Prostate Cancer Analysis in Follow-up in the Oncology Care Network of Espírito Santo, Brazil

Análise do Câncer de Próstata na Rede de Atenção Oncológica do Espírito Santo, Brasil
Análisis del Cáncer de Próstata en Seguimiento en la Red de Atención Oncológica de Espírito Santo, Brasil

Wesley Rocha Grippa[1]; Luís Carlos Lopes-Júnior[2]

ABSTRACT

Introduction: Hospital-based Cancer Registries (HCR) are systematic sources of information, installed in general/specialized oncology hospitals, with the aim of collecting data regarding the diagnosis, treatment, and monitoring of patients treated in these institutions. **Objective:** To analyze the epidemiological profile of patients with prostate cancer being followed up in the Oncology Care Network (OCN) of a state in southeastern Brazil. **Method:** Descriptive hospital-based study. Secondary data were obtained via tumor registration forms from the HCR of the entire State OCN (2000-2020). The sample was stratified between analytical and non-analytical cases and the groups compared using Student's t-test and Pearson's chi-square test. Additionally, a binary logistic regression was conducted. **Results:** We retrieved 13,519 records of prostate neoplasms from 2000-2020, where 9,838 were analytical cases and 3,681 were non-analytical. The present historical series showed an increasing trend (p<0.001). The mean age of patients was 69 years. In addition, 67.91% were referred by the SUS, 95.74% had only one primary tumor, and the tumor was classified as adenocarcinoma in 98% of the records. The first treatment received at the hospital was surgery in 23.68%, followed by hormone therapy in 21.01% of the cases. The variables 'source of referral' ($X^2(1)=18.27;p<0.001$) and 'previous diagnosis and treatment' ($X^2(3)=1516.83;p<0.001$) were predictors for the variable 'type of case' (analytical and non-analytical). **Conclusion:** There was a growing trend in the number of prostate cancer cases over the years in the state, with a tropism for elderly, married men with low educational levels and non-analytical cases.
Key words: Oncology/trends; Prostate Neoplasms/epidemiology; Epidemiology/trends; Men's Health; Hospital Records.

RESUMO

Introdução: Os Registros Hospitalares de Câncer (RHC) são fontes sistemáticas de informações, instalados em hospitais gerais/especializados em oncologia, com intuito de coletar dados referentes ao diagnóstico, tratamento e acompanhamento de pacientes atendidos nessas instituições. **Objetivo:** Analisar o perfil epidemiológico de pacientes com câncer de próstata em seguimento na Rede de Atenção Oncológica (RAO) de um Estado do Sudeste brasileiro. **Método:** Estudo descritivo de base hospitalar. Os dados secundários foram obtidos via ficha de registro do tumor dos RHC de toda RAO estadual (2000-2020). A amostra foi estratificada entre casos analíticos e não analíticos e os grupos comparados usando os testes t-Student e qui-quadrado de Pearson, além disso, uma regressão logística binária foi conduzida. **Resultados:** Recuperaram-se 13.519 registros de neoplasias prostáticas de 2000-2020, dos quais 9.838 eram casos analíticos e 3.681 não analíticos. A presente série histórica exibiu tendência crescente (p<0,001). A idade média dos pacientes foi de 69 anos. Além disso, 67,91% foram encaminhados pelo SUS, 95,74% apresentaram a ocorrência de apenas um tumor primário, sendo o tumor classificado como adenocarcinoma em 98% dos registros. O primeiro tratamento recebido no hospital foi a cirurgia em 23,68%, seguida por hormonioterapia em 21,01% dos casos. As variáveis 'origem de encaminhamento' ($X^2(1)=18,27;p<0,001$) e 'diagnóstico e tratamento anterior' ($X^2(3)=1516,83;p<0,001$) foram preditoras para a variável 'tipo de caso' (analítico e não analítico). **Conclusão:** Houve tendência de crescimento no número registros de câncer de próstata com o passar dos anos no Estado, apresentando tropismo para homens idosos, casados e com baixa nível educacional e casos analíticos.
Palavras-chave: Oncologia/tendências; Neoplasias da Próstata/epidemiologia; Epidemiologia/tendências; Saúde do Homem; Registros Hospitalares.

