Original Article

Epidemiological profile of stroke in the city of Araçatuba

Fernando Akio Saito[1], Rafael Flamarin Cavasana[1], Manuella Gomes Corrêa[1], Lucila Bistaffa de Paula[2]

[1]Medicine School | Centro Universitário Católico Salesiano Auxilium (UniSalesiano) | Araçatuba-SP, Brazil.

[2]Nursing School | Centro Universitário Católico Salesiano Auxilium (UniSalesiano) | Araçatuba-SP, Brazil.

Mailing to:
Fernando Akio Saito
E-mail: patologia.animal@ial.sp.gov.br
Institute: MS | UniSalesiano | Aracatuba-SP
Address: Rod. Teotônio Vilela, 3821. CEP: 16016-500. Aracatuba-SP, Brazil

ABSTRACT

Objective: To analyze the epidemiological profile of the population affected by aerebrovascular accident (CVA) in Araçatuba, Sao Paulo (SP), to estimate the importance of prevalence and incidence indicators of stroke in the city and to assess mortality for stroke, according to age, sex, education, color/race and length of hospitalization, and to correlate this data to national and state data. **Methods:** This is a descriptive, retrospective, and documental epidemiology study, with a quantitative approach of the notified cases of stroke in the hospital admission systems available in the DATASUS database, regarding patients in the city of Araçatuba, located in the Northwest region of the State of SP, between 2008 and 2018. **Results:** The results showed that the municipality of Araçatuba had a percentage decrease of 10% (14 cases) in the period evaluated. In addition, 1,718 (74.17%) of individuals affected by CVA were white, and 2,181 (94.17%) were predominantly above 40 years of age. The average length of stay had an increase of 2.4 (46.15%) days, and the costs of care in the city represent 0.92% of the total expenditure of the state of São Paulo. **Conclusion:** Our study observed that the incidence of CVA in the city is influenced by being over 60 years, having a low educational level, being white and of the male gender.

KEYWORDS: Stroke, Cerebrovascular accident (CVA), Epidemiological profile, Risk factors.

RESUMO

Objetivo: Analisar o perfil epidemiológico da população acometida por Acidente Vascular Encefálico (AVE) em Araçatuba - São Paulo (SP), estimar a importância dos indicadores de prevalência e incidência de AVE no município, correlacionando aos dados nacionais e estaduais e avaliar a mortalidade para AVE, segundo idade, sexo, escolaridade, cor/raça e tempo de internação, além de correlacionar com os gastos anuais na terapêutica da doença. **Métodos:** Trata-se de um estudo epidemiológico descritivo, retrospectivo, e documental, com abordagem quantitativa dos casos registrados de AVE nos sistemas de internação hospitalares disponíveis no banco DATASUS, de pacientes do município de Araçatuba, localizado na região Noroeste do Estado de SP, entre 2008 a 2018. **Resultados:** Os resultados evidenciaram que o município de Araçatuba teve um decréscimo percentual de 10% (14 casos) no período avaliado, além disso 1.718 (74,17%) dos indivíduos acometidos por AVE eram da raça branca, 2.181 (94,17%) eram predominantemente da faixa etária acima dos 40 anos. Quanto aos atendimentos, 2.315 (99,95%) dos atendimentos por AVE são de caráter urgente, tempo médio de permanência teve um aumento de 2,4 (46,15%) dias de permanência e os custos de atendimentos no município representam 0,92% do gasto total do estado de SP. **Conclusão:** Nosso

estudo observou que a incidência de AVE no município é influenciada por faixa etária acima dos 60 anos, baixo nível de escolaridade, raça branca e sexo masculino.

PALAVRAS-CHAVE: Acidente Vascular Encefálico, Perfil Epidemiológico, Fatores de Risco.

INTRODUCTION

Given the current situation in Brazil, it is observed that there has been a phenomenon of epidemiological transition, characterized by a decrease in deaths from acute and infectious diseases, and an increase in mortality from chronic non-communicable diseases and external causes, a phenomenon that directly has an impact on three factors: the individual, his family and the society.[1]

For the most part, the increase in longevity favors functional changes in individuals, resulting in a predisposition to the onset of non-communicable chronic diseases and their sequelae, which are almost always disabling, especially systemic arterial hypertension (SAH), diabetes mellitus (DM), rheumatoid arthritis (RA), and stroke.[2]

Currently, patient survival has been drastically prolonged with the help of technological advances in health, allowing something that was previously unfeasible, enabling greater survival of the population with more advanced ages, but also increasing the susceptibility and frequency of disabling chronic diseases. The WHO, based on statistical data, points to cardiovascular diseases as responsible for more than 16 million deaths, corresponding to one third of all deaths in 2001, with 5.5 million of these deaths caused by cerebrovascular accidents.[3]

There is a strong correlation between stroke and hospital admissions, mortality, and disability.[4]

A total incidence of stroke cases in the population of Latin America and the Caribbean of 140/100,000 inhabitants, and the prevalence of stroke survivors with incomplete recoveries, estimated at 460/100,000, were observed. National studies show that the incidence varies between 156/100,000 and 168/100,000. In the first year, an estimated mortality is found between 15% and 25%; recurrence rates between 5% and 14%; and partial or total disability between 24% and 54%.[5]

Stroke is a worldwide public health problem, being responsible for a large proportion of neurological diseases. It is an important cause of morbidity and mortality. Based on data available from DATASUS, stroke is the leading cause of death from cardiovascular disease in Brazil. Its incidence reaches 500,000 cases per year in the USA, representing 20% of cardiovascular deaths.

It ranks third among the causes of death in developed countries, surpassed only by ischemic heart diseases, and cancer.

It is responsible for more than 5 million deaths and more than 15 million non-fatal events per year. There are 50 million survivors of the condition, and of those, many will have a new stroke or transient ischemic attack (TIA) within five years.[7]

In addition to being one of the main causes of death in Brazil, stroke stands out for causing a high rate of disability. Several studies indicate that approximately 70% of patients who have suffered a stroke are unable to return to their work activities, and 50% of them even have difficulties in their daily living activities. Those disabilities generate significant damage to the physical, mental, and social well-being of the affected individual.[7]

Stroke is defined as a disturbance of brain function within a period of 24 hours with possible vascular origins. Currently, stroke is the second largest magnitude among the deaths found, being surpassed only by ischemic heart disease, and is shown to be responsible for a critical public health situation, generating high costs due to hospitalizations and treatment of sequelae.[6,8]

It is estimated that about 85% of strokes are ischemic in origin, due to occlusion of an artery by atheroma or secondary emboli, depriving the brain of oxygen and glucose, impairing cellular metabolism, and resulting in tissue injury and death. 15% of strokes are of hemorrhagic origin, due to excessive bleeding into the brain parenchyma, resulting from aneurysm, arteriovenous malformations, trauma, and hypertensive arterial disease. Patients in this group suffer from increasing intracranial pressure, causing brain tissue damage and restriction of distal blood flow.[9,10]

