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Prevalence of cancer and time to referral care in oncology patients
Prevalencia de cáncer y tiempo de atención de referencias en pacientes oncológicos.

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ABSTRACT

Cancer represents a worldwide problem. In 2022, there were 30888 new cases of cancer and 16158 deaths in Ecuador. Considering the high morbidity and mortality due to this disease, health systems are trying to meet the demand of these patients in public and private health services. Our main objective was to establish the prevalence of cancer and the time of care of oncological patients referred to the second level from the first of care during January-July 2024 at the Hospital Provincial General Docente Riobamba. An original, observational, retrospective, descriptive, and correlational study was presented. The prevalence of neoplasms is 3.11 %, and 45.09 % are malignant. The prevalence of cancer in total hospitalizations is 1.4 %, and the average waiting time for care is 35 days. There was a high prevalence of cancer in the hospital, where Internal medicine and Surgery are the services with the most hospitalizations for this pathology.

Keywords: Cancer; Neoplasms; Epidemiology; Community Health Planning; Secondary Care Centers.

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RESUMEN

El cáncer representa un problema a nivel mundial, en el año 2022 en el Ecuador existieron 30888 nuevos casos de cáncer y 16158 muertes, considerando una elevada morbimortalidad a causa de este padecimiento, los sistemas de salud realizan un esfuerzo por solventar la demanda de estos pacientes en los servicios de salud públicos y privados. El objetivo de esta investigación fue establecer la prevalencia de cáncer y el tiempo de atención de referencias de pacientes oncológicos referidos desde el primer nivel de atención al segundo nivel de atención de enero a julio de 2024 en el Hospital Provincial General Docente de Riobamba. Se presentó un estudio original, observacional, transversal retrospectivo, descriptivo y correlacional. La prevalencia de neoplasias es de 3,11 % y el 45,09 % son malignas. La prevalencia de cáncer en el total de hospitalizaciones es 1,4% y el promedio de tiempo de espera para la atención es de 35 días. Existió una elevada prevalencia de cáncer en el hospital, siendo medicina interna y cirugía los servicios con más hospitalizaciones por esta patología.

Palabras clave: cáncer; neoplasias; epidemiología; planificación sanitaria comunitaria; centros de atención secundaria.

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INTRODUCTION

Cancer is a term used to refer to a broad group of diseases of complex and multifactorial origin caused by abnormal cells that multiply autonomously and irregularly, invading other tissues locally and at a distance.[1] The degree of malignancy is variable. It depends on the aggressiveness of its cells and biological characteristics[2]. They can spread and cause metastasis from different routes of dissemination (lymphatic, blood, or by extension and direct invasion of neighboring tissues).[2,3] In general, if their natural evolution is sought, they tend to lead to the death of the affected person in the short term.[4] Currently, more than 200 different types of cancer are known, depending on the tissue from which they are derived. The most common are those of the skin, lungs, breast, colon, and rectum.[5]

According to PAHO, cancer is one of the leading causes of mortality in the Americas. The figures indicate that its incidence is growing rapidly worldwide, becoming a significant barrier to increasing life expectancy. It is estimated that in 2022, there were 20 million new cases of cancer and 9.7 million deaths in the region. [6,7]

Statistics from the International Agency for Research on Cancer indicate that in 2022 in Ecuador there were 30888 new cases of cancer, 16,158 deaths, a risk of 7.3 % of dying from cancer before the age of 75; Prostate (29.4 %), stomach (11.2 %) and colorectal (8.4 %) cancer are more prevalent in our country; In female sex, lung cancer (23 %), cervical cancer (10.5 %) and colorectal cancer (8.0 %) are the main ones; It is also mentioned that by 2040 there will be more than 53,701 cases detected during the year in Ecuador. [8]

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When analyzing the statistics, we observe that in Ecuador, as in the rest of the world, the incidence of cancer is increasing, which is why it is necessary to have a health system that provides the opportunity for each user to have adequate and timely care for their diagnosis and treatment.[8,9] It has been shown that the delay in the care of this type of patient has been directly related to survival rates.[9] A study in London about the survival of patients with breast cancer related to delayed uptake and treatment showed that 32 % of patients with delays of 12 weeks or more had locally advanced or metastatic disease, compared to only 10 % of those with delays of less than 12 weeks, which shows us the importance of early recruitment.[10]

The national health system in Ecuador has a system of universality and progressive free healthcare based on the Comprehensive Health Care model, which is supported by the user referral system to improve healthcare.[11,12] This regulation is applied at all levels of care, thus allowing adequate care to be provided to all users who require it according to the degree of complexity to achieve complete, acceptable, and timely care.[13]

The health system of Ecuador offers a model that allows recruitment at the first level of health, which is responsible for making the referral to the next step.[14] The time that elapses from the recruitment of an oncology patient to the moment they obtain specialized care is usually long since the influx of patients within the public health system is large.[11,15] Now, there are no studies that report the approximate time of care for this type of patient.

