




Evaluation of Employees' Knowledge of Colorectal Cancer Prevention and Screening at a Reference Oncology Centre

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Abstract

Introduction Despite the high prevalence and severity of colorectal cancer (CRC), the public is mostly unaware of its prevention and screening.

Objective To determine the level of knowledge regarding CRC prevention and screening among staff at a reference cancer center.

Materials and Methods A cross-sectional study was conducted in a reference cancer center. Employees aged 18 and up who had worked at the oncology center for at least one year were given a questionnaire containing sociodemographic and evaluative questions about CRC prevention and screening.

Results The sample comprised 266 employees, with a median age of 45 (53.00–35.75) years of age. Most of the staff (76.3%) were female, had at least a year of experience at the health facility (74.1%), and agreed on the definition of CRC. Inflammatory bowel illness was the least commonly recognized risk factor (67.6%). Most of the sample (56%) recognized all 5 warning flags. Colonoscopy was the most popular screening test (98.7%). Although the health center does not offer official CRC education, most of the staff (42.1%) reported learning about CRC while working.

There was no difference in perceptions of the optimal age to begin screening between employees 45 years or older and those younger ($p = 0.729$). Higher-educated employees were more knowledgeable about CRC ($p = 0.001$).

Conclusion In a reference cancer center, the staff members who work directly with patients as well as those with higher levels of schooling have a satisfactory level of knowledge regarding CRC prevention and screening.

Keywords

- ▶ colorectal cancer
- ▶ screening
- ▶ prevention
- ▶ risk factor
- ▶ knowledge

Introduction

Colorectal cancer (CRC) is the most prevalent malignant neoplasm in the gastrointestinal tract and one of the most prevalent malignant neoplasms worldwide.^{1,2} Having a high propensity for metastasis and significant aggression, this

type of tumor primarily impacts individuals over the age of 50.¹

The onset of CRC decreases significantly with the adoption of healthier lifestyles, which are associated with a multitude of risk factors.³ Hence, engaging in regular physical activity, increasing fiber consumption, decreasing carbohydrates,

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alcoholic beverages, red meat, sodium, ultra-processed foods, and overall caloric intake appear to provide a preventive influence against the development of tumors.^{4,5} Conversely, the presence of polyps and prior inflammatory diseases (e.g., ulcerative colitis and Crohn disease) are risk factors for colorectal cancer, while the transmission of genetic mutations within the family is associated with this condition.^{2,4,5}

Colorectal cancer is characterized by a significant mortality rate; thus, the prevention of this disease is critical.⁴ This preventive measure is linked not only to lifestyle modifications but also to heightened public awareness concerning risk factors and screening techniques.³ Finding this subtle neoplasm early is often difficult because symptoms do not appear until the cancer has spread significantly. Knowledge of the signs improves the prognosis because it allows for an earlier diagnosis.^{4,5}

Furthermore, screening methods are extraordinarily effective at reducing the morbidity, mortality, and treatment expenses associated with advanced stages of CRC.⁶ Early-stage tumors and precancerous lesions can be identified using screening procedures such as sigmoidoscopy, fecal occult blood testing, and colonoscopy.^{4,5}

Despite the considerable prevalence and fatality rate associated with this malignancy, societal awareness regarding CRC prevention and screening remains limited.⁶ The general public's lack of awareness regarding risk factors and warning signs remains a significant obstacle to early detection, morbidity reduction, and mortality mitigation.^{3,4,7}

In light of this epidemiological situation characterized by a high incidence of CRC and limited dissemination of information regarding the disease, the purpose of the present research is to assess the level of knowledge that employees at a reference cancer center have regarding CRC screening and prevention. By implementing this methodology, we will have the capacity to evaluate the effectiveness of the information distribution concerning CRC in our local community. This will enable us to devise initiatives that promote the spread of knowledge of this malignancy.

