

# Analysis of the Time to Initiate Oncological Treatment in Brazil: Demographic and Related-To-The-Tumor Factors

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*Análise do Tempo para Início do Tratamento Oncológico no Brasil: Fatores Demográficos e Relacionados à Neoplasia*

*Análisis del Tiempo de Inicio del Tratamiento Oncológico en Brasil: Factores Demográficos y Relacionados con la Neoplasia*

Glebson Santos Sobral<sup>1</sup>; Yuri Barbosa Araújo<sup>2</sup>; Simone Yuriko Kameo<sup>3</sup>; Glebson Moura Silva<sup>4</sup>; Dayane Ketlyn da Cunha Santos<sup>5</sup>; Lêda Leonôr Mendonça Carvalho<sup>6</sup>

## ABSTRACT

**Introduction:** According to the 60 Days Law, all Brazilians with cancer are entitled to start treatment within two months. However, previous studies point to the difficulty of patients in enforcing this regulation, by running into macro-structural problems in health systems. **Objective:** To assess the influence of demographic and cancer-related factors on the time elapsed to start cancer treatment in Brazil. **Method:** Cross-sectional study developed with data from *PAINEL-Oncologia*, a national public database, fed by different sources of information from the *Sistema Único de Saúde* [Brazilian public health system]. The following variables of interest were chosen: a) time of treatment; b) sex; c) age; d) diagnosis; e) staging; f) therapeutic modality. Then, the time elapsed between diagnosis and the start of cancer treatment was analyzed. **Results:** There was an exponential increase over the years in the proportion of cases treated in a timely manner, that is, within 60 days, as mandated by the Law. However, the prevalence of delays to start treatment is still considerable, especially among elderly, males, with cancers in less advanced stages and who needed radiotherapy as their first therapeutic modality. In addition, the waiting time was especially longer for male genitalia, head and neck, and breast cancers. **Conclusion:** Some demographic and neoplasia-related factors are involved in late beginning of oncological therapy.

**Key words:** neoplasms/epidemiology; time-to-treatment; epidemiologic measurements.

## RESUMO

**Introdução:** É reservado a todo brasileiro com câncer, pela Lei dos 60 Dias, o direito de começar o tratamento em até dois meses. Todavia, estudos anteriores apontam a dificuldade dos pacientes em fazer valer essa normativa ao esbarrarem em problemáticas macroestruturais dos sistemas de saúde. **Objetivo:** Avaliar a influência de fatores demográficos e relacionados à neoplasia sobre o tempo para início do tratamento oncológico no Brasil. **Método:** Estudo seccional, desenvolvido com dados oriundos do *PAINEL-Oncologia*, uma base pública nacional, alimentada por diversas fontes de informação do Sistema Único de Saúde. Como variáveis de interesse, elegeram-se: a) tempo de tratamento; b) sexo; c) idade; d) diagnóstico; e) estadiamento; f) modalidade terapêutica. Então, foi analisado o tempo transcorrido entre o diagnóstico e o início do tratamento oncológico. **Resultados:** Percebeu-se aumento exponencial, ao longo dos anos, da proporção de casos tratados oportunamente, isto é, em até 60 dias, como regulamenta a Lei. Entretanto, ainda é considerável a prevalência de atrasos no início do tratamento, sobretudo entre indivíduos idosos, do sexo masculino, com cânceres em estádios menos avançados e que precisaram de radioterapia como primeira modalidade terapêutica. Além disso, o tempo de espera foi especialmente maior para os cânceres de órgãos genitais masculinos, de cabeça e pescoço e de mama. **Conclusão:** Alguns fatores demográficos e relacionados à neoplasia estão envolvidos no atraso do início da terapia oncológica.

**Palavras-chave:** neoplasias/epidemiologia; tempo para o tratamento; medidas em epidemiologia.

## RESUMEN

**Introducción:** Según la Ley de los 60 Días, todos los brasileños con cáncer tienen derecho a comenzar el tratamiento dentro de dos meses. Sin embargo, estudios previos señalan la dificultad de los pacientes para hacer cumplir esta regulación, por encontrarse con problemas macroestructurales en los sistemas de salud. **Objetivo:** Evaluar la influencia de factores demográficos y relacionados con el cáncer sobre el tiempo para iniciar el tratamiento del cáncer en Brasil. **Método:** Estudio seccional, desarrollado con datos de *PAINEL-Oncologia*, base de datos pública nacional, alimentada por diferentes fuentes de información del Sistema Único de Salud [sistema público de salud brasileño]. Como variables de interés se eligieron las siguientes: a) tiempo de tratamiento; b) sexo; c) edad; d) diagnóstico; e) estadificación; f) modalidad terapéutica. Luego, se analizó el tiempo transcurrido entre el diagnóstico y el inicio del tratamiento del cáncer. **Resultados:** Hubo un aumento exponencial a lo largo de los años en la proporción de casos atendidos oportunamente, es decir, dentro de los 60 días, según lo que regula la Ley. Sin embargo, la prevalencia de retrasos en el inicio del tratamiento sigue siendo considerable, especialmente entre los hombres, ancianos, con cánceres en estadios menos avanzados y que necesitaron de radioterapia como primera modalidad terapéutica. Además, el tiempo de espera fue especialmente mayor para los cánceres de genitales masculinos, de cabeza y cuello y de mama. **Conclusión:** Algunos factores demográficos y relacionados con la neoplasia intervienen en el retraso del inicio del tratamiento del cáncer.

**Palabras clave:** neoplasias/epidemiología; tiempo de tratamiento; mediciones epidemiológicas.

<sup>1-6</sup>Universidade Federal de Sergipe (UFS). Lagarto (SE), Brazil.