A Transient Ischemic Attack (TIA) usually lasts 10 to 20 minutes. Ischemic symptoms present for one hour rarely resolve within the next 23 hours (<15%). The vast majority of TIAs resulting from arterial atherothromboembolism are indicative of the presence of unstable atherosclerotic plaque, therefore signaling risk factors for additional events in the same territory, which may be equal to or greater than that after cerebral infarction.[10]

Risk factors for stroke can be divided into two groups, non-modifiable and modifiable. The main components of the first class are age, heredity, sex and race. Regarding the factors that can be modified, we highlight SAH, DM, smoking, dyslipidemia, heart disease, obesity, migraine, and the use of contraceptives.[6]

SAH is the main risk factor for the occurrence of stroke, due to its nature of reaching small and large arteries, directly correlating with the increase in thromboembolic events.[11]

Another important risk factor for the development of cerebrovascular involvement is DM, especially atherothromboembolic cerebral infarction. In diabetics, the etiopathogenesis of stroke and TIA are pathophysiological results that occur due to changes in cerebral hemodynamics, the presence of hyperglycemia, and other associated risk factors. DM is a risk factor related to increased occurrence of stroke by direct atherogenic mechanisms, and by interaction with other risk factors. In addition, such a condition has the ability to aggravate existing risks, such as SAH and hyperlipidemia.[11]

Several epidemiological studies have correlated smoking as an important risk factor for stroke. It is proven that this factor increases the chances of having a stroke by about two to four times, particularly of the extracranial atheroma type 12, demonstrating that it may have the ability to interact with other risk factors such as SAH, DM, glucose intolerance, age, hypercholesterolemia, and preexisting cardiovascular disease.

The diagnosis of stroke begins with the clinical suspicion of signs and symptoms characteristic for the patient's condition, highlighting: sudden muscle weakness or sudden unilateral sensory change; confusion, dysarthria, or sudden aphasia; sudden unilateral or bilateral visual loss; sudden loss of balance or sudden motor incoordination; severe and sudden headache with no definite cause; sudden lowering of the level of consciousness.[13]

The identification of a stroke episode can be aided using the Cincinnati scale, which is a simple way to identify a stroke by assessing face, strength, and speech. In the suspicion of a stroke, there may be weakness in the face, loss of strength in the arms, and speech alteration. There may be only one of the alterations, or all; the more alterations, the greater the probability of being a CVA.[14]

Even after treatment to intervene in the evolution of the patient with stroke, there will almost always be neurological deficits, which may compromise certain functionalities, varying according to the location of the vascular injury, the presence or absence of collateral circulation, and the time that inadequate perfusion persisted.[2]

The high incidence of stroke episodes causes critical damage to the patient's global health; the physical-functional and emotional sequelae demonstrate another stroke complication: its expenses with hospital admissions and rehabilitation processes. Furthermore, some sequelae may imply a certain dependence; affected individuals may be removed from the labor market, representing 30% to 40% of absences, increasing Social Security and disability costs, as they become dependent on retirement and/or benefits.[17]

For strokes that occurred and were notified, in patients residing in Araçatuba, the patient's lifestyle (specifically socioeconomic level, age, sex) proved to be relevant, providing significant increases in the prevalence and mortality of the disease. Hospital morbidity due to stroke is a frequent fact in the city of Araçatuba, and leads to several social and economic problems.

Within the existing literature on the subject, there is still a limited number of studies evaluating the epidemiological situation in the city, making it challenging to understand the involvement of the pathology in the population. Thus, carrying out a study evaluating quantitative data by reviewing the profile of multiple cases of patients affected by the disease, may add knowledge and literary applicability with the capacity to be used in clinical practices.

The study aims to analyze the epidemiological profile of the population affected by stroke in the city of Araçatuba, in the Northwest region of the State of São Paulo, through the analysis of cases registered in the hospital admission system available in the DATASUS database, to estimate the prevalence and incidence indicators of CVA in the city of Araçatuba, correlating with national and state data, and evaluating the mortality in Araçatuba for CVA, according to age, sex, education, and race, in addition to studying the annual costs of hospitalizations for the pathology.

METHODOLOGY

This is a descriptive, retrospective and documentary epidemiological study, with a quantitative approach to notified cases of stroke found in hospital admission systems in the DATASUS database, respecting patients in the city of Araçatuba, located in the Northwest region of the State of São Paulo.

Men and women affected by stroke who were hospitalized or died in the city of Araçatuba, in the countryside of the State of São Paulo, who were registered in the DATASUS database from 2008 to 2018, were included in this study.

All patients outside the parameter used were excluded from the analysis: patients who were hospitalized or who died due to stroke before or after the analysis period.

A sample size of 2,316 patients who suffered at least one stroke episode notified between 2008 and 2018 was used, considering all age groups, sex, and ethnicity.

Data were obtained from the HIA (Hospital Internment) files, carried out between 2008 and 2018, referring to patients in the municipality of Araçatuba belonging to the region of the Regional Department of Health II - Araçatuba, being logged in the Hospital Information System (SIHSus), and available in the DATASUS database for public consultation.

RESULTS

According to the results obtained, little variance in the number of hospitalizations were recorded in the State of São Paulo in the period evaluated. However, in Araçatuba, there were some oscillations found between the evaluation years. Between 2017 and 2018, there was a 53% reduction in the number of hospitalizations (table 1).

