



Historical disposition of hospitalizations for Ischemic Stroke in Northeast Brazil between 1999–2019

Disposição histórica das internações por Acidente Vascular Cerebral Isquêmico no Nordeste brasileiro entre 1999-2019

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ABSTRACT

The aim of this study was to analyze the historical disposition of hospitalizations for ischemic stroke and their hospital characteristics over the last 20 years in northeastern Brazil, hypothesizing the impact of the creation of national public policies. This is a retrospective ecological study of time series between 1999–2019 based on data collected in the Hospital Information System of the SUS. The data were stratified by sex and age group. There was a significant reduction in the number of hospitalizations, total value (cost), and number of deaths between the years 2001–2002 and 2013–2014; the other years show similar constancy. The same variables increased with age, but were found to be equivalent between genders. The data studied for IS showed a sharp decline between 2002 and 2014. Numerous factors might have influenced this change in behavior, including the implementation of programs such as Hiperdia and Mais Médicos.

Keywords: Brazil. Epidemiology. Public health policy. Stroke.

RESUMO

O objetivo foi analisar a disposição histórica das internações por Acidente Vascular Cerebral Isquêmico (AVCI) e suas características hospitalares dos últimos 20 anos no nordeste brasileiro, hipotetizando o impacto da criação de políticas públicas nacionais. Trata-se de um estudo ecológico retrospectivo de série temporal entre 1999-2019, baseado em dados coletados no Sistema de Informação Hospitalar (SIH) do SUS (DATASUS). Os dados foram estratificados por sexo e faixa etária, e observou-se grande redução do número de internações, valor total (custo) e número de óbitos entre 2001-2002 e entre 2013-2014; os demais anos apresentaram graus proporcionais de constância, sem alterações importantes. As mesmas variáveis aumentaram com a idade, mas mostraram-se equivalentes entre os sexos. Concluiu-se que dados estudados sobre AVCI indicaram declínio acentuado nos anos de 2002 e 2014. Inúmeros fatores podem ter influenciado essa mudança de comportamento, incluindo a implementação de programas como o Hiperdia e Mais Médicos.

Palavras-chave: Acidente vascular cerebral. Brasil. Epidemiologia. Política de saúde pública.

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INTRODUCTION

Ischemic stroke (IS) is a thrombotic or embolic event that causes a decrease in blood flow to the brain.¹ Data from the National Registry of Health Facilities (CNES) of Brazil show that in 2016, the Southeast Region led hospitalizations for stroke (72,229), followed by the Northeast (48,532), South (35,802), Center-West (10,171), and North (10,075).² Because it is a disease with a major impact on the health of the population, the notification of cases of hospitalization is essential for prevention, promotion, protection, and control measures.

In view of this, in 1991, the SUS Computer Department (DATASUS) was created with the objective of computerizing the activities of the Unified Health System (SUS) and decentralizing information on health activities for a better use of available resources.³ Therefore, information from DATASUS helps in the construction of public health policies, which are essential for planning actions that can improve the health conditions of the population.⁴

Brazil is a populous country, with a large territory and significant socioeconomic inequality, reflecting the duality of access to health from a public and private point of view.⁴ According to information from the National Health Survey (NHS) carried out in 2013, inequality was found in access to and use of health services between regions in Brazil, with the North and Northeast having the lowest proportions of medical consultation records in the country.^{5,6}

In addition, in the Northeast, access to urgent and emergency services is often impossible because small municipalities do not provide adequate physical and personal infrastructure.⁷ In this context, there are many difficulties faced in this region, directly reflecting the importance of preventing injuries related to stroke, in the observation of initial clinical manifestations and in the presence of centers specialized in the treatment of cerebrovascular diseases. If the situation is favorable to the affected person and the assistance is immediate, the tendency is to reduce the number of hospitalizations, total expenses, and deaths.⁸

In this sense, the objective of this study was

to analyze the historical disposition of hospitalizations due to stroke and related syndromes and their hospital characteristics over the last 20 years in northeastern Brazil, hypothesizing the impact of the creation of national public policies.

METHODOLOGY

This is a retrospective ecological study of time series data based on census data. The data were extracted in March 2020 from the Hospital Information System (HIS) of the SUS Computer Department (DATA-SUS).