RESUMEN

Introducción: Los Registros Hospitalarios de Cáncer (RCH) son fuentes sistemáticas de información, instalados en hospitales generales/especializados de oncología, con el objetivo de recolectar datos respecto al diagnóstico, tratamiento y seguimiento de los pacientes atendidos en estas instituciones. **Objetivo:** Analizar el perfil epidemiológico de los pacientes con cáncer de próstata en seguimiento en la Red de Atención Oncológica (RAO) de un estado del sureste del Brasil. **Método:** Estudio descriptivo de base hospitalaria. Los datos secundarios se obtuvieron a través de formularios de registro de tumores de los RCH de toda la RAO de Espírito Santo (2000-2020). La muestra se estratificó entre casos analíticos y no analíticos y los grupos se compararon mediante la prueba t de Student y la prueba de ji al cuadrado de Pearson, además, se realizó una regresión logística binaria. **Resultados:** Se recuperaron 13 519 registros de neoplasias de próstata entre 2000 y 2020, de los cuales 9838 fueron casos analíticos y 3681 no analíticos. La presente serie histórica mostró una tendencia creciente (p<0,001). La edad media de los pacientes fue de 69 años. Además, el 67,91% fue remitido por el SUS, el 95,74% tenía un solo tumor primario y el tumor fue clasificado como adenocarcinoma en el 98% de los registros. El primer tratamiento recibido en el hospital fue la cirugía en el 23,68%, seguido de la terapia hormonal en el 21,01% de los casos. Las variables 'fuente de derivación' ($X^2(1)=18,27;p<0,001$) y 'diagnóstico y tratamiento previo' ($X^2(3)=1516,83;p<0,001$) fueron predictoras de la variable 'tipo de caso' (analítico y no analítico). **Conclusión:** Hubo una tendencia creciente en el número de casos de cáncer de próstata a lo largo de los años en el estado, con tropismo para hombres mayores, casados y con bajo nivel educativo y casos analíticos.
Palabras clave: Oncología/tendencias; Neoplasias de la Próstata/epidemiología; Epidemiología/tendencias; Salud del Hombre; Registros de Hospitales.

[1]Universidade Federal do Espírito Santo (Ufes). Vitória (ES), Brasil. Centro Universitário Norte do Espírito Santo, Departamento de Matemática Aplicada. São Mateus (ES), Brasil. E-mail: wgripa@gmail.com. Orcid iD: https://orcid.org/0000-0003-3572-6031
[2]Ufes, Centro de Ciências da Saúde, Programa de Pós-graduação de Saúde Coletiva. Vitória (ES), Brasil. E-mail: lopesjr.lc@gmail.com. Orcid iD: https://orcid.org/0000-0002-2424-6510
Corresponding author: Luís Carlos Lopes-Júnior. Ufes. Av. Marechal Campos, 1468 – Maruípe. Vitória (ES), Brasil. CEP 29043-900. E-mail: lopesjr.lc@gmail.com

INTRODUCTION

Hospital-based Cancer Registries (HCR) are systematic sources of information, installed in general hospitals or specialized in oncology, in order to collect data regarding the diagnosis, treatment and follow-up of patients treated in those institutions[1]. The HCR also provides information for hospital administration and for researchers interested in information on the results of treatment in different groups and risk factors or prognostic factors. They also individually contribute to patient care, since they ensure the follow-up of these patients[1-4].

The information produced by the HCR makes it possible to analyze the performance of each institution in the care of oncological patients, in addition to enabling the development of cancer control strategies, as well as contributing to prognostic and survival studies with relevance for Public Health Surveillance, in particular for cancer surveillance[4-7].

It should be noted that, unlike the Population-Based Cancer Registries (PBCR) that collect data from all cancer cases verified in a population of a well-defined geographic area, with the main objective of producing indicators such as incidence, prevalence and survival for its area of coverage, the HCR cannot serve for national cancer planning and assessment, since sampling is not based on the population. However, the PBCR, by definition, depends on the care of patients in one or more hospitals, with the cancer profile determined by the referral patterns and the facilities and experience in these institutions[8].

