

Factors Associated with Surgery as Initial Treatment for Head and Neck Cancers at a Referral Hospital in the City of Rio de Janeiro

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Fatores Associados à Realização de Cirurgia como Tratamento Inicial em Cânceres de Cabeça e Pescoço em Hospital de Referência na Cidade do Rio de Janeiro

Factores Asociados a la Realización de Cirugía como Tratamiento Inicial en Cânceres de Cabeza y Cuello en un Hospital de Referencia de la Ciudad de Río de Janeiro

Adriana Tavares de Moraes Atty¹; Andréia Dumas²; Anna Carolina de Almeida Portugal³; Antonio Tadeu Cheriff dos Santos⁴; Cristina de Fátima Vieira Campos⁵; Fernando Lopes Tavares de Lima⁶; Jaine Martins-Ferreira⁷; Nina Calvente Hanewald⁸; Pedro Henrique Mandetta⁹; Michelle Azevedo Gomes¹⁰; Fernando Luiz Dias¹¹; Jeane Tomazelli¹²

ABSTRACT

Introduction: Surgery has a central role in the treatment of head and neck cancers (HNC). Inequalities in access to cancer care can impact the therapeutic plan. **Objective:** To identify factors associated with surgery as the first cancer treatment in patients with HNC treated at a referral hospital in the city of Rio de Janeiro. **Method:** Retrospective cohort study with data from patients diagnosed with HNC in 2024. The outcome was surgery as the first treatment. Sociodemographic, clinical, and healthcare context variables were analyzed. Chi-square or Fisher's exact tests were used to compare outcome groups, alongside association tests and univariate and multivariate logistic regressions, with adjusted odds ratio (aOR) and 95% confidence intervals. **Results:** Of the 399 patients, 67.9% underwent surgery as initial treatment. The following groups had a lower likelihood of undergoing surgery: men (aOR=0.31; 95% CI: 0.17–0.54), and cases of nasopharyngeal and hypopharyngeal tumors (aOR=0.11; 95% CI: 0.00–0.67). A higher likelihood of initial surgical treatment was observed in patients with thyroid cancer (aOR=13.22; 95% CI: 4.95–42.49), eye and adnexal cancers (aOR=31.04; 95% CI: 5.78–580.79), larynx (aOR=4.02; 95% CI: 1.67–10.28) and malignant skin neoplasms (aOR=5.77; 95% CI: 2.71–13.07). There was no significant association with distance between residence and hospital. **Conclusion:** The definition of initial treatment in HNC is influenced by clinical and sociodemographic factors. Low likelihood of surgery in men and patients with oral and oropharynx cancer reinforces the necessity of strategies aimed at early diagnosis and reduction of inequalities of oncologic care in the National Health System.

Key words: Head and Neck Neoplasms/diagnosis; Head and Neck Neoplasms/surgery; Health Inequities; Socioeconomic Factors.

RESUMO

Introdução: A cirurgia ocupa papel central no tratamento dos cânceres de cabeça e pescoço (CCP). Desigualdades no acesso ao cuidado oncológico podem impactar no plano terapêutico. **Objetivo:** Identificar fatores associados à realização da cirurgia como primeiro tratamento oncológico em pacientes com CCP atendidos em hospital de referência do município do Rio de Janeiro. **Método:** Estudo de coorte retrospectiva de pacientes com CCP em 2024. O desfecho foi ter realizado cirurgia como primeiro tratamento. Foram analisadas variáveis sociodemográficas, clínicas e de contexto assistencial. Utilizaram-se teste qui-quadrado ou Fisher na comparação dos grupos do desfecho, testes de associação e regressões logísticas univariadas e multivariadas, com *odds ratio* ajustada (ORa) e intervalos de confiança de 95%. **Resultados:** Dos 399 pacientes, 67,9% realizaram cirurgia como tratamento inicial. Apresentaram menor chance de serem submetidos à cirurgia: homens (ORa=0,31; IC 95%: 0,17–0,54), casos de tumores de nasofaringe e hipofaringe (ORa=0,11; IC 95%: 0,00–0,67). Maior chance de tratamento cirúrgico inicial ocorreu em pacientes com câncer de tireoide (ORa=13,22; IC 95%: 4,95–42,49), olhos e anexos (ORa=31,04; IC 95%: 5,78–580,79), laringe (ORa=4,02; IC 95%: 1,67–10,28) e de pele (ORa=5,77; IC 95%: 2,71–13,07). Não houve associação significativa com distância entre residência e hospital. **Conclusão:** A definição do tratamento inicial em CCP é influenciada por fatores clínicos e sociodemográficos. A menor chance de cirurgia entre homens e pacientes com câncer de boca e orofaringe reforça a necessidade de estratégias voltadas ao diagnóstico precoce e à redução de iniquidades no cuidado oncológico no Sistema Único de Saúde.

