Assessing Knowledge Gaps in Colorectal Cancer Screening Among Physicians in Al-Madinah, Saudi Arabia: Implications for Targeted Education Programs

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Abstract

Background: Colorectal cancer (CRC) is a highly fatal disease. Its incidence is increasing in Saudi Arabia. Early detection through screening programs effectively reduces mortality rates, but the lack of updated physicians' knowledge favors CRC.

Objectives: This study aimed to assess physicians' knowledge about CRC screening in Al-Madinah Al-Munawwarah (Western KSA) and help health authorities define the need for awareness campaigns directed toward physicians concerned with CRC screening.

Materials and methods: A cross-sectional study involving various specialties, including primary healthcare physicians, internists, general physicians, and general surgeons, using an electronic questionnaire. 327 physicians participated, and the responses were carried out using RStudio (R version 4.3.1). Frequencies and percentages expressed the categorical variables. A Pearson's Chi-squared test was used to assess the statistical differences in knowledge levels. Regression analysis results were expressed as odds ratios (ORs) and 95% confidence intervals (95% CIs).

Results: 73.7% of the participants correctly identified inflammatory bowel disease as a CRC risk, and (85.9%) identified positive family history of CRC as a risk factor. 84.4% of participants identified colonoscopy as a screening modality and 50.4% answered correctly that it should be repeated every 10 years. 52,1% of consultants and 62.4% of general practitioners had updated knowledge on CRC screening. 55% of general practitioners, 75% of gastroenterologists, and 62% of radiologists had updated knowledge regarding CRC risk stratification.

Conclusion: More updated knowledge is needed and our findings provide valuable insights for healthcare authorities to develop strategies to update physicians' knowledge on CRC screening to reduce CRC burden.

Keywords: Colorectal cancer; Awareness; Screening; Al-Madinah; Saudi Arabia; Physicians.

DOI: 10.21608/svuijm.2024.333396.2008

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Received: 13 October,2024.

Revised: 17 November,2024.

Accepted: 23 November,2024.

Published: 24 November, 2024

Cite this article as: Asim M. Almughamsi , Ahmad M Ban, Mohammad A Mohammed, Abdurrahman S Seraj, Hamza A Domlo, Hamza M Alayoubi, Hussam K Aloufi, Inass Taha..(2024). Assessing Knowledge Gaps in Colorectal Cancer Screening Among Physicians in Al-Madinah, Saudi Arabia: Implications for Targeted Education Programs. *SVU-International Journal of Medical Sciences*. Vol.7, Issue 2, pp: 842-857.

Introduction

Colorectal cancer (CRC) is a major health ailment that is responsible for cancer-related mortality worldwide **(Xi and Xu, 2021)**. It is the most common gastrointestinal cancer, having a multifactorial disease process. Etiology includes genetic factors, environmental exposures (including diet), and inflammatory conditions of the digestive tract **(Sameer, 2013)**. In Saudi Arabia, CRC is the first and the third most frequent cancer in men and women respectively, with a consistent rise in its incidence and deaths over the past 20 years. Moreover, most patients were diagnosed late, and the overall rate of survival is only 44.6%, with a mean age of diagnosis of 58 years **(Surendra et al., 2016)**. On the contrary, there is a recent decline in colorectal cancer-related morbidity and mortality in developed countries where most cases are diagnosed early through widely applied screening programs **(Arnold et al., 2017)**. It takes several years for CRC to develop from precancerous polyps to malignant carcinomas **(Mahmoud et al., 2020)**. 90% of patients would survive if the disease was confirmed early, while 10% would survive if metastasis occurred. Thus, there is a crucial opportunity for doctors and public health workers for early detection and intervention through screening. CRC is a suitable cancer for screening strategies **(Kuipers et al., 2018)**. The current guidelines for CRC screening include fecal occult blood testing, sigmoidoscopy, and colonoscopy every 1, 5, and 10 years, respectively, beginning from the age of 50 years **(Wolf et al., 2018)**. Despite the crucial role of early detection of CRC by screening in decreasing the prevalence and mortality, there is still a low rate of participation in such screening programs. This could be due to various barriers, including lack of knowledge and awareness among patients and physicians and psychosocial, socio-demographic, and healthcare system barriers. Accordingly, taking into consideration such barriers and further education about the disease process and clinical features may encourage individuals to undergo screening programs to reduce mortality rates **(AlSulaim et al., 2021)**. The risk factors of CRC include old age, low fiber diet, smoking, family history, eating processed meat, obesity, inflammatory bowel diseases, and binge drinking. Moreover, changes in bowel habits, stomach pain, rectal bleeding, and unexpected weight loss are clinical features of CRC **(Jarab et al., 2024)**Physicians play a critical role in encouraging patients to undergo the CRC screening program. This study aims to assess physicians' knowledge and awareness of CRC screening.