This study in general terms aimed to establish the prevalence of cancer and the waiting time for the care of cancer patients referred from the first to the second level of care from January to July 2024 at the Hospital Provincial General Docente Riobamba (HPGDR).

The hypothesis proposed was that there is a high prevalence of cancer patients treated in the hospital and a delay in the care of cancer patients due to the high demand for examinations and specialist doctors that are not paid for by the Ministry of Public Health.

MATERIAL Y MÉTODOS

An original, observational, cross-sectional, retrospective study with a quantitative, descriptive, and correlational approach was presented.

We worked with the entire population, representing the total number of patients hospitalized in all specialties of the HPGDR, internal medicine, pediatrics, gynecology and obstetrics, Surgery, and ICU from January to July 2024, p= 6559. By working with the entire population, we avoid sampling and selection bias. The patient matrix called "Hospital discharges January to July 2024" is in the Hospital's statistics service, which was provided to the researchers of an anonymized nature with the required data according to the variables to be studied and before the delivery of a confidentiality commitment from the authors and a general informed consent by the hospital's medical management.

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Inclusion criteria.

- Patients treated in the hospital and registered in the hospital discharge matrix.
- Patients diagnosed with neoplastic pathology of any organ.
- Patients who have complied with the referral from the first level to the second level of care for the calculation of the average days of waiting for referral care.

Exclusion criteria.

- Patients who do not provide the service where they were hospitalized in their database record.

Variables

Age, sex, diagnosis, date of care at the first level of care, date of care at the second level of care, type of cancer, and hospitalization service.

The data obtained for the analysis correspond to the records of referral matrices and hospital discharge matrices. These matrices are mandatory to report to the authorities of Ecuador's Zonal Coordination 3, who evaluate care times to determine the productivity of treating medical professionals and hospital-level productivity. The data are subject to review and registration in the Epidemiology Department. This ensures the validity and quality of the data.

Once the final database was obtained in Excel, it was imported into the SPSS27 statistical package for the coding of variables and statistical analysis. A univariate analysis was carried out to calculate the prevalence of neoplasms and cancer based on the population. Ratios, proportions, and percentages for qualitative variables; Measures of central tendency and dispersion for quantitative variables, always accompanied by their 95 % confidence interval. The multivariate analysis looked for factors that influence the presence of neoplasms and the presence of cancer, for which a logistic regression analysis was performed.

The filling method was used for data processing with the average of the data obtained. This method was used to analyze the average waiting time for referrals of oncology patients from primary to secondary care.

The study was approved by a human research ethics committee code: IO-29-CEISH- ESPOCH-2024.

RESULTS

Univariate analysis

The prevalence of patients with benign and malignant neoplasms of any organ calculated using the formula: [(# of patients diagnosed with neoplasia / P) *100] [(204/6559)*100] is equal to 3.11 % (95 %

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CI 3 %-4 %) from January to July 2024 in the HPGDR. 75.49 % were women (n=154) and 24.51% were men (n=50).

The average age of patients with neoplasms, regardless of sex (n=204), is 49 years (95 % CI, 46 – 51 years) (minimum n = 1 year and maximum n = 94 years).

Based on the total population, the prevalence of cancer (malignant neoplasms) [(92/6559)*100] is 1.4% (95 % CI 1 %-2 %) from January to July 2024 in HPGDR. The prevalence of cancer concerning the total number of patients diagnosed with neoplasia [(92/204)*100] is 45.09 % (9 5% CI 38 %-52 %). Therefore, almost half of the patients hospitalized for neoplasms are malignant. About sex, 57.61% (n=53) were women versus 42.39 % (n=39) were men.

The mean age, regardless of sex, of patients with malignant neoplasms is 56 years (95 % CI 52 – 59 years) (minimum n = 15 years and maximum n = 94 years).

Tables 1 and 2 represent the description of the tumors according to the hospitalization service.

Table 1. Benign tumors according to the hospitalization service.