Palavras-chave: Neoplasias de Cabeça e Pescoço/diagnóstico; Neoplasias de Cabeça e Pescoço/cirurgia; Desigualdades de Saúde; Fatores Socioeconômicos.

RESUMEN

Introducción: La cirugía ocupa un lugar central en el tratamiento de los cánceres de cabeza y cuello (CCC). Las desigualdades en el acceso a la atención oncológica pueden repercutir en el plan terapéutico. **Objetivo:** Identificar factores asociados a la realización de cirugía como primer tratamiento oncológico en pacientes con CCC atendidos en un hospital de referencia del municipio de Río de Janeiro. **Método:** Estudio de cohorte retrospectivo de pacientes diagnosticados con CCC en 2024. El criterio de valoración fue haber sido sometido a cirugía como primer tratamiento. Se analizaron variables sociodemográficas, clínicas y de contexto asistencial. Se utilizó la prueba de ji al cuadrado o de Fisher para comparación de los grupos del resultado, pruebas de asociación y regresiones logísticas univariadas y multivariadas, con razón de probabilidades ajustada (ORa) e intervalos de confianza del 95%. **Resultados:** De los 399 pacientes, el 67,9% se sometió a cirugía como tratamiento inicial. Presentaron menor probabilidad de someterse a cirugía los hombres (ORa=0,31; IC 95% 0,17–0,54) y los casos de tumores de nasofaringe e hipofaringe (ORa=0,11; IC 95% 0,00–0,67). La mayor probabilidad de tratamiento quirúrgico inicial se observó en pacientes con cáncer de tiroides (ORa = 13,22; IC 95%: 4,95–42,49), de ojos y anexos (ORa = 31,04; IC 95%: 5,78–580,79), laringe (ORa= 4,02; IC 95%: 1,67–10,28) y de piel (ORa = 5,77; IC 95%: 2,71–13,07). No hubo una asociación significativa con la distancia entre domicilio y hospital. **Conclusión:** La definición del tratamiento inicial en CCC está influenciada por factores clínicos y sociodemográficos. La menor probabilidad de cirugía entre hombres y pacientes con cáncer bucal y orofaringe refuerza la necesidad de estrategias con miras al diagnóstico temprano y a la reducción de inequidades en el cuidado oncológico en el Sistema Único de Salud.

Palabras clave: Neoplasias de Cabeza y Cuello/diagnóstico; Neoplasias de Cabeza y Cuello/cirugía; Inequidades en Salud; Factores Socioeconómicos.

^{1,2,4,6,8-12}Instituto Nacional de Câncer (INCA). Rio de Janeiro (RJ), Brasil. E-mails: aatty@inca.gov.br; andrea.dumas@inca.gov.br; cheriff@inca.gov.br; cristina.campos@inca.gov.br; flima@inca.gov.br; nina.hanewald@inca.gov.br; pedro.mandetta@hotmail.com; michelle.gomes@inca.gov.br; fdias@inca.gov.br; jtomazelli@inca.gov.br. Orcid iD: <https://orcid.org/0000-0003-2271-746X>; Orcid iD: <https://orcid.org/0009-0007-6727-0469>; Orcid iD: <https://orcid.org/0000-0002-3577-0772>; Orcid iD: <https://orcid.org/0009-0006-8074-6858>; Orcid iD: <https://orcid.org/0009-0006-8668-5742>; Orcid iD: <https://orcid.org/0000-0002-3140-1988>; Orcid iD: <https://orcid.org/0000-0003-1000-7436>; Orcid iD: <https://orcid.org/0000-0002-2472-3444>

