ORIGINAL ARTICLE

INTENSIVE ADMISSIONS FOR NEOPLASMS IN BRAZIL: ANALYSIS OF THE HISTORICAL SERIES FROM 2001 TO 2020

Maicon Henrique Lentsck[1], Eveline Christina Czaika[2], Tatiana da Silva Melo Malaquias[3]
Maria Regiane Trincaus[4], Bruno Bordin Pelazza[5], Carine Teles Sangaleti[6]
Tatiane Baratieri[7], Erica de Brito Pitilin[8]

Highlights: (1) Intensive care hospitalization rates for neoplasms in Brazil have increased in 20 years. (2) The trend was increasing for genders, age groups and the North and Northeast regions. (3) Among neoplasms, hospitalizations for malignancies of the digestive organs prevailed

PRE-PROOF

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[1] State University of the Midwest– UNICENTRO. Guarapuava/PR, Brazil. https://orcid.org/0000-0002-8912-8902
[2] State University of the Midwest– UNICENTRO. Guarapuava/PR, Brazil. https://orcid.org/0009-0009-8562-195X
[3] State University of the Midwest– UNICENTRO. Guarapuava/PR, Brazil. https://orcid.org/0000-0001-5541-441X
[4] State University of the Midwest– UNICENTRO. Guarapuava/PR, Brazil. https://orcid.org/0000-0001-7481-2501
[5] State University of the Midwest– UNICENTRO. Guarapuava/PR, Brazil. https://orcid.org/0000-0003-2245-6482
[6] State University of the Midwest– UNICENTRO. Guarapuava/PR, Brazil. https://orcid.org/0000-0002-0696-325X
[7] State University of the Midwest– UNICENTRO. Guarapuava/PR, Brazil. https://orcid.org/0000-0002-0270-6395
[8] Federal University of the Southern Border – UFFS. Chapecó/SC, Brazil. https://orcid.org/0000-0003-3950-2633

INTENSIVE ADMISSIONS FOR NEOPLASMS IN BRAZIL: ANALYSIS OF THE HISTORICAL SERIES FROM 2001 TO 2020

ABSTRACT

The aim of the study was to analyze the magnitude of intensive care unit (ICU) admission rates due to neoplasms in Brazil, according to admission diagnosis, regions, sex, and age group from 2001 to 2020. Method: This ecological time-series study analyzed ICU admission rates for neoplasms under the Unified Health System (SUS). The rates were standardized and analyzed descriptively, as well as through trend analysis. Results: Over 20 years, there was an increase in rates across all states. Brazil and the Southeast, South, and Central-West regions showed no trend, while the North and Northeast regions exhibited growth. The population over 60 years of age had the highest admission rates. Both sexes showed an increasing trend, but the ratio between them decreased. Among the neoplasms, malignant tumors of the digestive organs were the most prevalent. Conclusion: There was an observed increase in intensive cancer-related admissions in the country, with no identified trend related to the extensive historical series. Further studies are needed to describe ICU admissions in Brazil, in order to contribute to the development of strategies for reducing hospitalizations and healthcare costs.

Keywords: Intensive Care Unit; Hospitalization; Neoplasms.

INTRODUCTION

The Intensive Care Unit (ICU) is the specialized department that provides continuous care for critically ill patients in severe condition, with an imminent risk of death and/or in the postoperative period. Within the hospital, it is considered the unit with the highest complexity, as the activities carried out in this department require high-tech equipment combined with a trained team[1-3].

It is important to emphasize that with the implementation of ICUs, it was possible to ensure a reduction in the mortality of critically ill patients across the country. During the COVID-19 pandemic, a greater need for healthcare attention was observed, and the significant difficulty faced by more remote areas in providing quality care and life support without this sector being fully operational[4-5].

Sectors that require numerous technological supplies, such as ICUs, consequently demand higher expenses for institutions. For low- and middle-income countries, including Brazil, it is estimated that spending on non-communicable chronic diseases will total 7 trillion dollars from 2011 to 2025. including hospitalizations. In comparison with other health treatments offered by the Unified Health System (SUS), oncology treatment has one of the highest costs, with an estimated 30% of the total value associated with hospital admissions, including intensive care admissions[6]. A Brazilian study[7] observed that the average cost of a hospitalization due to neoplasm from 2008 to 2018 was approximately one thousand seven hundred and fifty reais per patient, with an average of 5.4 days of hospitalization, but without exploring intensive care admissions.