The data were collected as follows: in the row, the option for “region” was selected, and the column was not activated. The content sought was “hospitalizations,” “total amount spent,” and “deaths” resulting from Transient Ischemic Stroke and Related Syndromes (CID-10 Morbidity List), framed in ICD-10 in “VI. Nervous System Diseases.” The variables were chosen because they are considered important for obtaining useful indicators for monitoring noncommunicable diseases and diseases (DANT) and for studies of the costs produced by the system.⁹

Regarding the age group, the following groups were selected: “20 to 29 years old,” “30 to 39 years old,” “40 to 49 years old,” “50 to 59 years old,” “60 to 69 years old,” “70 to 79 years,” and “80 years or more.” The selected age groups correspond to stroke only in adult individuals, excluding people under 19 years of age, as ages 0–18 years are classified as child stroke, according to the Intercollegiate Working Party for Pediatric Stroke.¹⁰ The group aged 19 is combined in the HIS in the age group of “15–19 years,” making it impossible to analyze it separately. Furthermore, the data were stratified by “male” and “female” to distinguish between the sexes.

The category of stroke in the CDI-10 classification corresponds to the vertebrobasilar artery syndrome, carotid artery syndrome (hemispheric), multiple and bilateral pre-cerebral artery syndrome, fleeting amaurosis, transient global amnesia, other transient ischemic strokes and related syndromes, transient cerebral ischemia, unspecified.

The hospital mortality rate was determined by the relationship between the number of deaths due to stroke and the number of hospitalizations determined by the stroke in percentages. For data analysis, Microsoft Excel was used.

RESULTS

Data on the historical disposition of hospitalizations due to stroke and their hospital characteristics from 1999 to 2019 in northeastern Brazil were evaluated.

Table 1 shows the data regarding the number of hospitalizations, the total value (cost), and number of deaths due to stroke in the Northeast in the last 20 years. It is observed that the largest number of hospitalizations in this time interval was registered in 2001, with 13,369 cases, showing a considerable reduction in the following two years, registering a variation of approximately 10,000 cases. The years with the lowest number of hospitalizations were 2003 and 2017, with 3,635 and 3,562, respectively. The remaining years show proportional degrees of constancy, without major changes.

Table 1. Description of the number of hospitalizations, total amount spent, number of deaths and mortality rate due to stroke in the Northeast from 1999 to 2019

Years	Number of hospitalizations	Total amount spent*	Number of deaths	Mortality Rate
1999	12.714	3.675.745,50	1.866	14,68
2000	12.838	4.575.563,80	1.977	15,40
2001	13.369	4.882.002,82	1.887	14,11
2002	4.406	1.612.852,15	585	13,28
2003	3.635	1.573.325,52	470	12,93
2004	4.086	2.138.542,32	517	12,65
2005	4.545	2.426.467,18	478	10,52
2006	4.927	2.634.757,85	647	13,13
2007	4.750	2.793.065,33	644	13,56
2008	6.771	5.273.632,07	1.218	17,99
2009	7.291	6.849.527,23	1.119	15,35
2010	7.420	6.869.153,83	1.042	14,04
2011	6.398	5.550.730,73	865	13,52
2012	7.137	6.958.531,42	899	12,60
2013	8.269	8.631.518,08	1.058	12,79
2014	5.129	5.791.755,28	582	11,35
2015	4.491	4.965.388,53	517	11,51
2016	3.725	3.687.374,53	428	11,49
2017	3.562	3.635.502,87	341	9,57
2018	4.210	4.099.835,59	422	10,02
2019	4.824	4.193.407,74	409	8,48

* The amounts are expressed in Reais.

Source: DATA-SUS, 2020.

The same table shows the total costs used to assist inpatients. The year 2013 represented the largest expense in the last 20 years, with a total of R\$ 8,631,518.08. The year 2003 represented the lowest expense, totaling R\$ 1,573,325.52.

Regarding the number of deaths, the year 2000 presented the highest number of deaths due to stroke in the Northeast, with 1977 deaths, while 2017 had the lowest number of deaths, 341. The highest mortality rate was in 2008 (17.99%), while the lowest rate was in 2019 (8.48%).

The figures below concern the number of hospitalizations, the total value (cost), and the number of deaths stratified by sex and age group over the years. In Figure 1, males and females presented similar trends, showing a drop of 67.04% in the number of hospitalizations from 2001 to 2002 and of 37.97% from 2013 to 2014. For the other years, the values were similar. Regarding the age group, for men the highest proportion of hospitalizations was for individuals aged 80 years or older, while for women, it was for individuals aged 70–79 years.