^{3,7}Pontifícia Universidade Católica (PUC) do Rio de Janeiro, Departamento de Psicologia. Rio de Janeiro (RJ), Brasil. E-mails: portugal.aca@gmail.com; jainne@gmail.com. Orcid iD: <https://orcid.org/0000-0003-3693-9979>; Orcid iD: <https://orcid.org/0000-0002-5318-5294>

Corresponding author: Adriana Tavares de Moraes Atty. Rua Marquês de Pombal 125, 7º andar – Centro. Rio de Janeiro (RJ), Brasil. CEP 20230-240. E-mail: aatty@inca.gov.br



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INTRODUCTION

Head and neck cancers (HNC) encompass a heterogeneous group of malignant tumors. Among the HNC anatomical sites, oral cavity and larynx cancers are the most incident in men and thyroid cancer in women. Oral cavity cancers account for 48% of HNC related deaths and thyroid, 6.7%¹.

For each year of the triennium 2026-2028, the National Cancer Institute (INCA) estimates around 42,150 new cases of oral cavity, larynx and thyroid cancers in Brazil. The Southeast region leads the annual estimates compared to other Brazilian regions with 20,810 new cases of HNC².

The treatment of HNC is complex and multidisciplinary involving surgery, radiotherapy and chemotherapy, isolated or combined according to the primary site, clinical staging and general conditions of the patient. Among the therapeutic modalities, surgery has a central role in the management of most of the resectable tumors, being the treatment of choice in localized and potentially curable cases³. The complete resection of the tumor with free margins is directly associated with increased global survival and reduction of the local and regional relapse⁴. Even for advanced tumors, surgery, combined with adjuvant therapies, can contribute significantly to control the disease and improve the quality of life^{5,6}.

It is essential to identify the factors associated with surgery as first therapeutic option to expose the inequalities of access and guide strategies of full care to patients with HNC, mainly those with oral cavity and oropharynx cancer. Usually, surgeries are indicated for early detected cancers. The aim of the present study is to identify which factors are associated with surgery as first oncologic treatment in patients diagnosed with HNC at a referral hospital in Rio de Janeiro.

METHOD

Retrospective cohort study of patients diagnosed with HNC treated at INCA in Rio de Janeiro from January 1 to December 31, 2024.

For this study, records of patients with confirmed diagnosis of HNC in the period investigated according to the International Classification of Diseases and Related Health Problems (ICD-10)⁷, registered in the institution's Division of Head and Neck and treatment performed were checked.

The outcome of interest was surgical oncologic treatment as first treatment.

The following variables were investigated: sex (male, female), age-range (<40 years, 40-59 years, 60-79

years and >80 or older), race (White, Black, Yellow, unknown), living in the city of Rio de Janeiro (RJ), the same city of the institution (RJ, out of RJ), diagnosis (mouth and oropharynx, nasal cavity and paranasal sinuses, larynx, nasopharynx and hypopharynx, eyes and adnexal, other skin malignancies, thyroid, other diagnoses of HNC), education (illiterate, incomplete elementary school, complete elementary school, incomplete high school, complete high school, incomplete graduation, complete graduation, unknown), distance between the residence and health facility categorized in quartiles ($Q1 \leq 17.39$ Km; 17.39 Km < $Q2 \leq 27.41$ Km; 27.41 Km < $Q3 \leq 45.85$ Km; 45.85 Km < $Q4 \leq 1,711.92$ Km), type of treatment (surgical, non-surgical). Rare HNC diagnoses were grouped in the category other diagnoses of HNC.

The data were collected from the records of the daily visits of the institution's Division of Head and Neck and the information about the treatment was obtained upon investigation of two electronic register and monitoring systems of the patients registered at the institution.

To minimize potential bias of information, typical of retrospective studies, it was adopted the data triangulation upon investigation of two different electronic registration tools, ensuring the consistency of the variable 'treatment'. The bias of selection was impaired with the utilization of ICD-10-based objective inclusion criteria and register of daily visits of the Section. Additionally, the extraction of the data was standardized to ensure reliability of the transposition of the information from the charts to the study database.