Due to the economic impact of this sector, it is necessary to observe the particularities of hospitalizations for diseases with the highest prevalence in society. In this regard, according to the Department of Informatics of the Unified Health System (DATASUS), in the classification of deaths by occurrence, according to the International Classification of Diseases and Related Health Problems (ICD-10), neoplasms were the third most prevalent cause of mortality in Brazil in 2020[8].

The ICD-10 is a tool used to systematically record information on pathologies and ailments, ensuring the interpretation and comparison of morbidity and mortality data between different regions and countries. The recording of ICDs for neoplasms supports services and their systems with information on the type of cancer, location, and behavior of the diseases, enabling the production of statistical data for specific populations[8].

Cancer is a leading public health problem worldwide[9]and in most countries, it ranks among the four leading causes of death in age groups under 70 years. With technological advances in intensive care, the mortality of critically ill cancer patients tends to decrease, even in higher-risk populations, such as those undergoing mechanical ventilation. However, although mortality has decreased, ICU admissions for cancer patients with acute complications still carry a history of unfavorable prognose[10].

Epidemiological studies with information on ICU admissions are seldom explored in Brazil, according to admission diagnoses. This is important for understanding the overall landscape of Brazilian healthcare in the intensive hospital environment, as knowing the profile of the population and admissions allows for the establishment of goals to meet the needs of each region. Additionally, intensive treatment, specifically neoplastic admissions, generates substantial costs and has various specificities, which can be managed according to the profile of each location for better resource distribution[1, 11].

The healthcare provided to critically ill cancer patients involves the essential work of a multidisciplinary team and also requires high technological support, given the complexity of the patient and their needs[12]. Therefore, it is possible to identify the importance of these discussions to raise awareness among healthcare managers and professionals about the significance of intensive care in the treatment of cancer patients who require specialized care in the Intensive Care Unit. The ICU represents the highest cost for the healthcare sector and society.

In light of this, the aim of this study was to analyze the magnitude of intensive care admissions for neoplasms in Brazil, according to admission diagnosis, regions, sex, and age group from 2001 to 2020.

METHODOLOGY

An ecological time-series study, guided by the principles of the Strengthening the Reporting of Observational Studies in Epidemiology *(STROBE)*,[13] checklist, was conducted using data on ICU hospital admissions financed by the Unified Health System (SUS), contained in the SUS Hospital Admission System (SIH-SUS). Hospital Admission Authorizations (AIH) were collected from January 2001 to December 2020 from all states in Brazil.

Data collection was carried out through the DATASUS website. Information from the Hospital Admission Authorizations (AIH) was collected in the form of monthly files for each year and each state in the federation. These files were converted for Excel viewing through the Tabwin program, provided by the DATASUS platform itself, and ICU admissions were selected. This selection resulted in a database of over 12 million admissions (from 2000 to 2020), which were analyzed according to year, sex, age group, and admission diagnosis.

From this selection, another database was created with the AIHs filtered by ICD codes for neoplasms, according to Chapter II of the ICD-10. using codes C00.0 to D48.9. in order to select only intensive care admissions with neoplasms as the primary diagnosis. For better observation and organization, the codes referring to neoplasms were grouped by anatomical groups, location, spread, or behavior in common, and described in Table 1.

Table 1. Grouping of Neoplasms and Codes According to the Tenth International Classification of Diseases, Chapter II, Brazil 2022.

Grouping of Neoplasms	Codes (ICD)
Malignant neoplasms of the lip, oral cavity, and pharynx.	C00.0 a C14.9
Malignant neoplasms of digestive organs.	C15.0 a C26.9
Malignant neoplasms of the respiratory system and intrathoracic organs.	C30.0 a C39.9
Malignant neoplasms of bones/joint cartilages.	C40.0 a C41.9
Melanomas and other malignant neoplasms of the skin.	C43.0 a C44.9
Malignant neoplasms of the mesothelial tissue and soft tissues.	C45.0 a C49.9
Malignant neoplasms of the breast.	C50.0 a C50.9
Malignant neoplasms of female genital organs.	C51.0 a C58.9
Malignant neoplasms of male genital organs.	C60.0 a C63.9
Malignant neoplasms of the urinary tract.	C64.0 a C68.9
Malignant neoplasms of the eye/brain/other parts of the central nervous system.	C69.0 a C72.9
Malignant neoplasms of the thyroid/other endocrine glands.	C73.0 a C75.9
Malignant neoplasms of unspecified location, secondary, and not otherwise specified.	C76.0 a C80.9
Malignant neoplasms of lymphatic/hematopoietic tissue/related.	C81.0 a C96.9
Malignant neoplasms of multiple independent sites.	C97.0 a C97.9
In situ neoplasms.	D00.0 a D09.9
Benign neoplasms.	D10.0 a D36.9
Neoplasms of uncertain or unknown behavior	D37.0 a D48.9

