

Hospital Admissions for Neoplasms in Brazil, 2008-2018: Expenses and Length of Stay

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Internações Hospitalares por Neoplasias no Brasil, 2008-2018: Gastos e Tempo de Permanência Ingresos Hospitalarios por Neoplasias en Brasil, 2008-2018: Gastos y Duración de la Estadía

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ABSTRACT

Introduction: Neoplasms represent the second leading cause of death in Brazil, however ensuring full and balanced assistance to diagnosis and treatment in the regions of the country remains one of the biggest challenges of the Brazilian health system. **Objective:** To describe the rates of hospitalization by neoplasms in Brazil between the years 2008 and 2018, to calculate hospital expenditures and the length of stay of hospitalizations by neoplasms in the Unified Health System (SUS). **Method:** Ecological study of time series with data from SUS Hospital Information System. **Results:** In the 2008-2018 history series, there were 7,578,552 hospitalizations for neoplasms in SUS, 59% of which in female patients, 20% in the age-range between 50 and 59 years old, 43%, Caucasian and 44% in the country's southeastern region. The total cost of hospital admissions by neoplasms reached R\$ 13,225,554,102.73, with an average stay of 5.4 days of hospitalization per patient. **Conclusion:** This is the first study that uses the entire country as a territorial unit of analysis, so it is expected that further studies involving hospital morbidity in the country will be developed.

Key words: Neoplasms; Hospitalization/statistics & numerical data; Hospital Costs/statistics & numerical data; Health Expenditures/statistics & numerical data; Epidemiology, Descriptive.

RESUMO

Introdução: As neoplasias representam a segunda causa de morte no Brasil, no entanto, garantir assistência plena e equilibrada ao diagnóstico e tratamento nas Regiões do país segue sendo um dos grandes desafios do sistema de saúde brasileiro. **Objetivo:** Descrever as taxas de internação por neoplasias no Brasil entre os anos de 2008 e 2018, mensurar os gastos hospitalares e o tempo de permanência das internações por neoplasias no Sistema Único de Saúde (SUS). **Método:** Estudo ecológico de séries temporais com dados do Sistema de Informações Hospitalares do SUS. **Resultados:** Na série história de 2008-2018, houve 7.578.552 internações por neoplasias no SUS, sendo 59% em pacientes do sexo feminino, 20% na faixa etária de 50 a 59 anos, 43% de cor branca e 44% na Região Sudeste do país. O gasto total das internações hospitalares por neoplasias alcançou R\$ 13.225.554.102,73, com permanência média de 5,4 dias de internação por paciente. **Conclusão:** Este é o primeiro estudo que utiliza como unidade territorial de análise todo o país; dessa maneira, espera-se que novos estudos envolvendo a morbidade hospitalar no país sejam desenvolvidos.

Palavras-chave: Neoplasias; Hospitalização/estatística & dados numéricos; Custos Hospitalares/estatística & dados numéricos; Gastos em Saúde/estatística & dados numéricos; Epidemiologia Descritiva.

RESUMEN

Introducción: Las neoplasias representan la segunda causa de muerte en Brasil, sin embargo, garantizar una asistencia completa y equilibrada para el diagnóstico y el tratamiento en las regiones del país sigue siendo uno de los grandes desafíos del sistema de salud brasileño. **Objetivo:** Describir las tasas de hospitalización por neoplasias en Brasil entre los años 2008 y 2018, medir los gastos hospitalarios y la duración de la hospitalización por neoplasias en el Sistema Único de Salud (SUS). **Método:** Estudio ecológico de series de tiempo con datos del Información hospitalaria del SUS. **Resultados:** En la serie de historia 2008-2018, hubo 7.578.552 hospitalizaciones por neoplasias en el SUS, el 59% de los cuales eran pacientes de sexo femenino, el 20% tenían entre 50 y 59 años, 43% blancos y 44% en la región sureste del país. El costo total de los ingresos hospitalarios por neoplasias alcanzó R \$ 13.225.554.102,73, con una estadía promedio de 5,4 días de hospitalización por paciente. **Conclusión:** este es el primer estudio que utiliza todo el país como unidad de análisis territorial, por lo que se espera que se desarrollen más estudios sobre la morbilidad hospitalaria en el país.