Relevant to the National Policy of Oncological Care, cancer registries cooperate with health planning, in the qualification of care and as an incentive to clinical research. The attribution of these guidelines is carried out by the National Cancer Institute (INCA) of Brazil, in partnership with the State Health Departments[1]. INCA, in addition to forming registrars and coordinators of cancer registration[8], produced and implemented a computerized web system to analyze national data, the Hospital-based Cancer Registries Integrator (*Integrador RHC*)[9], which is essential to facilitate data transmission, in a standardized way and with central storage and security[1].

To standardize data collection in Brazil, the Tumor Registration Form was developed, which is endorsed by the World Health Organization (WHO) International Agency for Research on Cancer (IARC), enabling the analysis of some sociodemographic and clinical variables such as: Sex, age, race/color, education, occupation, previous diagnosis and treatment, diagnosis, date of treatment start, location of primary tumor, histological type, staging, TNM (tumor-node-metastasis) system, first

treatment received at the hospital, disease stage after first treatment, among others[3].

In Latin America, cancer care is highly heterogeneous, since countries in the region represent a great variety in terms of healthcare systems, resources, care processes and health needs[10]. Additionally, epidemiological data has variable quality, and comparability is often limited, since most countries have little regional information on cancer records, especially data such as incidence, survival and mortality[10].

Recently, artificial neural networks have been increasingly used to build advanced prognostic models for prostate cancer[11]. Researchers have invested in training machine learning models, in which you only need to acquire structured data sets, including input variables and results, with little knowledge on prostate cancer[12,13]. For example, several new tools are available for prostate cancer screening and diagnosis, such as genomics, magnetic resonance imaging and biomarkers. In this scenario, artificial intelligence plays a key role, first in interpreting this huge amount of data, second in the development of machine learning algorithms that can help clinical experts reduce the number of unnecessary prostate biopsies without losing the diagnosis of aggressive prostate cancer[12,13].

Researchers have already developed and validated a multiparametric artificial neural network for prediction and stratification of prostate cancer risk[14]. Based on clinical and demographic characteristics, the pre-histopathological status allowed the model to predict the risk of prostate cancer with high specificity (89.4%) and low sensitivity (23.2%) for predicting the risk of this cancer[14].

It should be noted that information on the occurrence of neoplasms and their outcomes are essential requirements for regional and national programs for cancer control, as well as subsidizing and guiding the agenda of cancer research. Thus, cancer registries and mortality information are the basis on which such programs and actions are supported in order to strengthen cancer surveillance[4,15].

Currently, several countries report an increase in incidence and mortality from malignant neoplasms including prostate cancer[16,17]. The HCR of the State of Espírito Santo, despite being a rich database, lacks epidemiological studies of current historical series. In addition, men must be considered as singular beings with specific care needs. In 2009, the Brazilian Ministry of Health elaborated the National Policy of Men's Health Integral Care (PNAISH), instituted by Ordinance No. 1,944[18], to guide actions and health services for men, striving for humanization of care. Among the priority axes of PNAISH are the prevalent diseases of the male population and, among its guidelines, health professionals

are recommended to observe the male population in order to contribute to the strengthening of adherence to the reception processes and approach of this public in the health-disease process[19,20].

Considering men's health and the high coefficients of male morbidity and mortality due to prostate malignant neoplasm, it is important to know the epidemiological profile of these patients in the State of Espírito Santo to subsidize the actions of cancer surveillance. In this context, the present study aims to analyze the epidemiological profile of patients with prostate cancer in follow-up in the Oncological Care Network of a State in the Southeast of Brazil.

METHOD

Descriptive hospital-based study with secondary data from the HCR[9] of the entire Oncological Care Network in the State of Espírito Santo, considering the complete historical series from 2000 to 2020. Secondary data were obtained from the Cancer Surveillance of Espírito Santo's State Health Department (Sesa/ES) and consolidated by INCA.