BENING NEOPLASM		
SERVICE	**n**	**%**
SURGERY	31	27.68
INTERNAL MEDICINE	2	1.79
GYNECOLOGY AND OBSTETRICS	75	66.96
PEDIATRICS	4	3.57
TOTAL	112	100

Table 2. Malignant tumors according to the hospitalization service.

MALIGNANT NEOPLASMS		
SERVICE	**n**	**%**
SURGERY	15	16.30
INTERNAL MEDICINE	71	77.17
GYNECOLOGY AND OBSTETRICS	6	6.52
PEDIATRICS	0	0.00
TOTAL	92	100

Benign and malignant tumors are described below according to their prevalence and hospitalization services.

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Tabla 3. Benign tumors.

SURGERY	INTERNAL MEDICINE	GYNECOLOGY	PEDIATRICS
-benign lipomatous tumor of the skin and subcutaneous tissue of the trunk (5.4 %) -benign lipomatous tumor from other specified sites (4.5 %) -benign lipomatous tumor of the skin and subcutaneous tissue of the head, face, and neck (3.6 %) -benign lipomatous tumor of unspecified site (3.6 %) -non-toxic multinodular goiter (2.7 %) -benign lipomatous tumor of the skin and subcutaneous tissue of the limbs (2.7 %)	-tumor of uncertain or unknown behavior of the lip, oral cavity, and pharynx (0.9 %)	-leiomyoma of the uterus, not otherwise specified (56.3%) -benign ovarian tumor (7.1 %) -benign breast tumor (2.7 %) -hydatidiform mole, unspecified (0.9 %)	-Benign tumor of the skin of the upper limb, including the shoulder (0.9 %) -Benign tumor of connective tissue and other soft tissues of the head, face, and neck (0.9 %)

The benign tumors with a frequency of 1 (0,9 %) each in Surgery are: tumor of the tongue; tumor of the nasopharynx; tumor of the rectosigmoid junction; tumor of the meninges, part not specified; tumor of the anal canal and anus; tumor of the lower jaw; kidney tumor; lipomatous tumor of the intra-abdominal organs; and tumor of uncertain or unknown behavior of the brain, unspecified part.

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Tabla 4. Malignant tumors.

SURGERY	INTERNAL MEDICINE	GYNECOLOGY
- malignant skin tumor, unspecified site (3.3 %) - malignant tumor of the colon, part not specified (2.2) - malignant tumor of the prostate (1.1 %) - malignant tumor of the urinary bladder, part not specified (1.1 %) - malignant tumor of the kidney, except the renal pelvis (1.1 %) - malignant tumor of the maxillary sinus (1.1 %) - malignant tumor of the connective tissue and soft tissue of the head, face, and neck (1.1 %) - malignant tumor of the testicle, unspecified (1.1 %)	- non-Hodgkin's lymphoma, unspecified (6.5 %) - malignant tumor of the stomach, unspecified part (6.5 %) - acute lymphoblastic leukemia (4.3 %) - malignant tumor of the bronchi or lung, part not specified (4.3 %) - malignant tumor of the prostate (3.3 %) - malignant tumor of the kidney, except of the renal pelvis (3.3 %) - secondary malignant tumor of the peritoneum and retroperitoneum (3.3 %) - malignant tumor of the pancreas, part not specified (3.3 %) - intrahepatic bile duct carcinoma (2.2 %) - malignant tumor of the breast, part not specified (2.2 %) - malignant tumor of the skin of the upper limb, including the shoulder (2.2 %) - malignant skin tumor, unspecified site (2.2 %) - malignant extrahepatic bile duct tumor (2.2 %) - malignant tumor of the specified part of the peritoneum (2.2 %) - malignant tumor of the liver angle (2.2 %) - malignant cardia tumor (2.2 %) - malignant tumor of the gastric fundus (2.2 %)	- malignant tumor of the breast, part not specified (1.1 %) - malignant tumor of the pelvis (1.1 %) - malignant tumor of the cervix, not otherwise specified (1.1 %) - malignant tumor of the fundus of the uterus (1.1 %) - secondary malignant tumor of the peritoneum and retroperitoneum (1.1 %)

Malignant tumors with a frequency of 1 (1.1 %) each in Internal medicine are: lymphoid leukemia, no other specification; carcinoma in situ of the stomach; lymphoid leukemia, no other specification;

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acute myeloblastic leukemia; chronic myeloid leukemia bcr/abl-positive; hodgkin's lymphoma unspecified; non-follicular (diffuse) lymphoma not otherwise specified; multiple myeloma; kaposi's sarcoma of the soft tissue; tumor of the thyroid gland; tumor of the skin of the trunk; tumor of the central portion of the breast; tumor of the bones of the skull and face; tumor of the abdomen; tumor of the cerebellum; brain tumor, except lobes and ventricles; tumor of the upper outer quadrant of the breast; tumor of the body of the stomach; tumor of the body of the uterus, part not specified; tumor of the esophagus, part not specified; tumor of the exocervix; liver tumor unspecified; ileum tumor; tumor of the frontal lobe; tumor of the upper lobe, bronchus, or lung; tumor of the ovary; and tumor of the testicle, unspecified.