Palabras clave: Neoplasias; Hospitalización/estadística & datos numéricos; Costos de Hospital/estadística & datos numéricos; Gastos en Salud/estadística & datos numéricos; Epidemiología Descriptiva.

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INTRODUCTION

Morbimortality by cancer is increasing expressively worldwide. In the developing countries this occurs, in part, by the recent populational ageing that leads to exponential growth of older adults. In Brazil, malignant neoplasms represent a second cause of death, however, strategic measures for its control face problems and require SUS (National Health System) health managers an immense effort to ensure proper healthcare^{1,2}.

The main challenges for the Brazilian health system consist in ensuring full and balanced access to disease diagnosis and treatment in different regions of the country². At the same time, studies reinforce the urgency of strategic operational actions to reduce the economic burden of cancer in developing economies³.

Worth mentioning that the economic cost of a sickening process or health-related event involve direct, indirect and intangible costs. The direct comprehend medical costs (exams, procedures, medication, human resources, consultations, admissions, rehabilitation and others) and complementary actions as transportation expenses of relatives and companions, specific diets, among others. The indirect include expenses with loss of productivity in labor and the intangible, loss of the quality of life⁴.

In this perspective, analyzes that ensure the calculation of direct medical-hospital costs are important to understand the disease toll over health systems. Thus, the objective of this study was to describe the rates of admission by neoplasms in Brazil between 2008 and 2018, calculate hospital costs and time of hospital stay by neoplasms in SUS.

METHOD

Time series ecological study with data of the hospitalizations by neoplasms registered in the Hospital Information System (SIH) of SUS⁵, available at the website of SUS Computer Department (DATASUS). The data were obtained on March 2020. Hospitalizations by neoplasms occurred between 2008 and 2018 registered by the code of Chapter 2 of the 10th. Review of the International Classification of Diseases and Related Health Problems (ICD-10) were selected⁶.

SIH/SUS is a public domain access-free database offered by the Health Ministry. It allows to obtain hospital expenses data per SUS associated public and private accredited entities, demonstrating part of the direct hospital costs as value of hospitalizations, expenses of hospital and professional services, hospital stay, among other data⁷.

A time series was constructed with absolute numbers and hospitalizations rates calculated per gender (male, female), age-range (in years: lower than 1, 1 to 4; 5 to 9; 10 to 14; 15 to 19; 20 to 29; 30 to 39; 40 to 49; 50 to 59; 60 to 69; 70 to 79; 80 and older), race/color (Caucasian, Black, Brown, Asian, native, without information and Region (North, Northeast, West-Central, Southeast, South) of the country. SUS expenses with hospitalizations by neoplasms (values in Reais: total expenses, hospital and professional services expenses and mean value of hospitalization), length of stay in days and mean stay in days referred from 2008 to 2018 were also estimated.

Windows Microsoft Excel software version 10 was used for the analyzes. According to Ordinance number 466 of 2012 of the National Health Council, because only anonymous and public available data were utilized, it was not necessary to submit the study to the Institutional Review Board for review and approval.

RESULTS

From 2008 to 2018 in Brazil, 7,578,552 hospitalizations by neoplasms were registered. The historical series of this period (Graph 1) allows to observe that, during this period, the hospitalizations by cancer increased but in 2018, a non-significant drop of 1.85% was observed in comparison to the previous year.

When this population was stratified by gender, females were predominant corresponding to 59%. The age-range analysis revealed that 57.4% were above 50 years old of the total of hospitalizations. There was predominance of Caucasians (43%) when race/color is analyzed, but for 22% of the patients, it is worth reminding, this field was left blank. Based in the regions of the Brazilian territory, the geographic distribution of the hospitalizations by neoplasms showed that 44% registered in SUS are concentrated in the Southeast region (Table 1).