Absolute and relative frequencies of the variables were calculated, stratified by surgical treatment. Pearson's chi-square or Fisher's exact test were applied to compare surgical and non-surgical treatment, if necessary. To evaluate the statistical significance, *p* values were stated.

Initially, univariate logistic regressions were calculated for each predictive variable and outcome. As selection criteria of the multivariate model, the variables with $p \leq 0.20$ were included, ensuring that potentially relevant variables were not excluded⁸. The variable age was kept in the model, regardless of presenting or not statistically significant association in the univariate analysis to control possible residual confounding. The results of the regressions were presented as odds ratio (OR) for univariate model and adjusted odds ratio (aOR) in the adjusted model with confidence intervals of 95%.

INCA's Ethics Committee approved the study, report number 6,273,841 (CAAE (submission for ethical review): 71500523.7.0000.5274) in compliance with Directive 466/12⁹ of the Brazilian National Health Council.

RESULTS

Data from 399 patients registered at the head and neck clinic of a referral hospital in Rio de Janeiro between January and December 2024 have been retrieved. Of these, 271 (67.9%) were submitted to surgery as first treatment, while 128 (32.1%) were submitted to other treatment modalities. There was statistically significant difference between sex ($p < 0.001$), with higher proportion of surgeries in women (55.4%) and non-surgical treatment in men (75.8%). The age range did not present significant difference in relation to the type of treatment ($p = 0.312$), most of the patients were in the age-range of 60-79 years (48.4%). Similarly, there was no statistical difference in race ($p = 0.289$), with predominance of Whites (50.9%) among those submitted to surgery and Blacks (54.7%) among those treated with other modalities (Table 1).

Education presented significant difference in relation to the type of treatment ($p = 0.047$). Patients who completed high-school (31.0%) were more frequently submitted to surgery and those with incomplete elementary school (30.5%) prevailed among those who received non-surgical treatment. There were no significant differences according to place of residence ($p = 0.413$) or distance to the hospital ($p = 0.208$) (Table 1).

There was difference ($p < 0.001$) in diagnosis by type of treatment. Thyroid (26.6%) and skin (21.0%) neoplasms concentrated the highest proportion of surgical treatments, while mouth and oropharynx (48.4%) were more frequent among non-surgical treatments (Table 1).

The proportional distributions of diagnoses by sex and education are presented in Figures 1 and 2. There were more cases of oral cavity and oropharynx (72.0%) and larynx (84.4%) cancers in men and of thyroid (24.7%) and eyes and adnexal (40.0%) cancers in women. More than 60% of the patients with thyroid and nasal cavity and paranasal sinuses cancers completed elementary school or higher grades, different from other cases.

The variables sex, education and diagnosis were significant ($p \leq 0.05$) in the bivariate logistic analysis. The variable distance between the residence and the hospital showed a $p > 0.05$, but ≤ 0.20 , being considered in the multivariate logistic regression together with the others.

Men had 68% lower probability of receiving surgery as initial treatment in the multivariate logistic regression analysis than women (aOR=0.32 CI95% 0.17–0.56 $p < 0.001$). Patients with thyroid cancer had 12.45-fold more likelihood of being submitted to surgical treatment than cases of mouth and oropharynx cancer (aOR=12.45 CI95% 4.66–39.98 $p < 0.001$). Patients with diagnosis of eyes and adnexal cancer had 32.97-fold more likelihood (aOR=32.97 CI95% 6.07–620.29 $p < 0.001$); for other

skin malignancies, the likelihood was 6.08-fold higher (aOR=6.08 CI95% 2.81–14.02 $p < 0.001$); and for larynx cancer, the likelihood was 4.34-fold higher (aOR=4.34 CI95% 1.79–11.18 $p < 0.01$). On the other hand, patients with nasopharynx and hypopharynx cancers had 89% low likelihood of being treated surgically (aOR=0.11 CI95% 0.01–0.65 $p < 0.05$). Patients with other diagnosis of HNC have also presented low likelihood of surgical treatment (Table 2).