The Oncological Care Network of Espírito Santo covers three Health Regions: North/Center, Metropolitan and South[4,6]. It is composed of a Cacon represented by *Hospital Santa Rita de Cássia*, located in the capital Vitória, as well as the seven High-Complexity Oncology Care Units (Unacon) qualified by the Ministry of Health: *Hospital Evangélico de Cachoeiro de Itapemirim*, located in the municipality of Cachoeiro de Itapemirim; *Hospital Evangélico de Vila Velha*, located in the city of Vila Velha; *Hospital Universitário Antônio Cassiano de Moraes*, *Hospital Santa Casa de Misericórdia de Vitória* and *Hospital Estadual Infantil Nossa Senhora da Glória*, located in the capital Vitória; *Hospital São José*, located in Colatina; and *Hospital Rio Doce*, in Linhares, up North. All oncological hospital units of the State present structured and functioning HCRs, sending their bases annually to the *Integrador RHC*[6].

The study included all the analytical (whose planning and treatment are conducted in the hospital that registered the case) and non-analytical (those who came in to the hospital already treated or who did not undergo the recommended treatment, specially) cases[1] of men over 18 years with prostate cancer diagnosis, based on the International Classification of Diseases and Related Health Problems, 10th Review (ICD-10[21]) "C61: Malignant neoplasm of prostate", and confirmed through primary tumor histology, who received care at any hospital of the Espírito Santo State oncology network and who were registered in the Health Information System –

Hospital-based Cancer Registry (SisRHC)[9] from January 1st, 2000 to December 31st, 2020 in the tumor registry forms, totaling a sample of 13,519 records.

The data was collected from December 2022 to June 2023. The epidemiological variables obtained in the SisRHC[1] tumor registry form and analyzed in the present study were: (1) age; (2) race/skin color; (3) education; (4) origin; (5) marital status; (6) type of case; (7) diagnosis and previous treatment; (8) most important basis for tumor diagnosis; (9) histological type of primary tumor; (10) first treatment received at the hospital; (11) origin of referral; (12) occurrence of more than one primary tumor. Other important variables of clinical and epidemiological relevance were not included in the study, due to their high percentages of incompleteness, as demonstrated by Grippa et al.[22].

The HCR tumor registry form is used to gather information from the medical record, provide a case summary, and to enter information into the SisRHC[1] computerized databases. The content of this form is defined based on the information needs of hospitals with HCRs and follows the standardization guidelines suggested by the WHO through the IARC, validated by consensus meetings coordinated by INCA[1].

Statistical analyses were conducted using the free RStudio[23] (version 2023.09.1 Build 494) and R[24] (version 4.4.1) software. For numerical variables, mean, standard deviation and median were presented, while for categorical variables the observed and relative frequencies were presented. The Mann-Kendall test was used to evaluate the trend in the historical series of the number of cases recorded per year. The sample was stratified between analytical and non-analytical cases and the groups compared using the Student's t and Pearson's chi-square[25] tests, depending on the characteristics of the variable. In addition, a binary logistic regression was adjusted. In all tests, a significance level of 5% was used.

The present research was submitted and approved by the Research Ethics Committee (CEP) of the *Universidade Federal do Espírito Santo*, approval report number 5,533,541 (CAAE (submission for ethical review): 59921622.9.0000.5060), in compliance with Resolution 466/12[26] of the National Health Council. In addition, approval and authorization of the State Health Department of Espírito Santo, located in the capital city of Vitória, were obtained for the collection of secondary data and restricted data related to this research.

RESULTS

The study sample was comprised of 13,519 cases of prostate neoplasm recorded in the HCR of the State of

Espírito Santo. Of those, 9,838 were analytical cases and 3,681 were non-analytical. The historical series of the number of records per year, presented in Graph 1, shows an increasing trend of prostate cancer case records, confirmed by the Mann-Kendall test (p<0.001).
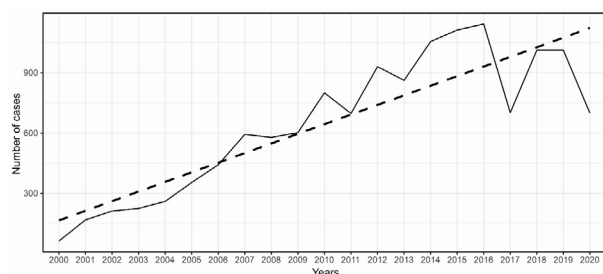
Graph 1. Historical series of the number of cases of prostate cancer diagnosed from 2000 to 2020, recorded in the HCR of the State of Espírito Santo (n=13,519). Vitória, ES, Brazil, 2023