<sup>1</sup>E-mail: [glebsonsobral@academico.ufs.br](mailto:glebsonsobral@academico.ufs.br). Orcid iD: <https://orcid.org/0000-0002-3835-7916>

<sup>2</sup>E-mail: [yuribarbosa@academico.ufs.br](mailto:yuribarbosa@academico.ufs.br). Orcid iD: <https://orcid.org/0000-0002-1724-3637>

<sup>3</sup>E-mail: [simonekameo@hotmail.com](mailto:simonekameo@hotmail.com). Orcid iD: <https://orcid.org/0000-0002-0035-2415>

<sup>4</sup>E-mail: [glebsonmoura@yahoo.com.br](mailto:glebsonmoura@yahoo.com.br). Orcid iD: <https://orcid.org/0000-0002-4977-2787>

<sup>5</sup>E-mail: [daayketlyn27@gmail.com](mailto:daayketlyn27@gmail.com). Orcid iD: <https://orcid.org/0000-0002-9312-4891>

<sup>6</sup>E-mail: [ledacaarvalho@hotmail.com](mailto:ledacaarvalho@hotmail.com). Orcid iD: <https://orcid.org/0000-0003-3174-8575>

**Corresponding author:** Glebson Santos Sobral. UFS. Av. Gov. Marcelo Déda, s/n – São José. Lagarto (SE), Brazil. CEP 49400-000. E-mail: [glebsonsobral@academico.ufs.br](mailto:glebsonsobral@academico.ufs.br)



## INTRODUCTION

Cancer is recognized as a preventable chronic disease<sup>1</sup>. Worldwide it is the second major cause of death second only to cardiovascular diseases<sup>2</sup>. For each year of the triennium 2020-2022, 625,000 new cases are estimated for Brazil, the most incident is non-melanoma skin cancer (177 thousand), followed by breast neoplasms (66 thousand), prostate (66 thousand), colon and rectum (41 thousand), lung (30 thousand) and stomach (21 thousand)<sup>3</sup>.

Although the developed countries account for more than half of the cases globally, they represent only 30% of deaths and 23% of potential years of life lost<sup>2</sup>. An epidemiological investigation conducted in Malaysia revealed that 50% to 88% of the deaths by breast cancer would be avoidable had they been diagnosed earlier with best access possible to treatment<sup>4</sup>. The most outstanding disparities occur in developing countries and favor worst outcomes in these settings.

Law number 12,732 dated November 22, 2012<sup>5</sup> ensures all Brazilians with confirmed diagnosis of cancer the right to initiate treatment in until 60 days. Later, other legal dispositions complemented the so-called 60-days Law as it is known nowadays in addition to 30 days for proven diagnosis and obligation to report cancer cases across the national territory<sup>6,7</sup>.

Nevertheless, several studies developed in different country regions reveal that the time between the diagnosis and beginning of the treatment exceeds largely what the 60-days Law determined. Between 2012 and 2014, at the Federal District, women with breast cancer needed to wait in average 211.8 days to begin the therapy<sup>8</sup>. In Amazonas in 2016, the median of waiting time was 111 days for several groups of neoplasms<sup>9</sup>. According to recent integrative literature review, most of the patients are unable to begin the treatment before three months<sup>10</sup>.

Sacramento et al.<sup>11</sup>, while studying cases of prostate cancer consulted at a reference hospital in Espírito Santo, before and after the approval of this Law<sup>5</sup>, found no impact over the time between the diagnosis and beginning of the treatment.

Some sociodemographic factors are associated with the delay of beginning the treatment and appear to repeat for several types of cancer, reflecting problematics of health systems macrostructure. Black individuals with low socioeconomic and educational level living in non-metropolitan areas and health-uninsured tend to delay more to be diagnosed and initiate the treatment of several neoplasms<sup>12-15</sup>.

National-based studies are still scarce because there was no tool to facilitate this analysis in the past. To meet this

demand, it was created “*PAINEL-Oncologia*”<sup>16</sup> in May 2019 which replaced the former “module treatment”, connected to the Cancer Information System (Siscan) and gathers neoplasms cases of the entire country in a single base.

This information are originated from the Health Information Systems (SIS) adopted by the National Health System (SUS) and do not address cancer incidence in the country as a whole. “*PAINEL-Oncologia*” is an important management tool, allowing the expressive increase of cases captured and quality of the information in addition to gathering and reconciling conflicting and complementary data in a single system<sup>17</sup>.

This study aims to analyze the influence of demographic factors and related to the neoplasm over the time between the diagnosis until the beginning of the oncologic treatment.

## METHOD

Some of the factors delaying the beginning of oncologic treatment in Brazil were tentatively identified through a sectional study with data from “*PAINEL-Oncologia*”<sup>16</sup>, a public database with different SIS/SUS information that allows to detect the interval between the diagnosis date and the first cancer treatment<sup>17</sup>. These data are but a portion of the cases in the country, exclusively available from different SIS.

The definition of the case according to “*PAINEL-Oncologia*” is based on the combination of the National Health Card (CNS) with the International Classification of Diseases and Related Health Problems (ICD-10)<sup>18</sup> reported, the same CNS with more than one ICD represents different cases<sup>17</sup>. All the data are referenced to February 2021 and initially tabulated in duplicate by two different investigators in the statistical package Epi Info 2000 of the Centers for Disease Control and Prevention which analyses the consistency. Cases with diagnosis information for the period 2013-2020 were gathered for all the Brazilian regions, the object of the study.