Materials and methods

Study design and location

This is a cross-sectional study in Al-Madinah Al-Munawwarah, a city in the western region of KSA. It included physicians who are expected to care for patients that may be candidates for CRC screening e.g., primary healthcare physicians, internists, general physicians, and general surgeons. It continued for 12 months, in the period from November 2022 to November 2023.

Based on the calculation of the sample size, 333 subjects were planned to be included. The number of physicians in Al-Madinah Al-Munawwarah, as it was retained from the MOH official website, was 2408, according to the latest statistics in mid-2018. Oncologists were excluded. Out of the initially participating 333 physicians, six did not complete the questionnaire, and thus, they were excluded. Therefore, the responses of 327 participants were studied.

Sampling Tool

This study was based on an electronic questionnaire that was distributed to physicians in Al-Madinah Al-Munawwarah, and the data was collected accordingly. The questionnaire was initially validated by a pilot study for the first 50 participants, and it was also revised by a statistician and a consultant physician expert in research methodology. The administered questionnaire used was adopted from another research after permission **(Ooi et al., 2019)**. Participants' knowledge was based on four items related to risk stratification of colorectal cancer (CRC), three items related to the family history, and 15 items related to knowledge regarding CRS screening modalities. This accounted for a total of 22 items. Knowledge scoring was performed for 18 items because four items had no correct responses (recommended starting age of double contrast barium enema (DCBE) and carcinoembryonic antigen (CEA) testing and the frequencies of performing DCBE and CEA. Each correct response was assigned 1, and other incorrect selections were assigned zero. Therefore, the overall knowledge score ranged between 0 and 18, where higher scores indicated higher knowledge. This was converted to a percentage score by using the following formula: Percentage score = (overall score*100)/18. Knowledge levels were categorized into updated and non-updated knowledge. Updated knowledge was defined as a score of > 80% for participants in four specialties (family medicine, internal medicine, general surgery, and gastroenterology) or a score of > 60% for other specialties.

Ethical considerations

The study was performed in compliance with the Helsinki Declaration and in accordance with the regulations laid down by the College of Medicine, Taibah University's ethical committee (No. STU-22-022), dated 15th February 2023. The study questionnaire introduced the research and researchers, outlining the research objectives and allowing the participants to give informed written consent in its first part. All data obtained were kept confidentially and safely with the principal investigator.

Statistical Analysis

Data analysis was carried out using RStudio (R version 4.3.1). We used frequencies and percentages to express categorical variables. A Pearson's Chi-squared test was used to assess the statistical differences in knowledge levels between participants of the four primary specialties (family medicine, internal medicine, general surgery, and gastroenterology) and those in other specialties. We performed a multiple

logistic regression analysis to explore the risk factors for non-updated knowledge, where the knowledge level (updated vs non-updated) was entered as a dependent variable. Demographic and occupational characteristics were used as independent variables. Regression analysis results were expressed as odds ratios (ORs) and 95% confidence intervals (95% CIs). A (p) value of <0.05 is considered statistically significant for all analyses.

Results

Demographic and occupational characteristics of the participants

All demographic data and occupational characteristics of the participants are summarized in (**Table.1**).