Table 1 shows the sociodemographic characteristics of the sample selected for this study, whose average age of patients was 69 years, with 69.49% of elderly men aged at least 65 years; 64.31% self-declared non-white (black, brown, yellow or indigenous); 53.38% reported complete elementary education; 65.01% were married; and 96.48% lived in the State of Espírito Santo. Stratifying the sample, the analytical cases presented an average age of 69.07 years, with 69.93% of the patients being 65 years or older, 63.63% self-declared non-white, 52.75% had basic education level (elementary school), 65.09% were married, 95.95% were residents of the State of Espírito Santo. Among the cases classified as non-analytical, the patients had a mean age of 68.82 years with standard deviation of 9.10 years; 68.32% were elderly (65 years or older); 66.12% non-white; 55.07% only had elementary education; 64.79% were married; and 97.88% were residents in the State of Espírito Santo. Among sociodemographic variables, the tests indicated a significant difference for all variables, except for 'age'.

Table 2 provides information on the clinical variables of the cohort in question, in which 67.91% were referred to by the National Health System (SUS), 95.74% presented the occurrence of only one primary tumor, and the tumor was classified as adenocarcinoma in 98% of the records. The first treatment received at the hospital was surgery in 23.68%, followed by hormone therapy in 21.01% of the cases. For the analytical cases, 68.54% were referred by the SUS, 95.12% had only one primary tumor, 97.91% had adenocarcinoma as histological type, 70.40% arrived at the hospital with diagnosis and no treatment, with tumoral biomarker being the relevant test type for the diagnosis and planning of tumor therapy in 49.71%. The first treatments received at the hospital were surgery in 26.11% and hormone therapy in 24.16%

of the cases, and histology of the primary tumor was the most important basis for the diagnosis of the tumor in 96.69%. Regarding non-analytical cases, the main type of referral was SUS (66.23%), with only one primary tumor in 97.39%, the most frequent being the histological type tumors adenocarcinoma in 98.23% of the cases; 42.24% came into the hospital with a diagnosis and no treatment and 39.72% with diagnosis and treatment; and the relevant test type for diagnosis and planning of tumor therapy was tumoral biomarker for 64% of the sample. The first treatment was radiotherapy in 34.23% of the cases. The most important basis for tumor diagnosis was primary tumor histology in 96.14%. For the clinical variables, the Pearson chi-square test indicated a significant difference between analytical and non-analytical cases for the variables 'origin of referral', 'diagnosis and previous treatment', 'relevant tests for the diagnosis and planning of tumor therapy', 'first treatment received at the hospital' and 'most important basis for tumor diagnosis'.

Of the variables that presented significant difference between analytical and non-analytical cases, 'origin of referral' and 'diagnosis and previous treatment' were selected to adjust a binary logistic regression, as shown in Table 3. Thus, an analysis of variance (ANOVA) applied to the binary logistic regression model, to quantify the general effects of the covariables, showed that 'origin of referral' ($X^2(1) = 18.27$; $p < 0.001$) and 'diagnosis and previous treatment' ($X^2(3)1,516.83$; $p < 0.001$) are predictors for the variable 'case type' (analytical and non-analytical) whose patient not coming from SUS is 27.6% more prone to be non-analytical, when compared to those coming from SUS. Similarly, patients who arrive at the hospital with diagnosis and treatment have 6.39 times more chance of being non-analytical when compared to patients with no diagnosis and no treatment. On the other hand, patients who arrive at the hospital with diagnosis and no treatment have 32.7% more chance of being analytical, when compared to those with no diagnosis and no treatment.