The following variables of interest were selected: a) time to the treatment; b) sex – male and female; c) age; d) diagnosis; e) therapeutic modality – surgery, chemotherapy, radiotherapy and both (chemo and radiotherapy); f) staging – 0, I, II, III, IV and “does not apply” for surgical cases given the nature of the database feeding “*PAINEL-Oncologia*”<sup>17</sup>. Later, the variable “time to the treatment” was subdivided to meet the goals of this study and compliance with the Law number 12,732/12<sup>5</sup> – ≤ 60 days (timely) and > 60 days (off-time). In addition, the variable “diagnosis” which refers to the neoplasm reported at the anatomopathological exam (ICD-10: C00-D48) was categorized in: “malignant neoplasms”

(C00-C97, except C44 and C73, cited by the Law – other malignant neoplasms of the skin and malignant neoplasm of the thyroid gland, respectively); “neoplasms *in situ*” (D00-D09) and “neoplasms of uncertain or unknown behavior” (D37-D48)<sup>19</sup>.

The exclusion criteria were cases without information about the time to treatment, cases with time to treatment prior to diagnosis (negative time) and lack of information about variables of exposure.

Time series charts were prepared to evaluate the shift of the distribution of cases treated timely only for the malignant neoplasms as they account for near all the cases included in the analysis and because other neoplasms (D00-D09 and D37-D48) had higher percentages of timely treatment during the entire period analyzed.

Subsequently, a descriptive analysis of the data through the distribution of the variables of the study population was carried out. Being categorical variables, proportions were calculated, and Pearson’s chi-square test was utilized to compare the groups. As the odds ratio (OR) may overestimate or underestimate the power of the association when the outcome analyzed is common, the prevalence ratio (PR) must be preferred in these situations<sup>20,21</sup>. Francisco et al.<sup>22</sup> have also affirmed that PR appears to be more appropriate to analyze subgroups than OR.

Based in the study design, crude PR were estimated with their respective confidence intervals of 95% (CI<sub>95%</sub>) and considered statistically significant with  $p < 0.05$  by the test  $\chi^2$  of Wald. All the analyzes were processed with the software Statistical Package for Social Sciences (SPSS), version 20.0.

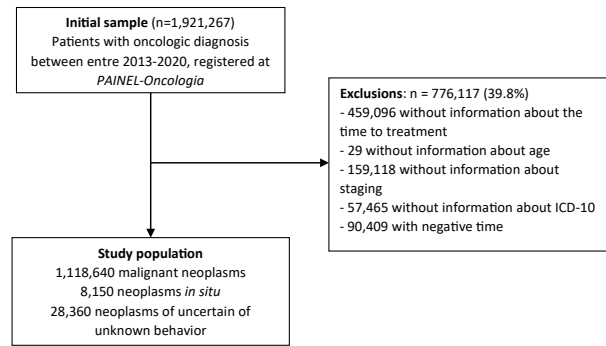
Because only secondary public data were utilized, the study was not submitted for review by the Institutional Review Board, but it complied with Resolution. 466/2012<sup>23</sup> of the National Health Council. The data are deidentified addressing Collective Health information only.

**RESULTS**

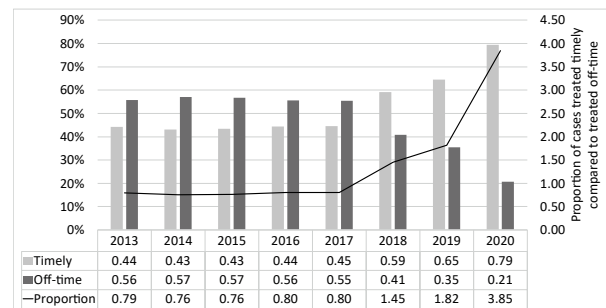
Of the total 1,921,267 cases extracted from “PAINEL-Oncologia<sup>16</sup>, 776,117 were excluded according to the motives presented in Figure 1 and 1,118,640 (96.8%) of the remaining cases were diagnoses ruled by Law 12,732/12<sup>5</sup>.

Until 2017, the proportional distribution of cases treated in until 60 days remained nearly stable and lower than untreated in the same period. Henceforward, this relation became gradually favorable, 3.85 times greater for timely against off-time treatment in 2020 (Graph 1).

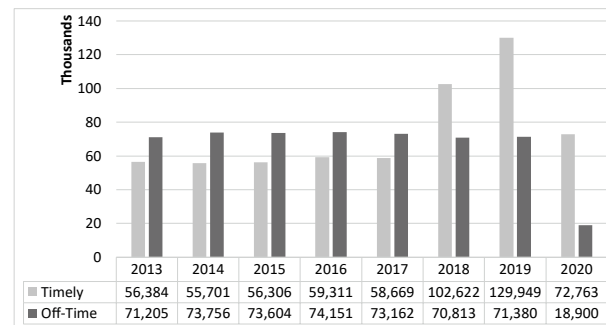
The absolute drop of cases from PAINEL-Oncologia<sup>16</sup> for the biennium 2019-2020 suggests that the cases of the last year may not be consolidated yet at the database (Graph 2).



**Figure 1.** Flowchart of the neoplasm cases included and excluded, 2013-2020, Brazil



**Graph 1.** Relative distribution of malignant neoplasms registered at PAINEL-Oncologia, 2013-2020, Brazil



**Graph 2.** Absolute distribution of malignant neoplasm cases registered at PAINEL-Oncologia, 2013-2020, Brazil

As shown in Table 1 with all the types of neoplasms (n=1,155,150), it was noticed lower prevalence of malignant neoplasms initiated timely against other neoplasms: neoplasms *in situ* and neoplasms of uncertain or unknown behavior. For the population of interest – only malignant neoplasms – it was found a negative association between males and timely oncologic treatment.

Adults and mainly older adults had lower PR of timely beginning compared with younger population.

Higher prevalence of timely first treatment was found for referrals to surgery compared to chemotherapy. In counterpart, lower prevalence of timely treatment were detected for chemotherapy associated with radiotherapy and mainly radiotherapy alone.

Timely treatment was negatively associated with initial stages and the grade of association tends to be positive at later stages.