To establish the mean number of days that patients were required to wait to receive care at the second level, the total number of cancers (n=92) was taken. However, there was significant data loss. It was only possible to obtain information on waiting days for care for 36 patients (39.13 %) versus 56 (60.87 %) patients who did not have information on the days they waited to receive care in the hospital.

Taking the data from the 36 patients, the average number of days required to be seen in the HPGDR was 35 (95 % CI 19 – 51 days). The minimum waiting time was 2 days. The maximum was 204 days waiting for care, and a Mode=2.

Multivariate analysis

Table 5 is presented below. A logistic regression model was performed to explain the dependent variable presence of neoplasms, p= 6559.

Table 5. Logistic regression Presence of neoplasms.

Variables in the Equation					
	B	Sig.	Exp(B) (OR)	95% CI for EXP(B)	
				Lower	Upper
GENDER (REF WOMAN)	-0.741	0.045	0.477	0.231	0.983
AGE	0.062	0.000	1.064	1.049	1.079
REF. PEDIATRICS		0.000			
SURGERY	-1.752	0.011	0.173	0.045	0.673
INTERNAL MEDICINE	-4.787	0.000	0.008	0.001	0.060
GYNECOLOGY	0.089	0.874	1.093	0.361	3.311
Constant	22.983	0.995	9577236694.826		
a. Variable(s) entered on step 1: GENDER, AGE, SERVICE.					

It can be seen that the variables that explain the appearance of neoplasms are sex, age, and belonging to the Surgery or gynecology service. Men are less likely to have a neoplasm (benign or malignant) diagnosis OR 0.477, statistically significant, compared to women.

Concerning the 204 patients who presented neoplasms, a logistic regression was performed to explain the dependent variable presence of malignant neoplasms. The results are shown below in Table 6.

Table 6. Logistic regression Presence of malignant neoplasms.

Variables in the Equation					
	B	Sig.	Exp(B) (OR)	95% CI for EXP(B)	
				Lower	Upper
GENDER (REF WOMAN)	-0.741	0.045	0.477	0.231	0.983
AGE	0.062	0.000	1.064		1.079
REF. PEDIATRICS		0.000			
SURGERY	-1.752	0.011	0.173	0.045	0.673
INTERNAL MEDICINE	-4.787	0.000	0.008	0.001	0.060
GYNECOLOGY	0.089	0.874	1.093	0.361	3.311
Constant	22.983	0.995	9577236694.826		
a. Variable(s) entered on step 1: GENDER, AGE, SERVICE.					

The variables that explain the presence of malignant neoplasms are age when the cut-off point is 65 years, and sex. Being male confers a higher chance of having malignancies (OR 5.99). Being younger than 65 is less likely to get cancer (OR 0.25).

DISCUSSIÓN

The prevalence of benign or malignant neoplasms (3.11 %) represents a high percentage concerning all HPGDR care that required hospitalization because it is a second-level hospital. If we divide the number of neoplasms, we obtain that approximately 34 patients are hospitalized per month on average. The hospital must ensure quality care for all patients.[11] It should be considered that approximately half of the neoplasms are malignant (45.09 %). In most cases, more complex and expensive diagnostic tests are required to determine their nature.[16-18] The percentage obtained in this study on the prevalence of cancer shows a global reality, being the leading cause of death in 2020.[19]

In the univariate analysis, there were differences concerning age and sex, which were corroborated by the multivariate analysis, where men have a lower risk of having a neoplasm (OR 0.47) p= 0.045. However, men have a higher risk of malignancies (OR 5.99) p=0.000. According to international

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statistics, men have an age-standardized incidence rate of 212.6, with a cumulative risk of developing cancer before the age of 75 of 21.8 %, compared to women who have a standardized incidence rate of 186.3 with a risk of 18.5 %. (19,20) Similarly, our study shows that those younger than 65 represent a lower cancer risk (OR 0.25) p=0.035.