Table 1. Demographic and occupational characteristics of the participants

Characteristic	N=327
Gender	
• Male	241 (73.7%)
• Female	86 (26.3%)
Age	
• 20-30	214 (65.4%)
• 31-40	66 (20.2%)
• 41-50	22 (6.7%)
• 51-60	14 (4.3%)
• Above 60	11 (3.4%)
Nationality	
• Saudi	292 (89.3%)
• Non-Saudi	35 (10.7%)
Profession/specialty	
• General Practitioner	109 (33.3%)
• Internal Medicine	37 (11.3%)
• Gastroenterology	4 (1.2%)
• Family Medicine	39 (11.9%)
• Radiology	8 (2.4%)
• Other medical specialties	70 (21.4%)
• General Surgery	16 (4.9%)
• Other surgical specialties	44 (13.5%)
Rank	
• Resident	99 (30.3%)
• General Practitioner	119 (36.4%)
• Fellow	1 (0.3%)
• Specialist	35 (10.7%)
• Consultant	73 (22.3%)
Place of practice	
• University	3 (0.9%)
• Hospital	302 (92.4%)
• Polyclinic	22 (6.7%)
Section of practice	
• Government	309 (94.5%)
• Private	18 (5.5%)

Participants' responses to knowledge items regarding CRC risk stratification and screening modalities

For risk stratification, most correctly identified the elevated risk associated with inflammatory bowel disease (73.7%) and a family history of CRC in two relatives (85.9%). However, participants exhibited non-updated knowledge in recognizing appropriate screening modalities, as evidenced by highly correct responses for recommended starting age and frequency of fecal occult blood test (FOBT) (84,8%, 84,4%, respectively). Additionally, the majority correctly identified that it must be repeated annually (75.1%); only (84.4%) identified colonoscopy as a screening modality. 50.4% think correctly that it should be repeated every 10 years, and flexible sigmoidoscopy as a screening tool was the choice for 51.4%, and 75.9% believed it should be repeated every 5 years. Participants were less familiar with double-contrast barium enema (DCBE) and serum carcinoembryonic antigen (CEA), with only 49.2% and 45.9% correctly indicating their non-recommendation as screening methods, respectively. More details about the correct responses are provided in (**Table.2**).

In general, based on knowledge scoring and categorization, almost half of the respondents had non-updated knowledge regarding CRC (50.8%),

Table 2.Participants' responses to knowledge items regarding CRC risk stratification and screening modalities.

Characteristics	N=327 n (%)
Inflammatory bowel disease	
• Low	11 (3.4%)
• Average	56 (17.1%)
• High*	241 (73.7%)
• Do not know	19 (5.8%)
Family history of CRC in two relatives	
• Low	1 (0.3%)
• Average	36 (11.0%)
• High*	281 (85.9%)
• Do not know	9 (2.8%)
A female patient with no family history of colorectal cancer	
• Low	150 (45.9%)
• Average*	131 (40.1%)
• High	21 (6.4%)
• Do not know	25 (7.6%)
A male patient with no family history of colorectal cancer	
• Low	67 (20.5%)
• Average*	193 (59.0%)
• High	46 (14.1%)
• Do not know	21 (6.4%)
Family history of familial adenomatous polyposis	

• No	9 (2.8%)
• Yes*	292 (89.3%)
• Do not know	26 (8.0%)
Family history of hereditary non-polyposis colorectal cancer	
• No	31 (9.5%)
• Yes*	240 (73.4%)
• Do not know	56 (17.1%)
Patient with inflammatory bowel disease	
• No	22 (7.4%)
• Yes*	237 (79.8%)
• Do not know	38 (12.8%)
• Missing	30
• Fecal occult blood test (FOBT)	
• No	23 (7.0%)
• Yes*	276 (84.4%)
• Do not know	28 (8.6%)
Recommended starting age of FOBT	
• 45*	119 (43.1%)
• 50*	115 (41.7%)
• 55	30 (10.9%)
• 60	11 (4.0%)
• 65	0 (0.0%)
• 70	1 (0.4%)
Frequency of FOBT	
• Annually*	205 (75.1%)
• Every 5 years	58 (21.2%)
• Every 10 years	10 (3.7%)
• Missing	3
Colonoscopy	
• No	31 (9.5%)
• Yes*	276 (84.4%)
• Do not know	20 (6.1%)
Recommended starting age of colonoscopy	
• 45*	95 (34.4%)
• 50*	127 (46.0%)
• 55	32 (11.6%)
• 60	18 (6.5%)
• 65	3 (1.1%)
• 70	1 (0.4%)
Frequency of colonoscopy	
• Annually	24 (8.8%)
• Every 5 years	112 (40.9%)
• Every 10 years*	138 (50.4%)
• Missing	2
Double-contrast barium enema (DCBE)	