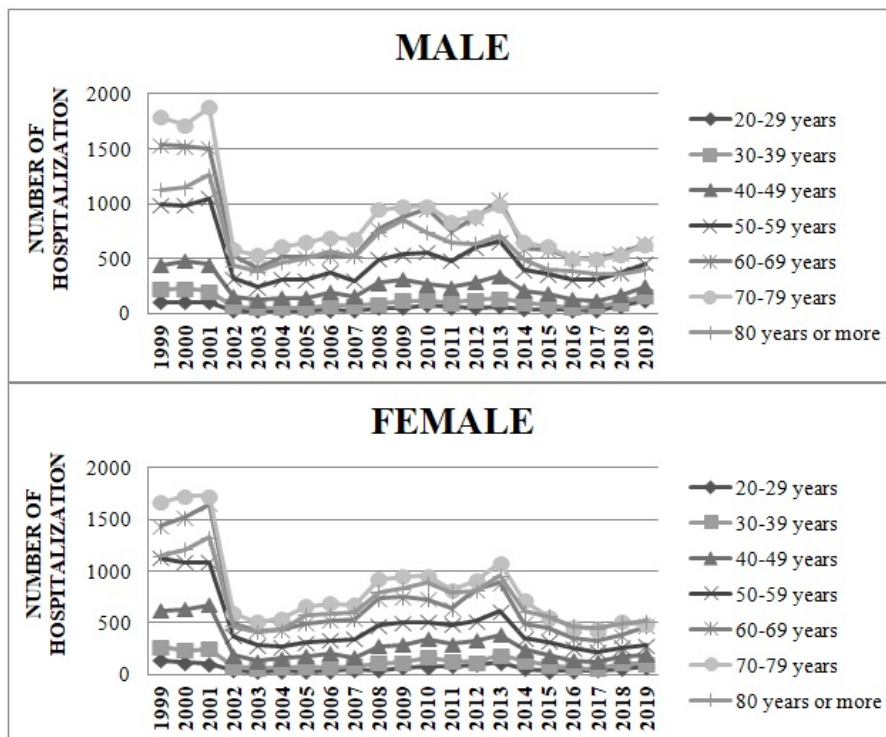


Figure 1. Temporal distribution of the number of hospitalizations for ischemic stroke in Northeast Brazil between 1999-2019 stratified by sex and age groups.

In Figure 2, it may be noted that there was a significant decrease in the total amount spent on hospitalizations for stroke in the years 2002 and 2014. The remaining years showed proportional values, increasing or decreasing, according to the time trend. Both spending peaks for both sexes were in 2013; for men, the value was R\$ 1,114,289.57 in the 60–69 age group, and for women, the value was R\$ 1,025,504.91 in the 70–79 age group.

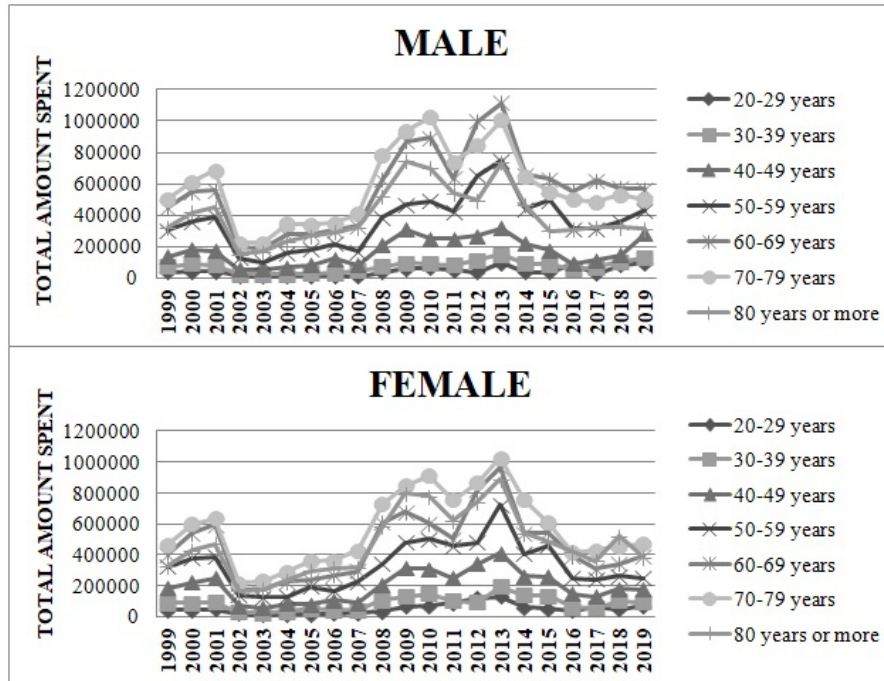


Figure 2. Temporal distribution of the total amount spent (cost) of hospitalizations for ischemic stroke in Northeast Brazil between 1999-2019 stratified by sex and age groups.

