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PERSPECTIVES

Mapping the Colorectal Cancer Patient Journey From the Oncologist Perspective in Saudi Arabia

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Purpose: Mapping the colorectal cancer (CRC) patient pathway is needed to identify knowledge gaps and improve patient care. We aimed to understand the medical journey of patients and the role of the multidisciplinary team (MDT) in managing CRC in Saudi Arabia.

Methods: A nationwide survey was administered to healthcare professionals (HCPs) in Saudi Arabia during August 1–September 15, 2024, to characterize typical patient profiles and CRC management.

Results: Out of 33 responses, 28 were eligible, mostly were medical oncologists (96.4%) in tertiary healthcare settings (>85%) with 5–20 years of experience (78.6%). Most HCPs reported that patients had no or limited awareness of CRC (89.3%) and lacked access to support groups (71.4%). The guideline-recommended screening of individuals aged 45–75 years with no symptoms or a family history of CRC or polyps was only reported by 67.9% of respondents. Common screening methods were colonoscopy (89.3%) and fecal immunochemical test (53.6%). Major barriers to optimal CRC screening were patients' lack of awareness (92.9%) and challenges in accessing screening programs (75.0%). Gastroenterologists were the primary referrers to specialized centers and were responsible for diagnosing CRC (reported by 92.9% and 85.7%, respectively); 53.6% and 17.9% of respondents reported that surgical oncologists and an MDT also made the definitive diagnosis, respectively. Respondents identified the key MDT members taking care of patients with CRC as surgical (100.0%), medical (100.0%), radiation oncologists (92.9%), and pathologists (92.9%). Some MDTs involved other professionals, including radiologists (85.7%), clinical gastroenterologists (64.3%), dieticians (64.3%) and pharmacists (60.7%). The most common barrier to effective CRC treatment was delays in patient presentation (67.9%).

Conclusion: The results give clinicians and public bodies the opportunity to address critical factors for improving the outcomes for CRC patients in Saudi Arabia.

Keywords: CRC, survey, oncologist, barrier, management, awareness

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Introduction

Colorectal cancer (CRC) was the third most common cancer worldwide in 2020, accounting for 10.0% of all cases and the second leading cause of cancer deaths, responsible for 9.4% of cancer-related mortalities.[1] This trend is also reflected in Saudi Arabia, where CRC is now the second most common type of cancer, accounting for 13.3% of new cases overall, and it was the leading cause for cancer-related mortality, resulting in 13,399 deaths.[2] Over the past two decades, the incidence of CRC in Saudi Arabia has nearly tripled in men, with the age-standardized rate (ASR) increasing from 5.0 in 2001 to 13.0 in 2022.[2–4] In women, the incidence has doubled, with the ASR rising from 5.0 in 2001 to 9.8 in 2022.[2,3] The incidence and mortality of CRC in Saudi Arabia are anticipated to rise over the next 20 years.[2,4,5]

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Recent advancements in cancer prevention efforts such as early detection screening and treatment options, have decreased CRC incidence and mortality rates in Europe and North America.[4,6,7] These contrasting trends underscore the importance of tailored strategies across the patient pathway to address the unique challenges faced in Saudi Arabia.

Risk factors associated with CRC have been well-established in global studies, but there are only a limited number of small studies investigating the specific risk factors contributing to the increased incidence of CRC in Saudi Arabia.[8–12] One study highlighted that since the 1970s, there has been a rise in the incidence of non-communicable diseases such as obesity in Saudi Arabia.[3,12–14] Obesity is a widely accepted risk factor associated with CRC.[12,14] Other risk factors that have been associated with CRC among the Saudi Arabian population include alcohol, smoking, physical inactivity, high cholesterol, family history of CRC, body mass index, employment status, colon polyps and constipation.[12–14] However, a study surveying the awareness of cancer risk factors and warning signs among 390 Saudi adults demonstrated that over half the population had low to moderate knowledge of cancer risk factors.[15] Therefore, it is crucial to confirm the risk factors associated with CRC in Saudi Arabia to support adoption of screening strategies to enable early diagnosis.

Saudi Arabia offers free healthcare services to both its citizens and non-Saudis employed in government sectors, significantly increasing the financial burden on the healthcare system.[3,16] Therefore, there is an urgent need to bolster the healthcare system and optimize the patient journey. In response to the rising demand for health services, the Saudi Arabian Ministry of Health has developed a national strategy, which is part of the Saudi Arabia's Vision 2030.[17] The health sector transformation strategy aims to expand the healthcare system and improve access to treatment with support from the private sector.[17] By mapping the patient pathway, areas for improvement can be identified that will help facilitate multidisciplinary development of the healthcare services for patients.

There is a paucity of information in the literature regarding the management of CRC in Saudi Arabia. Therefore, through a comprehensive literature search and a survey of HCPs in Saudi Arabia, we aimed to understand their perspectives on the patient journey, gain insights on their role in diagnosing and treating CRC, and identify areas for improvement in patient care. This study sought to understand the medical journey of patients and the role of the multidisciplinary team (MDT) in managing CRC in Saudi Arabia.

Methods

A three-step approach was used to develop the patient pathway. First, a comprehensive literature review was conducted to identify previous practices and developments (Figure 1). Second, an expert scientific committee comprising seven oncologists from Saudi Arabia was convened to design a national survey aimed at characterizing typical patient profiles and management practices among healthcare professionals (HCPs). Finally, a consensus workshop was held to discuss the experts' insights and perspectives on the survey results.

A review of the literature published in the period January 1, 2014 to July 1, 2024 was performed to identify relevant articles on epidemiology, awareness and screening of patients with CRC. The selected articles were searched against the topics of interest and duplicates, randomized controlled trials, other interventional studies, non-English language and non-human articles were excluded. The remaining articles were reviewed and used to develop recommendations based on evidence. The search terms included: "bowel cancer", "Saudi Arabia", "colorectal cancer", "colon cancer", "rectum cancer", "anal cancer" and other related keywords.