Materials and Methods

Study Design

An observational, cross-sectional study was conducted in a public oncological center located in Salvador, Bahia, which is a health center dedicated to the specialized care of patients diagnosed with cancer. Sociodemographic and evaluative inquiries pertaining to the prevention and screening of CRC were incorporated into a questionnaire utilized for the analysis. Personnel affiliated with the health center who were a minimum of 18 years old were included, regardless of gender. Conversely, employees who were illiterate were not eligible.

Instruments for Data Collection and Questionnaires

The data were gathered via in-person administration of a structured electronic questionnaire (Google Forms, Google LLC., Mountain View, CA, USA) that comprised evaluative and

sociodemographic inquiries pertaining to the prevention and screening of CRC. Data collection was conducted from 8 a.m. to 5 p.m., 5 days per week, during business hours. Participants who satisfied the inclusion criteria and expressed interest in taking part in the research were informed about the study and directed to a designated area to respond to the inquiries in private and one-on-one. To ensure the preservation of confidentiality, the researcher refrained from becoming involved and solely extended aid upon the interviewee's request. The participant completed the survey solely after affixing their signature to the Informed Consent Form (ICF). Messages or email invitations to the form (e-mails containing a single sender and recipient) were promptly dispatched to the volunteers following their completion of the ICF. The questionnaire did not allow for the omission of answers. This safeguard kept questionnaires from being filled out incorrectly.

Prior to administering the questionnaire, the research team had not established any prior relationships with the interviewees, and they were not provided with any information regarding the prevention or screening of colon and rectal cancer. The study received approval from the Ethics Committee of the Health Department of the State of Bahia (CAEE, 67505623.9.0000.5606).

In addition to knowledge of risk (family history, smoking, alcoholism, personal history of inflammatory bowel disease [IBD], inadequate diet, and sedentary lifestyle), preventive factors (maintenance of a healthy diet, regular exercise, and medical checkups), screening techniques (fecal blood, sigmoidoscopy, and colonoscopy), warning signs (tenesmus, loss of weight for no apparent reason, alteration in intestinal rhythm, abdominal pain, and the presence of blood in the stool), and recommended start dates for screening (≥ 45 years), the following variables were assessed: occupational domain, gender, age, schooling, and length of service in the organization.

Data Analysis

The SPSS for Windows software, version 14.0 (SPSS Inc., Chicago, IL, USA) was used to develop the database and conduct descriptive and analytical statistical analyses.

The means and standard deviations were used to represent continuous variables that followed a normal distribution, while the median and interquartile range (IQR) were applied to represent non-normally distributed variables. Categorical variables were expressed as absolute frequencies and percentages. Using descriptive statistics, graphical analysis, and the Kolmogorov-Smirnov test, the normality of the numerical variables was confirmed.

The sample size was estimated a priori based on the difference between group proportions (50% and 70% in relation to knowledge about colorectal cancer screening). Therefore, adopting an α value of 5% and a statistical power ($1-\beta$) of 90%, it was necessary to apply 266 questionnaires.

To assess the relationship between the variables under investigation, the Mann-Whitney U test or the student *t*-test was utilized, contingent upon the variables' normality. The Pearson or Spearman correlation coefficient and the Pearson

Table 1 General characteristics of the sample of employees of the Centro Estadual de Oncologia (CICAN), Salvador, BA, 2023

| Variables | Employees N = 266 |
|-------------------------------------|----------------------|
| Age (ME/IQR) | 45/53.00–35.75 |
| Gender N (%) | |
| Male | 63 (23.7) |
| Female | 203 (76.3) |
| Education N (%) | |
| Elementary/High school | 120 (45.1) |
| Higher education | 146 (54.9) |
| Occupation area N (%) | |
| Health services | 122 (45.9) |
| General and administrative services | 144 (54.1) |
| Working time N (%) | |
| For 1 year | 69 (25.9) |
| For more than 1 year | 197 (74.1) |

Abbreviations: IQR, interquartile range; Me, median; N, number.

chi-squared test were applied to determine the relationship between categorical and numeric variables, respectively. The statistical significance level was $p < 0.05$.