Since Law 12,732/12<sup>5</sup> entered into force and time-series were initiated, the biennia gradually presented more positive associations, particularly the most recent, 2019-2020.

For the types of malignant neoplasms analyzed by groups according to ICD-10<sup>18</sup> it was found negative association between timely treatment and the following malignant neoplasms: C60-C63, male genital organs; C00-C14, lip, oral cavity and pharynx; C50, breast and C51-C58, female genital organs. In counterpart, for another malignant neoplasms, positive association with timely treatment was detected.

## DISCUSSION

Most likely, the expressive growth of cases since 2018 results from Directive 643<sup>24</sup> of the same year which determined that the anatomopathological procedures

register should contain fields for CNS and ICD-10. Because of the legal pressure to monitor the time to treatment, there was an important advance of diagnostic information available at the databank in comparison with the former period since only breast and cervical cancers had SISCAN's mandatory fields. Despite continuous efforts, much information before 2018 were unable to retrieve<sup>17</sup>.

The excision of small and superficial masses of soft tissues especially those with less than 5 cm of diameter is common in unspecialized clinics due to the presumption of non-malignancy of these injuries<sup>25</sup>. Later, the diagnosis is determined with anatomopathological exam and these cases are registered at "PAINEL-Oncologia" within the time interval from 0 to 30 days with surgery as excision modality of the first treatment<sup>17,19</sup>. This can partially explain why non-malignant neoplasms had more odds of receiving timely treatment.

In line with the 60-days Law and by extension with the objective of this article the findings discussed below address only malignant neoplasms<sup>5</sup>.

**Table 1.** Variables related to the patients treatment with malignant neoplasm. PAINEL-Oncologia, 2013-2020, Brasil

Variable	n (%)	Prevalence of timely treatments (%)	PR (CI <sub>95%</sub> )	p-value
<b>Diagnosis (n=1,155,150)</b>			<0.001	<0.001
Other neoplasms <sup>a</sup>	36,510 (3.2%)	99.0%	1.0	
Malignant neoplasms	1,118,640 (96.8%)	52.9%	0.535 (0.533-0.536)	
<b>Year of diagnosis (n=1,118,640)<sup>b</sup></b>			<0.001	<0.001
2013-2014	257,010 (23.0%)	43.6%	1.0	
2015-2016	263,372 (23.5%)	43.9%	1.007 (1.002-1.012)	
2017-2018	305,266 (27.3%)	52.8%	1.212 (1.205-1.219)	
2019-2020	292,992 (26.2%)	69.2%	1.587 (1.579-1.595)	
<b>Sex (n=1,118,640)<sup>b</sup></b>			<0.001	<0.001
Female	584,130 (52.2%)	56.1%	1.0	
Male	534,510 (47.8%)	52.4%	0.934 (0.931-0.937)	
<b>Age (n=1,118,640)<sup>b</sup></b>			<0.001	<0.001
< 20 years	20,025 (1.8%)	84.0%	1,0	
20-59 years	503,861 (45.0%)	57.7%	0.687 (0.683-0.691)	
≥ 60 years	594,754 (53.2%)	50.8%	0.605 (0.601-0.609)	
<b>First therapeutic modality (n=1,118,640)<sup>b</sup></b>			<0.001	<0.001
Chemotherapy	616,084 (55.1%)	49.3%	1.0	
Radiotherapy	223,745 (20.0%)	30.8%	0.625 (0.620-0.629)	
Chemotherapy + radiotherapy	14,083 (1.3%)	37.8%	0.768 (0.752-0.785)	
Surgery	264,728 (23.7%)	80.8%	1.640 (1.635-1.646)	

to be continued

Table 1. continuation

Variable	n (%)	Prevalence of timely treatments (%)	PR (CI <sub>95%</sub> )	p-value
<b>Staging (n=1,118,640)<sup>b</sup></b>			<0.001	<0.001
0	53,474 (4.8%)	49.0%	1.0	
I	97,507 (8.7%)	37.0%	0.754 (0.746-0.764)	
II	191,345 (17.1%)	35.8%	0.730 (0.722-0.738)	
III	247,491 (22.1%)	45.4%	0.927 (0.918-0.936)	
IV	264,095 (23.6%)	50.9%	1.040 (1.030-1.050)	
Not applicable	264,728 (23.7%)	83.0%	1.649 (1.635-1.664)	
<b>Specific Diagnosis (n=1,118,640)<sup>b</sup></b>			<0.001	<0.001
	<b>ICD-10</b>			
Total	C00-C97	1,118,640 (100%)	52.9%	1.0
Male genital organs	C60-C63	181,831 (16.3%)	35.2%	0.665 (0.661-0.669)
Lip, oral cavity and pharynx	C00-C14	93,470 (8.4%)	43.6%	0.825 (0.818-0.831)
Breast	C50	236,262 (21.1%)	46.6%	0.881 (0.877-0.885)
Female genital organs	C51-58	128,554 (11.5%)	51.3%	0.970 (0.964-0.975)
Melanoma	C43	12,670 (1.1%)	57.8%	1.092 (1.076-1.109)
Digestive organs	C15-26	228,382 (20.4%)	58%	1.096 (1.092-1.100)
Respiratory and intrathoracic organs	C30-39	90,299 (8.1%)	66.1%	1.249 (1.243-1.255)
Mesothelial and soft tissues	C45-49	25,774 (2.3%)	67.9%	1.284 (1.273-1.295)
Bone and articular cartilage	C40-41	10,498 (0.9%)	69.5%	1.314 (1.297-1.331)
Lymphoid, hematopoietic tissues and related tissues	C81-C96	53,191 (4.8%)	70.2%	1.326 (1.319-1.334)
Urinary tract	C64-C68	31,345 (2.8%)	76.6%	1.448 (1.439-1.458)
Eye, brain and other parts of the central nervous system	C69-C72	5,023 (0.4%)	88.6%	1.675 (1.658-1.692)
Other endocrine glands	C74-C75	528 (<0.1%)	97.5%	1.844 (1.819-1.869)
Ill-defined, secondary and unspecified sites	C76-C80	20,808 (1.9%)	98.2%	1.857 (1.853-1.862)
Independent multiple sites	C97	5 (<0.1%)	100%	1.891 (1.887-1.894)

**Captions:** PR= prevalence ratio; CI<sub>95%</sub> = confidence interval of 95%; ICD-10 = International Classification of Diseases and Related Health Problems 10<sup>th</sup> edition.