• No*	161 (49.2%)
• Yes	48 (14.7%)
• Do not know	118 (36.1%)
Recommended starting age of DCBE	
• 45	17 (36.2%)
• 50	18 (38.3%)
• 55	3 (6.4%)
• 60	5 (10.6%)
• 65	2 (4.3%)
• 70	2 (4.3%)
• Missing	1
Frequency of DCBE	
• Annually	14 (29.8%)
• Every 5 years	25 (53.2%)
• Every 10 years	8 (17.0%)
• Missing	1
Flexible sigmoidoscopy	
• No	93 (28.4%)
• Yes*	168 (51.4%)
• Do not know	66 (20.2%)
Recommended starting age of flexible sigmoidoscopy	
• 45*	60 (36.6%)
• 50*	75 (45.7%)
• 55	17 (10.4%)
• 60	8 (4.9%)
• 65	3 (1.8%)
• 70	1 (0.6%)
• Missing	4
Frequency of flexible sigmoidoscopy	
• Annually	21 (12.7%)
• Every 5 years*	126 (75.9%)
• Every 10 years	19 (11.4%)
• Missing	2
Serum carcinoembryonic antigen (CEA)	
• No*	150 (45.9%)
• Yes	86 (26.3%)
• Do not know	91 (27.8%)
Recommended starting age of CEA	
• 45	28 (33.3%)
• 50	25 (29.8%)
• 55	12 (14.3%)
• 60	16 (19.0%)
• 65	2 (2.4%)
• 70	1 (1.2%)
• Missing	2
Frequency of CEA	

• Annually	42 (50.0%)
• Every 5 years	37 (44.0%)
• Every 10 years	5 (6.0%)
• Missing	2

*An asterisk indicates a correct answer

Factors associated with non-updated knowledge regarding overall CRC basic knowledge

(Table.3) represents the factors associated with non-updated knowledge regarding overall CRC basic knowledge among the surveyed physicians. A significant difference was observed based on profession/specialty ($p < 0.001$). General surgeons (87.5%) and internal medicine specialists (78.4%) showed a higher proportion of non-updated knowledge. Rank also displayed a significant association ($p = 0.029$). 52,1 % of consultants and 62.4 % of general practitioners had updated knowledge, while 59.6% of residents and 62.9 % of specialists had non-updated knowledge. Moreover, the place of practice demonstrated a significant association ($p = 0.040$), with physicians practicing in university institutions (100.0%) and polyclinics (68.2%) exhibiting a higher proportion of non-updated knowledge compared to those in hospitals (49.0%).

Table 3. Factors associated with non-updated knowledge regarding overall CRC basic knowledge

Characteristics	Knowledge regarding overall CRC knowledge n (%)		p-value
	Updated N=161	Non-updated N=166	
Gender			0.556
• Male	121 (50.2%)	120 (49.8%)	
• Female	40 (46.5%)	46 (53.5%)	
Age			0.967
• 20-30	107 (50.0%)	107 (50.0%)	
• 31-40	30 (45.5%)	36 (54.5%)	
• 41-50	11 (50.0%)	11 (50.0%)	
• 51-60	7 (50.0%)	7 (50.0%)	
• Above 60	6 (54.5%)	5 (45.5%)	
Nationality			0.424
• Saudi	146 (50.0%)	146 (50.0%)	
• Non-Saudi	15 (42.9%)	20 (57.1%)	
Profession/specialty			<0.001
• General Practitioner	68 (62.4%)	41 (37.6%)	
• Internal Medicine	8 (21.6%)	29 (78.4%)	
• Gastroenterology	2 (50.0%)	2 (50.0%)	
• Family Medicine	18 (46.2%)	21 (53.8%)	
• Radiology	3 (37.5%)	5 (62.5%)	
• Other medical specialties	37 (52.9%)	33 (47.1%)	