DISCUSSION

Age is a significant factor for the development of anomalies in the prostate, especially for patients aged 50 years or older, and prostate neoplasm is the main of those anomalies[16,17,22,27]. Prostate neoplasm generally has a slow development with a long pre-clinical phase, and can be identified in young men, however, with high prevalence in elderly men[16,17,22,27]. As identified, the cohort of the study consists of 69% of men aged at least 65 years old, similar to other prostate cancer patients cohorts analyzed around the world[28].

Table 1. Distribution of the number of prostate cancer cases diagnosed from 2000 to 2020, for sociodemographic variables stratified between analytical and non-analytical cases, recorded in the HCR of Espírito Santo (n=13,519). Vitória, ES, Brazil, 2023

Variable	Whole sample		Analytical		Non-analytical		P
	n	%	n	%	n	%	
Age (in years)							0.150*
Mean (SD)	69.00 (9.08)	-	69.07 (9.07)	-	68.82 (9.10)	-	
Median (IQI)	69 (63-75)	-	69 (63-76)	-	69 (63-75)	-	
Age groups							0.075**
18 to 64 years-old	4,121	30.48	2,956	30.05	1,165	31.65	
65 years-old and over	9,395	69.49	6,880	69.93	2,515	68.32	
No information	3	0.02	2	0.02	1	0.03	
Race/skin color							< 0.001**
White	3,805	28.15	2,893	29.41	912	24.78	
Non-white	8,694	64.31	6,260	63.63	2,434	66.12	
No information	1,020	7.54	685	6.96	335	9.10	
Education							< 0.001**
Illiterate	1,451	10.73	1,103	11.21	348	9.45	
Elementary school	7,217	53.38	5,190	52.75	2,027	55.07	
High school and/or higher education	1,703	12.60	1,070	10.88	633	17.20	
No information	3,148	23.29	2,475	25.16	673	18.28	
Marital status							0.005**
Single	2,024	14.97	1,464	14.88	560	15.21	
Married	8,789	65.01	6,404	65.09	2,385	64.79	
Widower	1,070	7.91	782	7.95	288	7.82	
Judicially separated	855	6.32	585	5.95	270	7.33	
Consensual union	147	1.09	121	1.23	26	0.71	
No information	634	4.69	482	4.90	152	4.13	
FU of residence							< 0.001**
Espírito Santo	13,043	96.48	9,440	95.95	3,603	97.88	
Other States	394	2.91	322	3.27	72	1.96	
No information	82	0.61	76	0.77	6	0.16	
Total	**13,519**	**100.00**	**9,838**	**100.00**	**3,681**	**100.00**	

Captions: SD = Standard deviation; IQI = Interquartile interval; FU = Federal units; *Student's t-test; **Pearson's chi-squared test.

Another important risk factor for prostate cancer is ethnicity, in which individuals with African and Asian descent have higher incidence rates, more aggressive types of this neoplasm and consequently higher mortality rates[22,27-30]. The sample selected for this study has 64.31% of self-declared non-white patients, which is compatible with results identified by *Instituto Brasileiro de Geografia e Estatística* (IBGE) for the Brazilian population. Other studies show that ethnicity is associated with socioeconomic disparities with late diagnoses and, therefore, more advanced stages of this neoplasm culminate in a higher mortality rate[28-34].

According to some studies, the lack of formal education is correlated with late identification and treatment of diseases, which decreases the chances of recovery and increases the mortality rate[19,34,35]. In addition, patients' delay in seeking medical care can be explained by lack of information, lack of access or difficulty in understanding their current health situation[19], which results in the progression of disease conditions. Moreover, due to beliefs, culture and work, men seek less health services, resulting in diagnoses with advanced disease staging and reduced possibilities for treatment, healing and rehabilitation[36]. It is noteworthy that the ways in which men conceive and

Table 2. Distribution of the number of prostate cancer cases diagnosed from 2000 to 2020, for clinical variables stratified between analytical and non-analytical cases, recorded in the HCR of Espírito Santo (n=13,519). Vitória, ES, Brazil, 2023