Although supported by evidence, the methodological nature of the study confers results that must be corroborated with more powerful studies and stricter inclusion and selection criteria. Age and sex should also be considered as confounding variables.

Gynecology represents 66.96 % of hospitalizations for benign tumors, which is consistent with the most frequent types of benign tumors treated, uterine leiomyomas and ovarian and breast tumors. In the second place, Surgery is found with 27.68 % for the resolution mainly of lipomas.

Internal medicine is the leading cancer care service, accounting for 77.17 % of hospitalizations. The main types of cancer are leukemias, lymphomas, skin, lung, and gastric. The second service with the highest percentage of hospitalizations is Surgery, with 16.30 %, where gastric and urological cancer are mainly treated. The main types of cancer worldwide are lung, breast, colorectal, prostate, stomach, liver, thyroid, and uterine cervix. [20-24]

A timely cancer diagnosis represents a greater probability of long-term survival, implementing early surgical or clinical treatments. [25-28] We found an average wait of 35 days to be seen as referrals from the first level, in charge of the health centers, to the second level of care, in charge of the HPGDR. These data represent an essential information bias due to the number of losses, which made it impossible to have a waiting time for analysis. Longitudinal studies are recommended to have a more accurate follow-up and not have losses from that follow-up.

The National Institute for Health and Care Excellence recommends referring patients with metastatic cancer of unknown origin for care within two weeks of referral.[29] It is necessary to create public policies to address medical and non-medical expenses to improve the quality of life of cancer patients and mitigate barriers to access to care since a timely diagnosis and approach reduce subsequent treatment costs.[30,31]

The strengths of this study are the rigor of the results obtained since the appropriate statistics were used, providing 95 % CI and p values; it represents epidemiological data that can be extrapolated to the general population since there were no sampling biases, obtaining adequate external validity; and it is the starting point for more rigorous investigations in search of data that explain causality.

Limitations:

The main limitation of this study is the impossibility of stricter follow-up and control of the participants. It was not possible to analyze more factors that contributed to the diagnosis of cancer.

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To establish causal relationships, the design of our study is limited, as we present a cross-sectional design. However, this type of design does allow for the analysis of relationships between variables that present associations, such as the prevalence ratio, OR, etc. In medicine, it is impossible to establish specific cause-and-effect relationships since pathologies, primarily cancer, are multifactorial.

The main limitation regarding the analysis of waiting times for care was the loss of data, which confers little external validity to our results. These losses are primarily attributed to the fact that all hospital discharges for cancer were considered, and many of them originate from emergency departments, where there is no care policy based on primary care referrals.

Recommendations:

Mandatory, real-time health record keeping should be implemented, in addition to the referral form (Form 053) to monitor patients. This would facilitate longitudinal studies.

Consider including oncology professionals at least once or twice a week to support outpatient care, perform procedures, and diagnose patients with suspected cancer.

CONCLUSIONS

The prevalence of neoplasms in HPGDR from January to July 2024 is 3.11 % (95 % CI 3 %-4 %), and 45.09 % (95 % CI 38 %-52 %) corresponds to malignant neoplasms. The prevalence of cancer in the total hospitalizations from January to July 2024 in HPGDR is 1.4 % (95 % CI 1 %-2 %).

Gynecology is the main service that treats benign neoplasms, the most frequent being leiomyomas, ovarian or breast. The second service corresponds to Surgery for the resolution of lipomas.

The main cancer care service is internal medicine, which is used to treat leukemias, lymphomas, skin, lung, and gastric cancers. The second service is Surgery for gastric and urological cancer care.

The waiting time required by patients to receive care by referrals from health centers to HPGDR is 35 days (95 % CI 19 – 51 days).

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Contribution Statement:

Conceptualization: Md. M.Sc. Carlos Andrés Yépez Salgado; Dr. Zully Mayra Romero Orellana. Data curation, Formal analysis, Methodology, Software, Validation, Visualization, and Writing – review and editing: Md. M.Sc. Carlos Andrés Yépez Salgado. Acquisition of funds: project self-financed by the authors. Research: Md. M.Sc. Carlos Andrés Yépez Salgado; Dr. Zully Mayra Romero Orellana; Dr. Paola Buenaño; Dr. David Orozco; Md. Yesenia Chandi. Project administration: Dr. Paola Buenaño; Dr. David Orozco; Md. Yesenia Chandi. Supervision: Dr. Zully Mayra Romero Orellana; Dr. Paola Buenaño; Dr. David Orozco. Writing – original draft: Md. Yesenia Chandi. All authors have read and agreed to the published version of the manuscript.

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