• General Surgery	2 (12.5%)	14 (87.5%)	
• Other surgical specialties	23 (52.3%)	21 (47.7%)	
Rank			0.029
• Resident	40 (40.4%)	59 (59.6%)	
• General Practitioner	69 (58.0%)	50 (42.0%)	
• Fellow	1 (100.0%)	0 (0.0%)	
• Specialist	13 (37.1%)	22 (62.9%)	
• Consultant	38 (52.1%)	35 (47.9%)	
Place of practice			0.040
• Hospital	154 (51.0%)	148 (49.0%)	
• University	0 (0.0%)	3 (100.0%)	
• Poly clinic	7 (31.8%)	15 (68.2%)	
Section of practice			0.581
• Government	151 (48.9%)	158 (51.1%)	
• Private	10 (55.6%)	8 (44.4%)	

Pearson's Chi-squared test; Fisher's Exact Test

Factors associated with non-updated knowledge regarding CRC risk stratification

(**Table.4**) presents factors associated with non-updated knowledge regarding CRC risk stratification among physicians. In terms of profession/specialty, physicians specializing in family medicine (79.5%), internal medicine (75.7%), and general surgery (75.0%) exhibited significantly higher proportions of non-updated knowledge ($p < 0.001$). 55 % of general practitioners, 75 % of gastroenterologists, and 62 % of radiologists were found to have updated knowledge regarding CRC risk stratification. Furthermore, Residents (64.6%) and specialists (68.6%) displayed a significantly higher percentage of non-updated knowledge than other ranks. Additionally, the place of practice demonstrated a significant association ($p = 0.024$), with physicians practicing in university hospitals and polyclinics exhibiting non-updated knowledge (100.0% and 77.3%, respectively) compared to those practicing in hospitals (53.6%).

Table 4. Factors associated with non-updated knowledge regarding CRC risk stratification

Characteristic	**Knowledge regarding CRC risk stratification n (%)**		**p-value**
	Updated N=145	**Non-updated** N=182	
Gender			0.637
• Male	105 (43.6%)	136 (56.4%)	
• Female	40 (46.5%)	46 (53.5%)	
Age			0.775
• 20-30	91 (42.5%)	123 (57.5%)	

• 31-40	32 (48.5%)	34 (51.5%)	
• 41-50	9 (40.9%)	13 (59.1%)	
• 51-60	8 (57.1%)	6 (42.9%)	
• Above 60	5 (45.5%)	6 (54.5%)	
Nationality			0.372
• Saudi	127 (43.5%)	165 (56.5%)	
• Non-Saudi	18 (51.4%)	17 (48.6%)	
Profession/specialty			< 0.001
• General Practitioner	60 (55.0%)	49 (45.0%)	
• Internal Medicine	9 (24.3%)	28 (75.7%)	
• Gastroenterology	3 (75.0%)	1 (25.0%)	
• Family Medicine	8 (20.5%)	31 (79.5%)	
• Radiology	5 (62.5%)	3 (37.5%)	
• Other medical specialties	34 (48.6%)	36 (51.4%)	
• General Surgery	4 (25.0%)	12 (75.0%)	
• Other surgical specialties	22 (50.0%)	22 (50.0%)	
Rank			0.025
• Resident	35 (35.4%)	64 (64.6%)	
• General Practitioner	61 (51.3%)	58 (48.7%)	
• Fellow	1 (100.0%)	0 (0.0%)	
• Specialist	11 (31.4%)	24 (68.6%)	
• Consultant	37 (50.7%)	36 (49.3%)	
Place of practice			0.024
• Hospital	140 (46.4%)	162 (53.6%)	
• University	0 (0.0%)	3 (100.0%)	
• Poly clinic	5 (22.7%)	17 (77.3%)	
Section of practice			0.632
• Government	138 (44.7%)	171 (55.3%)	
• Private	7 (38.9%)	11 (61.1%)	