**Note:** (a) neoplasms *in situ* (n=8,150) and uncertain or unknown behavior (n=28,360); (b) only the malignant neoplasms evaluated enforced by Law number 12,732/12.

Timely treatment was more prevalent in females as the results of the present study have concluded. Although corroborated by former studies<sup>9,26</sup>, time differences between genders are greater prior to the diagnosis, males tend to neglect the symptoms and postpone seeking medical help because of an alleged model of masculinity where men would be more resilient to diseases and less self-caring<sup>13,27,28</sup>.

Patients older than 60 years of age have lowest prevalence of timely treatment, partially because of older adults diminished perception of the severity of their health conditions and fear of cancer diagnosis<sup>29</sup>. In addition, comorbidities are more frequent in this population requiring a careful and long evaluation before oncologic therapy<sup>30</sup>.

As mentioned earlier, other sociodemographics are involved in the delay of beginning the treatment

as Black race, lower educational and socioeconomic level, uninsured health care and non-metropolitan areas residence<sup>11-15</sup>. As *PAINEL-Oncologia* does not offer these variables, the analysis was waived in this study.

Independent multiple locations and staging IV tumors were less likely of receiving timely treatment. Because the health system is unable to absorb all the patients, most advanced and symptomatic neoplasms are prioritized to begin timely treatment<sup>31</sup>. Hypothetically, the system overload, a characteristic of Latin American countries can be lessened with well-planned early diagnosis and screening programs which reduce mortality while allow early detection of initial stages tumors<sup>15,32</sup>.

It was found that the surgery as modality of first treatment had more odds of occurring timely, because of better access to this type of therapy as some general hospitals are able to offer oncologic surgeries with less waiting time in comparison with high complexity centers<sup>1,15,33</sup>. Some diagnoses are confirmed later than the first intervention because specimens are collected during surgery followed by anatomopathological test to confirm the malignancy<sup>16,17</sup> which most likely contributes to this finding.

On the other hand, radiotherapy either associated with chemotherapy or alone was the less prevalent modality of timely treatments. These therapies rely on referrals to reference centers which usually have to deal with large volume of consultations and procedures causing delays in the beginning of the treatment<sup>15,33</sup>.

Neoplasms of male genital organs had the worst performance of time between diagnosis and beginning of the treatment, influenced by heterogeneity of conducts for prostate cancer. In view of the natural history usually indolent, extensive literature advocates active surveillance with monitoring of low-risk prostate tumors with periodical evaluation for potential definitive treatment<sup>34-36</sup>. Thus, the time to begin treatment may be prolonged in many cases although it does not necessarily mean worsening of patients' survival<sup>37</sup>. Furthermore, specifically for this group of neoplasms, the pre-treatment apprehension should be a matter of attention for fearing painful therapies and possible changes of body image. Individually, it may also delay the treatment<sup>28,38</sup>.

The second group with more time to begin the treatment as the present study concluded was head and neck cancers, consistent with former epidemiological analyzes which found mean waiting time of 12 weeks, regardless of the therapeutic modality adopted<sup>39</sup>. Because of difficult location and advanced stage usually found in these types of tumor it is advisable that the treatment is decided as early as possible but not compromising the quality of the care<sup>40</sup>. However, the aspects related to the

quality of the care are precisely the main factors of delay of beginning the treatment of head and neck cancer. Ordering and analysis of additional diagnosis, increase of interdisciplinary referrals, expansion of therapeutic options and refinement of techniques utilized, demanding skilled teams are hurdles that damage the timely beginning of the treatment notwithstanding the advances achieved<sup>39,41-43</sup>.

Finally, breast cancer stands out since the absolute number of untreated cases before 60-days overcomes the first two groups of neoplasms referenced above. As it happens with head and neck cancers, more complex procedures as needed require thorough preoperative appraisal and coordination of different teams as mastologist, plastic surgeon and nuclear medicine<sup>43,44</sup>. Typically, genetic tests are run for breast cancer as predictive and prognostic tool to evaluate the benefits of chemotherapy because of possible recurrence<sup>45</sup>. Depending on the histopathological type found, more sensitive imaging and secondary lesions biopsies are required to guide the surgical plan<sup>46</sup>, which impact the global time since diagnosis up to the beginning of the treatment.

Still, a study conducted at a reference institution of the State of Espírito Santo found time of timely treatment for women diagnosed with breast cancer with a median of 44 days until the first therapy, further to important increase of the number of patients who initiated the treatment in until 60 days<sup>47</sup>. Actually, there are Brazilian health services which are managing to meet the deadlines of Law number 12,732/12<sup>5</sup>, although not the majority as the literature showed.

The study's limitations are data loss by SIS/SUS which are interconnected and cause impact on the databases these systems provide information to as *PAINEL-Oncologia*<sup>17</sup>. The lack of publications based on *PAINEL-Oncologia* hampers the comparison of results even if the current findings are consistent with the literature's epidemiology. However, the high heterogeneity of the population investigated is positive which allows good comparability with populations with similar profile of Brazil's.