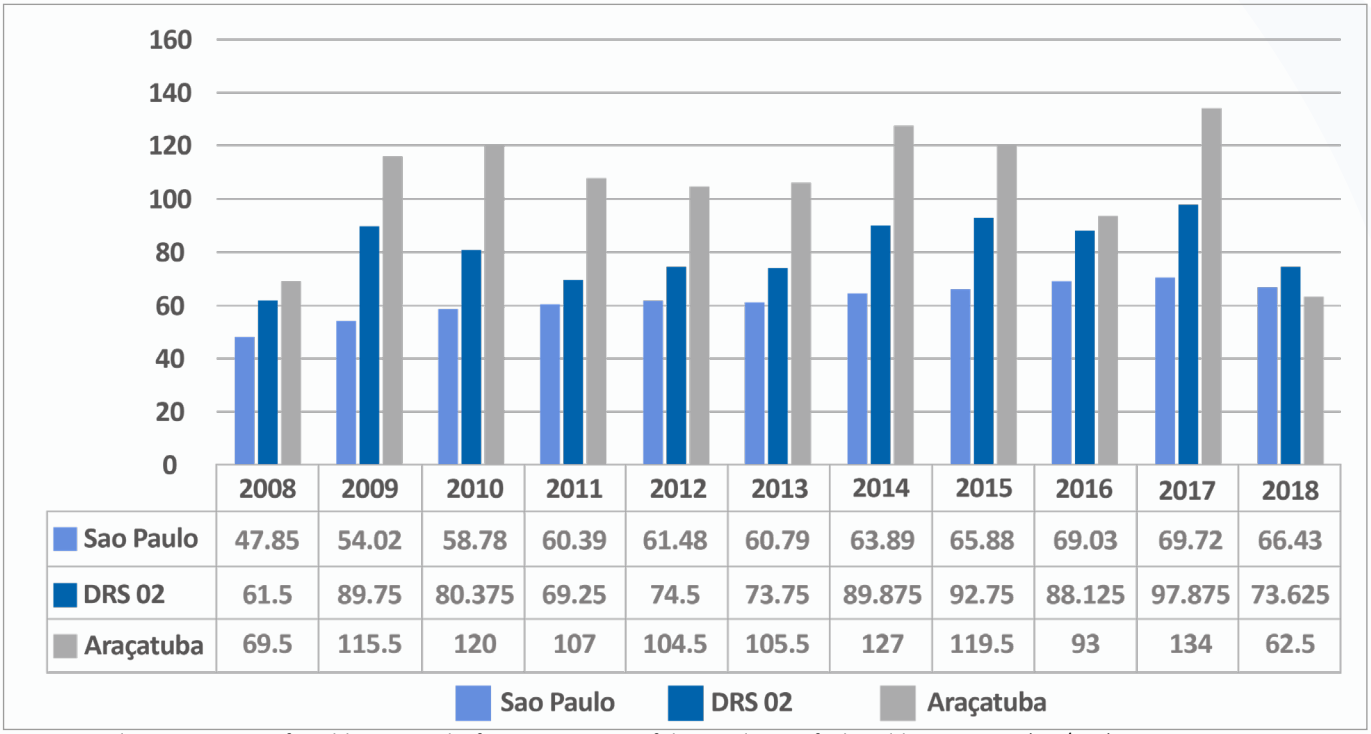
Table 1. Number of strokes distributed by year of occurrence, in the period from 2008 to 2018.

Year of treatment	Hospitalizations	
	Sao Paulo	Araçatuba
2008	22,015	139
2009	24,851	231
2010	27,043	240
2011	27,782	214
2012	28,285	209
2013	27,965	211
2014	29,390	254
2015	30,305	239
2016	31,755	186
2017	32,073	268
2018	30,560	125
Total	**313,049**	**2,324**

Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS).

When comparing the city of Araçatuba with the State of São Paulo, it is noted that both had their biggest drop in 2018, respectively 53% (125 cases) and 5% (30,560 cases). 2009 was the year with the highest increase for both, with Araçatuba representing 66% (231 cases), and the State of São Paulo, 13% (24,861 cases). Hospitalizations in the state increased in the period from 2008 to 2018, with an increase of 38% (8,545 cases) from 2008 to 2018. In addition, it is observed that this increase follows a linear characteristic, considering the gradual increase in most of the period (Figure 1).

Figure 1. Incidence of hospitalizations according to place of residence of stroke patients, distributed by year of occurrence.



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Sao Paulo	47.85	54.02	58.78	60.39	61.48	60.79	63.89	65.88	69.03	69.72	66.43
DRS 02	61.5	89.75	80.375	69.25	74.5	73.75	89.875	92.75	88.125	97.875	73.625
Araçatuba	69.5	115.5	120	107	104.5	105.5	127	119.5	93	134	62.5

Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS).

The same can be observed when examining the DRS 02 Region, which, despite not having a gradual and linear growth, had an observable increase at the end of the period from 2008 to 2018, with a total increase of 19,71% (97 cases).

The same cannot be said when observing the municipality of Araçatuba, which, contrary to what was previously analyzed, does not have a progressive growth pattern, and had no increase in cases at the end of the period. A decrease of approximately 10% was actually observed (14 cases).

Most cases of stroke care, in the city of Araçatuba and in the State of São Paulo, are urgent. However, there is a relative difference when evaluating elective care, since, in Araçatuba, of the 2,316 cases evaluated in the collected sample, 2,315 cases were of urgent nature, and only 1 was considered as elective, representing less than 0.05% of all cases. In the State of São Paulo, although elective care represents the minority—9,657 cases (3.09%)—, there is still a record of elective cases (Table 2).

But according to the SUS Table of Procedures, Medicines and OPM Management System (SIGTAP), care for stroke victims is urgent in Hospital Units, indicating a registration or typing error for cases notified as elective.

Table 2. Number of strokes distributed by year of occurrence in the state, according to hospitalization classification.

Locality	Elective	%	Urgency	%	Other causes	%	Total
Sao Paulo	9.657	3,09	302.359	96,9	8	0,002	**312.024**
Araçatuba	1	0,04	2.315	99,95	0	0	**2.316**

Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS)

It appears that, in the period from 2008 to 2018, there was an increase in the average length of stay of hospitalizations in the municipality. Interestingly, it is not possible to observe whether the increase in the number of cases has a correlation with the increase in the average length of stay, inferring other causes that may have culminated in this increase, with the year 2016 having an average of 9.1 days higher than the record period studied. The year with the lowest record was 2008, with an average of 5.2 days (Table 3).

Table 3. Average days of hospitalization for stroke distributed by year of occurrence, in the city of Araçatuba.

Year of occurance	Number of cases	Number of cases
2008	139	5.2
2009	231	6.5
2010	240	6
2011	214	6.2
2012	209	8.1
2013	211	7.9
2014	254	9
2015	239	8.4
2016	186	9.1
2017	268	7.4
2018	125	7.6

Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS).

There is a positive correlation between increased risk of stroke and an increase in age, as more than 90% of cases (2,189 cases) are concentrated in the age group of over 40 years (Table 4).

Table 4. Number of stroke patients according to age group, in the city of Araçatuba.

Age group	N	%
5 – 9 years	1	0,04
10 – 14 years	2	0,08
15 – 19 years	7	0,3
20 – 29 years	35	1,51
30 – 39 years	90	3,88
40 – 49 years	186	8,03
50 – 59 years	379	16,36
60 – 69 years	590	25,47
70 – 79 years	583	25,17
Over 80 years	443	19,12

Fonte: Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS).