In Figure 3, it is evident that the number of deaths presented the same behavior as the previous figures, with a sharp drop in numbers in the years 2002

and 2014 and constancy in the other years. The peak of deaths for both sexes was in 2000, with 288 deaths for males and 255 for females, both aged 70–79 years.

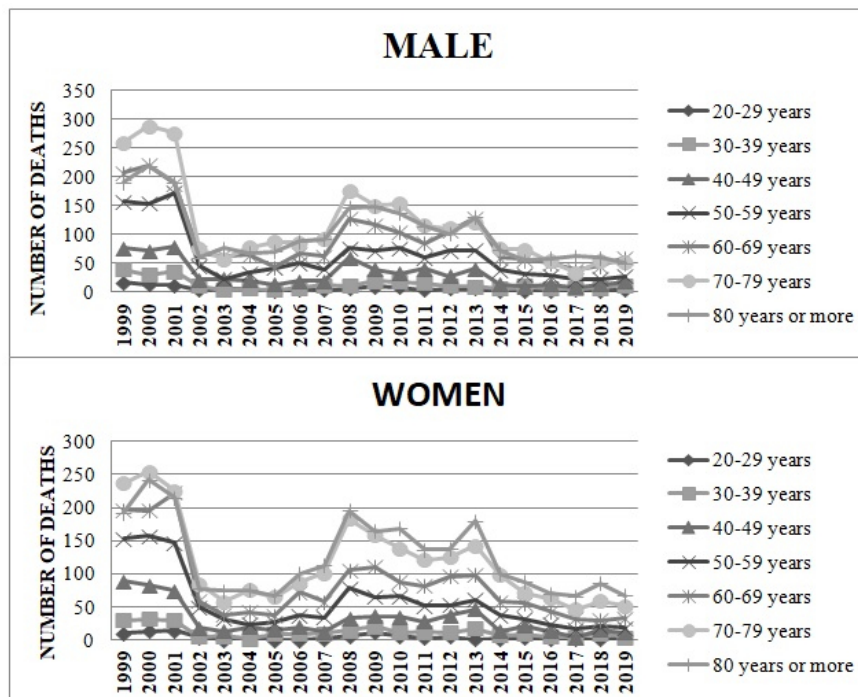


Figure 3. Temporal distribution of the number of deaths from ischemic stroke in Northeast Brazil between 1999-2019 stratified by sex and age groups.

DISCUSSION

The data mentioned in the present study were acquired in a search for factors related to the IS morbidity and mortality profile in Northeast Brazil. Despite clinical and epidemiological data that have a significant impact on the development and evaluation of public health policies, they are not always discussed and disseminated in the scientific literature. In fact, there are few ecological studies with this approach and within this time range.

It is estimated that the global burden of cerebrovascular disease in years of life, adjusted for disability, in 2030 may be three times greater than for tuberculosis and four times greater than for malaria. This growth is reflected in the increase in the number and days of hospitalization, resulting in increased costs of stroke care.¹¹

After stratification by sex in the present study, it is clear that the number of hospitalizations, the total amount of expenses, and the number of deaths between male and female individuals appear equivalent. In this sense, it is adopted that there are no important differences in the patterns of these data. This finding corroborates the study of Lopes et al.⁷, which found that male and female mortality remained in parallel between 1998 and 2010 in all age groups for which data were available in the Northeast.

Furthermore, this same profile was found in Lopes et al.,¹² confirming that hospitalizations for stroke in Brazil from 1998 to 2010 remained proportional in men and women of all age groups. These data stratified by sex may imply that the scope of public policies is similar for both sexes or even that essential public health services are equal in this regard.