DISCUSSION

Surgery plays a key role among therapeutic modalities of HNC treatment, mainly in cases of resectable tumors¹⁰. However, the present study found important inequalities in the likelihood of performing surgical treatment in patients with HNC, especially per sex and diagnose.

The elevated proportion of patients submitted to surgery in the referral hospital where the study was conducted is consistent with the national and international guidelines that indicate surgical resection as treatment of choice for oral cavity and other sites whenever possible^{4,5}.

The significant predominance of men in the incidence of HNC, except thyroid, is attributed to high historical exposure to classic risk factors as smoking and alcohol use¹¹⁻¹³. Men presented low likelihood of submitting to surgery as first oncologic treatment. This finding is relevant and is aligned with the literature, which states that these tumors are frequently diagnosed at advanced stages, which reduces the eligibility to isolated surgical approaches and increases the indication of non-surgical or multimodal treatments. National and international studies indicate that men tend to be diagnosed later¹⁴⁻¹⁵.

Although education, usually utilized as proxy of socioeconomic level, has not been associated with the outcome of the adjusted model, the literature indicates that individuals with low education level tend to access specialized services later. This can be attributed to more difficulty of navigation in the health system and poor access to qualified information, indicative of social inequities in the pathway of care¹⁶. This assumption is strongly supported by a cross-sectional study conducted with hospital cancer registries with more than 145 thousand cases in Brazil that revealed that approximately 80% of the patients with HNC presented advanced clinical staging (III and IV). However, it has been noticed that the prevalence of advanced staging cases diminished as the patient's education level increased¹⁵.

Conway et al.¹⁷ remarked that individuals with low occupational socioeconomic prestige, a measure that considers to what extent professions are valued and respected in the society, and low occupational socioeconomic position



Table 1. Distribution of the characteristics of patients registered at the Division of Head and Neck according to the treatment. Specialized institution, Rio de Janeiro, 2024

Characteristics	Type of treatment		p ¹	
	Surgical	Non-surgical		
Sex	Female	150 (55.4)	31 (24.2)	<0.001
	Male	121 (44.6)	97 (75.8)	
Age range	< 40 years	29 (10.7)	10 (7.8)	0.312
	40-59 years	102 (37.6)	43 (33.6)	
	60-79 years	123 (45.4)	70 (54.7)	
	80 years or +	17 (6.3)	5 (3.9)	
Race	Yellow	4 (1.5)	3 (2.3)	0.289
	White	138 (50.9)	53 (41.4)	
	Black	123 (45.4)	70 (54.7)	
	Unknown	6 (2.2)	2 (1.6)	
Education	Illiterate	15 (5.5)	9 (7.0)	0.047
	Incomplete elementary school	61 (22.5)	39 (30.5)	
	Complete elementary school	39 (14.4)	27 (21.1)	
	Incomplete high-school	10 (3.7)	9 (7.0)	
	Complete high-school	84 (31.0)	26 (20.3)	
	Incomplete graduation	15 (5.5)	3 (2.3)	
	Complete graduation	34 (12.5)	11 (8.6)	
	Unknown	13 (4.8)	4 (3.1)	
Residence	Outside RJ	139 (51.3)	72 (56.2)	0.413
	RJ	132 (48.7)	56 (43.8)	
Distance to the hospital	Q1 ≤ 17.39 Km	64 (23.6)	36 (28.1)	0.208
	17.39 Km < Q2 ≤ 27.41	62 (22.9)	38 (29.7)	
	27.41 Km < Q3 ≤ 45.85 Km	72 (26.6)	27 (21.1)	
	45.85 Km < Q4 ≤ 1,711.92 Km	73 (26.9)	27 (21.1)	
	Oral and oropharynx	45 (16.6)	62 (48.4)	
Nasal cavity and paranasal sinuses	10 (3.7)	11 (8.6)		
Larynx	22 (8.1)	10 (7.8)		
Thyroid	72 (26.6)	5 (3.9)		
Nasopharynx and hypopharynx	1 (0.4)	11 (8.6)		
Diagnosis	Eyes and adnexal	29 (10.7)	1 (0.8)	
	Other malignant skin neoplasms	57 (21.0)	12 (9.4)	
	Others	35 (12.9)	16 (12.5)	

¹Pearson's chi-square or Fisher exact tests.

were at more risk of HNC, partially explained by smoking and alcohol use. Low education usually associated with low social prestige was considered significant and inversely associated with the risk of developing head and neck cancer, that is, as higher the education level, lower is the risk¹⁸.