Variable	Whole sample		Analytical		Non-analytical		p
	n	%	n	%	n	%	
Source of referral							< 0,001**
SUS	9,181	67.91	6,743	68.54	2,438	66.23	
Not SUS*	2,282	16.88	1,494	15.19	788	21.41	
No information	2,056	15.21	1,601	16.27	455	12.36	
Occurrence of more than one primary tumor							0,163**
No	12,943	95.74	9,358	95.12	3,585	97.39	
Yes	350	2.59	267	2.71	83	2.25	
Uncertain	28	0.21	18	0.18	10	0.27	
No information	198	1.46	195	1.98	3	0.08	
Histological type of primary tumor							0,253**
Adenocarcinoma, NOS	13,248	98.00	9,632	97.91	3,616	98.23	
Others	271	2.00	206	2.09	65	1.77	
Diagnosis and previous treatment							< 0,001**
No diagnosis/No treatment	2,616	19.35	2,053	20.87	563	15.29	
With diagnosis/no treatment	8,481	62.73	6,926	70.40	1,555	42.24	
With diagnosis/with treatment	2,141	15.84	679	6.90	1,462	39.72	
Others	92	0.68	87	0.88	5	0.14	
No information	189	1.40	93	0.95	96	2.61	
Relevant tests to the diagnosis and planning of tumor therapy							< 0.001**
Pathological anatomy	4,155	30.73	3,139	31.91	1,016	27.60	
Tumor markers	7,246	53.60	4,890	49.71	2,356	64.00	
Other tests	793	5.87	699	7.11	94	2.55	
No information	1,325	9.80	1,110	11.28	215	5.84	
First treatment received at the hospital							< 0,001**
No treatment	1,241	9.18	416	4.23	825	22.41	
Surgery (S)	3,201	23.68	2,569	26.11	632	17.17	
Radiotherapy (R)	2,577	19.06	1,317	13.39	1,260	34.23	
Chemotherapy (C)	260	1.92	218	2.22	42	1.14	
Hormone therapy (H)	2,840	21.01	2,377	24.16	463	12.58	
S + H	1,970	14.57	1,697	17.25	273	7.42	
Other treatments	1,298	9.60	1,149	11.68	149	4.05	
No information	132	0.98	95	0.97	37	1.01	
Most important basis for tumor diagnosis							0,505**
Histology of primary tumor	13,051	96.54	9512	96.69	3,539	96.14	
Others	267	1.97	200	2.03	67	1.82	
No information	201	1.49	126	1.28	75	2.04	
Total	**13,519**	**100.00**	**9,838**	**100.00**	**3,681**	**100.00**	

Captions: SUS = National Health System; NOS = not otherwise specified; * Private network or "came on their own"; **Pearson's chi-squared test.

Table 3. Binary logistic regression of factors associated with the variable type of cases (analytical and non-analytical)

Variable	OR	CI 95%	p**
Source of referral			
SUS	Ref	-	-
Not SUS*	1.276	1.141 - 1.427	< 0.001
Diagnosis and previous treatment			
No diagnosis/No treatment	Ref	-	-
With diagnosis/No treatment	0.673	0.599 - 0.756	< 0.001
With diagnosis/With treatment	6.391	5.556 - 7.352	< 0.001
Others	0.198	0.080 - 0.493	< 0.001

Captions: SUS = National Health System; *Private network or "came on their own"; **Significance level considered as 5%.

experience their masculinities can directly impact health-disease processes and care practices[19,36].

In the study cohort, more than 64% of the sample had a basic educational level. In addition, 'married' was the most recurrent marital status among patients with prostate cancer, corresponding to 65.01% in the cohort of the present study, in line with other studies 75.12%[30] and 76.78%[33], respectively.

Adenocarcinoma was the most commonly identified histological type of primary tumor in 98% of the study sample, corroborating the findings of other cohorts of men diagnosed with prostate neoplasm[30]. In a study with patients up to 50 years old and diagnosed with prostate cancer, adenocarcinoma was identified in 100% of the sample[37].

The variable 'diagnosis and previous treatment' shows that, among analytical patients, only 6.9% arrive at the hospital with diagnosis and treatment, while non-analytical patients account for 39.72%. This characteristic is due to the very definition of the type of cases[1].