Pearson's Chi-squared test; Fisher's exact test

Factors associated with non-updated knowledge regarding CRC screening modalities

(Table. 5) outlines factors associated with non-updated knowledge regarding CRC screening modalities among physicians. Profession/specialty exhibited a significant association ($p < 0.001$), indicating substantial differences in knowledge levels. 56% of General practitioners had updated knowledge regarding CRC screening. Notably, radiologists included (though only 8) all (100%) had non-updated knowledge. 78.4% of internal medicine specialists and 81.3% of general surgery specialists exhibit non-updated knowledge. 61.4% of other surgical specialties (ear, nose and throat, urologists, and ophthalmologists) had non-updated knowledge. Rank also displayed a significant association (p =

0.011), with higher percentages of non-updated knowledge among residents (65.7%), specialists (62.9%), and consultants (68.5%), compared to general practitioners.

Table 5.Factors associated with non-updated knowledge regarding CRC screening modalities.

Characteristic	Knowledge regarding CRC screening modalities n (%)		p-value
	Updated N=133	Non-updated N=194	
Gender			0.074
• Male	105 (43.6%)	136 (56.4%)	
• Female	28 (32.6%)	58 (67.4%)	
Age			0.206
• 20-30	97 (45.3%)	117 (54.7%)	
• 31-40	20 (30.3%)	46 (69.7%)	
• 41-50	8 (36.4%)	14 (63.6%)	
• 51-60	5 (35.7%)	9 (64.3%)	
• Above 60	3 (27.3%)	8 (72.7%)	
Nationality			0.653
• Saudi	120 (41.1%)	172 (58.1%)	
• Non-Saudi	13 (37.1%)	22 (62.9%)	
Profession/specialty			< 0.001
• General Practitioner	61 (56.0%)	48 (44.0%)	
• Internal Medicine	8 (21.6%)	29 (78.4%)	
• Gastroenterology	2 (50.0%)	2 (50.0%)	
• Family Medicine	21 (53.8%)	18 (46.2%)	
• Radiology	0 (0.0%)	8 (100.0%)	
• Other medical specialties	21 (30.0%)	49 (70.0%)	
• General Surgery	3 (18.8%)	13 (81.3%)	
• Other surgical specialties	17 (38.6%)	27 (61.4%)	
Rank			0.011
• Resident	34 (34.3%)	65 (65.7%)	
• General Practitioner	62 (52.1%)	57 (47.9%)	
• Fellow	1 (100.0%)	0 (0.0%)	
• Specialist	13 (37.1%)	22 (62.9%)	
• Consultant	23 (31.5%)	50 (68.5%)	
Place of practice			0.497
• Hospital	124 (41.1%)	178 (58.9%)	
• University	0 (0.0%)	3 (100.0%)	
• Poly clinic	9 (40.9%)	13 (59.1%)	

• Section of practice			0.874
• Government	126 (40.8%)	183 (59.2%)	
• Private	7 (38.9%)	11 (61.1%)	

Pearson's Chi-squared test; Fisher's exact test

Perceived barriers and facilitators influencing the decision for CRC screening

More than half of the responders agreed and or strongly agreed that screening for CRC is beneficial for their patients (80.4%),

screening for colorectal cancer is cost-effective (65.4%), and that there are adequate laboratory, diagnostic, and specialist resources in the health region for CRC implantation (64.2%). On the other hand, almost one-third of the respondents disagreed or strongly disagreed that they had enough knowledge about various CRS screening tools (37.6%), (34.3%) agreed that they had inconsistent recommendations about CRC, and 33.3% agreed that the time restrictions during a routine check up would mean that other conditions (e.g., heart disease) have higher priority than screening for CRC (**Fig.1**).

