

The Impact of the COVID-19 Pandemic on the Diagnosis of Neoplasms in the Western Amazon

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ABSTRACT

Importance: The global oncology systems have been significantly affected by the COVID-19 epidemic. The quantification and comprehension of these changes are crucial to facilitate the restoration of service delivery and to strategize for future pandemics.

Objective: To assess the impact of the pandemic on the diagnosis of neoplasms in the Western Amazon.

Study Design: Retrospective cohort study

Sitting & Participants: We evaluate the number of diagnoses and neoplastic incidence by site in adult populations carried out in an oncological center, which attends a population of 800 thousand, in the years 2018 to 2021.

Exposure: COVID-19 pandemic

Outcomes: The volume of diagnoses and neoplastic incidences of the pre-pandemic years (2018-2019), were compared with the volume during the pandemic years (2020-2021).

Results: The control group exhibited a total of 1290 diagnoses, while the group exposed to the pandemic displayed 1074 diagnoses, resulting in a reduction of 16.4% in the overall volume of diagnoses. The incidence of breast, prostate, and skin neoplasms exhibited decreases of 16%, 14.9%, and 38.9%, correspondingly. The incidence of lung, urinary, and gastrointestinal malignancies shown a respective increase of 50%, 34.7%, and 18.5%.

Conclusions: Despite a reduction in diagnoses, the Western Amazon's oncological sector has been less affected by the COVID-19 pandemic than other regions. Furthermore, a substantial increase in the diagnosis of pulmonary neoplasms was seen, which can be attributed to the heightened patient demand for healthcare services due to respiratory complaints.

Keywords: COVID-19; Western Amazon; Cancer; Cancer Diagnosis; SARS-COV-2; Pandemic

Abbreviations: WHO: World Health Organization; SUS: Brazilian Public Health System; COHC: Centre of Oncology and Hematology of Cacoal; GGI: Gastrointestinal Tract; SBCO: Brazilian Society of Oncological Surgery

Introduction

In late 2019, the first episodes of respiratory failure with an unidentified etiology were reported in Wuhan, Hubei Province, China [1]. On March 11, 2020, the World Health Organization (WHO) officially announced the COVID-19 pandemic. The previous events have resulted in a decline in healthcare services for non-COVID-19 patients [2]. Due to the quick dissemination of the virus, patients exhibited hesitancy in seeking medical care [3]. In addition, the ongoing epidemic has compelled healthcare practitioners to make a decision between adhering to pre-existing care protocols and modifying their practices to minimize the potential exposure of vulnerable patients to the SARS-CoV-2 virus [4]. As a result, the occurrence of delays in the administration of tests, elective treatments, and consultations had the effect of impeding cancer patients' ability to get necessary medical care [3]. The analysis of data collected from various cancer centers worldwide revealed a substantial decrease in the delivery of oncological care during the COVID-19 pandemic [5]. Projections from several countries indicate an increase in mortality over the next 5–10 years due to the delay in the diagnosis of various types of cancer [5,6]. In addition, early diagnosis and timely treatment directly impact the prognosis of the cancer patient [4].

The number of diagnostic procedures carried out in the Brazilian public health system (SUS) decreased by 32% in the year 2020 compared to the year 2019, with the months of April and May representing the greatest decrease in the period [7]. Many countries, even those that are more developed, also observed a notable decrease in the number of newly diagnosed cancer cases [8]. The Netherlands Cancer Register has reported a decrease of approximately 40% in the weekly occurrence of cancer cases, while the United Kingdom has experienced a decline of 75% in the number of referrals for suspected cancer since the emergence of the COVID-19 pandemic [9]. The objective of this study is to assess the influence of the COVID-19 pandemic on the incidence of malignant neoplasms by comparing the two-year period prior to the pandemic with the two-year period most impacted by the SARS-CoV-2 virus. Additionally, the patients' profiles were examined, along with the occurrence of metastatic neoplasms, within the previously mentioned period, inside the oncology department of the Western Amazon region.

Materials and Methods

Oncology Health Service

The state of Rondônia, located in the Western Amazon, is organized into two macro regions of health. For 12 years, the Centre of Oncology and Hematology of Cacoal (COHC) has assisted the entire Macro region II, composed of 34 municipalities, covering a population of approximately 800,000 individuals. The public network provides a range of services, including outpatient consultations, oncological operations, chemotherapy, and radiation treatments. Access to the COHC is given through the referral of cancer patients and other health

services, taking an average of 30 days between the date of diagnosis and the beginning of treatment.