The data analysis was conducted according to the neoplasm groups with the highest number of total admissions in Brazil. All admissions from 2001 to 2020 were summed, and the top 10 groups with the highest number of admissions were selected. The remaining groups were combined into a single category named "Other Groupings." The neoplasms included in this group are: Malignant neoplasms of bones/joint cartilages, Melanomas and other malignant neoplasms of the skin, Malignant neoplasms of mesothelial tissue and soft tissues, Malignant neoplasms of the breast, Malignant neoplasms of male genital organs, Malignant neoplasms of the thyroid/other endocrine glands, and Malignant neoplasms of multiple independent locations.

The admission rates were organized per 100.000 inhabitants, stratified by place of residence (major regions and states), sex, and age group, using the 2010 population data from the Population Census according to the Brazilian Institute of Geography and Statistics (IBGE).

Trend analysis was performed using generalized linear regression, with the admission rates as the dependent variable (Y-axis) and the years as the independent variable (X-axis). The first-order temporal autocorrelation effect of the residuals was corrected using the Prais-Winsten procedure, which employs the Durbin-Watson test to assess the presence of autocorrelation. Serial autocorrelation can be interpreted in the test with a result ranging from 0 to 4. where a value of 2 indicates the absence of autocorrelation.

Through the third-order moving average, the series were smoothed, and later a logarithmic transformation was applied. Scatter and autocorrelation diagrams were constructed. The Prais-Winsten autoregressive model was applied to identify whether the behavior of the rates was increasing ($p < 0.05$ and regression coefficient β1 positive), decreasing ($p < 0.05$ and regression coefficient β1 negative), or stable ($p > 0.05$).

The average annual percentage variation of the admission rates during the period was also calculated for the regression coefficient using the formula (-1 + 10^ b) x 100. along with the respective 95% confidence intervals (CI95%) using the formula b±tEP, where t is the Table value of the t-test and EP is the standard error of the regression coefficient. The tables were presented with data from 2001. 2010. and 2020. and the relative difference was calculated between the extreme years. Stata version 13 was used for the trend analysis.

The study is exempt from analysis by the Research Ethics Committee, in accordance with Ordinance No. 466 of 2012 from the National Health Council, as it involves secondary data and public acces.

RESULTS

Over the 20-year period, it is possible to observe that there was no trend for Brazil, despite an increase in the rate values from 2001 to 2020. The Southeast, South, and Central-West regions also show no trend, following the same pattern of rate growth (Table 2).

The North and Northeast regions show an increasing trend, with annual variation of 2.2% and 1.1%, respectively. The states that exhibit an increasing trend are: Acre, Amapá, Pará, Roraima, Bahia, Maranhão, Pernambuco, Piauí, Rio Grande do Sul, and Rondônia, with the latter standing out for having the highest annual variation of 16.7% per year (CI95%: 9.8; 24.0). Other states showed a decreasing trend, such as Amapá, Alagoas, Ceará, Paraíba, and Mato Grosso. The states of Amazonas, Tocantins, Rio Grande do Norte, Sergipe, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, Federal District, Goiás, and Mato Grosso do Sul show no trend (Table 2).

Table 2. ICU admission rates for neoplasms, average annual variation, confidence interval (CI), and trend. Brazil, major regions, and states, from 2001 to 2020.