An anonymous, internet-based, self-administered online survey consisting of 32 close-ended questions was developed based on the comprehensive literature review. The survey aimed to capture the perspectives of HCPs currently practicing in Saudi Arabia who care for patients with CRC. The questions centered on five key domains of the patient journey: patient characteristics and behavior, screening and referral, diagnosis, treatment, post-treatment follow-up (Table 1). In certain instances, participants were permitted to select multiple responses for a given question.

The survey was conducted by Innovaacom LLC and circulated via Email and WhatsApp by the authors targeting oncologists caring for patients with CRC, gastroenterologists and internists in Saudi Arabia. The survey was available for 46 days (August 1–September 15, 2024) to complete.

During the consensus process, results of the survey were presented to the expert panel for review and discussion, leading to the final milestones for the patient journey.

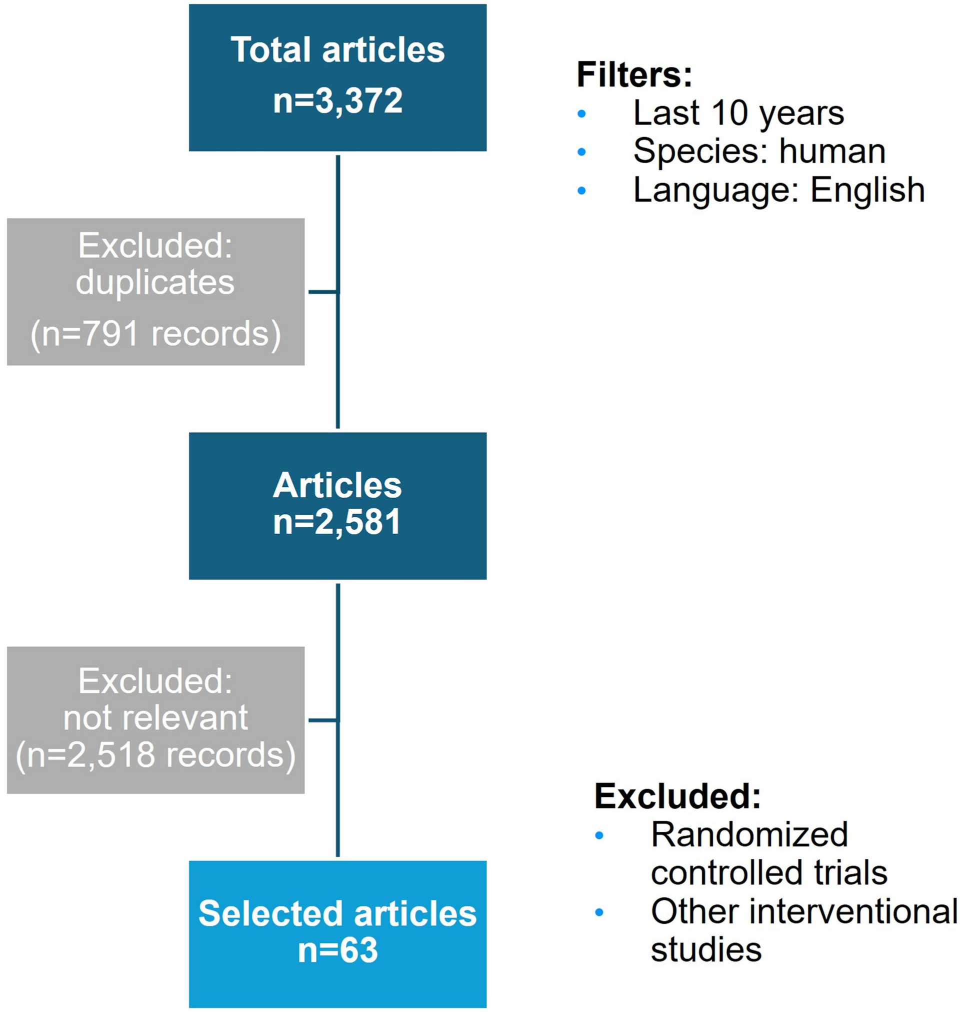

Figure 1 Literature analysis.

Ethical approval was not applicable, as the manuscript does not involve research with human or animal subjects per the guidelines outlined by the Ministry of Health of Saudi Arabia.[18] All participants provided informed consent prior to starting the survey and at any point in survey could withdraw participation by not submitting their responses.

Results

Thirty-three HCPs initiated the survey. One participant did not provide consent and did not complete the survey. Of the remaining 32 respondents, 28 qualified for and completed the survey; four were excluded for not currently being a practicing physician in Saudi Arabia.

HCP Setting and Experience

Most respondents identified as medical oncologists (96.4%). The majority of respondents were practicing in a public, government, or military healthcare center or hospital (85.7%) with the rest practicing in the private sector (14.3%). (Table 2). Nearly a quarter worked in academic hospitals (21.4%). The majority of respondents had between 5 and 20 years of experience caring for patients with CRC (78.6%).

Table 1 National Survey

Domain and Questions	
D00.	Screening questions
D00.1	Do you consent to the terms above and wish to continue with the survey? A. Yes B. No
D00.2	Are you a consultant physician currently practicing in Saudi Arabia? A. Yes B. No
D0.	Healthcare professional setting and experience
D0.1	Which of the following most closely describes your professional role? A. Medical oncologist B. Surgical oncologist C. Radiation oncologist D. Gastroenterologist E. Internist F. Other
D0.2	Which of the following most closely describes your main work setting? A. Private sector B. Public, government, or military healthcare center or hospital C. Academic hospital (teaching hospital/university) D. Other
D0.3	How many years have you been working in the care of patients with CRC? A. <5 years B. ≥5–<10 years C. ≥10–<20 years D. ≥20 years
D1.	Patients' profile
D1.1	In general, what is the level of awareness of CRC among patients at the time of diagnosis? A. No awareness B. Limited awareness C. Good awareness D. I do not know
D1.2	Are support groups available for patients with CRC and their families in your region? A. Patient support groups are available and active in my region B. Patient support groups exist but are not active C. No patient support groups exist in my region D. I do not know
D1.3	Which risk factors / comorbidities are present in ≥25% of your patients with CRC at some point during their journey? A. Depression or anxiety B. Cardiovascular disease, including hypertension C. Diabetes D. Renal disease E. Chronic obstructive pulmonary disease (COPD) F. Inflammatory bowel disease G. Obesity H. Smoking I. Other
D2.	Screening and referral to specialized care
D2.1	Which population groups are selected for CRC screening in your region? A. Individuals aged 45–75 years with no symptoms or a family history of CRC or polyps B. Individuals with inflammatory bowel disease C. Individuals with personal or family history of CRC or polyps D. Individuals exposed to radiotherapy during childhood E. Individuals with a genetic disease such as familial adenomatous syndrome F. Other G. A screening program is not available in my region