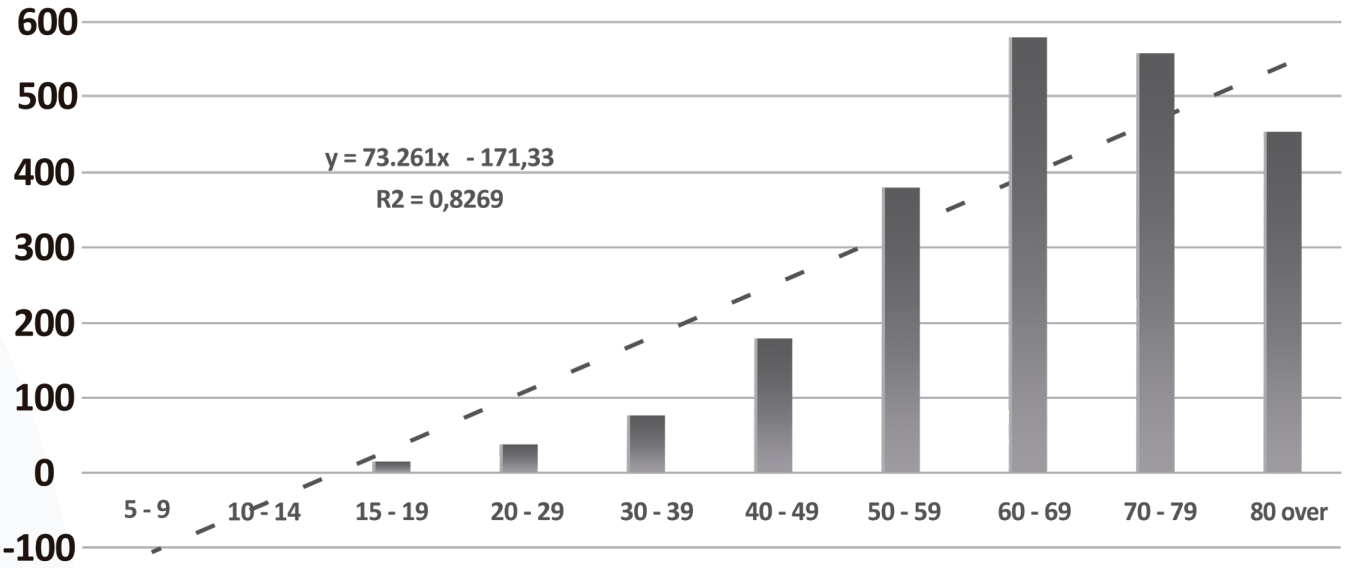
The relationship between age and increased risk for stroke corroborates the findings in literature that place age as an important risk factor for developing stroke.[6]

It was found that higher age groups show an increase in prevalence, being supported by a significant coefficient of determination that positively supports the relationship between age group and prevalence (R-square = 82.69%). In addition, it was observed that the vast majority of patients are concentrated in the age group of 60 to 69 years and 70 to 79 years, representing respectively 25.47% and 25.17% of the total hospitalizations (Figure 2).

It is shown that more than 70% of stroke cases in the studied period were in white-skinned patients, followed respectively by brown-skinned, not informed, black-skinned, and yellow-skinned patients (Figure 3).

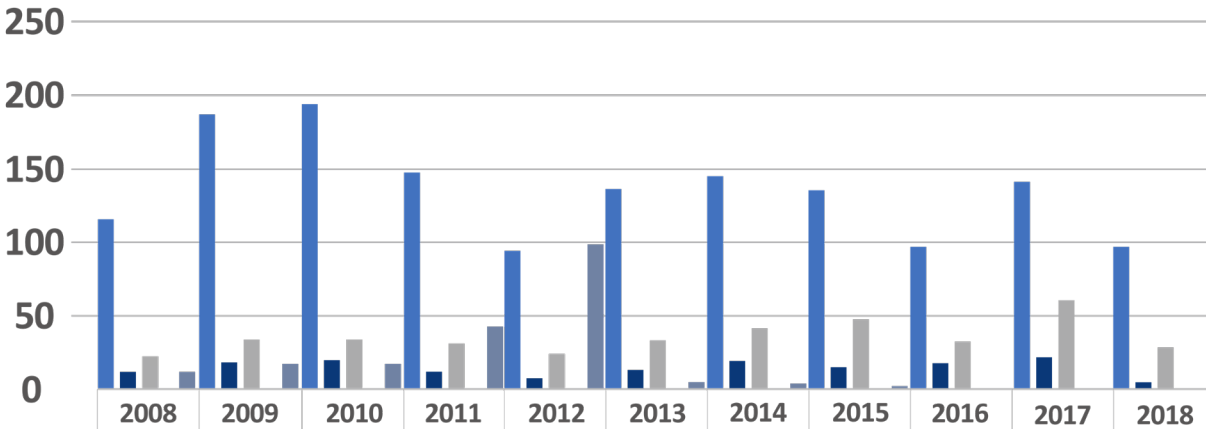
There is a slightly increased prevalence in males in the studied period, although there are controversies in the research literature highlighting the female sex as an imminent risk factor,[29,30] and at some points such was observed. In 2011, both sexes had similar records, and in 2015 and 2016 females had a greater number of records; but at all other moments of the evaluated period, males were predominant, although this predominance is negligible being less than 2% (Figure 4).

Figure 2. Total number of patients hospitalized with stroke according to age group from 2008 to 2018, in the city of Araçatuba.



Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS).

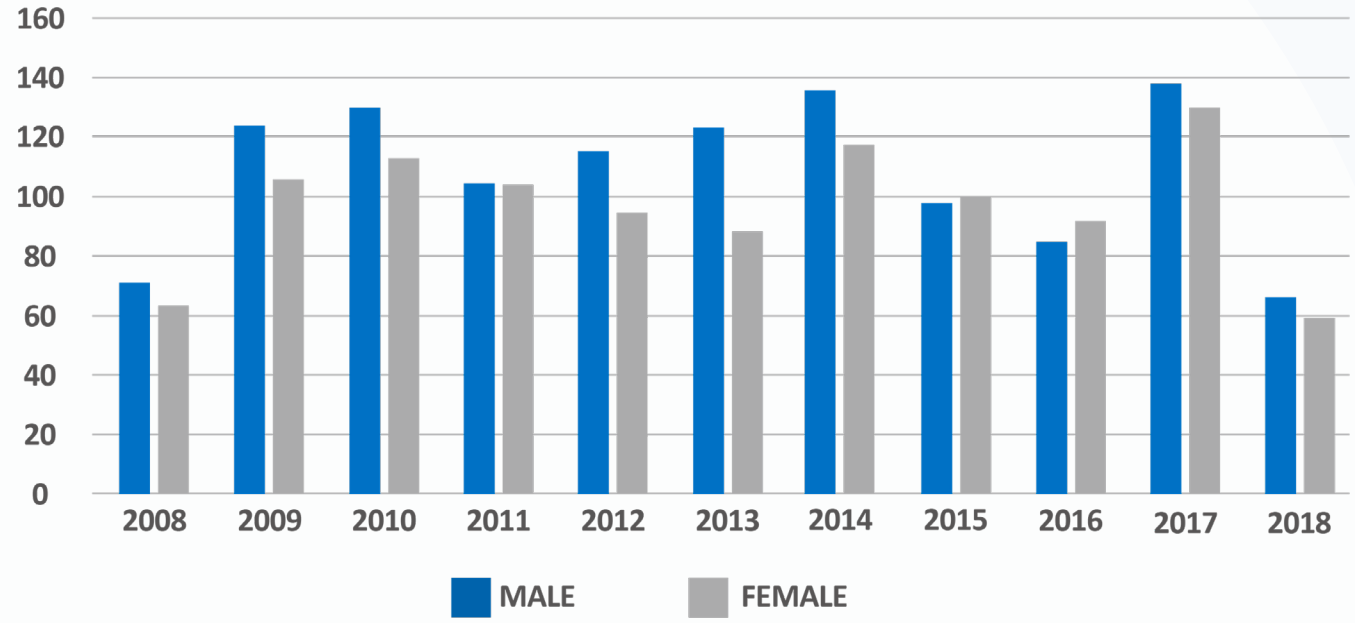
Figure 3. Number of patients hospitalized with stroke according to race from 2008 to 2018, in the city of Araçatuba.