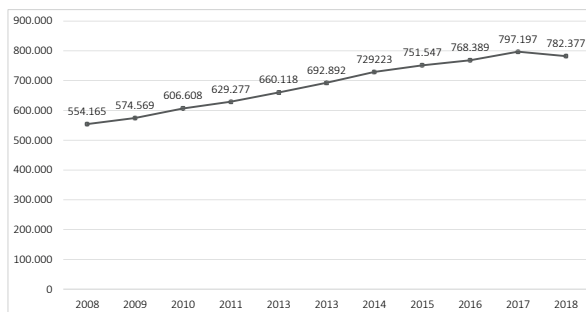


Chart 1. Hospitalizations by neoplasms in Brazil between 2008 and 2018

Source: SIH/SUS⁵.

Table 1. Absolute and percent hospitalization per neoplasm according to gender, age-range, race/color and region, Brazil, 2008-2018

Variables	N	%
Gender		
Male	3,111,126	41.00
Female	4,467,426	59.00
Age-range (years)		
Less than 1 year	26,719	0.35
1-4 years	143,882	2.00
5-9 years	139,061	1.83
10-14 years	145,502	1.92
15-19 years	168,748	2.22
20-29 years	378,502	5.00
30-39 years	758,943	10.01
40-49 years	1,433,838	18.92
50-59 years	1,517,240	20.02
60-69 years	1,476,677	19.48
70-79 years	985,842	13.01
80 years and older	403,598	5.32
Race/color		
Caucasian	3,244,583	42.81
Black	306,371	4.04
Brown	2,303,100	30.38
Asian	75,241	1.00
Native	4,973	0.06
No information	1,643,984	21.69
Region		
North	314,151	4.14
Northeast	1,841,841	24.30
Southeast	3,334,196	44.00
South	1,605,049	21.18
West-Central	483,315	6.37
Total	7,578,552	100

Source: SIH/SUS⁵.

In relation to direct medical-hospital costs, total expenses with hospitalizations resulting from neoplasms between 2008 and 2018 in SUS reached R\$ 13,225,554,102.73, of which, R\$ 10,359,637,600.61 corresponded to expenses with hospital services and R\$ 2,807,793,325.14 with professional services. The mean value of hospitalization by neoplasms was R\$ 1,745.13. For length of hospital stay, 41,216,608 days were accounted with mean stay of 5.4 of hospitalization per patient (Table 2).

DISCUSSION

After the study results, it was noticed that the magnitude of hospitalizations by neoplasms between 2008 and 2018 were raising, but at a stable growing tendency. Data disclosed by the National Cancer Institute José Alencar Gomes da Silva (INCA)¹ reveal that the disease is among the four main causes of premature death (before 70 years old) in several countries and the estimate for each year of the triennium 2020-2022, is the occurrence of 625 thousand new cases of cancer in the country¹.

Brazil, it is worth mentioning, is going through a demographic and epidemiologic transition process, being population ageing one of the greatest challenges for public health nowadays⁸. Simultaneously, non-communicable diseases socioeconomic-associated costs including neoplasms impact the countries' economy, being estimated US\$ 7 trillion for the period of 2011-2025 in low and average income countries⁹. According to the Brazilian Institute of Geography and Statistics (IBGE)¹⁰, in 2030, Brazil will have more older adults than children and youth and mortality by cancer will have grown 45%.

The data presented in this study about the predominance of hospitalizations by cancer in women corroborate the existing literature since in developing countries as Brazil, it is anticipated the predominance of cancer in females because of the high rate of detection of specific neoplasm

Table 2. Expenses (in Reais), time and mean of hospitalization stay (in days) by neoplasms per country region, Brazil, 2008-2018