Study Design and Participants

The research is a retrospective cohort with secondary data obtained from the records of oncological patients entering the COHC between 2018 and 2021. 2477 patients were evaluated, of which 113 were excluded by the criteria: age < 18 years, non-melanoma skin cancer, and no confirmed diagnosis of malignant neoplasm. We include adults of both sexes with a diagnosis of malignant neoplasm and may present the following statuses: carcinoma in situ, clinically localized disease, regionally advanced disease, and metastatic disease. Cancer cases were categorized by location using codes from the 11th revision of the International Statistical Classification of Diseases and Related Health Problems, published by WHO. Subsequently, they were grouped by anatomical systems in the gastrointestinal tract (GGI), gynecological, head and neck, skin, respiratory, hematological, and endocrine, related to the urinary system, central nervous system (CNS), spinal cord, male reproductive system, and lymphatic system. Separately, the neoplasia of the breast and prostate. Finally, a specific group of metastatic neoplasms with an occult primary site. Two periods were analyzed: from January 2018 to December 2019, pre-pandemic period, setting up the control group; and from January 2020 to December 2021, pandemic time, exposed group.

This study was exempt from the Ethics Committee's approval due to the nature of the study and the fact that it used only anonymous data or estimates.

Statistical Analysis

For all diagnostic methods, the difference was calculated between the annual volumes of anatomopathology carried out in the pre-pandemic period and in the pandemic, reporting absolute volume and percentage variations. The absolute volume and percentage variations were calculated by comparing the two years preceding the pandemic (1 January 2018 to 31 December 2019) with the year's most affected by COVID-19 (1 January 2020 to 31 December 2021). The data were evaluated in Excel (Microsoft) and analyzed from January 1 to July 31, 2023.

Results

In the pre-pandemic group, there were a total of 1290 patients diagnosed with some type of malignant neoplasm, aged between 18 and 106 years, from 58 municipalities, of whom 50.7% were female and 49.3% were male. The exposed group consisted of 1074 patients, aged 18–93 years, with an equivalent incidence between the sexes. Setting up a reduction in diagnoses by 16.4%. Comparing the incidence of systemic malignant neoplasms in the pre-pandemic vs. pandemic period (Table 1), the diagnoses of breast, prostate, and skin tumors were reduced by 16%, 14.9%, and 38.7%, respectively. In contrast, the malignancies that increased their incidence were related to

the respiratory system in 50%, the urinary system in 34.7%, the male reproductive system in 87.5%, and gynecological in 12.6%. Little or no change was observed in the incidence values of hematological, CNS and head and neck neoplasms (Table 2). During the pre-pandemic period, the occurrence of metastatic neoplasms was observed to be 8.7%; however, in the pandemic period, it increased to 13.9%, indicating a significant rise of 59%. This increase in incidence was attributed to the staging of all diagnoses. The respiratory system is the predominant anatomical location commonly associated with metastatic cancers over both time periods, accounting for 30.8% and 30.4% of cases, respectively. The incidence of metastasis was found to be lowest in central nervous system (CNS) and hematological neoplasms, with rates of 0% and 1.5%, respectively.

Table 1: Incidence of neoplasm by systems.

Systems	% Pre-Pandemic	% Pandemic
Breast	23%	19,3%
Prostate	20,7%	17,6%
Gastrointestinal Tract	16,7%	19,8%
Gynecological	9,5%	10,7%
Head and Neck	8,2%	8,1%
Skin	6,2%	3,8%
Respiratory System	5,0%	7,5%
Hematological	4,8%	4,9%
Urinary System	2,3%	3,1%
CNS	2,1%	2,4%
Male Reproductive System	0,8%	1,5%
Lymphatic System	0,2%	0,1%
Endocrine	0,1%	0%
Hidden Primary Site	0,4%	1,2%

Table 2: Impact on the incidence of diagnoses.

