hospitais gerais pelo Sistema Único de Saúde (SUS). *Acta Scientiarum Health Sciences* [Internet]. 2010 [citado 2020 Jun 17];32(1):79-83. Disponível em: <https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.4025%2Ffactascihealthsci.v32i1.5631>
- Silveira RE, Santos AS, Sousa MC, Monteiro TS. Gastos relacionados a hospitalizações de idosos no Brasil: perspectivas de uma década. *Einstein* 2013;11(4):514-520.
- Souza CS, Bandeira LL, Napolini MM, Aguiar MC, Marcolla V, Souza Neto JD. Análise das taxas de internação e de mortalidade por agressão em pacientes com mais de 60 anos. *Rev Soc Bras Clin Med* 2018 abr/jun;16(2):89-93.
- Santos VC, Anjos KF, Boery RN, Moreira RM, Cruz DP, Boery EN. Internação e mortalidade hospitalar de idosos por transtornos mentais e comportamentais no Brasil, 2008-2014. *Epidemiol Serv Saude* 2017 jan/mar;26(1):39-49.
- Marques AP, Montilla DE, Almeida WS, Andrade CL. Internação de idosos por condições sensíveis à atenção primária à saúde. *Rev Saúde Pública* 2014;48(5):817-826.

Authors' Contribution

Macedo Júnior AM, Macedo JPS, Cardoso TIA, Lima GM, Nogami ASA and Moraga LMVM jointly carried out the conception of the work, the design of the methodology used and the initial writing of the manuscript. Macedo JPS, Macedo Júnior AM, Cardoso TIA and Nogami ASA performed data collection and tabulation. Moraga LMVM and Lima GM carried out a review of the final content in terms of intellectual, content, style and grammatical aspects.

Funding Source

We declare that the study did not receive any funding.

Conflict Of Interests

We declare that there are no conflicts of interest.

Corresponding Author:

Lilian Mara Vieira Monsalve Moraga.
lilian.mara@hotmail.com

Editor:

Prof. Dr. Marcelo Riberto

Received: jan 12, 2020

Approved: jan 10, 2021