(*Continued*)

Table 1 (Continued).

D2.2	Which screening methods are available in your region? A. FIT (fecal immunochemical test) for blood B. Colonoscopy C. Guaiac-based fecal occult blood test (gFOBT) D. Multitarget stool DNA tests with fecal immunochemical testing (MT-sDNA or FIT-DNA) E. Computed tomography colonography (CTC) F. Other G. None
D2.3	In which setting does the screening of high-risk individuals usually happen? A. Primary care B. Secondary care C. Tertiary care (university hospitals, reference hospitals)
D2.4	Which healthcare professional usually refers individuals to the specialized center for additional investigation and diagnosis? A. Primary care physician/family medicine physician B. Gastroenterologist C. Emergency care physician D. Internist E. Other healthcare professionals
D2.5	Is a cancer genetics service for individuals who are at risk for hereditary cancer syndromes available in your region? A. Yes B. No
D2.6	Which barriers to optimal CRC screening are relevant to your practice currently? A. Challenges in accessing screening programs B. Challenges to complete screening in a timely manner C. Geographical factors (eg, distance from healthcare facilities) D. Patient's lack of awareness E. Delays in patient presentation F. Patients refusing screening G. Screening programs do not currently exist in my region H. Other
D3	Diagnosis
D3.1	"The majority of CRC cases in Saudi Arabia are diagnosed during clinical evaluations rather than through screening programs". Do you agree with this statement? A. Yes B. No
D3.2	In general, what's the time interval between the initial symptoms and the diagnosis of CRC? A. <1 month B. ≥1–<3 months C. ≥3–<6 months D. ≥6–<12 months E. ≥12 months F. Other
D3.3	Which of the following clinical features are present in ≥25% of your patients at the time of diagnosis? A. Diarrhea B. Constipation C. Bloating D. Cramping or abdominal pain E. Hematochezia F. Weakness and fatigue G. Unintended weight loss H. Jaundice I. Dyspnea J. Anemia K. Other L. No signs or symptoms

(*Continued*)

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Table 1 (Continued).

D3.4	Which healthcare professional usually makes the definite diagnosis of CRC? A. Medical oncologist B. Surgical oncologist C. Primary care/family medicine physician D. Gastroenterologist E. Internist F. Other specialties G. The definite diagnosis is made by a multidisciplinary team
D3.5	In which setting does the diagnosis of CRC usually happen? A. Primary care B. Secondary care C. Tertiary care (university hospitals, reference hospitals)
D3.6	Which barriers to optimal CRC diagnosis are relevant to your practice currently? A. Human resources (eg, insufficient number of specialized professionals) B. Infrastructure (eg, insufficiently equipped centers) C. Lack of access to BRAF testing D. Patients' lack of awareness of CRC E. Delays in patient presentation F. Patients refusing care G. Geographical factors (eg, distance from facilities) H. Delays in referral I. Other
D4	Treatment
D4.1	Which healthcare professionals are part of the team taking care of patients with CRC currently at your center? A. Clinical gastroenterologist B. Surgical oncologist C. Medical oncologist D. Radiation oncologist E. Radiologist F. Pathologist G. Colorectal nurse specialist H. Stoma nurse specialist I. Pharmacist J. Dietician K. Psychologist L. Other
D4.2	To what extent are patient preferences taken into consideration when making treatment decisions? A. Always B. Usually C. Sometimes D. Never
D4.3	What treatment modalities are available at your center? A. Chemotherapy B. Radiotherapy C. Surgery D. Immuno-oncology and targeted therapy
D4.4	Which agents are available at your center? A. Fluoropyrimidines (including fluorouracil) B. Irinotecan C. Oxaliplatin D. Cetuximab and/or panitumumab E. VEGFs inhibitors, such as bevacizumab, ramucirumab, aflibercept, and regorafenib F. Pembrolizumab G. Encorafenib H. Trastuzumab I. Pertuzumab J. Lapatinib K. Fam-trastuzumab deruxtecan

(*Continued*)

Table 1 (Continued).

D4.5	What guidelines/protocols do you follow for the treatment of CRC? A. International guidelines B. National guidelines/protocols C. Regional guidelines/protocols D. Center-specific/institutional guidelines
D4.6	What are the most common barriers to effective CRC treatment in your region currently? A. Human resources (eg, insufficient number of specialized professionals) B. Infrastructure (eg, insufficiently equipped centers) C. Lack of country-level guidelines for the management of CRC D. Delay between diagnosis and access to treatment E. The requirement to refer patients to specialist service F. Delays in patient presentation G. Patients refusing care H. Geographical factors (eg, distance from facilities) I. Access to new treatment options J. Patient presentation at advanced stage of disease K. Other
D5	Post-treatment follow-up
D5.1	In which setting are patients seen on the long-term follow-up after treatment completion in your region? A. Primary care B. Secondary care C. Tertiary care (university hospitals, reference hospitals)
D5.2	Which guidelines/protocols do you follow for long-term follow-up of patients after treatment completion? A. International guidelines B. National guidelines/protocols C. Regional guidelines/protocols D. Center-specific/institutional guidelines
D5.3	How do you usually do CRC post-treatment surveillance? A. Periodic history and physical examination B. Annual computed tomography (CT) scans C. Periodic colonoscopy D. Periodic serum concentrations of the tumor marker carcinoembryonic antigen (CEA) levels measurement E. Other F. This is not part of my practice
D5.4	Is a survivorship program available at your center? A. Yes B. No