Region	Total expenses(R\$)	Value of hospital services (R\$)	Value of Professional services (R\$)	Mean value per Hospitalization (R\$)	Total stay (days)	Mean stay (days)
North	395,707,683.18	301,533,533.58	91,802,180.34	1,259.61	2,131,201	6.8
Northeast	3,527,351,432.65	2,684,610,451.33	817,720,678.77	1,915.12	9,178,049	5.0
Southeast	5,804,752,007.09	4,608,893,264.74	1,175,458,269.25	1,740.98	18,916,422	5.7
South	2,771,422,067.06	2,204,838,170.60	560,105,088.86	1,726.69	8,477,604	5.3
West-Central	726,320,912.75	559,762,180.36	162,707,107.92	1,502.79	2,513,332	5.2
Total	13,225,554,102.73	10,359,637,600.61	1,745.13	2,807,793,325.14	41,216,608	5.4

Source: SIH/SUS⁵.

as cervical cancer¹¹⁻¹³. Still, it must be considered that the great concentration of female hospitalization could also be the result that women population is bigger in certain demographic regions¹⁴. Studies indicate that women seek and use more services of consultation and hospitalizations, which may be related to early detection of the disease and more odds of timely admission to receive care¹⁵.

Regarding more hospitalizations among individuals older than 50 years this study corroborates the data found in the literature^{4,14,16}. Sousa-Muñoz et al.¹² points out the progressive increase of cancer incidence during ageing and how it implies in different necessities of healthcare in relation to hospitalizations, most of all. In general, older adults tend to use more health services, the admission rate and hospital stay for this population tends to be higher than in individuals of other age-range^{13,14,16}.

Sousa-Muñoz et al.¹² presents still a data that concurs with the present study, which is the lower frequency of admissions by cancer in older adults above 80 years, that can be related to the fact that it is a high lethality disease and relative short duration in general. Age is an important risk and defining marker of the patient prognosis.

Some studies^{17,18} indicate that, while comparing the incidence of cancer in adults and children (0 to 19 years), the latter has low occurrence. In Brazil, it corresponds to nearly 3% of all the malignant tumors¹⁸, corroborating the data found of lower indicators of hospitalization for this cause in this age-range.

In regard to the variable race/color, it was observed that nearly half of the hospitalizations happen with individuals allegedly Caucasians. What draws the attention in this article is the percent of patients who failed to complete this information, this concurs with an analysis about hospitalizations by neoplasms in the State of Rio Grande do Sul, that found a percent of 14.71%¹⁹. In their study, Farias et al.²⁰ remarked the fact that 100% of all the variables were complete, however, the variable race/color is quite beyond of the other Brazilian health information systems such as: the Mortality Information System (SIM) and the Information System of Born Alive (SINASC).

Because of ethnical inequalities in health information, failing to inform this data impacts the analyzes of inequities (unfair and unavoidable) and hampers the elaboration of more equanimous public policies²¹. It is important to notice that the unavailability or incompleteness of individualized information in the health information systems hamper the development of epidemiologic studies from secondary data.

A study that attempted to investigate the association race/color and survival in a cohort of women with breast cancer evidenced that black women were diagnosed at more advanced stages and had lower survival in comparison

with Caucasians²². Another Brazilian populational-based study demonstrated that Caucasian women accessed more screening mammography²³. Despite the methodological limitations of these studies as obstacles for epidemiologic studies of race and health²¹, it is quite evident that it is of the utmost relevance to inform this data.

In this study, the Southeast regions presented the biggest number of hospitalizations by neoplasms. The data found are directly related to INCA estimates for each year of the triennium 2020-2022, with more than 60% of incidence in the Southeast region. It must be considered that the distribution per type of cancer varies among the Brazilian macroregions and even if there is a drop of the cases of neoplasms associated to unfavorable socioeconomic conditions, this profile persists in some Brazilian regions. It is even a greater challenge the development of public policies for the Brazilian health system capable to balance the socioeconomic inequities and the population¹ access to public health services.

Some authors^{24,25} show that medical care and distributions of beds across the country are concentrated in the Southeast, with the South region showing the highest average of beds per thousand inhabitants in the country. A study disclosed by the Observatory of Oncology showed that in 2015, cancer was the main cause of death in 516 Brazilian municipalities, but the majority of these municipalities was in the more developed regions of the country where life expectancy and HDI – Human Development Index are higher. Eighty percent of these municipalities are in the South and Southeast regions of the country that count with more health services available, better diagnosis options and older population which results in higher cancer prevalence²⁶.