Results

Simple Characterization

The study sample comprised 266 employees, with a median age of 45 (53.00–35.75). A significant proportion of the employees were female (76.3%) and had a higher level of schooling (54.9%). Additionally, it was noted that a significant proportion of the participants were employed in the administrative and general services sectors (54.1%) and possessed over a year of experience at the health center (74.1%). (► **Table 1**)

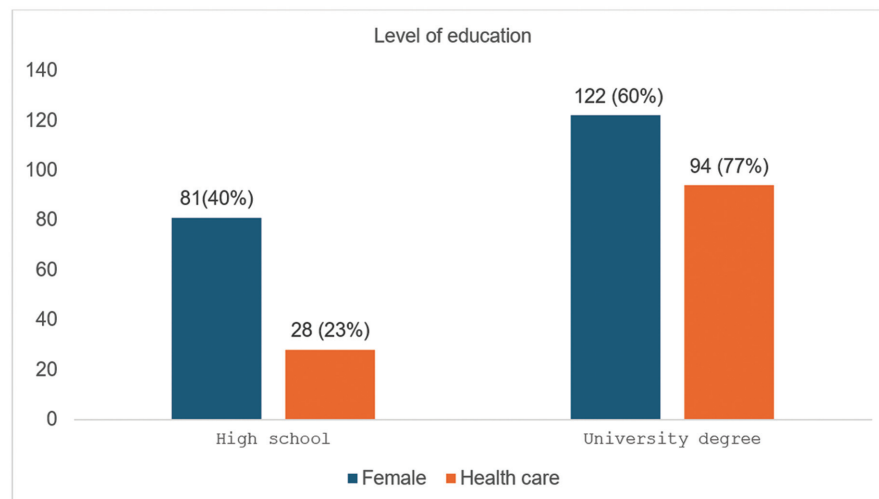
A significant proportion of the 63 men interviewed (74.6%) were employed in services other than health (general and administrative), whereas 106 (52.2%) of the 203 women interviewed were directly employed in health services. This indicates that women held a greater number of positions associated with patient care (106 [52.2%] versus 16 [25.4%], $p < 0.001$). Additionally, most of the women (122 women, 60%) and employees (94 employees, 77%) who were directly involved in health services (► **Graph 1**) had higher levels of schooling.

CCR Knowledge Assessment

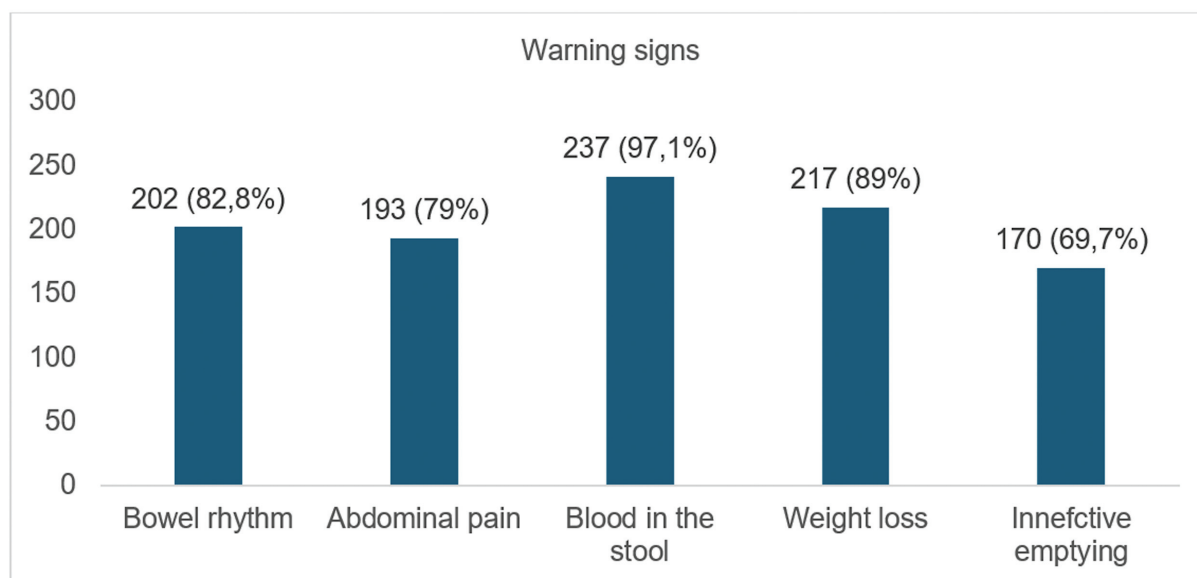
Consensus was reached regarding the definition of CCR by most of the respondents (87.2%). In relation to CRC risk factors, 110 (41.4%) participants demonstrated awareness of all 6 factors outlined in the questionnaire, whereas 19 (7.1%) did not identify any of them. A total of 220 (82.7%) participants were able to identify at least half of the risk factors. Moreover, lack of awareness regarding personal history of inflammatory bowel disease was the least acknowledged risk factor (167 participants, 67.6%), whereas inadequate nutrition was the most recognized (229 participants, 92.9%).