The lack of association between distance from the residence to the hospital and surgery as first treatment can reflect the function of the hospital investigated as referral center able to absorb patients from different

geographical regions and changes of residence to facilitate the treatment. However, it is not possible to exclude the existence of barriers to access in early phases of care such as early diagnosis and timely referral, aspects widely discussed in the literature about regionalization of oncologic attention in Brazil. Living out of the large centers can be associated with advanced staging at diagnosis¹⁴. Nevertheless, a systematic literature review that investigated the socioeconomic factors influencing

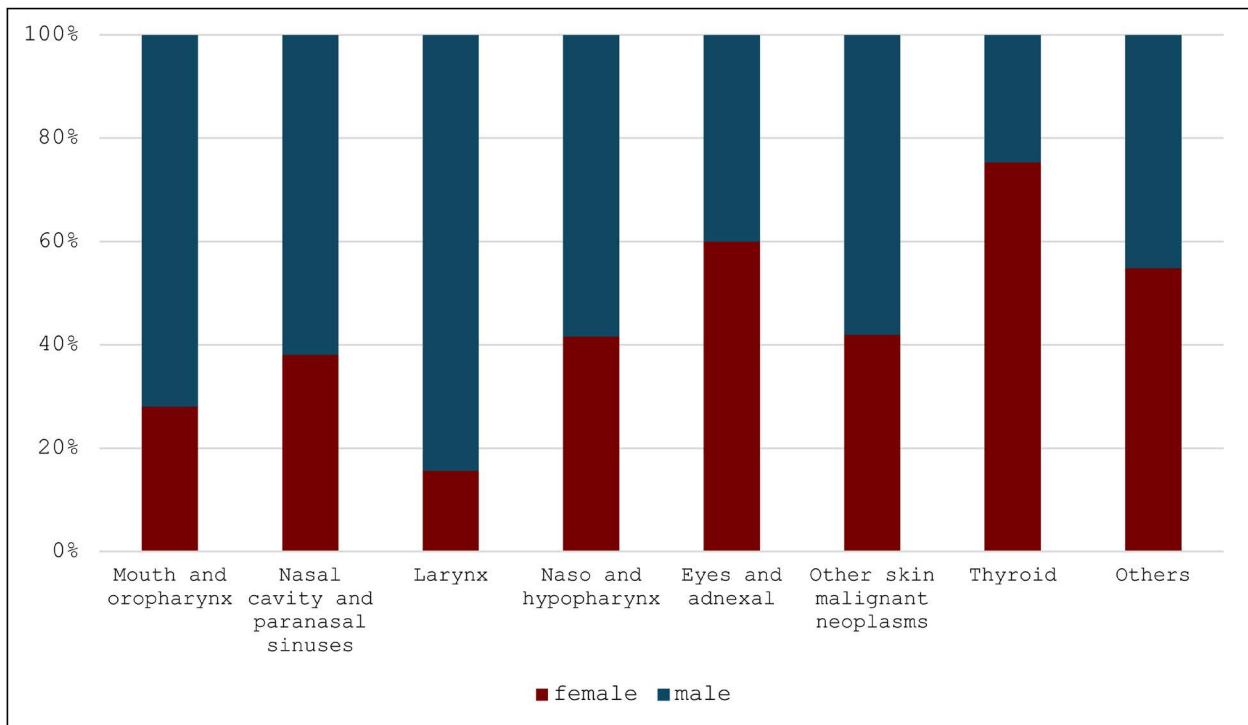


Figure 1. Distribution of head and neck cancer diagnoses by sex at a specialized institution, Rio de Janeiro, 2024