Based on this premise, in 2001, the Care Reorganization Plan for Arterial Hypertension and Diabetes Mellitus (Hiperdia) was created. According to Ordinance GM/MS 235, the program aims to organize assistance, prevent and promote health, and implement permanent health education programs within the scope of primary health care. It was created for individuals with chronic non-communicable diseases (CNCD) that are associated with cardiovascular

diseases, such as stroke, in order to reduce the impact of related morbidity and mortality.^{13, 14}

Taking into account the highlight of the decreases in the variables “hospital admissions,” “total value,” and “deaths” due to stroke in the northeast in 2002, it is suggested that this is the first impact of the creation of the Hiperdia program. According to Negreiros et al.,¹⁵ and Saraiva et al.¹⁶ the mentioned program assists in addressing adherence to the cardiovascular disease treatment program as well as medication adherence and health guidelines. In addition, it directly assists in the control of blood pressure compared to individuals not monitored by the program.¹⁷ Thus, the beneficial effects are essential for the quality of life of its users.

Among the findings of the research in question, it is observed that the year 2014 was of fundamental importance for the epidemiology of stroke. This year also saw a decrease in the variables studied concomitantly with the implementation of the Mais Médicos Program (MMP), based on Law No. 12,871 of October 2013, following evidence of a deep shortage of doctors in the country, especially in primary health care (PHC).¹⁸ One of the objectives of the program is to take doctors to regions with a scarcity or absence of medical professionals, and it was structured around three lines of action that aimed to expand the supply of doctors and improve care conditions in Brazilian municipalities: (i) investment in improving the health infrastructure of healthcare networks; (ii) the expansion of courses and vacancies offered in medicine, including extensive educational reforms in undergraduate and medical residencies; and (iii) the implementation of the Mais Médicos para o Brasil Project (MMBP), which deals with the emergency provision of doctors in priority areas for SUS and the reduction of distributive inequalities.¹⁸

In the first two years, more than 18,000 doctors were integrated into the primary health care workforce, with the Northeast being one of the most favored regions.¹⁹ According to data from the Ministry of Health, 4,825 (33.4%) professionals went to the Northeast, which initially received the largest number of doctors. In this way, the MMP has contributed signi-

ificantly to the reduction of several causes of mortality, morbidity, and hospitalizations in the country as well as improving access to and use of health services, expanding access to treatments, and improving equity and reducing inequality.²⁰

Despite the attempt to improve assistance to stroke patients at the hospital level, the Northeast still suffers from the lack of immediate care for this condition. The support provided by the Emergency Medical Service (SAMU) is not yet the reality of many northeastern municipalities and there are reports of inadequate service, such as lack of training for communication at SAMU, failures in radio and transmission equipment, lack of information, absence of coordinators, and a lack of communication between teams, among others.²¹

Still, underfunding and regional inequalities constitute a deficit service in the Northeast, implying negative consequences for individuals who use the service.²² Another difficulty is in beginning thrombolytic therapy at SAMU itself, which directly improves the prognosis of patients with stroke, but which lacks training and practice, which is in fact lacking on a large scale in Brazil.²³

In addition, Brazil has a plan to address and stop CNCD in 2011–2022, including stroke, heart attack, high blood pressure, cancer, diabetes, and chronic respiratory diseases. Within this plan, several actions and programs, such as expansion of primary care and reduction in tobacco consumption, might have contributed to the decrease in mortality rates found during the study period, culminating in a lower rate in 2019.⁹

It is worth mentioning that the population and death data found in notification systems are not always entirely true to fact.²⁴ Even though these data are used by the Ministry of Health for the creation and elaboration of public health policies, an underreporting bias will always exist. This does not prevent the use of these data, since they are essential for epidemiological studies and are the closest to reality in relation to secondary data. Still, underreporting is more evident in the age group of the elderly due to the overlap of CNCD, which makes diagnoses difficult even for the control of deaths.²⁵

CONCLUSION

The number of hospitalizations, the total amount of expenses and deaths due to stroke, and related syndromes showed a sharp decline in the years 2002 and 2014, both in general data and in those stratified by sex and age group. Numerous factors might have influenced this change in behavior, such as the evolution of medical procedures, advances in drugs, therapy used to treat patients, investments in the health field, and the implementation of programs such as Hiperdia and Mais Médicos. Furthermore, considering that both programs were created to impact public health and reduce the morbidity and mortality reported in primary care, the findings of this study suggest that, in addition to the aspects mentioned above, the awareness of the general population and the favorable reach of these policies might be reflected in the study results.

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