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
White	112	191	195	147	90	176	195	178	147	191	96
Black	6	9	10	8	4	9	16	10	11	16	3
Mixed race	15	21	19	20	16	23	40	49	27	61	26
Yellow	0	1	0	1	0	0	0	0	1	0	0
Not informed	6	9	16	38	99	3	3	2	0	0	0

Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS).

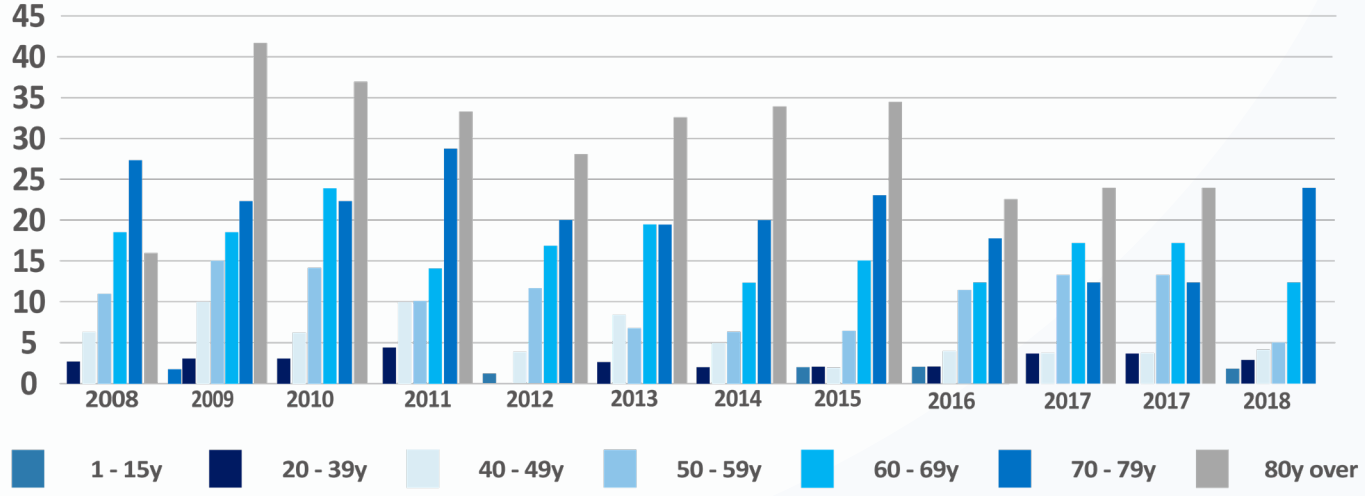
Figure 4. Number of patients hospitalized with stroke according to race from 2008 to 2018, in the city of Araçatuba.



Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS).

There was a drop in the number of deaths in the period evaluated, especially in the population over 80 years of age. There was a predominance of the age group over 80, but there was an exchange of predominance in the final year evaluated, when the concentration of the population from 70 to 79 years old stood out with the largest number of deaths (Figure 5).

Figure 5.Deaths from stroke, according to age group, that occurred in the city of Araçatuba, from 2008 to 2018.



Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS)

A significant part of deaths from stroke in Araçatuba had no information on the patient's education level in the attendance records; as it is considered an aspect to be evaluated, the data available raises the idea that patients with a higher education were treated in the same way as patients with a lower education (Table 5). Although treatment is the same, the approach could lead to an early intervention in the disease and risk factors (Table 5).

Table 5. Deaths from stroke, according to age group, that occurred in the city of Araçatuba, from 2008 to 2018.

Educational level	N	%
None	22	2.31
1 - 3 years	52	5.46
4 - 7 years	23	2.41
8 - 11 years	29	3.04
12 years or more	30	3.15
Not informed	796	83.61
Total	**952**	**100**

Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS).

When we evaluate the costs, we can observe, on Table 6, that the city of Araçatuba, in the studied period, represented 0.92% of all the amount spent for patients with stroke in the State of São Paulo. The lowest cost in the period studied was in 2008, when Araçatuba spent R$ 143,564.30, and the State of São Paulo spent R$ 19,881,647, demonstrating how high the costs for stroke treatment are (Table 6).

Table 6. Costs of patients treated with diagnosis of stroke in the city of Araçatuba, in relation to the DRS II region.

Year of treatment	Sao Paulo	Araçatuba
2008	19,881,647	143,564.3
2009	26,060,422	295,084.2
2010	29,359,596	307,139.9
2011	31,540,328	269,463.3
2012	33,407,931	285,431.3
2013	33,913,430	348,000.9
2014	38,259,390	469,647.7
2015	40,120,034	406,955.1
2016	43,097,258	340,723.0
2017	44,748,703	411,753.1
2018	42,016,433	248,990.9
Total	382,405,172.00	3,526,753.58

Source: Brazilian Department of Health – Hospital Information System of the Brazilian Unified Healthcare System (HIS/SUS).

The costs of stroke care in the city of Araçatuba in the studied period represent 0.92% of the entire amount spent for stroke patients in the State of São Paulo. In addition, it is noted that, in the period from 2013 to 2017, the highest costs for patients attended were shown, however in 2018 there was a decrease of R$ 162,762.20 (60.47% compared to the previous year). In the State of São Paulo, the oscillations between the values were smaller, showing positive increases throughout the evaluated period, from 2013 to 2017, in which the highest costs of patients treated were found. In addition, there was a decrease in the following year, but the percentage drop was significantly lower (10.65%).

DISCUSSION

It was noted that the municipality and the State of São Paulo both had their biggest drop in 2018, respectively 53% (125 cases) and 5% (30,560 cases). However, when evaluating the lowest recorded incidence, the State of São Paulo refers to 2008 with the lowest incidence, recording 47.85 cases per 100,000 inhabitants, while the city of Araçatuba relates the year 2018 with the lowest incidence, recording 62.5 cases per 100,000 inhabitants.

The year of 2017 registered the greatest increase in incidence; Araçatuba having 134 cases per 100,000 inhabitants, and the State of São Paulo, 69.72 cases per 100,000 inhabitants.

The study showed that the State of São Paulo had an increase in hospitalizations with a linear characteristic, revealing a gradual rise in most of the period.