Brazil/Region/State	Rate [a]			Annual Variation[b]	CI (95%)	Trend
	2001	2010	2020			
Brasil	14.21	24.08	37.00	-0.2	-1.6; 1.3	-
North	1.63	3.70	7.21	2.2	0.9; 3.7	Increasing
Acre	0.48	0.55	1.73	4.7	2.2; 7.7	Increasing
Amapá	0.07	0.42	1.13	-6.6	-8.5; -4.6	Decreasing
Amazonas	0.38	7.00	6.48	-0.9	-4.5; 2.9	-
Pará	4.01	15.99	18.12	3.1	1.2; 5.0	Increasing
Rondônia	0.16	1.47	11.53	16.7	9.8; 24.0	Increasing
Roraima	0.00	1.28	0.96	5.4	2.2; 8.8	Increasing
Tocantins	1.62	2.69	2.42	-2.0	-4.3; 0.4	-
Northeast	6.91	17.18	25.30	1.1	0.1; 2.1	Increasing
Alagoas	10.46	7.48	12.72	-4.9	-7.2; -2.7	Decreasing
Bahia	8.56	34.25	55.10	7.3	5.8; 8.9	Increasing
Ceará	13.09	25.89	26.63	-1.9	-3.1; -0.6	Decreasing
Maranhão	6.00	11.61	26.31	2.6	0.7; 4.6	Increasing
Paraíba	4.01	15.99	18.12	-6.6	-11.5; -1.1	Decreasing
Pernambuco	8.22	35.92	43.45	6.4	1.6; 11.4	Increasing
Piauí	7.59	9.18	13.82	2.6	0.1; 5.2	Increasing
Rio Grande do Norte	3.31	10.22	26.78	2.0	-1.2; 5.3	-
Sergipe	0.92	4.09	4.80	1.3	-1.5; 4.3	-
Southeast	70.05	97.29	136.56	0.6	-0.8; 2.0	-
Espírito Santo	5.35	8.42	28.66	1.9	-1.6; 5.6	-
Minas Gerais	1.63	3.70	7.21	1.9	-1.5; 5.4	-
Rio de Janeiro	43.75	42.98	71.22	0.5	-1.2; 2.5	-
São Paulo	195.69	254.18	285.33	0.6	-1.3; 2.6	-

South	47.72	55.54	77.42	-1.3	-3.2; 0.5	-
Paraná	66.50	83.76	114.85	-1.1	-2.7; 0.4	-
Rio Grande do Sul	56.83	57.21	71.86	3.5	0.0; 7.0	Increasing
Santa Catarina	19.84	25.65	45.56	0.7	-2.3; 0.9	-
Midwest	9.39	12.12	14.81	-0.7	-1.9; 0.5	-
Distrito Federal	6.08	5.47	13.81	2.6	-1.0; 6.4	-
Goiás	25.52	28.88	22.85	-2.5	-5.7; 0.8	-
Mato Grosso	3.91	7.62	12.84	-2.2	-3.4; -0.9	Decreasing
Mato Grosso do Sul	2.05	6.51	9.76	1.9	-1.5; 5.4	-

[a] Standardized rates by the Brazilian population, 2010 Population Census. Per 100,000 inhabitants; [b] Average annual percentage variation of the admission rates calculated from β1 of the Prais-Winsten generalized linear regression model.

Figure 1 graphically represents the admission rates for Brazil and its regions, per 100,000 inhabitants, from 2001 to 2020. There was growth across all observed series. A difference between the regions is noticeable, with the Southeast and South regions having the highest rates, while the North, Northeast, and Central-West regions had the lowest rates. Brazil is situated exactly at the limit of these rates, indicating that the differences between the regions balance out the values for the country as a whole. The growth pattern is more pronounced at the beginning of the series, with a common decline in the Southeast and South regions between 2007 and 2010, but with a return to growth, albeit gradual. The Southeast region stands out, having the highest growth curve, reaching a rate of just over 150 admissions in 2019, and then sharply decreasing in 2020 (Figure 1).