Systems	Impact
Male Reproductive System	↑ 87,5%
Respiratory System	↑ 50%
Urinary System	↑ 34,7%
Gastrointestinal Tract	↑ 18,5%
Gynecological	↑ 12,6%
Endocrine	↓ 100%
Lymphatic System	↓ 50%
Skin	↓ 38,7%
Breast	↓ 16%
Prostate	↓ 14,9%
Hematological	≅ 0%
CNS	≅ 0%
Head and Neck	≅ 0%

Discussion

A survey conducted in 2020 by the Brazilian Society of Oncological Surgery (SBCO) and the Brazilian Pathology Society (SBP) with the main public and private services of reference in the country indicates that since the start of the new coronavirus pandemic, there has been a 70% reduction in the number of cancer surgeries and a 50% to 90% drop in biopsies [9]. With this, it is estimated that at least 50 thousand Brazilians have stopped receiving the diagnosis of cancer in the first two months of the pandemic [3]. During the pandemic, our oncology center noticed a reduction in the number of diagnoses of approximately 16.4%, which is lower than the trends in the medical literature. The study by Marques et al. showed that the number of new cancer cases fell in all regions of Brazil, with the decline in new cancer diagnoses ranging from -24.3% in the North region to -42.7% in the Northeast region [3]. In other studies, with similar objectives to ours, conducted in the Netherlands, USA, India, Korea, and Brazil since the first diagnosis of COVID-19, there has been a decrease in the number of cancer diagnoses. This decrease has been observed in almost all types of cancer [3,8,10-12]. However, in our study, the decrease in the number of new cancers varied according to the type, with breast, prostate, and skin cancers being the most affected, while respiratory, gynecological, and gastrointestinal cancers experienced an increase in their incidence.

Our attention has been drawn to a 50% increase in the diagnosis of respiratory cancer. Factors such as an increase in hospitalizations for suspected COVID-19 infection in patients with respiratory symptoms during the pandemic period, as well as an increase in the utilization of imaging technologies, may have led to individuals being diagnosed with respiratory tract neoplasms [13,14]. Breast cancer holds the position of being the most prevalent form of cancer throughout all regions of Brazil, excluding non-melanoma skin cancers, making it extremely relevant to public health. Negrao, et al. described drops in breast cancer diagnosis at 48.7% in the studied population. Although it does not show the same difference in magnitude in our study for this disease, in both studies, the reductions were substantial [15,16].

The considerable increase in metastatic neoplasms in our region during the pandemic is another pertinent fact. Despite this resulting in a delayed diagnosis, concern about the COVID-19 infection may have aided hospitalization efforts [13,14]. Furthermore, additional research is required to determine whether the pandemic will result in clinically significant alterations among metastatic patients [5]. The primary discovery of the current study pertains to the relatively small repercussions experienced by our oncology center compared to other sectors, both inside Brazil and on a global scale [3,8,17]. As our study is in an area with limited human, financial, and technological resources, it was expected to have a great impact on the number of diagnoses. However, the continuation of care with small reductions, coupled with increased demand and concern among the population regarding their health, may have been crucial factors in reducing this impact [5].

The state implemented a public health policy that placed a high priority on oncological treatment, distinguishing itself from other Brazilian and international states by not suspending such care services [18]. In addition, strategies have been implemented with local health staff for exclusive care to keep the oncological service working [18]. These actions may have had a direct impact on the quality of life of patients, avoiding late diagnoses and reducing healthcare spending [3,13]. This study has some limitations. Our project could not consider non-pandemic events that occurred during the same period. Nor have we been able to take account of external factors, such as individual decisions on taking care during the pandemic and pandemic-related mortality. The comparison period for the exposed group included the first 72 days of the year 2020, when the pandemic had not yet been declared by WHO, which may have led to underestimating the changes. The overall change has also been underestimated because our study did not include some aspects of primary prevention, such as the start of vaccination against COVID-19 in 2021.

Conclusion

The oncological sector of the Western Amazon suffered a smaller impact from the COVID-19 pandemic when compared to other national and international regions. There has been a decrease in the absolute number of diagnoses in the pandemic, which has contributed to the decline in the incidence of the most prevalent cancers, such as breast and prostate cancer. Meanwhile, during the same period, a significant increase in diagnoses of pulmonary neoplasms was observed. This fact may be related to the increased demand of patients for the health service due to respiratory symptoms due to COVID infection and the fact that, through follow-up, neoplastic causes were found. Such findings demonstrate the effectiveness of the health strategies implemented by the region studied. As well as the need to improve screening and diagnostic measures aimed at recovering from the delay caused by the pandemic and even improving previous oncological indicators.

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Conflict of Interest

The author declares no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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