The year of 2019 had the highest number of hospitalizations ever recorded (47,924), representing an increase of about 60% compared to the first year of observation (2010), which had 27,499 hospitalizations; that was the year with the lowest number of hospitalizations for this medical condition, in the period studied, in the Northeast region of Brazil.[18]

When observing the city of Araçatuba, which, unlike the State of São Paulo analyzed above, does not have a progressive growth pattern, the municipality had no increase in cases in the final year of evaluation, with just 125 hospitalizations. It was possible to identify a decrease of approximately 10% (14 cases) compared to the initial year of 2008, with 139 hospitalizations. However, the proportion was reduced, with 69.5 cases per 100,000 inhabitants in 2008, while 2018 listed 62.5 cases per 100,000 inhabitants.

Of 312,024 patients hospitalized with a diagnosis of stroke in the State of São Paulo, the city of Araçatuba payed 0.74% (2,324 cases) of the total number of visits to hospitalized patients throughout the state.

The research confirms that stroke care is urgent. With 2,316 of the total cases in the studied period, the years with the highest incidence were 2010 (240 cases), 2014 (254 cases), 2015 (239 cases), and 2017 (268 cases). In accordance with SUS's Management System for the Table of Procedures, Medicines and OPM (Orthotics, Prosthetics and Special Materials) (SIGTAP), healthcare for stroke victims is urgent in hospital units, and the city of Araçatuba has a single record in 2018 as elective, indicating a typing error.

Stroke cases must be dealt with urgently. In Brazil, the most followed risk classification protocol is the Manchester Triage System, an instrument that recognizes patients in critical situations in the emergency unit and contributes to the regulation of stroke-care demands and treatment priority.[18]

In order to get treatment with the greatest benefit and the highest rate of recovery, the stroke patient must be received, evaluated and prescribed to within the shortest possible time. The faster the intervention, the lower the mortality rates and complications.[19]

When the length of stay of hospitalizations in the period from 2008 to 2018 is evaluated, an increase is noticed, but it is not possible to observe whether such information has a correlation with the increase in the average length of stay, inferring that other medical causes may have been responsible for this increase. The year of 2016 had an average of 9.1 days as the longest length of stay in the studied period, and 2008 had an average of 5.2 days as the shortest length of stay found.

Length of stay is an important predictor of patient management and hospital care performance, and may be associated with multiple variables such as age, stroke severity, and comorbidities. Taking this into account, it is possible to assume that with the phenomenon of epidemiological transition for the elderly population, the length of stay will naturally suffer with age variation, and will become increasingly longer.[20]

The stroke patient needs more specific, high-complex care at some point during the hospitalization period, especially in the emergency room, which directly affects the length of stay of patients in hospitals.[21]

A study carried out in 2016 found out the average stay was 95.94%, similar to the average total stay recorded at the end of the evaluated period in the city of Araçatuba.[22]

Age is a non-modifiable factor that will become increasingly relevant, but there is still the possibility of more intense measures to impact other variables, such as comorbidities and stroke severity. It follows that the control of these variables must be included in performance indicators to reduce the time stroke victims stay at the hospital.[23]

In the study, 80% of stroke records (1,723 cases) in the studied period were of patients registering their race as white. Interestingly, this data is contrary to the literature, which infers that being black is a risk factor for developing CVA. That fact suggests most patients in the city of Araçatuba might be white and, therefore, they will represent most of the cases.[6,11]

This discordant scenario may be related to the predominance of white and mixed-race people both in Araçatuba and in the State of São Paulo. Such a fact is present in studies that took place in southern regions of Brazil, which can attenst the population in the South and Southeast regions in the country have a prevalence of the white population, and thus could have different risk factors involved in the pathogenesis of stroke.[12,24]

It has been shown economically disadvantaged population groups have higher rates of cardiovascular mortality than those with better living conditions and higher education.[26] In addition to the fact that the poorest parts of the population are also subject to the main risk factors, they still use cheaper, often low-quality products. Cigarettes, distilled alcoholic beverages, meat with high fat contents, fried food with saturated oils, canned food, among others, are frequently consumed.[25]

It was noted that starting with patients within the 30-39 age group, every ten years the number of deaths increases by 50%, until the 70-79 age group. In addition, it appears that the age group with the highest number of hospitalizations are patients between 60 to 69 and 70 to 79 years, concentrating respectively the 1st and 2nd age group with the highest number of hospitalizations.

Among several aspects, other risk factors are also mentioned as causes justifying the predominance of that age group. According to a 2013 study, stroke is a disease predominantly affecting the elderly.[22]

Age is a significant risk factor, since the elderly have more fragile health conditions, increasing their susceptibility to stroke, as well as lack of monitoring and control of chronic diseases.

The prevalence of stroke in older people can be explained by the fact that they are the group with the highest rates of chronic diseases such as type 2 diabetes mellitus, hypertension blood pressure, and dyslipidemia—characteristic risk factors of the pathology. Consequently, there is a need for preventive strategies aimed at reducing and controlling these and other chronic diseases.[26]

Furthermore, patients over 60 years old were found to show a greater risk factor of stroke. In addition, patients in the 50-59 age group represent twice the prevalence of the preceding age group. Thus, preventive measures in the city should be instituted at the age of 50, bringing potential benefits to the health of the elderly population.[2]

There is a slightly increased number of cases in males in the evaluated period; but there are moments of equality, or even inversion of cases, as in the period of 2015 and 2016, when female rates were higher than male.

Stroke can occur in both sexes, but there is a similarity in the involvement observed in our research. Data report that female patients also had a high risk of stroke. However, this finding has been discussed in current research literature, mostly relating the risk to the use of oral contraceptives used mainly by women of childbearing age or in post-menopause.[6,11,27]

The characteristic female sex hormone, estrogen, especially in ethinylestradiol form, has an important influence on hemostasis, activating pathways of pro-coagulant factors, reducing natural anticoagulant factors, and stimulating endothelium dysfunctions. That contributes to the establishment of Virchow's triad, which consists of three primary factors for thromboembolic events: endothelial dysfunction, venous stasis and changes in coagulability.[28]

In addition, it is reported that although there is still no consensus that sex is a risk factor, most hospitalized patients are male, indicating the possibility that being male may be a factor for increased mortality.[29]

Education is a notable predictor, not only for the development of stroke, but also for resulting disabilities.

A low level of education is associated with other risk factors, such as lower socioeconomic conditions, and reduced acknowledgement of risk indicators, influencing lower awareness of health care during the patient's life, knowledge of therapeutic measures, and the proper following of treatment. That can culminate in unsatisfactory adherence to specific treatments and preventive measures for gait changes and muscle strength deficits, which can result in higher fall rates and factors that limit patient autonomy.[30]

Another important element is the caregiver's level of education, since, like the patient, they must be aware of the measures to be taken in the attention to a stroke victim. Some authors point out that the lack of information about attention, associated with a low level of education, can cause anxiety and anguish in the caregiver, reflecting negatively on the care of the stroke patient, as well as on the caregiver's own health.[31]

When evaluating stroke mortality, a decrease in the number of deaths from 2008 to 2018 was found. In the years 2008 and 2018, the population aged 70 to 79 years had the highest number of deaths, and in all other years the predominance was in the population over 80 years old. Despite the age group above 80 not having the highest number of hospitalizations, it has the 2nd highest number of recognized deaths, following the 70-79 age group.