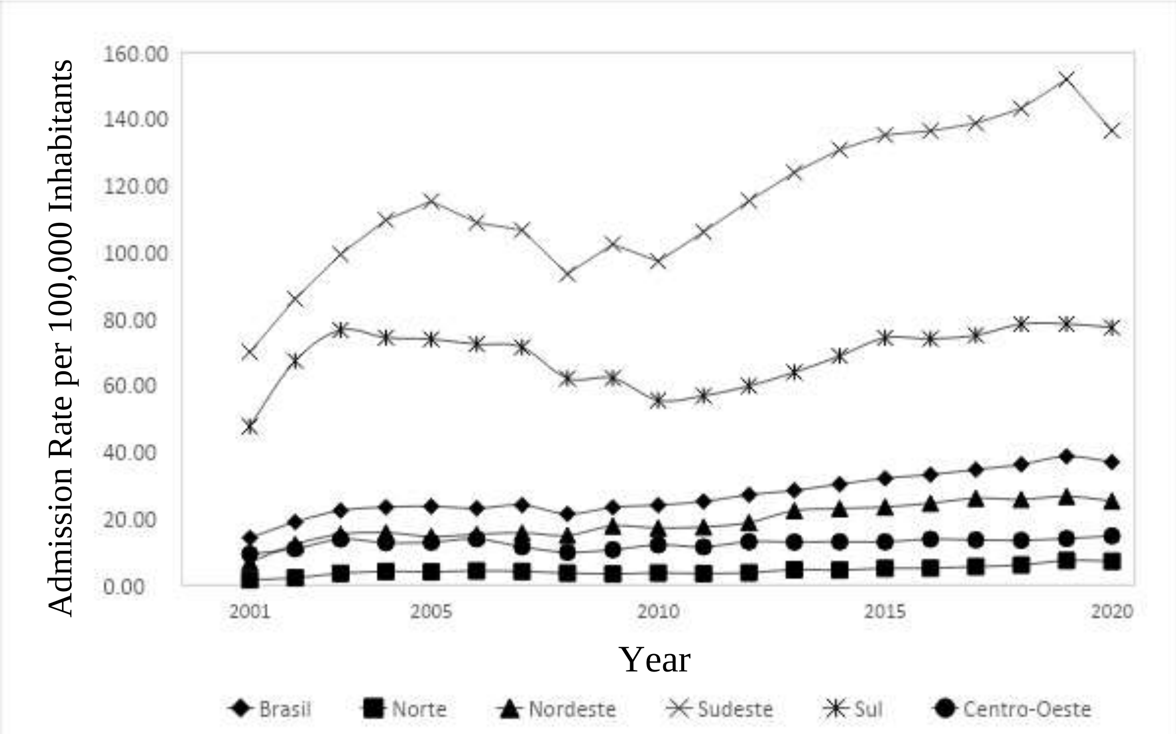

Figure 1. Admission Rates (per 100,000 inhabitants) for Neoplasms in ICU. Brazil and Regions, 2001 to 2020.

Table 3 presents the admission rate values by sex and age. Unlike the analysis by state, when sex was considered, both showed an increasing trend, and the ratio between female/male admissions (F/M ratio) shows that in 2001, for every male admission, there were 1.18 female admissions, meaning the proportion of women admitted was higher than that of men. The decreasing trend for this ratio indicates that this proportion decreased over the years, and by 2020, it was very close to 1 (1.01). The population over 60 years of age had admission rates much higher than those of the younger population, as well as a greater annual variation. Both age groups showed an increasing trend (Table 3).

Table 3. Admission rates for neoplasms in ICU, by sex, sex ratio, and age, average annual variation, confidence interval (CI), and trend. Brazil, 2001 to 2020.

Caracteristics	Rate[a]			Annual Variation[b]	CI (95%)	Trend
	2001	2010	2020			
Gender						
Male	13.02	23.03	36.80	4.8	3.8; 5.8	Increasing
Female	15.38	25.11	37.20	3.2	2.1; 4.3	Increasing
F/M Ratio	1.18	1.09	1.01	-1.0	-1.3; -0.7	Decreasing
Age						
< 60	8.89	14.33	19.41	3.2	2.1; 4.3	Increasing
60 and over	82.97	127.03	206.38	4.1	2.8; 5.4	Increasing

[a] Rates standardized by the Brazilian population according to the 2010 Population Census. Per 100,000 inhabitants; [b]Average annual percentage variation of the admission rates calculated from β1 of the Prais-Winsten generalized linear regression model.

Regarding the neoplasm groupings, malignant neoplasms of digestive organs (codes C15.0 and C26.9) were the group with the highest number and admission rates in the country, with a relative difference between the rates of the extreme years of 308.6%, demonstrating a significant increase in these rates over 20 years. The second group with the highest number of admissions were neoplasms of the eye, brain, and other parts of the nervous system (codes C69.0 to C72.9), with a relative difference of 131.1%. The group with the largest relative difference is that of neoplasms of uncertain or unknown behavior (codes D37.0 to D48.9), with a value of 721.2%. In 2001, the number of admissions for this group was 1,027, reaching 7,140 in 2020 (Table 4).

Table 4. Admission Rates for Neoplastic Diseases in ICU by Primary Admission Diagnosis and Year. Brazil, 2001, 2010, and 2020.