A total of 188 (70.7%) employees demonstrated awareness of all 3 CRC preventive factors that were included in the questionnaire. Conversely, 18 (6.8%) employees failed to recognize any of the factors. Moreover, regular medical appointments were the subject of the greatest amount of knowledge (241 employees, 97.2%) among the group of 248 employees who possessed at least 1 preventive factor.

It was seen that most of the sample (149 employees, 56%) knew all 5 warning signs of CRC covered by the questionnaire, and 22 (8.3%) employees were not aware of any of them. A total of 212 (79.7%) individuals identified 3 or more signs. The presence of blood in feces was the most recognized by 237 (97.1%) employees of the group with at least one alarm signal knowledge (244 employees, or 91.7%), whereas tenesmus received the least recognition (170 employees, 69.7%). (► **Graph 2**).



Graph 1 Level of schooling of women and employees working in health services.



Graph 2 Recognition of each warning sign for colorectal cancer by CICAN employees.

As for CRC screening, it was observed that 154 (57.9%) employees were duly informed of the 3 primary tests employed for this objective, whereas 29 (10.9%) employees failed to comprehend the implementation of any of them. Conversely, a minimum of 1 method was understood by 237 (89%) employees. Colonoscopy was the most widely recognized screening test (98.7%), whereas sigmoidoscopy was the least recognized (74.7%). (►Graph 3)

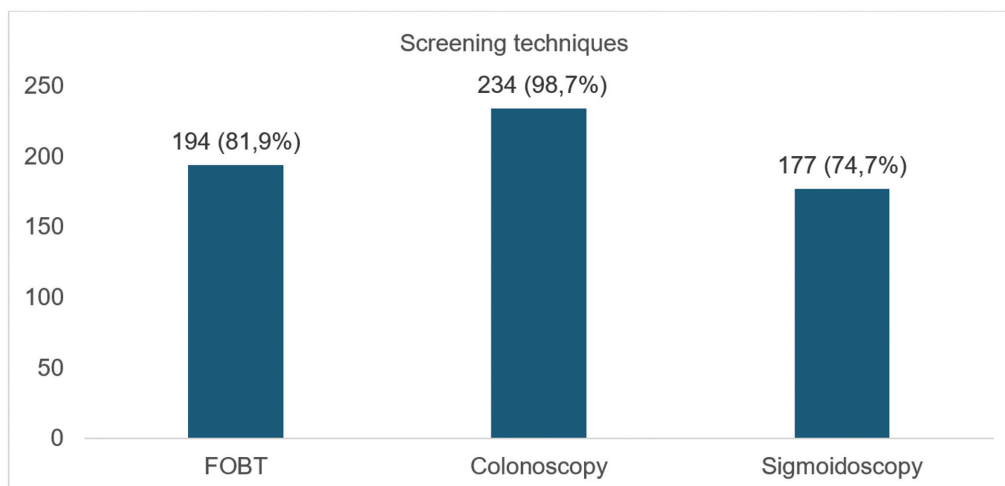
With respect to employee satisfaction with their level of knowledge concerning CRC, 50% of the participants expressed satisfaction. But in relation to the presence of educational initiatives concerning CRC, a majority (52.6%) of the respondents indicated that the cancer center did not offer any information. Although the health center does not provide formal CRC education, most of the employees with more than 1 year of experience at the cancer center reported learning about CRC during their professional activity [83 (42.1%) × 17 (24.6%), $p = 0.001$].