In relation to SUS hospital expenses with neoplasms, few studies with this estimate having Brazil as geographical unit were found^{27,28}. Considering the 10-years historical series from 2008 to 2018, the cost was R\$ 13.2 billion, the highest percent corresponding to hospital services expenses. The mean value of hospitalization was R\$ 1,745.13, but there are important differences among the regions. Other authors already noticed differences in the resources used by SUS with hospitalization in the different Brazilian macroregions, bigger in the South and Southeast and lower in the North region^{1,29}. The data presented in this study demonstrate that for hospitalizations by neoplasms, the Southeast and Northeast regions have the highest cost and the North region, the lowest.

The mean hospitalization value estimates the mean expense of resources spent by SUS in providing hospital care, but it is influenced by socioeconomic, epidemiologic and demographic factors determining the profile of SUS hospital demand. It has an important limitation for the

historical series because the values paid are in current Reais of the year and do not include allowances, adjustments, incentives, state and municipal complementation. The costs presented should not be used isolated, but as a support to elaborate strategies to reevaluate public health policies and stimulate the policy of price negotiations and compensation at the authorized values^{30,31}.

The national mean of hospital stay was 5.4 days, the North region presenting the highest rate, close to one week. This indicator evaluates in average the time the patient remains hospitalized and can help to evaluate the efficacy of the operational management and rotativity of the beds and for the clinical practices adopted. Several factors, it is worth mentioning, influence the time of hospital stay and neoplasms-related hospital expenses as: cancer type and staging, age, presence or not of comorbidities, agility and availability to perform tests and tests results, among others. The isolate use of the mean of hospital stay and the high volume of expenses do not offer enough information to indicate the good or poor use of the funds^{31,32}.

The limitations of the present study are originated from the understanding that SIH/SUS is an administrative database grounded in the logic of payment of hospital attention. It is a non-universal system, it registers only the hospitalizations at the public health system, it is possible that a patient happens to be double or triple counted because the system fails to register re-hospitalizations and transferences from other hospitals. Added to this, the irregular database coverage and the reliability of the information among the country's regions, further to regional differences in coverage of private services of admissions, more concentrated in the Southeast regions hampering the comparison among these regions⁷.

Another important limitation of this study is the lack of a robust statistical analysis and non-standardization per age, since it hampers the comparability of the hospitalization rates among different regions as they present different age structures, in addition of potentially underestimated costs since there is complementary funding over the official value of the system. In relation to the expenses, only direct medical-hospital costs were analyzed, leaving out the direct costs of complementary actions, indirect costs, monetary adjustments of inflation and rebates, intangible costs that impact the health economy directly, the individual, the families and the society^{7,33}.

Despite the barriers, SIH/SUS gather nearly 70% of the hospitalizations in the country and is one of the most used systems by several health management services⁷, although the therapeutic modalities of radiotherapy and chemotherapy within oncologic treatment are not

included, they are performed mostly in outpatient subject to Authorization of High Complexity Outpatient Procedure (APAC)³⁴.

Costs and operational complexity involved in the development of populational base epidemiologic studies become barriers for its wide utilization; the secondary data generated by the national health information systems appear to be a good alternative, its use should be stimulated because of content diversity and complexity of possible analyzes, considering the existing limitations³⁵.

CONCLUSION

Despite the limitations of the current study, it is possible to conclude that females, older than 50 years old, living in Brazil's Southeast Region, where higher expenses of hospitalizations by neoplasm were concentrated, predominated in the hospitalizations by neoplasms in SUS. These findings are important for operational strategic planning of health actions and access to services, since they reveal relevant regional differences that can mirror a historical process of organization of the attention to health in the country. It is expected that this study stimulates the development of studies with robust statistical analysis involving cost or cost-effectiveness of hospitalizations by neoplasms in the country.

CONTRIBUTIONS

All the authors contributed substantially for the conception or design of the study, gathering, analysis and/or interpretation of the data and/or wording and/or critical review and approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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