Table 2 Healthcare Professional Setting and Experience of Respondents

Healthcare Professional Setting and Experience, n (%)	Respondents (n=28)
Professional specialty	
Medical oncologists	27 (96.4)
Other	1 (3.6)
Main work setting*	
Public, government, or military healthcare center or hospital	24 (85.7)
Academic hospital (teaching hospital/university)	6 (21.4)
Private sector	4 (14.3)
Other	0

(*Continued*)

https://doi.org/10.2147/JMDH.S526377

Table 2 (Continued).

Healthcare Professional Setting and Experience, n (%)	**Respondents (n=28)**
Time working in the care of CRC patients	
<5 years	6 (21.4)
≥5–<10 years	8 (28.6)
≥10–<20 years	12 (42.9)
≥20 years	2 (7.1)

Notes: *The total number of responses can exceed the number of respondents where participants could select multiple answers for the question.
Abbreviation: CRC, colorectal cancer.

Patients' Profile

The survey found that respondents felt that most patients had either no or limited awareness of CRC at the time of diagnosis (89.3%) (Table 3). The majority (60.7%) of respondents reported no patient support groups in their region, and only three respondents mentioned support groups, but these were inactive.

The most common risk factors or comorbidities present in patients with CRC were obesity (82.1%), diabetes (75.0%) and smoking (67.9%). Half of the patients had cardiovascular disease, including hypertension (50.0%); 35.7% of respondents also identified depression or anxiety at some point during the patient journey as a potential risk factor or comorbidity. Less common risk factors or comorbidities included renal disease and chronic obstructive pulmonary disease, which were each reported by about 10% or less of respondents.

Table 3 Perspectives on Their Patients' Profile

Patient Profile, n (%)	**Respondents (n=28)**
Patient level of awareness of CRC at time of diagnosis	
No awareness	3 (10.7)
Limited awareness	22 (78.6)
Good awareness	3 (10.7)
Availability of support groups for patients and families	
Patient support groups are available and active in my region	0
Patient support groups exist but are not active	3 (10.7)
No patient support groups exist in the region	17 (60.7)
I do not know	8 (28.6)
Risk factors / comorbidities present in ≥25% of the respondents' patients with CRC at some point during their journey*	
Depression or anxiety	10 (35.7)
Cardiovascular disease, including hypertension	14 (50.0)
Diabetes	21 (75.0)
Renal disease	3 (10.7)
COPD	1 (3.6)

(*Continued*)

Table 3 (Continued).

Patient Profile, n (%)	**Respondents (n=28)**
Patient level of awareness of CRC at time of diagnosis	
Inflammatory bowel disease	5 (17.9)
Obesity	23 (82.1)
Smoking	19 (67.9)
Other	2 (7.1)

Notes: *The total number of responses can exceed the number of respondents where participants could select multiple answers for the question.
Abbreviations: COPD, chronic obstructive pulmonary disease; CRC, colorectal cancer.

Screening and Referral to Specialized Care

Key population groups selected for CRC screening included asymptomatic individuals aged 45–75 years with no family history of CRC or polyps (67.9%), those with inflammatory bowel disease (67.9%), and individuals with personal or family history of CRC or polyps (60.7%) (Table 4). Three respondents reported no screening program available in their region. In

Table 4 Perspectives on Screening and Referral to Specialized Care

Screening and Referral to Specialized Care, n (%)	**Respondents (n=28)**
Population groups selected for CRC screening in the region*	
Individuals aged 45–75 years with no symptoms or a family history of CRC or polyps	19 (67.9)
Individuals with inflammatory bowel disease	19 (67.9)
Individuals with personal or family history of CRC or polyps	17 (60.7)
Individuals exposed to radiotherapy during childhood	3 (10.7)
Individuals with a genetic disease such as familial adenomatous syndrome	14 (50.0)
A screening program is not available in my region	3 (10.7)
Other	1 (3.6)
Available screening methods in the region*	
FIT (fecal immunochemical test) for blood	15 (53.6)
Colonoscopy	25 (89.3)
Guaiac-based fecal occult blood test (gFOBT)	5 (17.9)
Multitarget stool DNA tests with fecal immunochemical testing (MT-sDNA or FIT-DNA)	1 (3.6)
CTC	5 (17.9)
Other	1 (3.6)
None	2 (7.1)
Screening of high-risk individuals*	
Primary care	6 (21.4)
Secondary care	13 (46.4)
Tertiary care (university hospitals, reference hospitals)	19 (67.9)

(*Continued*)

Table 4 (Continued).

Screening and Referral to Specialized Care, n (%)	**Respondents (n=28)**
HCP who refers individuals to the specialized center for additional investigation and diagnosis*	
Primary care physician/family medicine physician	12 (42.9)
Gastroenterologist	26 (92.9)
Emergency care physician	5 (17.9)
Internist	14 (50.0)
Other HCPs	5 (17.9)
Availability of a cancer genetics service for individuals who are at risk for hereditary cancer syndromes in the region	
Yes	19 (67.9)
No	7 (25.0)
I do not know	2 (7.1)
Barriers to optimal CRC screening in the practice*	
Challenges in accessing screening programs	21 (75.0)
Challenges to complete screening in a timely manner	9 (32.1)
Geographical factors (eg, distance from healthcare facilities)	14 (50.0)
Patient’s lack of awareness	26 (92.9)
Delays in patient presentation	15 (53.6)
Patients refusing screening	14 (50.0)
Screening programs do not currently exist in my region	6 (21.4)
Other	0 (0)

Notes: *The total number of responses can exceed the number of respondents where participants could select multiple answers for the question.
Abbreviations: COPD, chronic obstructive pulmonary disease; CRC, colorectal cancer; CTC, computed tomography colonography; HCP, healthcare professional.