Because of high frequency of statistically significant associations with narrow CI<sub>95%</sub> even when PR between exposure and outcomes were weak because of the robust casuistry, it was decided to not use the adjusted analysis by Poisson regression with strong variance since all the variables would be included in the analysis and would remain in the final model as a bias.

## CONCLUSION

It was found an exponential increase throughout the years of the proportion of cases treated timely in until 60

days as determined by Law number 12,732/12 after the analysis of the time between the diagnosis and beginning of oncologic treatment in Brazil. It is still considerable the prevalence of delays to begin the treatment mostly for older male adults with less advanced cancers. It was also detected lower prevalence of timely treatment of patients who needed radiotherapy as first therapeutic modality. In addition, male genital organs, head and neck and breast cancers were more associated with delays to begin oncologic treatment.

Because of the continuous monitoring of time from the diagnosis and first treatment, it is probable that the utilization of *PAINEL-Oncologia* stimulates the qualification of data from SIS/SUS that feed it resulting in steady improvement of the information for the tool itself. The managers could rely on the present analysis to guide health policies to ameliorate the reality of oncologic treatment and reduce waiting time.

### CONTRIBUTIONS

All the authors contributed substantially to the study design, acquisition, analysis and interpretation of the data, wording and critical review. They approved the final version to be published.

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### DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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None.

### REFERENCES

1. Ministério da Saúde (BR), Gabinete do Ministro. Portaria nº 874, de 16 de maio de 2013. Institui a Política Nacional para a Prevenção e Controle do Câncer na Rede de Atenção à Saúde das Pessoas com Doenças Crônicas no âmbito do Sistema Único de Saúde (SUS) [Internet]. Diário Oficial da União, Brasília, DF. 2013 maio 17 [acesso 2021 ago 20]; Seção 1:129. Disponível em: [http://bvsms.saude.gov.br/bvs/saudelegis/gm/2013/prt0874\\_16\\_05\\_2013.html](http://bvsms.saude.gov.br/bvs/saudelegis/gm/2013/prt0874_16_05_2013.html)
2. Global Burden of Disease Cancer Collaboration. Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 29 cancer groups, 1990 to 2017: a systematic analysis for the Global Burden of Disease Study. *JAMA Oncol* 2019;5(12):1749-68. doi: <https://doi.org/10.1001/jamaoncol.2019.2996>
3. Instituto Nacional de Câncer José Alencar Gomes da Silva. Estimativa 2020: incidência de câncer no Brasil [Internet]. Rio de Janeiro: INCA; 2019 [acesso 2021 ago 20]. Disponível em: <https://www.inca.gov.br/publicacoes/livros/estimativa-2020-incidencia-de-cancer-no-brasil>
4. Ho GF, Taib NA, Pritam Singh RK, et al. What if all patients with breast cancer in Malaysia have access to the best available care: how many deaths are avoidable? *Glob J Health Sci.* 2017;9(8):32-9. doi: <https://doi.org/10.5539/gjhs.v9n8p32>
5. Ministério da Saúde (BR). Lei nº 12.732, de 22 de novembro de 2012. Dispõe sobre o primeiro tratamento de paciente com neoplasia maligna comprovada e estabelece prazo para seu início [Internet]. Diário Oficial da União, Brasília, DF. 2012 nov 23 [acesso 2021 ago 20]; Seção 1:1. Disponível em: [http://www.planalto.gov.br/ccivil\\_03/\\_ato2011-2014/2012/lei/l12732.htm](http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2012/lei/l12732.htm)
6. Presidência da República (BR). Lei nº 13.685, de 25 de junho de 2018. Altera a Lei nº 12.732, de 22 de novembro de 2012, para estabelecer a notificação compulsória de agravos e eventos em saúde relacionados às neoplasias, e a Lei nº 12.662, de 5 de junho de 2012, para estabelecer a notificação compulsória de malformações congênitas [Internet]. Diário Oficial da União, Brasília, DF. 2018 jun. 26 [acesso 2021 ago 20]; Seção 1:1. Disponível em: [http://www.planalto.gov.br/ccivil\\_03/\\_Ato2015-2018/2018/Lei/L13685.htm](http://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2018/Lei/L13685.htm)
7. Presidência da República (BR). Lei nº 13.896, de 30 de outubro de 2019. Altera a Lei nº 12.732, de 22 de novembro de 2012, para que os exames relacionados ao diagnóstico de neoplasia maligna sejam realizados no prazo de 30 (trinta) dias, no caso em que especifica [Internet]. Diário Oficial da União, Brasília, DF. 2019 out 31 [acesso 2021 ago 20]; Seção 1:1. Disponível em: [http://www.planalto.gov.br/ccivil\\_03/\\_Ato2019-2022/2019/Lei/L13896.htm](http://www.planalto.gov.br/ccivil_03/_Ato2019-2022/2019/Lei/L13896.htm)
8. Barros AF, Araújo JM, Murta-Nascimento CM, et al. Clinical pathways of breast cancer patients treated in the Federal District, Brazil. *Rev Saúde Pública.* 2019;53:14. doi: <https://doi.org/10.11606/S1518-8787.2019053000406>
9. Rodrigues AS, Alencar LCFS, Branco VRMC. Efetividade da Lei nº 12.732/2012 na assistência às neoplasias malignas e sua associação com a mortalidade no Estado do Amazonas. *REDES.* 2020;8(1):49-61. doi: <http://doi.org/10.18316/REDES.v8i1.5895>
10. Lombardo MS, Popim RC. Acesso do paciente à rede oncológica na vigência da “Lei dos Sessenta Dias”: revisão integrativa. *Rev Bras Enferm.* 2020;73(5):e20190406. doi: <https://doi.org/10.1590/0034-7167-2019-0406>