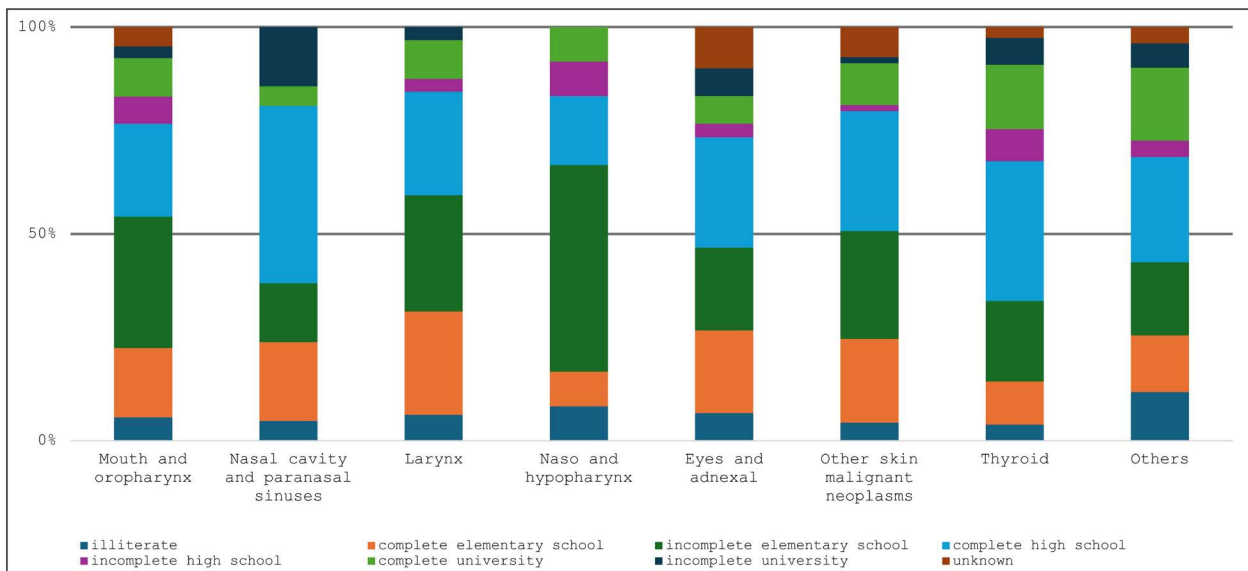


Figure 2. Distribution of head and neck cancer diagnoses by education level at a specialized institution, Rio de Janeiro, 2024

treatment delays of oral squamous cell and oropharynx carcinoma did not find evidences about the relation between living in areas far from metropolitan regions and delays to begin the oncologic treatment¹⁹.

A study conducted in Boston analyzed the trajectory of individuals with HNC and highlighted the importance of primary health care (PHC) mainly for diagnosis confirmation, the authors affirmed that PHC professionals are the first to have the opportunity of identifying warning signs; it is

essential that these professionals are able to identify any suspicious sign or symptom that needs to be investigated²⁰. In Brazil, PHC is the center of communication of the healthcare network²¹ where the teams perform a strategic role: they disseminate prevention guidelines, identify suspicious cases and refer confirmed cases for treatment.

The impossibility of retrieving information about staging in all the cases analyzed is the limitation of this study because it hindered the adjustment by this

Table 2. Odds ratio (OR) of the models of simple and multivariate logistic regression for the outcome “surgery as initial treatment” according to sociodemographic and context variables. Specialized institution, Rio de Janeiro, 2024