Groups of neoplasm	2001		2010		2020		Rel. Diff.[c]
	n	Rate[b]	n	Rate[b]	n	Rate[b]	
Malignant neoplasms of digestive organs	5996	60.6	12566	149.0	20692	247.6	308.6
Malignant neoplasms of the eye, brain, and other parts of the nervous system	3141	31.8	4518	53.6	6140	73.5	131.1
Benign neoplasms	1352	13.7	4380	51.9	4414	52.8	285.4
Malignant neoplasms of the respiratory system and intrathoracic organs	2025	20.5	3586	42.5	5182	62.0	202.2
Neoplasms of uncertain or unknown behavior	1027	10.4	3222	38.2	7140	85.4	721.2
Malignant neoplasms of lymphatic, hematopoietic tissue, and related	1004	10.2	2223	26.4	4855	58.1	469.6
Malignant neoplasms of unspecified location, secondary, and not specified	1600	16.2	1985	23.5	3508	42.0	159.6
Malignant neoplasms of female genital organs	1136	11.5	1738	20.6	4084	48.9	325.2
Malignant neoplasms of the urinary tract	939	9.5	1563	18.5	4064	48.5	410.5
Malignant neoplasms of the lip, oral cavity, and pharynx	712	7.2	1917	22.7	2283	27.3	279.2
Other groupings	3049	30.8	4794	56.83	8783	105.1	241.0
Total	21981	14.21	42492	24.08	71145	37.00	??

[a] By groupings of Chapter II of the ICD-10: neoplasms.[b] Rates standardized by the Brazilian population, 2010Population Census. Per 100,000 inhabitants.[c] Relative difference between the rates of the extreme years, 2001 and 2020;

Table 5 presents the average annual variation, confidence interval (CI), and Trend by sex for the main neoplasm groups in Brazil from 2001 to 2020. All groups showed an increasing trend, except for malignant neoplasms of the lip, oral cavity, and pharynx in females, which showed no trend (Table 5).

Malignant neoplasms of digestive organs affect a greater number of males, but they exhibit a lower annual variation compared to the variation in the female population, with rates of 6.1% and 6.9%, respectively. Only three neoplasm groups affect females more than males, according to the sum of the annual rates in Table 4. These are benign neoplasms, neoplasms of uncertain or unknown behavior, and exclusively malignant neoplasms of female genital organs. It is also noteworthy that neoplasms of the urinary tract showed a significant difference between the sexes, affecting the male population at higher rates, although the annual variation was greater in the female population (Table 5)

Table 5. Admission Rates for Main Neoplasm Groups in ICU, Average Annual Variation, Confidence Interval (CI), and Trend, by Sex. Brazil, 2001 to 2020.

Groups of neoplasm	**Male**						**Female**					
	Rate[a]			**Annual Variation[t]**	**IC (95%)**	**Trend**	**Rate[a]**			**Annual Variation[b]**	**CI (95%)**	**Trend**
	2001	**2010**	**2020**				**2001**	**2010**	**2020**			
Malignant neoplasms of digestive organs (C15-C26)	73.2	170.7	279.8	6.1	5.4; 6.8	Increasing	49.8	128.3	219.4	6.9	6.2; 7.5	Increasing
Malignant neoplasms of the eye, brain, and other parts of the nervous system (C69-C72)	33.9	56.7	74.9	3.2	2.5; 3.9	Increasing	29.7	50.5	72.2	3.9	3.1; 4.6	Increasing
Benign neoplasms (D10-D36)	12.5	47.0	43.6	3.0	0.1; 6.0	Increasing	14.8	56.6	61.8	5.8	3.2; 8.5	Increasing
Malignant neoplasms of the respiratory system and intrathoracic organs (C30-C39)	28.6	55.2	73.2	3.8	3.0; 4.7	Increasing	12.7	30.5	51.2	4.9	2.9; 7.0	Increasing
Neoplasms of uncertain or unknown behavior (D37-D48)	11.2	39.4	81.9	9.7	9.1; 10.7	Increasing	9.6	39.4	89.0	11.8	9.4; 14.2	Increasing
Malignant neoplasms of lymphatic, hematopoietic tissue, and related (C81-C96)	11.4	30.6	67.0	10.0	8.8; 11.2	Increasing	9.0	22.3	49.4	9.8	7.9; 11.7	Increasing
Malignant neoplasms of unspecified location, secondary, and not specified (C76-80)	18.3	24.4	44.2	5.6	4.5; 6.6	Increasing	14.2	22.7	39.8	5.8	3.9; 7.6	Increasing
Malignant neoplasms of female genital organs (C51-C58)	-	-	-	-	-	-	22.4	40.1	96.4	7.3	5.3; 9.4	Increasing
Malignant neoplasms of the urinary tract (C64-C68)	12.5	24.0	63.5	7.3	5.3; 9.4	Increasing	6.6	13.3	34.2	9.3	8.2; 10.4	Increasing
Malignant neoplasms of the lip, oral cavity, and pharynx (C00-C14)	11.5	31.8	39.7	4.9	2.2; 7.6	Increasing	3.1	14.1	15.3	4.4	-0.4; 9.5	-