For the group of analytical patients, the main treatment option chosen was surgery in 26.11%, while for the non-analytical patients, the choice was radiotherapy (34.23%). Another important difference is the percentage of cases that did not receive any type of treatment, five times higher for non-analytical cases when compared to analytical ones. In two studies conducted in Brazil, with cohorts of patients diagnosed with prostate cancer and data from the Department of Informatics of the National Health System (DATASUS), hormone therapy[38] and chemotherapy[39] were used as initial treatment. Using data from Massachusetts cancer records, patients with prostate cancer underwent surgery in 30.40% of the cases and another 14.30% underwent radiotherapy[40].

As in all secondary databases, some important variables, such as family history of cancer, alcohol and tobacco consumption and staging variables, presented high levels of incompleteness, making it impossible to use them in the analysis. Two studies in HCR bases of the State of Espírito Santo present details of an incompleteness analysis of these variables[6,22].

It should be noted that cancer registration (which provides information on cancer incidence and survival) can be seen as a complementary strategy, but distinct from the surveillance of chronic non-communicable diseases (NCDs)[8]. A thorough understanding of the differences in cancer surveillance in relation to other diseases is particularly important in the Latin American region where, supported by the experience of communicable disease surveillance, many Ministries of Health have promoted cancer surveillance systems based on cancer notifications that aim to offer complete services and national coverage[8]. Registries can provide essential additional population-based indicators to assess and quantify efforts to reduce burden and suffering caused by disease. These include the proportion of survivors to a cancer diagnosis, years of life lost due to death from cancer, and, among cancer survivors, years of life with disability after initial diagnosis[8].

Despite the creation of PNAISH, health professionals, due to direct contact with the patient, need to incorporate a more qualified and personalized view, which will make health care more efficient and effective, contributing to the reduction of complications and the appearance of diseases in the male population[20]. In addition, it is urgent to provide timely attention to cancer patients in the Health Care Network in order to improve the prognosis of the disease. This implies ensuring care as quickly as possible, in order to achieve the objective of care networks – integrity[20,41,42].

Social policies in general and PNAISH itself, in particular, faced difficulties in the last decade including budget cuts and the COVID-19 pandemic health crisis, which brought repercussions on cancer health care and health care for NCDs, especially with regard to the care of vulnerable people[20]. Another highlight is the social

relevance conferred by the incidence of diseases and the increase in vulnerability to diseases related to men[41,42].

Some limitations of this study should be considered. Since it used a secondary database, it presents a number of missing observations in important clinical variables, which prevented a better definition of the profile in question. Another issue is that, although the analyses were stratified by case classification (analytical *versus* non-analytical), this does not minimize the possible occurrence of selection bias, since some were duplicated, being analytical in one hospital HCR and non-analytical in another.

A relevant aspect in this context concerns the problems found in secondary databases such as the HCR, which indicates the urgent need to carry out permanent education not only for registrars, but, above all, for multiprofessional and interprofessional teams that provide care to the person with cancer to note the correct, complete and clear information in the medical records, with the aim of improving the quality of care[14,43]. It should be noted that the HCR database has great potential and usefulness for cancer research, as well as to provide subsidies for the planning and evaluation of the hospital unit, to contribute to the quality of cancer surveillance, diagnosis, through treatments and care and timely follow-up of cancer patients.

CONCLUSION

The analyses point to a growing trend in prostate cancer records over the years in the Health Regions of the State of Espírito Santo. This type of cancer was observed to affect mainly elderly married men with lower educational levels. Patients that do not come from SUS have 27.6% more chances of being non-analytical when compared to those from SUS. Similarly, patients who arrive at the hospital with diagnosis and treatment have 6.39 times more chance of being non-analytical when compared to patients with no diagnosis and no treatment.

This characterization can be useful to guide the development of public policies in the field of oncology, with the aim of planning effective measures and actions in cancer surveillance especially for the state cancer care network at the various levels of health care, aiming to improve the care with men's health. In this sense, this study can impact on preventive care, generating interventions that will change the reception process and provide subsidies for planning actions aimed at men's health and improve the health outcomes of this population.

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CONTRIBUTIONS

Both authors have substantially contributed to the study design and planning, data acquisition, analysis and interpretation, wording, and critical review. They approved the final version for publication.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interest to declare.

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