Even if they did not have risk factors, most patients aged 45 or older (83.65%) were aware that individuals in their age group should begin CRC screening. Conversely, employees aged 45 years or older and those younger did not differ in their understanding of the optimal age to begin screening (112 [83.6%] versus 109 [82.6%], $p = 0.729$).

Employers with a greater level of schooling had a greater understanding of the CRC concept than those with a lower level of schooling (139 [95.2%] versus 93 [77.5%], $p = 0.001$). Regarding inquiries about risk factors, prevention, warning signs, and screening, it was indisputable that healthcare employees recorded a higher proportion of accurate responses. (►Table 2)

Discussion

In the present study, it was seen that most of the employees had a good degree of information about the concept, risk factors, prevention, warning, signs and screening of CRC.



Graph 3 Recognition of each colorectal cancer screening technique by CICAN employees. Abbreviation: FOBT, Fecal occult blood test.

Table 2 Comparison between employees of health services and general and administrative services regarding the total number of correct answers regarding risk factors, prevention, warning signs and screening for colorectal cancer

| Variables | | Health services | General and administrative services | p-value |
|---------------|----------|-----------------|-------------------------------------|----------|
| | | N = 122 | N = 144 | |
| Risk factors | (ME/IQR) | 6 (4–6) | 5 (2–5.75) | < 0.001+ |
| Prevention | (ME/IQR) | 3 (3–3) | 3 (2–3) | < 0.001+ |
| Alarm signals | (ME/IQR) | 5 (5–5) | 4 (1–5) | < 0.001+ |
| Screening | (ME/IQR) | 3 (3–3) | 2 (1–3) | < 0.001+ |

Abbreviations: IQR, interquartile range; Me, median; N, number.

Note: +Mann-Whitney test.

Only a small number of respondents were unaware of the pathology. In addition, it was observed that the best-informed employees had higher level of schooling, worked directly in the health sector, and had been working for more than 1 year at the cancer center.

Most personnel asserted their understanding of the CRC concept. The primary factor contributing to this outcome is the occupational environment of these individuals, which is a reference cancer center where they are routinely exposed to cancer cases, including rectal and colon cancer. Additionally, it is critical to emphasize that the widespread recognition of this pathology's concept is aided by its high incidence; it is the second most prevalent cancer-related death and the third most prevalent malignant disease worldwide.⁸

At least half of the CRC risk factors discussed in the questionnaire were recognized by most of the respondents. The least recognized risk factor in this investigation was inflammatory bowel disease (IBD), while inadequate nutrition was the most widely acknowledged. Lifestyle has a direct impact on the development of colorectal neoplasia, as is well established in the scientific literature. Risk factors for colon and rectal tumors include a family history of CRC and IBD, excessive alcohol consumption, smoking, a sedentary lifestyle, and a poor diet.^{5,8,9} Six risk factors that were discussed are also prevalent in other malignancies; thus, they are already pervasive in society. As a result, it is important to note that the result in question might not be entirely attributable to knowledge of CRC. Patients with IBD have a 60% greater likelihood of developing CRC than the general population, which must be emphasized in this analysis.⁸ As the association between IBD and colon and rectal cancer is the least recognized risk factor by the staff, this is a concerning matter, as early screening is even more necessary in its presence.^{10,11}