[a] Rates standardized by the Brazilian population, 2010 Population Census. Per 100,000 inhabitants; [b]Average annual percentage variation of the admission rates calculated from β1 of the Prais-Winsten generalized linear regression model

DISCUSSION

Over 20 years of intensive care admissions for neoplasms, it was observed that there was no trend for Brazil, despite an increase in the admission rates in the time series. Only the North and Northeast regions showed an increasing trend, and the states with the same trend belong to these regions (Acre, Amapá, Pará, Roraima, Bahia, Maranhão, Pernambuco, Piauí, Rio Grande do Sul, and Rondônia).

A similar study analyzed general oncology hospital admissions in a historical series from 2008 to 2018 and observed an increasing trend in admissions across all regions of Brazil, except for the North region, which showed no trend. Women were mostly admitted for malignant breast neoplasm, while men were admitted for malignant prostate neoplasm[7].

Some studies provide an overview of the profile of ICU bed occupancy. A retrospective cohort study of cancer patients admitted to an ICU in a hospital in Canada estimated that approximately 20% of ICU beds are occupied by individuals with cancer diagnoses. Additionally, the literature indicates that cancer patients have a higher relative risk of hospitalization compared to the general population, and readmission of these individuals to the intensive care unit is often associated with higher rates of morbidity and mortality[1.13-16].

The increase in technology and accumulation of resources contribute to better structuring of intensive care units in any territory. ICU admission rates follow the same growth pattern as the expansion of facilities and bed availability as territories invest in this sector. However, there are few studies that provide data on oncology ICU admission rates, given that studies show cancer is the second most costly disease for the system, only behind heart diseases[15.17-19].

It was possible to observe the difference between the regions of the country through the graphical representation, in which the Southeast and South regions show the highest admission rates, with a notable discrepancy in values between the other territories, which balances the admission rates for the country. Until a certain point in the time series, the growth line of the rates is more pronounced, reflecting the beginning of the implementation and structuring of ICUs in Brazil. Technological advancements have led to improved care for cancer patients. Moreover, the evolution in understanding the pathophysiological mechanisms of neoplasms has resulted in increased survival rates and, ultimately, a higher demand for intensive care in this population[18.19].

Both age groups showed an increasing trend, but the population over 60 years of age has higher admission rates and annual variation than the population under 60 years. What is observed is that the elderly population has a higher risk for unplanned ICU admissions after elective or non-elective surgeries compared to the young adult population. Furthermore, the higher admission rates in the elderly population can be linked to the profile of admissions by age groups, as the young adult population enters the intensive care environment with diagnoses related to external causes, while the elderly population is admitted for chronic diseases[2.21].

The analysis focused on the difference between the female and male sexes showed an increasing trend for both. Over the time series, the ratio between the admission rates of the sexes came very close to 1, indicating that initially, more women occupied ICU beds due to oncological causes, and today, this difference is almost negligible. When only intensive care admissions are considered, it is observed that the prevalent ICDs between the sexes differ from the estimates of cancer incidence and also from hospitalizations in general medicine, which highlights the difference in the profile of oncology admissions at different levels of complexity[8].

The most common neoplasms for females, according to the latest estimate by the National Cancer Institute (INCA), are breast cancer, colon and rectal cancer, cervical cancer, lung cancer, and thyroid cancer. In the male population, the most common neoplasms are prostate cancer, colon and rectal cancer, lung cancer, stomach cancer, and oral cavity cancer[9]In contrast, the results of this study show ICDs that are not frequently associated with these populations. This may be related to the effective implementation of basic healthcare technologies for screening these diseases, which enables early diagnosis and reduces mortality and critical cases of these neoplasms[21-22].