There are indications in research literature that in the age group over 30 years, the death rate tends to rise, reaching a peak from the age group of 70 years, constituting an important risk factor not only for the development of CVA but also for mortality. A study evaluating 60 cities in Brazil suggests that deaths in the 30-69 age group represent 30.2%, while the age group over 70 represents 69.8%. Considering that from the age of 70, the mortality rate becomes twice as high, and this possibly implies that more rigorous care should be instituted in populations belonging to this group.[32]

Despite the drop in mortality rates in Brazil, stroke remains the leading cause of death and disability in the country. Data from a prospective national study indicated an annual incidence of 108 cases per 100,000 inhabitants.[13]

The hospitalization of a patient for stroke has an average cost of R$ 6,000 for SUS, and this value may change according to the severity of each case, In cases classified as mild, expenditures of approximately R$ 640.00 per hospitalization are budgeted, taking into account rehabilitation of neurological deficits without signs of significant impairment, with an indication of temporary hospitalization (3 to 5 days).

In scenarios with severe symptoms, the length of hospital stay has the potential to exceed one month, with an average cost estimated at R$ 32,000.[33]

A stroke cost of approximately US$ 40.9 billion was estimated in the US in 1997, based on data from the National Center for Health Statistics, the Health Care Financing Administration and the US Bureau of Census. Data that showed direct expenditures of 26.2 billion dollars with hospitalization, professionals and medication, and indirect losses of 14.7 billion dollars, It is estimated that the cost increased to 208 billion dollars in 2000. In addition, the budget used with stroke in 1999 was accounted for at 90 million pounds sterling in England, more than 5 billion reais.[34]

The indirect socioeconomic expenses resulting from the CVA are invaluable, due to the fact that the patient with sequelae has difficulty returning to professional activity or may become unable to return to the job market, in addition to causing a large social and psychological impact

on the socioeconomic structure of the family. Furthermore, families are often in need of help from caregivers, in administrating of drug treatment and performing activities for rehabilitation.[34]

CONCLUSION

This study observed that stroke in the city of Araçatuba has a prevalence among those over 60 years of age; those with a low level of education; the white race; and the male gender. Despite risk factors contrary to other research literature, such as white race, were found, it is crucial to understand the population profile in the city.

Furthermore, male sex as a risk factor alone is debatable, due to the minimal difference observed between men and women when assessing the incidence in both groups. It is known that estrogen has physiological characteristics relevant to the clinical outcome of thromboembolic events that may lead to stroke. Thus, it was not possible to unravel sex as an etiopathogenic source in isolation.

However, well-established risk factors such as age group and low educational level can be noted as important etiologies that should be included in clinical practice and in patient assessments indicating risks of future thromboembolic events resulting in stroke.

The increased financial cost due to hospital admissions at SUS in recent years could be reduced with preventive measures in primary care. However, this becomes a difficult task due to the scenario evaluated as the costs of the municipality do not have sufficient indicators that can provide data to predict an increase or decrease for the coming years.

Finally, age group and a low level of education are established as major etiological factors that need to have importance within a clinical history for effective prevention and interventions.

Within debatable risk factors such as sex and race, studies are needed to clarify the real role of the pathophysiological causes that may result in an increase in the incidence of stroke.

Finally, studies are needed that seek to illuminate the annual costs of hospitalizations for stroke with the purpose of tracing data that can predict annual increases or decreases in the treatment of the pathology.

REFERENCES

1. MACHADO, ALG.; JORGE, MSB; FREITAS, CHA. A vivência do cuidador familiar de vítima de Acidente Vascular Encefálico: uma abordagem interacionista. Revista Brasileira de Enfermagem, v. 62, n. 2, p. 246-51, abr. 2009.

2. CRUZ, KCT DA; DIOGO, MJD. Avaliação da capacidade funcional de idosos com acidente vascular encefálico. Acta Paulista de Enfermagem, v. 22, n. 5, p. 666-72, out. 2009.

3. BRITO, ES; RABINOVICH, EP. A família também adoece!: mudanças secundárias à ocorrência de um acidente vascular encefálico na família. Interface - Comunicação, Saúde, Educação, v. 12, n. 27, p. 783-94, dez. 2008.

4. BRITO, ES; RABINOVICH, EP. Desarrumou tudo! O impacto do acidente vascular encefálico na família. Saúde e Sociedade, v. 17, n. 2, p. 153-69, jun. 2008.

5. OLIVEIRA, MR DE; ORSINI, M. Escalas de avaliação da qualidade de vida em pacientes brasileiros após acidente vascular encefálico. Revista Neurociências, v. 17, n. 3, p. 255-62, 23 jan. 2019.

6. CASTRO, JAB DE; EPSTEIN, MG; SABINO, GB; NOGUEIRA, GLO; BLANKENBURG, C; STASZKO, KF et al. Estudo dos principais fatores de risco para acidente vascular encefálico. Revista da Sociedade Brasileira de Clínica Médica, v. 7, p. 171-3, 2009.

7. CONCEIÇÃO, ML; CONCEIÇÃO, ML; PIMENTEL, PHR. Qualidade de vida de indivíduos pós acidente vascular cerebral: uma revisão integrativa. Research, Society and Development, v. 10, n. 14, p. e506101422746, 12 nov. 2021.

8. OLIVEIRA, BC DE; GARANHANI, ML; GARANHANI, MR. Cuidador de pessoa com acidente vascular encefálico: necessidades, sentimentos e orientações recebidas. Acta Paulista de Enfermagem, v. 24, n. 1, p. 43-9, 2011.

9. Primeiro consenso brasileiro para trombólise no acidente vascular cerebral isquêmico agudo. Arquivos de Neuro-Psiquiatria, v. 60, n. 3A, p. 675-80, set. 2002.

10. MAZZOLA, D. et al. Perfil dos pacientes acometidos por acidente vascular encefálico assistidos na Clínica de Fisioterapia Neurológica da Universidade de Passo Fundo. Revista Brasileira em Promoção da Saúde, p. 22-7, 2007.

11. CHAVES, MLF. Acidente vascular encefálico: conceituação e fatores de risco. Revista da Sociedade Brasileira de Hipertensão, v. 4, p. 372-82, 2000.