Saudi Arabia, the most common screening methods were colonoscopy (89.3%) and fecal immunochemical test (FIT) for blood (53.6%). Less commonly used methods included guaiac-based fecal occult blood test (gFOBT) and computed tomography colonography (CTC; 17.9% each). Tertiary care facilities were reported as the setting for screening of high-risk individuals by 67.9% of respondents, with 46.4% reporting screening in the secondary care setting as well.

According to 92.9% of respondents, gastroenterologists are the primary referrers to specialized centers for further investigation and diagnosis. Internists (reported by 50.0% of respondents) and primary care physicians/family medicine physicians (reported by 42.9% of the respondents) also played significant roles in referrals. In contrast, emergency care physicians and other healthcare physicians were identified as primary referrers by only 17.9% of respondents.

Many respondents (67.9%) reported that cancer genetics services were available for individuals at risk of hereditary cancer syndromes. However, a quarter (25.0%) reported no availability of such services in their region.

Common barriers to optimal CRC screening identified by respondents included: patient’s lack of awareness (92.9%), challenges in accessing screening programs (75.0%), delays in presentation (53.6%), geographical factors (50.0%) and patients refusing screening (50.0%).

Diagnosis

All 28 respondents who answered the question reported that the majority of CRC cases in Saudi Arabia were diagnosed during clinical evaluations rather than through screening programs (Table 5).

Table 5 Perspectives on Diagnosis

Diagnosis, n (%)	**Respondents (n=28)**
The majority of CRC cases in Saudi Arabia are diagnosed during clinical evaluations rather than through screening programs	
Yes	28 (100.0)
No	0 (0)
The time interval between the initial symptoms and the diagnosis of CRC	
<1 month	2 (7.1)
≥1–<3 months	5 (17.9)
≥3–<6 months	11 (39.3)
≥6–<12 months	9 (32.1)
≥12 months	1 (3.6)
Clinical features present in ≥25% of the respondents' patients at the time of diagnosis*	
Diarrhea	6 (21.4)
Constipation	22 (78.6)
Bloating	8 (28.6)
Cramping or abdominal pain	20 (71.4)
Hematochezia	12 (42.9)
Weakness and fatigue	12 (42.9)
Unintended weight loss	14 (50.0)
Jaundice	1 (3.6)
Dyspnea	0 (0)
Anemia	20 (71.4)
Other	3 (10.7)
No signs or symptoms	1 (3.6)
HCPs that make the definite diagnosis of CRC*	
Medical oncologist	4 (14.3)
Surgical oncologist	15 (53.6)
Primary care/family medicine physician	1 (3.6)
Gastroenterologist	24 (85.7)
Internist	5 (17.9)
Other specialties	2 (7.1)
The definite diagnosis is made by a multidisciplinary team	5 (17.9)

(*Continued*)

Table 5 (Continued).

Diagnosis, n (%)	**Respondents (n=28)**
Setting that diagnosis of CRC occurs*	
Primary care	3 (10.7)
Secondary care	20 (71.4)
Tertiary care (university hospitals, reference hospitals)	19 (67.9)
Barriers to optimal CRC diagnosis in the practice*	
Human resources (eg, insufficient number of specialized professionals)	10 (35,7)
Infrastructure (eg, insufficiently equipped centers)	11 (39.3)
Lack of access to BRAF testing	4 (14.3)
Patients' lack of awareness of CRC	19 (67.9)
Delays in patient presentation	22 (78.6)
Patients refusing care	5 (17.9)
Geographical factors (eg, distance from facilities)	11 (39.3)
Delays in referral	15 (53.6)
Other	0 (0)

Notes: *The total number of responses can exceed the number of respondents where participants could select multiple answers for the question.
Abbreviations: COPD, chronic obstructive pulmonary disease; CRC, colorectal cancer; HCP, healthcare professional.

The time interval between the initial symptoms and the diagnosis of CRC was between 3 months and 12 months for 71.4% of respondents. A quarter of respondents (25.0%) stated that the interval was less than 3 months, and only one respondent reported that the internal was 12 months or more.

The survey found that the most common clinical features presented in patients at the time of diagnosis were constipation (78.6%), cramping or abdominal pain (71.4%), anemia (71.4%) and unintended weight loss (50.0%). Other clinical features reported by the respondents included weakness and fatigue (42.9%), hematochezia (42.9%), bloating (28.6%) and diarrhea (21.4%).

Gastroenterologists were reported most frequently (by 85.7% of respondents) as the HCPs that make the definitive diagnosis of CRC; 53.6% of respondents also reported that surgical oncologists make the definitive diagnosis. Additionally, 17.9% of respondents reported that a multidisciplinary team (MDT) and internists make the definitive diagnosis. Respondents indicated that the diagnosis of CRC typically occurs in secondary and tertiary care settings (71.4% and 67.9% respectively).

The survey reported that common barriers to optimal CRC diagnosis in practice were delays in patient presentation (78.6%) followed by patients' lack of awareness of CRC (67.9%). Additional barriers included delays in referral (53.6%), infrastructure issues (39.3%) and geographical factors (39.3%).

Treatment

On the patient journey, respondents identified the key members of the MDT taking care of patients with CRC as surgical oncologists (100.0%), medical oncologists (100.0%), radiation oncologists (92.9%), and pathologists (92.9%) (Table 6). Some MDTs also included other HCPs such as radiologists (85.7%), clinical gastroenterologists (64.3%), dieticians (64.3%) and pharmacists (60.7%). Colorectal or stoma nurse specialists were reported by 35.7% and 42.9% of respondents, respectively, to be parts of the MDT. Most respondents (78.6%) reported that patients' preferences were always or usually taken into consideration when making treatment decisions.