It is possible to observe that certain types of ICDs are more frequent in intensive care units and in greater numbers. This proportion can be related to the severity of the pathology or the diversity of treatments. Malignant neoplasms of digestive organs were the most prevalent cause of intensive care admission for the Brazilian population, followed by neoplasms of the eye, brain, and other parts of the nervous system, as well as benign neoplasms.

The literature states that gastric cancer is among the most common neoplasms in the world, being more prevalent in men than in women. Studies report an estimated risk of 14 cases per 100,000 men and 8 per 100,000 women. Treatment for digestive organ cancers is mainly surgical; however, it is also associated with morbidity and mortality for these patients. ICU admission for this ICD may be related both to post-surgery care and to complications of the disease[23-24].

Neoplasms of the central nervous system have unique characteristics regarding the complexity of the pathology and treatment. Biopsies and surgeries for these cases are commonly performed in specialized centers, but after these procedures, patients typically recover in the ICU due to neurological and hemodynamic impairment, as well as the monitoring capabilities that the ICU provides. ICU admissions are also related to complications; a study from France observed that the main reason for ICU admission in patients with brainstem tumors was acute respiratory failure, mainly secondary to aspiration pneumoni[25-27].

Benign neoplasms comprise a large group of tumors. According to the DATASUS tabulation list, benign tumors are classified by location, such as breast tumors, skin tumors, urinary tract tumors, central nervous system tumors, among others. Some studies report a higher incidence in the female populatio[28]. Interventions for these types of neoplasms are mostly surgical; however, minimally invasive approaches have gained an increasingly important role in recent years. Post-surgical monitoring is often transferred to the ICU, but the use of less invasive techniques results in a shorter stay in this sector[30]. Nevertheless, the literature lacks information on statistical data and the profile of admissions for benign neoplasms in the ICU.

When conducting the research, some study limitations were observed. The extensive time frame did not allow for observing trend variations in certain intervals of the series. As can be analyzed from the graphical representation, there were periods of increase and decrease in admissions, but these were masked in the trend due to the long time interval. Current literature also provides limited support for a better discussion and analysis of the results obtained, as studies on neoplasms in intensive care units are still underexplored in Brazil.

Another limitation is related to the source of the collected data. The AIHs (Hospital Admission Authorizations) are very reliable instruments; however, the completion of forms and the interpretation of diagnoses/ICDs make human error a limiting factor for the accuracy of the results. For example, male admissions were found in some years for ICDs specifically related to females, such as neoplasms of female genital organs and cervical cancer. These rates for these ICDs were disregarded for males.

CONCLUSION

Neoplasms occupy a significant space in the intensive care environment, and the profile of oncology patients in the ICU differs from the cancer incidence estimates for both sexes. It is possible to observe the growth of intensive oncology admission rates in the country, and the absence of a trend may be related to the extensive historical series of this study.

The increase in rates is closely linked to the rise in technology and the availability of intensive care beds. However, by examining the admission diagnoses, it is apparent that the literature lacks specific studies focused on neoplasms, as they are among the leading causes of mortality.

It is also important to highlight the need for studies that describe the profile of intensive care admissions in Brazil, focusing on the primary diagnoses, in order to contribute to the development of strategies to reduce hospitalization and decrease costs for conditions sensitive to primary care, ultimately contributing to lowering healthcare system costs and reducing mortality.

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INTENSIVE ADMISSIONS FOR NEOPLASMS IN BRAZIL: ANALYSIS OF THE HISTORICAL SERIES FROM 2001 TO 2020

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Author contributions	
Maicon Henrique Lentsck:	Conceptualization; Formal analysis; Investigation; Project administration; Supervision; Writing – original draft.
Eveline Christina Czaika:	Conceptualization; Data curation; Investigation; Writing – original draft.
Tatiana da Silva Melo Malaquias:	Visualization; Writing – original draft; Writing – review & editing.
Maria Regiane Trincaus:	Writing – review & editing.
Bruno Bordin Pelazza:	Writing – review & editing.
Carine Teles Sangaleti:	Writing – review & editing.
Tatiane Baratieri:	Writing – review & editing.
Erica de Brito Pitilin:	Writing – review & editing.
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Corresponding Author:	Maicon Henrique Lentsck Universidade Estadual do Centro Oeste – UNICENTRO Rua Padre, R. Salvatore Renna, 875 - Santa Cruz, Guarapuava/ PR, Brasil. CEP 85015-430 maiconlentsck@yahoo.com.br
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