The findings of the present study indicated that a significant proportion of employees possessed knowledge pertaining to the three preventive factors examined in relation to CRC prevention. A greater protection against the development of numerous neoplasms, including those of the colon and rectum, is assured by adopting healthy lifestyle practices such as good nutrition, regular exercise, and medical check-ups.^{6,9,12} Given its high mortality rate and substantial metastatic potential, prevention should be the primary focus, given the extremely aggressive nature of this neoplasm.⁴ The most widely known preventive measure for CRC among

employees in the current study was consistent medical consultations. This result may be attributed to the ongoing exposure of staff members to health concerns at the facility, where the physician assumes a pivotal role in the prevention, diagnosis, and treatment of malignancies. This exposure may be characterized by a direct or indirect connection.

Likewise, most of the employees, demonstrated awareness of all five risk indicators for CRC as outlined in the survey. Because it is an insidious neoplasm whose symptoms typically manifest in more advanced stages, delaying diagnosis, this analysis is crucial. Hematochezia, which was the most recognized alarm sign among those interviewed, merits special attention due to the fact that painless bleeding can foretell the emergence of other symptoms of CRC within 2 to 3 years.¹³ As a result, an earlier diagnosis and a more favorable prognosis can be achieved by promptly identifying the presence of blood in the stool as an indication of CRC prior to the manifestation of other symptoms. Tenesmus, by contrast, was the least known warning sign. The observed outcome may be attributed to the general population's awareness of the correlation between serious pathologies and blood, while tenesmus is a symptom that is considered more subjective in nature.

Regarding CRC screening, it is known that, in regions in which screening is effective and widespread, there is a proven reduction in the incidence and mortality rates of this neoplasm.^{5,12,14,15} In this regard, early detection of the pathology is critical, as any delay in diagnosis substantially increases morbidity, mortality, and treatment costs.⁶ It was discovered that a considerable proportion of the personnel involved in this study had acquired knowledge regarding all three screening techniques that were examined in the survey. Once more, this result may be attributed to the employment of the interviewees at an oncology center.¹² Furthermore, it is essential to underscore that the participants ranked colonoscopy as the most widely recognized screening test. This methodology is considered the standard for CRC screening on account of its ability to conduct biopsies of early-stage tumors, detect and excise precancerous lesions, and, thus, have a direct bearing on a more favorable prognosis.^{10,11} The preference for the examination as the principal method of screening could potentially be a factor in its heightened acknowledgment among personnel. Nevertheless, sigmoidoscopy was the least recognized technique in this regard when compared with the others. This could be attributed to the fact that colonoscopy can detect

proximal lesions, thus exerting a more significant impact on the reduction of incidence and mortality. Furthermore, the analysis of latent blood in feces requires less invasive techniques. These advantages, relative to sigmoidoscopy, could potentially explain a fraction of the increased public consciousness surrounding them.¹²

Moreover, it is established that screening for colon and rectal cancer should begin at age 45 for individuals devoid of major risk factors, including a significant family history and/or prior IBD.^{10,11} No significant disparity was identified between individuals aged 45 or older and those younger regarding their awareness of the optimal age to initiate screening. Younger employees, who fall outside the optimal age range for screening, may know as much as their older counterparts due to the recent proliferation of information and the accessibility of this subject through social media platforms, which enable knowledge to transcend age boundaries. Additionally, it is critical to emphasize that the incidence of CRC tends to rise among younger populations.^{13,14} To reduce rates, therefore, it is critical to distribute information regarding screening throughout all age groups.