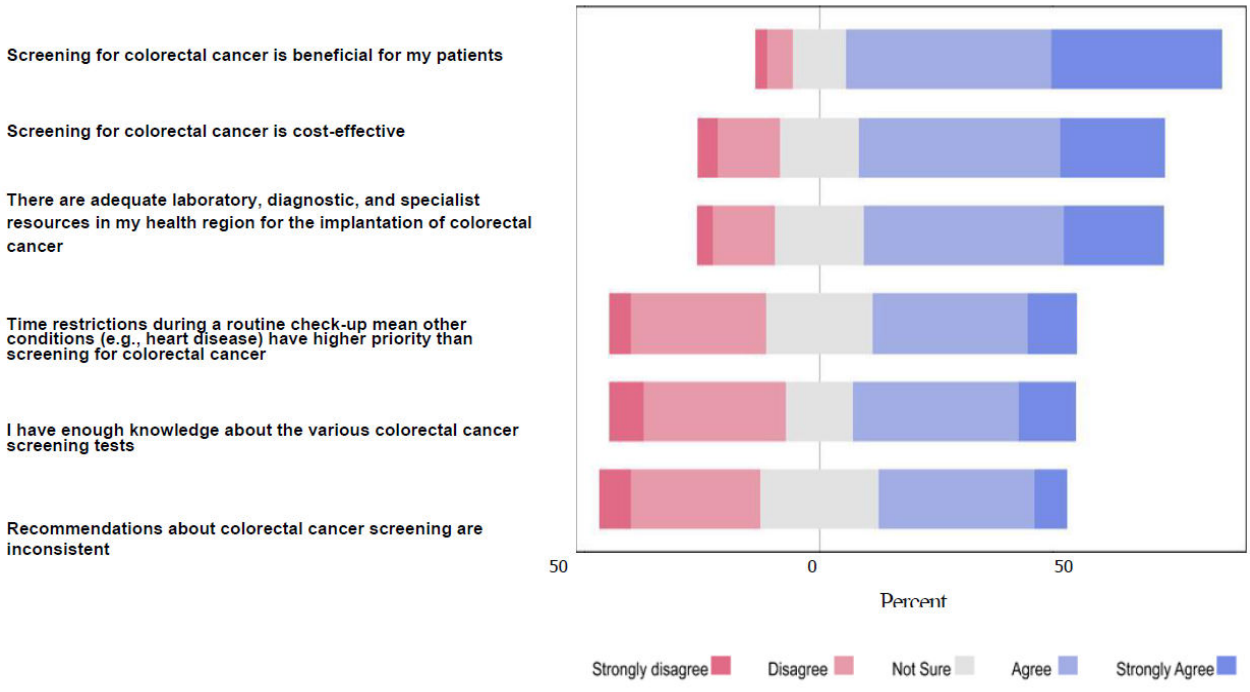

Fig.1 . Perceived barriers and facilitators influencing the decision for CRC screening

Discussion

Screening of colorectal cancer has the potential to significantly reduce CRC-associated mortality and morbidity **(Gini et al., 2020)**. In this cross-sectional study, we aimed to assess the knowledge and awareness of CRC screening among physicians in Al-Madinah, KSA . The majority of the participants were males , aged 20-30

years. The overall assessment showed a significant proportion of non-updated knowledge (50.7%), which is similar to a study done in Malaysia **(Ooi et al., 2019)**. Regarding risk assessment and whether it is indicated to screen at an earlier age in certain high-risk cases such as IBD, FAP, and HNPCC, the majority showed updated knowledge, which aligns with the literature done in Canada **(Sewitch et al., 2006)**. However, regarding screening modalities, about half of the physicians agreed or did not know if double-contrast barium enema and serum carcinoembryonic antigens are utilized in CRC screening. The starting age at which screening is recommended differs by guidelines as the American College of Gastroenterology, the American Association for Gastrointestinal Endoscopy, and the American Gastroenterological Association recommend screening by the age of 45 years **(Patel et al., 2022)**. While European and Canadian guidelines still recommend screening by the age of 50 years **(Shaukat et al., 2022)**. In our study, we considered that both answers, 45 and 50 years, are acceptable as starting ages. 80% of the participants had updated knowledge regarding the starting age of screening of CRC as compared to another research done in Al-Ahsa that showed less than 60% of the participants were aware of the starting age **(Surendra et al., 2016)**.