12. ARAÚJO, A; SILVA, P; MOREIRA, R et al. Prevalência dos fatores de risco em pacientes com acidente vascular encefálico atendidos no setor de neurologia da clínica de fisioterapia da UNIPAR - campus sede/Prevalence of the risk factors in the patients with stroke attended in the sector of neurology of the clinic of physiotherapy of the UNIPAR - campus. Arquivos de ciências da saúde da UNIPAR,v. 12, n. 1, p. 35-42. 2008

13. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Especializada. Manual de rotinas para atenção ao AVC. 1ª ed. Brasilia-DF: Ministério da Saúde; 2013.

14. Hospital Alemão Oswaldo Cruz, Ministério da Saúde. Neurologia - Suporte Básico de Vida (SBV) 2ª ed. Programa de Apoio ao Desenvolvimento Institucional do Sistema Único de Saúde, editor. Vol. 5. Hospital Alemão Oswaldo Cruz; 2018.

15. LESSMANN, JC et al. Atuação da enfermagem no autocuidado e reabilitação de pacientes que sofreram Acidente Vascular Encefálico. Revista Brasileira de Enfermagem, v. 64, n. 1, p. 198-202, fev. 2011.

16. SÁ, B; GRAVE, M; PÉRICO, E. Profile of patients hospitalized with Stroke in a hospital of Vale do Taquari/RS. Revista Neurociências, v. 22, n. 03, p. 381-7, 1 set. 2014.

17. AFONSO CARLOS, N. et al. Custos do Paciente com Acidente Vascular Cerebral no Setor de Emergência do Hospital São Paulo. Revista Neurociências, v. 10, n. 3, 2002.

18. FIGUEIREDO, MM DE; BICHUETTI, D. B.; GOIS, AFT. Evidências sobre diagnóstico e tratamento do acidente vascular encefálico no serviço de urgência. Diagn Tratamento, v. 17, n. 4,p. 167-72, 2012.

19. PEREIRA, LFDML; SILVA, AM DA; FRANÇA EFG DE et al. ATUAÇÃO DO ENFERMEIRO NO ATENDIMENTO DE EMERGÊNCIA A IDOSOS PORTADORES DE ACIDENTE VASCULAR ENCEFÁLICO. Realize Editora, editor. Anais V CIEH, 20 de dezembro, 2017.

20. SEHN, M; LEDUR, FK; SEHN, I; SEHN, B; RAUBER, R; ALMEIDA, LP de. Factors that can influence the length of hospital stay in patients with Ischemic Stroke. Research, Society and Development, [S. l.], v. 10, n. 8, p. e20710817107, 2021. DOI: 10.33448/rsd-v10i8.17107.

21. BARBOSA, AM DE L. et al. Perfil epidemiológico dos pacientes internados por acidente vascular cerebral no nordeste do Brasil.Revista Eletrônica Acervo Saúde, v. 13, n. 1, p. e5155, 31 jan. 2021.

22. BOTELHO T. DE S; NETO, CDM; ARAÚJO, FLC DE et al. Epidemiologia do acidente vascular cerebral no Brasil. Temas em saúde,v. 2, n. 16, p. 361-77, 2016.

23. GASPARI, AP et al. Predictors of prolonged hospital stay in a Comprehensive Stroke Unit. Revista Latino-Americana de Enfermagem, v. 27, [s.d.].

24. SCHUSTER, RC et al. Caracterização de internações hospitalares por acidente vascular encefálico na cidade de Passo Fundo - RS. ConScientiae Saúde, v. 8, n. 4, p. 581-5, 3 mar. 2010.

25. LEITE, HR; NUNES, APN; CORRÊA, CL. Perfil epidemiológico de pacientes acometidos por acidente vascular encefálico cadastrados na estratégia de saúde da família em Diamantina, MG. Fisioterapia e Pesquisa, v. 16, n. 1, p. 34-9, mar. 2009.

26. AZEVEDO, GV DE O; DE ARAÚJO, AHV; DE SOUZA, TA. Aspectos epidemiológicos do acidente vascular encefálico na Paraíba em 2016. Fisioterapia Brasil, v. 19, n. 5, p. S236-S241, 6 nov. 2018.

27. COSTA, AG DE S et al. Identificação do risco de quedas em idosos após acidente vascular encefálico. Escola Anna Nery, v. 14, n. 4, p. 684-9, dez. 2010.

28. LAI, IK; BUSCHLE, MN; GRAVA, S et al. Trombose venosa pulmonar e acidente vascular encefálico em paciente jovem usuária de anticoncepcional oral: um relato de caso. UNIVERSIDADE CESUMAR, editor. UNIVERSIDADE CESUMAR, 2021.

29. SANTOS, IGO et al. Cuidados intensivos em Sergipe: perfil de internações segundo causas. Revista Recien - Revista Científica de Enfermagem, v. 9, n. 26, p. 23, 25 jun. 2019.

30. MENDONÇA, LB DE A; LIMA, FET; OLIVEIRA, SKP DE. Acidente vascular encefálico como complicação da hipertensão arterial: quais são os fatores intervenientes? Escola Anna Nery, v. 16, n. 2, p. 340-346, jun. 2012.

31. COSTA, TF DA et al. Burden over family caregivers of elderly people with stroke. Escola Anna Nery - Revista de Enfermagem, v. 19, n. 2, 2015.

32. Perfil epidemiológico sobre acidente vascular encefálico no município de Araçatuba Saito FA, Cavasana RF, Corrêa MG, Paula LB

33. MAMED, SN et al. Perfil dos óbitos por acidente vascular cerebral não especificado após investigação de códigos garbage em 60 cidades do Brasil, 2017. Revista Brasileira de Epidemiologia, v. 22, n. suppl 3, 2019.

34. ABRAMCZUK, Beatriz; VILLELA, Edlaine. A luta contra o AVC no Brasil. ComCiência, Campinas, n. 109, 2009. Disponível em <http://comciencia.scielo.br/scielo.php?script=sci_arttext&pid=S1519-76542009000500002&lng=pt&nrm=iso>. acessos em 21 fev. 2022.

35. BARBOSA, AMA et al. PERFIL EPIDEMIOLÓGICO DAS INTERNAÇÕES, GASTOS E MORTALIDADE INTRA- HOSPITALAR, POR SEQUELAS DA TUBERCULOSE, NO BRASIL. Revista UNINGÁ, v. 57, n. S1, p. 66-7, 4 fev. 2021.

Historic

Received	Approved	Publication
11/22/2021	02/22/2022	03/17/2022

How to cite

Akio Saito F, Flamarin Cavasana R, Gomes Corrêa M, Bistaffa de P aula L. Perfil epidemiológico sobre acidente vascular encefálico no município de Araçatuba. Bepa [Internet]. 17º de março de 2022 [citado 4º de janeiro de 2023];19:1-23. Disponível em: https://periodicos.saude.sp.gov.br/BEPA182/article/view/37334

Open Access

CVE CENTRO DE VIGILÂNCIA EPIDEMIOLÓGICA

CCD COORDENADORIA DE CONTROLE DE DOENÇAS

GOVERNO DO ESTADO DE SÃO PAULO