Variable	Category of reference	Univariate Model	p	Multivariate model (adjusted*)	p
		OR (CI 95%)		aOR (CI 95%)	
Sex	[Reference: Female]				
Male		0.26 (0.16–0.40)	<0.001	0.31 (0.17 - 0.54)	<0.001
Age range	[Reference: 40-59 years]				
< 40 years		1.22 (0.56 - 2.84)	0.623		
60 to 79 years		0.74 (0.46 - 1.17)	0.203		
80 years or +		1.43 (0.53 - 4.58)	0.505		
Race/Color	[Reference: White]				
Yellow		0.51 (0.11 - 3.60)	0.391	0.43 (0.05 - 3.93)	0.445
Black		0.67 (0.44 - 1.04)	0.074	0.67 (0.37 - 1.17)	0.163
Unknown		1.15 (0.26 - 8.03)	0.864	1.48 (0.25 - 13.64)	0.640
Education	[Reference: Illiterate]				
Incomplete elementary school		0.94 (0.36 - 2.32)	0.892	0.94 (0.32 - 2.98)	0.915
Complete elementary school		0.87 (0.32 - 2.24)	0.770	0.61 (0.20 - 2.08)	0.421
Incomplete high school		0.67 (0.19 - 2.27)	0.516	0.41 (0.08 - 2.11)	0.280
Complete high school		1.94 (0.74 - 4.89)	0.166	1.44 (0.47 - 4.53)	0.530
Incomplete graduation		3.00 (0.63 - 5.45)	0.148	2.33 (0.44 - 15.37)	0.337
Complete graduation		1.85 (0.63 - 5.45)	0.258	1.55 (0.41 - 5.60)	0.509
Unknown		1.95 (0.50 - 8.60)	0.347	1.28 (0.25 - 7.55)	0.774
Residence	[Reference: Outside RJ]				
RJ		1.22 (0.80 - 1.87)	0.355		
Distance to the hospital	[Reference: Q1_ Distance]				
Q2_Distance		0.92 (0.52 - 1.63)	0.769	1.09 (0.52 - 2.31)	0.814
Q3_Distance		1.5 (0.82 - 2.76)	0.186	1.46 (0.68 - 3)	0.335
Q4_Distance		1.52 (0.84 - 2.79)	0.172	1.40 (0.65 - 3.02)	0.392
Diagnosis	[Reference: Mouth and oropharynx]				
Nasal cavity and paranasal sinuses		1.25 (0.48 - 3.22)	0.101	0.94 (0.32 - 2.67)	0.864
Larynx		3.03 (1.34 - 7.28)	0.638	4.02 (1.67 - 10.28)	0.002
Nasopharynx and hypopharynx		0.13 (0.01 - 0.68)	0.009	0.11 (0.00 - 0.67)	0.026
Eyes and adnexal		39.96 (8.07 - 724.9)	0.050	31.04 (5.78 - 580.79)	0.000
Other malignant skin neoplasms		6.54 (3.24 - 14.10)	0.000	5.77 (2.71 - 13.07)	<0.001
Other		3.01 (1.51 - 6.22)	<0.001	2.07 (0.96 - 4.57)	0.023
Thyroid		19.84 (8.08 - 60.05)	0.002	13.22 (4.95 - 42.49)	<0.001

*Adjusted by age. The level of significance of the coefficients was estimated by Wald test.

variable. In addition, the lack of data about the origin of the referral and the time range between the onset of the symptoms and beginning of the treatment restricted the analysis of the care pathway. Furthermore, the potential selection bias resulting from the exclusion of the patients with incomplete registers or without confirmation of the treatment in the electronic tools is an additional limitation. This can impede the generalizability of the findings for populations with low adherence to the service.

CONCLUSION

The results indicate that the selection of the initial treatment of HNC does not depend only of clinical criteria, but it is also related to social and organizational issues that impact on the journey for care and treatment. The low likelihood of surgery in men and patients with mouth and oropharynx cancers reinforces the necessity of strengthening actions of early diagnosis, surveillance of risk factors and integration among the levels of care.

While revealing critical topics, these findings can guide public policies that address the dissemination of the main signs and symptoms and steer the organization of flows in the health attention network, collaborating to reduce the inequalities and improvement of oncologic outcomes.

CONTRIBUTIONS

Adriana Tavares de Moraes Atty, Andréia Dumas, Anna Carolina de Almeida Portugal, Cristina de Fátima Vieira Campos, Jaine Martins-Ferreira, Nina Calvente Hanewald and Jeane Tomazelli contributed to the conception and design of the study, acquisition, analysis and interpretation of the data, drafting and critical review. Antonio Tadeu Cheriff dos Santos, Fernando Lopes Tavares de Lima, Pedro Henrique Mandetta, Michelle Azevedo Gomes and Fernando Luiz Dias contributed to the drafting and critical review of the manuscript. All the authors approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

DATA AVAILABILITY STATEMENT

All the content underlying the text is contained in the manuscript.

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