Notably, there was a significant variation in knowledge based on the specialties, this may be due to the different thresholds of correct answers to be considered as updated knowledge, the specialties were divided according to their frequency of exposure to the eligible patients for colorectal cancer screening. Internal medicine physicians and general surgeons exhibited an unexpected non-updated knowledge. Family physicians had better understanding and knowledge level regarding the overall basic knowledge despite that they required similar threshold to that of internal medicine physicians and general surgeons. This could be attributable to family physicians being the first line of health hierarchy, and more aware of colorectal cancer screening as they encounter eligible patients more frequently. Furthermore, the reason radiologists exhibit a non-updated level of knowledge regarding screening modalities could be that the radiologists who participated in our questionnaire were from specialties that are not involved in colorectal cancer screening.

Moreover, regarding barriers that influence the decision for CRC screening, most respondents agreed that CRC is beneficial for their patients and is cost-effective. In the United States, a study has demonstrated the cost-effectiveness of CRC screening. However, a significant number of physicians disagreed that they had enough knowledge of different CRC screening tools **(Maciosek et al., 2006)**.

It is necessary to acknowledge certain limitations that may influence the generalization of our findings. The cross-sectional design of our study assesses the knowledge at a specific point in time. Also, the self-administration of the questionnaire makes the results vulnerable to recall

bias. Moreover, the sample size of our study was limited. Our study findings may not be representative of the comprehensive level of knowledge of all physicians in our region due to its limitations, however, it highlights the need for targeted educational programs regarding CRC screening to improve the knowledge level, enhance the practice of screening, and ultimately, reduce the sequelae of CRC and improve the quality of the patients' lives.

Recommendations

Customized Continuing Medical Education (CME) Programs:

Curriculum Development: Develop specialty-specific CME modules focusing on updated CRC screening guidelines, risk stratification, and available screening modalities. Experts in gastroenterology and oncology should create these modules to ensure accuracy and relevance.

Interactive Workshops: Conduct interactive workshops and seminars to facilitate learning. Use case studies, role-playing, and problem-solving exercises to engage participants actively.

Online Learning Platforms: Utilize e-learning platforms to offer flexible, self-paced learning opportunities. This can be especially beneficial for busy professionals who may find it challenging to attend in-person sessions.

Conclusion

The current study's findings indicate a gap in knowledge among physicians, which may contribute to the late diagnosis of CRC. The study also revealed differences in knowledge among different specialties. General practitioners and Family physicians showed a higher level of knowledge compared to other specialties. Still, the percentage is not optimal, especially as regards general basic knowledge and the available screening modalities.

Acknowledgment: First and foremost, we appreciate the physicians in Al-Madinah who participated in this study and generously shared their knowledge and experiences. Their valuable input and cooperation were instrumental in obtaining accurate and insightful data. We would also like to acknowledge the health authorities in Madinah for their support and cooperation in facilitating the research process. Their insights and guidance have been invaluable in defining the need for awareness campaigns directed toward physicians concerned with CRC screening.

Conflict of interest: The authors declare that there is no conflict of interest

Author Contributions:

Conceptualization, all authors; methodology; Ahmad M ban, Mohammad A mohammed, Abdurrahman S Seraj, Hamza A Domlo, Hamza M Alayoubi, Hussam K Aloufi, Data collection ; Ahmad M Ban, Mohammad A Mohammed, Abdurrahman S Seraj, Hamza A Domlo, Hamza M Alayoubi, Hussam K Aloufi , Drafting; writing—original draft preparation; — Ahmad M Ban, Mohammad A Mohammed, Abdurrahman S Seraj, Hamza A Domlo, Hamza M Alayoubi, Hussam K Aloufi ; review and editing,; visualization; Inass Taha, and All

authors have read and agreed to the published version of the manuscript.

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