11. Sacramento RS, Simião LJ, Viana KCG, et al. Association of sociodemographic and clinical variables with time to start prostate cancer treatment. *Ciênc Saúde Coletiva*. 2019;24(9):3265-74. doi: <https://doi.org/10.1590/1413-81232018249.31142017>
12. Attalla K, Paulucci DJ, Blum K, et al. Demographic and socioeconomic predictors of treatment delays, pathologic stage, and survival among patients with penile cancer: a report from the National Cancer Database. *Urologic Oncology*. 2018;36(1):4.e17-14.e24. doi: <https://doi.org/10.1016/j.urolonc.2017.09.014>
13. Bhatia RK, Rayne S, Rate W, et al. Patient factors associated with delays in obtaining cancer care in Botswana. *J Glob Oncol*. 2018;4:1-13. doi: <https://doi.org/10.1200/JGO.18.00088>
14. Reeder-Hayes KE, Mayer SE, Olshan AF, et al. Race and delays in breast cancer treatment across the care continuum in the Carolina Breast Cancer Study. *Cancer*. 2019;125(22):3985-92. doi: <https://doi.org/10.1002/cncr.32378>
15. Medeiros GC, Teodózio CGC, Fabro EAN, et al. Fatores associados ao atraso entre o diagnóstico e o início do tratamento de câncer de mama: um estudo de coorte com 204.130 casos no Brasil. *Rev Bras Cancerol*. 2020;66(3):e-09979. doi: <https://doi.org/10.32635/2176-9745.RBC.2020v66n3.979>
16. PAINEL-Oncologia [Internet]. Brasília (DF): DATASUS. [data desconhecida] - [atualizado 2022 abr 15; acesso 2020 set 4]. Disponível em: [http://tabnet.datasus.gov.br/cgi/dhdat.exe?PAINEL\\_ONCO/PAINEL\\_ONCOLOGIABR.def](http://tabnet.datasus.gov.br/cgi/dhdat.exe?PAINEL_ONCO/PAINEL_ONCOLOGIABR.def)
17. Atty ATM, Jardim BC, Dias MBK, et al. PAINEL-Oncologia: uma ferramenta de gestão. *Rev Bras Cancerol*. 2020;66(2):e-04827. doi: <https://doi.org/10.32635/2176-9745.RBC.2020v66n2.827>
18. Organização Mundial da Saúde. CID-10: Classificação Estatística Internacional de Doenças e problemas relacionados à saúde. São Paulo: Edusp; 2008.
19. Nota Técnica: painel de monitoramento de tratamento oncológico: PAINEL-Oncologia. Brasília (DF): DATASUS; [2013] [acesso 2021 ago 20]. Disponível em: [http://tabnet.datasus.gov.br/cgi/painel\\_onco/doc/painel\\_oncologia.pdf](http://tabnet.datasus.gov.br/cgi/painel_onco/doc/painel_oncologia.pdf)
20. Zocchetti C, Consonni D, Bertazzi PA. Relationship between prevalence rate ratios and odds ratios in cross-sectional studies. *Int J Epidemiol*. 1997;26(1):220-3. doi: <https://doi.org/10.1093/ije/26.1.220>
21. Thompson ML, Myers JE, Kriebel D. Prevalence odds ratio or prevalence ratio in the analysis of cross sectional data: what is to be done? *Occup Environ Med*. 1998;55(4):272-7. doi: <https://doi.org/10.1136/oem.55.4.272>
22. Francisco PMSB, Donalisio MR, Barros MBA, et al. Medidas de associação em estudo transversal com delineamento complexo: razão de chances e razão de prevalência. *Rev Bras Epidemiol*. 2008;11(3):347-55. doi: <https://doi.org/10.1590/S1415-790X2008000300002>
23. Conselho Nacional de Saúde (BR). Resolução nº 466, de 12 de dezembro de 2012. Aprova as diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos [Internet]. Diário Oficial da União, Brasília, DF. 2013 jun 13 [acesso 2020 set 4]; Seção 1:59. Disponível em: <https://conselho.saude.gov.br/resolucoes/2012/Reso466.pdf>
24. Ministério da Saúde (BR), Secretaria de Atenção à Saúde. Portaria n.º 643, de 17 de maio de 2018. Altera atributos do procedimento da Tabela de Procedimentos, Medicamentos, Órteses/Próteses e Materiais Especiais do SUS [Internet]. Diário Oficial da União, Brasília, DF; 2018 maio 21 [acesso 2021 ago 20]; Seção I:71. Disponível em: <https://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.jsp?data=21/05/2018&jornal=515&pagina=71>
25. Khoo M, Pressney I, Hargunani R, et al. Small, superficial, indeterminate soft-tissue lesions as suspected sarcomas: is primary excision biopsy suitable? *Skeletal Radiol*. 2017;46(7):919-24. doi: <https://doi.org/10.1007/s00256-017-2635-4>
26. Lima MAN, Villela DAM. Fatores sociodemográficos e clínicos associados ao tempo para o início do tratamento de câncer de cólon e reto no Brasil, 2006-2015. *Cad Saúde Pública*. 2021;37(5):e00214919. doi: <https://doi.org/10.1590/0102-311X00214919>
27. Modesto AAD, Lima RLB, D'Angelis AC, et al. Um novembro não tão azul: debatendo rastreamento de câncer de próstata e saúde do homem. *Interface* 2018;22(64):251-62. doi: <https://doi.org/10.1590/1807-57622016.0288>
28. Neto AJM, Granado LC, Salles RJ. A compreensão das atitudes diante do diagnóstico de câncer de próstata no processo psicodiagnóstico interventivo. *Rev SBPH [Internet]* 2020 [acesso 2021 nov 12];23(1):66-80. Disponível em: [http://pepsic.bvsalud.org/scielo.php?script=sci\\_arttext&pid=S1516-08582020000100007](http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S1516-08582020000100007)
29. Chen CP, Kung PT, Wang YH, et al. Effect of time interval from diagnosis to treatment for cervical cancer on survival: a nationwide cohort study. *PloS One*. 2019;14(9):e0221946. doi: <https://doi.org/10.1371/journal.pone.0221946>
30. Leprieur EG, Labrune S, Giraud V, et al. Delay between the initial symptoms, the diagnosis and the onset of specific treatment in elderly patients with lung cancer. *Clin Lung Cancer*. 2012;13(5):363-8. doi: <https://doi.org/10.1016/j.clcc.2011.11.010>
31. Abrao FC, Abreu IRLB, Rocha RO, et al. Impact of the delay to start treatment in patients with lung cancer treated in a densely populated area of Brazil. *Clinics*