Table 6 Perspectives on Treatment

Treatment, n (%)	**Respondents (n=28)**
HCPs that are part of the team taking care of patients with CRC*	
Clinical gastroenterologist	18 (64.3)
Surgical oncologist	28 (100.0)
Medical oncologist	28 (100.0)
Radiation oncologist	26 (92.9)
Radiologist	24 (85.7)
Pathologist	26 (92.9)
Colorectal nurse specialist	10 (35.7)
Stoma nurse specialist	12 (42.9)
Pharmacist	17 (60.7)
Dietician	18 (64.3)
Psychologist	7 (25.0)
Other	1 (3.6)
The extent that patient preferences are taken into consideration when making treatment decision	
Always	12 (42.9)
Usually	10 (35.7)
Sometimes	5 (17.9)
Never	1 (3.67)
Treatment modalities available at the practice*	
Chemotherapy	28 (100.0)
Radiotherapy	25 (89.3)
Surgery	28 (100.0)
Immuno-oncology and targeted therapy	28 (100.0)
Treatments available at the practice*	
Fluoropyrimidines (including fluorouracil)	27 (96.4)
Irinotecan	27 (96.4)
Oxaliplatin	27 (96.4)
Cetuximab and/or panitumumab	28 (100.0)
VEGFs inhibitors, such as bevacizumab, ramucirumab, aflibercept, and regorafenib	28 (100.0)
Pembrolizumab	26 (92.9)
Encorafenib	9 (32.1)
Trastuzumab	27 (96.4)
Pertuzumab	27 (96.4)
Lapatinib	22 (78.6)
Fam-trastuzumab deruxtecan	20 (71.4)

(*Continued*)

Table 6 (Continued).

Treatment, n (%)	Respondents (n=28)
Guidelines/protocols used*	
International guidelines	27 (96.4)
National guidelines/protocols	12 (42.9)
Regional guidelines/protocols	2 (7.1)
Center-specific/institutional guidelines	6 (21.4)
Most common barriers to effective CRC treatment in the region*	
Human resources (eg, insufficient number of specialized professionals)	7 (25.0)
Infrastructure (eg, insufficiently equipped centers)	8 (28.6)
Lack of country-level guidelines for the management of CRC	3 (10.7)
Delay between diagnosis and access to treatment	12 (42.9)
The requirement to refer patients to specialist service	9 (32.1)
Delays in patient presentation	19 (67.9)
Patients refusing care	5 (17.9)
Geographical factors (eg, distance from facilities)	11 (39.3)
Access to new treatment options	10 (35.7)
Patient presentation at advanced stage of disease	16 (57.1)
Other	0 (0)

Notes: *The total number of responses can exceed the number of respondents where participants could select multiple answers for the question.
Abbreviations: CRC, colorectal cancer; VEGF, vascular endothelial growth factor.

When asked about the treatment modalities available at the practices for their patients, all respondents reported chemotherapy, surgery and immune-oncology and targeted therapy were available. Radiotherapy was also available at most practices (89.3%). Cetuximab and/or panitumumab, and vascular endothelial growth factor (VEGF) inhibitors are targeted therapies available in all practices in Saudi Arabia, as reported by the respondents. Other targeted therapies that are often available to patients include trastuzumab and pertuzumab (96.4% each). Lapatinib and fam-trastuzumab deruxtecan were only available in 78.6% and 71.4% of practices, respectively. Encorafenib was not readily available as a treatment in many practices (32.1%). The following chemotherapy treatments were available at 96.4% of the respondents' practices: fluoropyrimidines, irinotecan, and oxaliplatin. The immunotherapy, pembrolizumab, was commonly available for patients (at 92.9% of practices).

International guidelines were most frequently used by the respondents in Saudi Arabia (96.4%). National guidelines were also commonly used (42.9%), while center-specific/institutional guidelines (21.4%) were utilized less frequently. Regional guidelines/protocols were rarely used (7.1%).

The most commonly reported barriers to effective CRC treatment in Saudi Arabia were delays in patient presentation (67.9%) and late-stage diagnosis (57.1%). Additionally, 42.9% of respondents cited delays between diagnosis and treatment access, while 39.3% identified geographical factors as obstacles. Other reported barriers included limited access to new treatment options (35.7%), the need for specialist referrals (32.1%), and infrastructure challenges (28.6%).

Post-Treatment Follow-up

Most respondents (92.9%) reported that patients were seen in tertiary care for long-term follow-up after treatment completion in Saudi Arabia (Table 7). For long-term follow-up, international guidelines were predominantly used by the

Table 7 Perspectives on Post-Treatment Follow-up

Post-Treatment Follow-Up, n (%)	Respondents (n=28)
The setting in which patients seen on the long-term follow-up after treatment completion in the region*	
Primary care	4 (14.3)
Secondary care	6 (21.4)
Tertiary care (university hospitals, references hospitals)	26 (92.9)
Guidelines/protocols followed for long-term follow-up of patients after treatment completion*	
International guidelines	27 (96.4)
National guidelines/protocols	8 (28.6)
Regional guidelines/protocols	2 (7.1)
Center-specific/institutional guidelines	7 (25.0)
Approach to CRC post-treatment surveillance*	
Periodic history and physical examination	26 (92.9)
Annual CT scans	27 (96.4)
Periodic colonoscopy	28 (100.0)
Periodic serum concentrations of the tumor marker CEA levels measurement	27 (96.4)
Other	0 (0)
This is not part of my practice	0 (0)
Availability of a survivorship program	
Yes	6 (21.4)
No	22 (78.6)

Notes: *The total number of responses can exceed the number of respondents where participants could select multiple answers for the question.
Abbreviations: CEA, carcinoembryonic antigen; CRC, colorectal cancer; CT, computed tomography; VEGF, vascular endothelial growth factor.

respondents (96.4%). Typical approaches for CRC post-treatment surveillance included periodic colonoscopy (100.0%), periodic serum concentration measurements of the tumor marker carcinoembryonic antigen (96.4%), annual computed tomography scans (96.4%) and periodic history and physician examination (92.9%). Only 21.4% of respondents reported having a survivorship program available for their patients.