An analysis was conducted to determine the extent to which the health center lacked information pertaining to CRC prevention and screening, with over half of the staff indicating that this information was unavailable. This result is unexpected given that, as an oncology center, employees and patients should be well informed about CRC through educational initiatives. Displaying information in a more accessible manner, such as through the use of posters, leaflets, or brief lectures, would be ideal from this vantage point. Conversely, among those who had been employed by the company for over a year, a greater proportion of staff members reported having acquired knowledge of CRC at the health center. Additionally, it was observed that personnel employed directly in health services possessed a more extensive understanding of the neoplasm in comparison to their counterparts in the administrative and general sectors. This result suggests that individuals who have been employed for a longer period of time and have a direct connection to the healthcare industry may have had greater exposure to CRC cases and gained knowledge from them on a daily basis. Consequently, employees with limited tenure at the health center and prior experience in other industries were unable to gain sufficient exposure to actual cases and were thus unaware of the malignancy at the establishment due to the lack of disclosed information. Furthermore, it is crucial to emphasize that a significant proportion of health sector employees possess advanced degrees. This suggests that they were afforded more educational opportunities prior to their employment at the health center and could have potentially responded to most of the inquiries regarding CRC by utilizing their prior knowledge.

Furthermore, it was disclosed that personnel possessing an advanced degree were more knowledgeable regarding colon and rectal cancer in comparison to their less educated counterparts. As a result of their increased understanding of the pathology, this group tends to have lower incidence, morbidity, and mortality rates associated with CRC. Moreover, they are

more adept at identifying warning signs, risk and prevention factors and initiating screening at the appropriate age. Statistical data demonstrates that as the Human Development Index (HDI) of a given region rises, there is a corresponding decline in both the incidence and fatality rate of colorectal tumors.¹⁵ This finding serves as a significant indicator of social inequality, as those with limited educational opportunities have a higher propensity to experience illness.

Overall, it was found that over 50% of the interviewees possessed knowledge of at least a substantial portion of the inquiries pertaining to the concept, risk factors, prevention, warning signs, and screening of CRC. Subsequently, to advance the democratization of information regarding this neoplasm, the health center must disseminate information regarding CRC prevention and screening in a lucid and expository fashion, whether via lectures, pamphlets, and posters. This ensures that information is accessible to all individuals, including those lacking undergraduate degrees or direct experience in health-related fields.

Because a significant portion of the sample also possesses academic training in the healthcare field and deals with cancer on a daily basis, it is crucial to emphasize that the current study has some limitations and may not accurately represent the level of knowledge of the general population. Furthermore, it is widely acknowledged that the general public still has limited access to information regarding colon and rectal cancer, rendering it a potentially fatal disease that is often detected too late.^{3,4,6} As a result, it is critical to increase public awareness regarding CRC. Equipped with this knowledge, individuals can take proactive measures to mitigate modifiable risk factors, identify warning signs with greater ease, and conduct screening at an earlier stage. The result will be an increased propensity for CRC prevalence, morbidity, and mortality rates to decline.^{3,4}

Conclusion

Employees at a reference cancer center have a satisfactory level of knowledge about CRC prevention and screening, including the ability to recognize risk and prevention factors, warning signs, and screening techniques, particularly employees who work directly with patients, and those with a higher level of schooling. This finding also highlights the need for greater dissemination of CRC information, particularly among those with lower levels of schooling.

Authors' Contributions

Karina Quely Andrade de Souza: contributed to conception or design, contributed to acquisition, analysis, or interpretation, drafted the manuscript.

de Abreu, GE: contributed to conception or design, contributed to acquisition, analysis, or interpretation, drafted the manuscript.

Paulo André Lago Silva: contributed to conception or design, critically revised the manuscript.

Dan Perdiz Fucs Machado: contributed to acquisition, analysis, or interpretation.

Gabriel Cury Andari David: contributed to acquisition.

All authors agree to be accountable for all aspects of work ensuring integrity and accuracy.

Conflict of Interests

The authors have no conflict of interests to declare.

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