- (São Paulo). 2017;72(11):675-80. doi: [https://doi.org/10.6061/clinics/2017\(11\)05](https://doi.org/10.6061/clinics/2017(11)05)
32. Lemos LLP, Souza MC, Moreira DP, et al. Stage at diagnosis and stage-specific survival of breast cancer in Latin America and the Caribbean: a systematic review and meta-analysis. *PLoS One* 2019;14(10):e0224012. doi: <https://doi.org/10.1371/journal.pone.0224012>
  33. Ministério da Saúde (BR), Secretaria de Atenção Especializada à Saúde. Portaria nº 1.399, de 17 de dezembro de 2019. Redefine os critérios e parâmetros referenciais para a habilitação de estabelecimentos de saúde na alta complexidade em oncologia no âmbito do SUS [Internet]. Diário Oficial da União, Brasília, DF. 2018 dez 19 [acesso 2021 ago 20]; Seção 1:173. Disponível em: <https://www.in.gov.br/web/dou/-/portaria-n-1.399-de-17-de-dezembro-de-2019-234338206>
  34. Litwin MS, Tan HJ. The diagnosis and treatment of prostate cancer: a review. *JAMA*. 2017;317(24):2532-42. doi: <https://doi.org/10.1001/jama.2017.7248>
  35. Loeb S, Folkvaljon Y, Curnyn C, et al. Uptake of active surveillance for very-low-risk prostate cancer in Sweden. *JAMA Oncol*. 2017;3(10):1393-8. doi: <https://doi.org/10.1001/jamaoncol.2016.3600>
  36. Briganti A, Fossati N, Catto JWF, et al. Active surveillance for low-risk prostate cancer: the European Association of Urology position in 2018. *Eur Urol*. 2018;74(3):357-68. doi: <https://doi.org/10.1016/j.eururo.2018.06.008>
  37. Khorana AA, Tullio K, Elson P, et al. Time to initial cancer treatment in the United States and association with survival over time: an observational study. *PLoS One* 2019;14(3):e0213209. doi: <https://doi.org/10.1371/journal.pone.0213209>
  38. Moraes V. Análise de fatores que levaram ao encaminhamento tardio em casos novos de câncer de próstata recebidos no Hospital Amaral Carvalho nos anos de 2015 e 2016 [dissertação na Internet]. Botucatu (SP): Universidade Estadual Paulista; 2018 [acesso 2021 nov 12]. Disponível em: <http://hdl.handle.net/11449/154516>
  39. Felippu AWD, Freire EC, Silva RA, et al. Impact of delay in the diagnosis and treatment of head and neck cancer. *Braz J Otorhinolaryngol*. 2016;82(2):140-3. doi: <https://doi.org/10.1016/j.bjorl.2015.10.009>
  40. Coca-Pelaz A, Takes RP, Hutcheson K, et al. Head and neck cancer: a review of the impact of treatment delay on outcome. *Adv Ther*. 2018;35(2):153-60. doi: <https://doi.org/10.1007/s12325-018-0663-7>
  41. Murphy CT, Galloway TJ, Handorf EA, et al. Increasing time to treatment initiation for head and neck cancer: an analysis of the National Cancer Database. *Cancer*. 2015;121(8):1204-13. doi: <https://doi.org/10.1002/cncr.29191>
  42. DeGraaff LH, Platek AJ, Iovoli AJ, et al. The effect of time between diagnosis and initiation of treatment on outcomes in patients with head and neck squamous cell carcinoma. *Oral Oncol*. 2019;96:148-52. doi: <https://doi.org/10.1016/j.oraloncology.2019.07.021>
  43. Hanna TP, King WD, Thibodeau S, et al. Mortality due to cancer treatment delay: systematic review and meta-analysis. *BMJ*. 2020;371:m4087. doi: <https://doi.org/10.1136/bmj.m4087>
  44. Bleicher RJ. Timing and delays in breast cancer evaluation and treatment. *Ann Surg Oncol*. 2018;25(10):2829-38. doi: <https://doi.org/10.1245/s10434-018-6615-2>
  45. Vandergrift JL, Niland JC, Theriault RL, et al. Time to adjuvant chemotherapy for breast cancer in National Comprehensive Cancer Network institutions. *J Natl Cancer Inst*. 2013;105(2):104-12. doi: <https://doi.org/10.1093/jnci/djs506>
  46. Padilla-Ruiz M, Zarcos-Pedrinaci I, Rivas-Ruiz F, et al. Factors that influence treatment delay for patients with breast cancer. *Ann Surg Oncol*. 2020;28:3714-21. doi: <https://doi.org/10.1245/s10434-020-09409-2>
  47. Simião LJ. Estudo dos tempos entre o diagnóstico e tratamento do câncer de mama em uma instituição de referência no Espírito Santo [dissertação na Internet]. Vitória (ES): Universidade Federal do Espírito Santo; 2016 [acesso 2020 dez 30]. Disponível em: <http://repositorio.ufes.br/handle/10/10100>

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