Discussion

This study was conducted among HCPs who were mainly practicing in the public, government or military healthcare setting and 78.6% had 5 years or more clinical experience in treating patients with CRC in Saudi Arabia. The aim was to elucidate the patient journey and identify knowledge gaps or areas for improvement to enhance patient care. The results of the study provide novel insights into CRC care in Saudi Arabia, including key observations that may inform practice and policy including poor awareness of CRC among patients, barriers to screening and diagnosis, and barriers to effective treatment.

This study demonstrates that patient lack of awareness was a common feature throughout the treatment journey that acted as a barrier to optimal management of patients with CRC in Saudi Arabia. From most respondents' perspectives (89.3%), patients in Saudi Arabia had negligible or limited awareness of CRC at the time of diagnosis. This finding aligns with a study of 1912 participants in Riyadh, which showed a lack of knowledge regarding CRC among certain demographic groups, including those with lower education levels.[19] Additionally, a study of 390 outpatients in Saudi

Arabia revealed that they had only moderate overall knowledge about cancer, with an average score of 49.2%.[15] In contrast, a study of 206 adults in Saudi Arabia aged ≥40 years reported that 75% of respondents were aware of CRC.[20] The discrepancy between these findings may reflect differences in study populations or the assessment of CRC knowledge, with awareness of CRC being more common than more detailed knowledge of CRC or cancer generally. HCPs in the present survey (mostly oncologist), may perceive patient awareness of CRC as low based on defining awareness according to a sufficient level of knowledge of the condition or its treatment, while awareness among the population may be more broadly related to knowledge of the term or condition itself. Further studies will be important to clarify awareness of CRC, from the patient perspective, to confirm the perceptions of the HCPs in this study.

Patients in Saudi Arabia exhibit typical lifestyle-related or hereditary risk factors for CRC, which are recognized globally.[6,12–14] In this study, 82.1%, 75.0% and 67.9% of respondents identified obesity, diabetes and smoking as the top three risk factors among their patients, respectively. This implies that patients may have a low level of knowledge about CRC risk factors leading them to seek help later in their journey with CRC. Supporting this, a study of 390 outpatients from Saudi Arabia showed they had low to moderate knowledge of cancer risk factors, with many not correctly identifying obesity and physical inactivity as cancer risk factors.[15] A study of 1912 patients in Saudi Arabia misidentified the top three risk factors as stress, family history and smoking.[19] Hence, the present study reinforces the importance of targeted educational initiatives to improve awareness of cancer and risk factors among the Saudi population.

Depression or anxiety at some point during the patient journey was identified as a potential risk factor or comorbidity by 35.7% of respondents. The expert panel felt that depression or anxiety was underdiagnosed in their region, which aligns with the survey findings. In a study of 115 patients with CRC in the central, eastern and western regions of Saudi Arabia, patients reported low quality of life scores.[21] Over half of the patients experienced moderate to severe depression, and nearly a third experienced moderate to high anxiety.[21] The study findings therefore suggest that the burden of depression and anxiety may be underestimated in the region, confirming an unmet need in Saudi Arabia for improved screening for quality of life and psychological wellbeing of patients with CRC.

An important finding of this survey is that no patients with CRC or their families had access to an active support group. Previous research has suggested that access to support may be limited in this context, with a study by Abu-Halalah et al (n=115) published in 2022 noting that only 3.7% of patients reported receiving psychological support.[21] The present survey suggests that a deficit in cancer support groups persists in current practice. This situation may be specific to patients with CRC, as Saudi Arabia does have successful support groups for other oncology fields, such as breast cancer. Studies on the effectiveness of psychoeducational support groups in patients with breast cancer showed statistically significant improvements in overall quality of life after 8 weeks of the support program versus baseline (p=0.0125), as well as significant improvements in overall depression and anxiety scores (p=0.0002 and p=0.0059, respectively).[22] This success in the breast cancer field provides a strong rationale for implementing similar support programs for CRC patients. By replicating these effective support structures, we can potentially enhance the quality of life and psychological wellbeing of CRC patients in Saudi Arabia.

Screening is essential for the early detection of CRC.[23] This study might reflect oncologists' views on who should be screened, but it also highlights a lack of awareness regarding the recommended screening population based on global and regional guidelines. Guidelines recommend screening individuals between the ages of 45 and 75 years, as well as those with a family history of CRC or advanced colorectal polyps.[23,24] In this study, 67.9% and 60.7% of respondents reported that screening was recommended for patients aged 45–75 years with no symptoms or a family history of CRC or polyps and for individuals with a personal or family history of CRC or polyps, respectively. Therefore, there is a rationale for improving HCP awareness of screening guidelines to ensure early detection and better outcomes for CRC patients.

The survey indicated that the most commonly available screening modality by respondents was colonoscopy (89.3%), followed by FIT by half of respondents (53.6%), and then gFOBT or CTC (17.9% each). Colonoscopy and FIT are broadly recommended for screening for CRC and therefore the availability of these modalities aligns with recommended practice.[24,25] However, a cross-sectional study of 10,781 adults from Saudi Arabia indicated that their preferred screening modality, based on accuracy, was FIT (47.9%), with colonoscopy being one of the least preferred options (19.6%).[26] Patient preference is an important factor that can influence uptake of screening and experiences of the screening process. This suggests that preferences for less invasive screening interventions, such as FIT, may be higher than for invasive colonoscopy, which highlights the need for expanding access to FIT and other less-invasive methods, such as gFOBT.[26] Overall, the results from the respondents in this study generally align with global guidelines that recommend colonoscopy, FIT and CTC as effective screening modalities that reduce the risk of mortality.[24,25] However, expansion of the availability of FIT, gFOBT and CTC may be needed to ensure adequate access to preferred screening modalities.

Despite the availability of established screening modalities in Saudi Arabia, uptake may not be as widespread as in some other countries for several reasons. The survey identified patient lack of awareness as the primary barrier to CRC screening. This finding was supported by a study of 206 adults in Saudi Arabia, which revealed that only 10% had received information about CRC prevention or discussed screening for CRC.[20] Furthermore, only 10% had undergone screening for CRC.[20] A systematic review of eight studies carried out in the US, Japan, Switzerland and the UK, showed that better understanding of health information was associated with greater CRC screening knowledge and a more positive attitude toward CRC screening.[27] In a study of 390 outpatients in Saudi Arabia, barely any of the warning signs of CRC such as changes in bowel habits, were recognized by the majority of the population.[15] Delays in symptom presentation were also noted as the third most common barrier to CRC screening, often resulting in missed opportunities for patients to receive the optimal therapeutic intervention. This was evidenced by the fact that the time interval between the initial symptoms and CRC diagnosis was reported as between 3 to 12 months by three-quarters of respondents. Therefore, if HCPs in Saudi Arabia can better support patients in understanding the importance of screening for CRC and provide education on symptoms it may encourage early detection and improve patient outcomes.

All respondents of the survey indicated that diagnosis typically occurs during clinical evaluations rather than through screening programs. There are very few nationwide organized or pilot programs for CRC screening in the entire central, west and south Asia region.[28] In 2017, the Ministry of Health of Saudi Arabia initiated a pilot screening program, providing annual FIT screenings for individuals aged 45–75 years.[28] In contrast, CRC diagnosis frequently occurs through established screening programs in many other countries in the world.[23,28,29] Given the higher survival rates of CRC when detected early, the International Agency for Cancer Research recommends CRC screening every 2 years.[25] The disparity in CRC screening practices between Saudi Arabia and other countries highlights the need for more robust and widespread screening programs. Enhanced awareness and education about the importance of regular CRC screening will help to reduce the burden of this disease in Saudi Arabia. Delays in patient presentation was selected as the top barrier to optimal CRC diagnosis in the practice (78.6%), further supporting the critical need for patient screening.

Gastroenterologists were reported in this study to have a primary role in the care of patients with CRC, as they are involved in screening patients and referring them for specialized care. Gastroenterologists and surgical medical oncologists were responsible for making the definitive diagnosis of CRC. The MDT involved in making treatment decisions in Saudi Arabia largely included surgical, medical and radiation oncologists, pathologists, radiologists, clinical gastroenterologists and dietitians. The involvement of an MDT is important for the effective management of CRC and is recommended by international guidelines.[6,7,30] However, the experts noted that while MDTs are often seen in tertiary care settings, there is significant potential to apply this approach more broadly across Saudi Arabia. Strengthening collaboration among HCPs is an essential step for improving patient outcomes. In addition, equipping the MDT with knowledge and skills in the use of new and emerging technologies that can facilitate effective MDT practice can be recommended. For instance, training on the use of artificial intelligence (AI) in supporting biomarker identification, screening and personalized treatment decisions and integration of AI into practice can be considered important strategies to enhance collaborative decision-making and in improving the care of patients with CRC in the future.[31–33]

There are several similarities in the practices in Saudi Arabia versus international guidelines.[24,25] The key treatment modalities that are available for patients worldwide are also available in most practices in Saudi Arabia.[6,7] Despite guidelines recommending that patients should be transferred to their primary care provider,[6] long-term follow-up in Saudi Arabia is reported to be carried out in a tertiary care setting. Many respondents (67.9%) reported that patients had access to a cancer genetics service. However, the experts felt this was only representative of the respondents in our survey who predominately worked in a tertiary healthcare setting and not reflective of the broader situation in Saudi Arabia. The expert panel recommends increasing the availability of cancer genetics services for individuals at risk for hereditary cancer syndromes. Most respondents (78.6%) also reported that patients had no access to a survivorship program. However, we believe these results may not accurately reflect the situation in Saudi Arabia, likely due to the selection of respondents from the tertiary care settings. Saudi Arabia typically follows the National Comprehensive Cancer Network guidelines, which recommend survivorship programs to provide screening, evaluation and treatment recommendations in the post-treatment setting.[6]

While this survey provides valuable insights into clinician perceptions of the patient journey, it has several limitations. The self-reported nature of the experiences may introduce inaccuracies or incomplete recollections. Additionally, the small sample size of mostly oncologist respondents limits the generalizability of the findings to the wider population of clinicians caring for patients with CRC. Most respondents were from public, government, or military healthcare settings, which may not reflect experiences in academic or private sector settings. Finally, the survey was originally directed toward oncologists, gastroenterologists, and internists; however, no gastroenterologists or internists participated. Because gastroenterologists play a pivotal role in the clinical management of patients with CRC, future studies should be designed to ensure their inclusion.

Conclusion

This study provides an important contemporary insight into CRC patient journey from the perspective of HCPs, mostly oncologists, in Saudi Arabia. Survey respondents highlighted that gastroenterologists play a crucial role in the care of patients with CRC in Saudi Arabia, from initial screening to referral for specialized care. Strengthening their involvement and ensuring they are well-equipped with the latest guidelines can enhance early diagnosis and improve overall patient management. Many patients in Saudi Arabia have inadequate knowledge and awareness about CRC, including its diagnosis, screening, and management. Nonetheless, the introduction of widespread opportunistic screening could lead to earlier diagnosis and an increase in the number of patients identified with CRC. Given the high resource availability in Saudi Arabia,[19] there is significant potential for improving patient education and awareness initiatives to ensure that awareness translates into actionable knowledge and behaviors through more comprehensive education and communication between clinicians and patients. A range of professionals were identified as participating in the MDT at differing frequencies; solidifying the MDT approach more broadly across Saudi Arabia would enhance patient care.

Data Sharing Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Ethics Statement

This study conformed with the ethical principles of informed consent, anonymity, and confidentiality. Ethical approval was not applicable, as the manuscript does not involve research with human or animal subjects.[18]

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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