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The colorectal cancer screening gap in Türkiye: A tripartite survey of barriers among patients and surgeons

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ABSTRACT

Objective: Colorectal cancer (CRC) screening uptake in Türkiye remains suboptimal, despite the presence of a national screening program. Understanding whether barriers arise primarily from patient-related factors or system-level constraints is essential for effective policy planning. This study aimed to evaluate barriers to CRC screening across the screening pathway using patient, procedural, and provider perspectives.

Material and Methods: A descriptive cross-sectional study was conducted between January and June 2025 at a tertiary training and research hospital. Three distinct groups were surveyed: 100 screening-naïve outpatients aged 50-70 years, 100 patients undergoing diagnostic or screening colonoscopy, and 50 general surgeons performing or referring for colonoscopy. Study-specific questionnaires, pilot-tested for clarity but not formally validated, were used to assess screening awareness, attitudes, perceived barriers, and strategies for improvement. The data were analyzed descriptively.

Results: Among screening-naïve outpatients, 54% had no prior awareness of CRC screening, and only 28% had received a physician recommendation for screening. Fear of a serious diagnosis (45%) and pain or discomfort (40%) were commonly reported concerns; however, most respondents indicated that these would not deter screening. Among patients undergoing colonoscopy, 77% underwent the procedure for symptoms rather than preventive screening, while post-procedure satisfaction was high. Surgeons predominantly identified system-level barriers, particularly long waiting times (90%) and an insufficient number of trained endoscopists (92%), as major limitations in effective screening delivery.

Conclusion: The primary perceived barrier to CRC screening in Türkiye appears to be limited system capacity rather than patient reluctance. Improving screening uptake will likely require coordinated public awareness efforts, structured national reminder systems, and expansion of the number of adequately trained endoscopists, alongside endoscopy infrastructure.

Keywords: Colonoscopy, colorectal cancer, public health, screening

INTRODUCTION

Colorectal cancer (CRC) represents a significant and growing public health challenge in Türkiye. With approximately 21,700 new cases diagnosed annually, CRC is the third most common cancer in the country and accounts for nearly 9% of all new cancer diagnoses. It is also the second leading cause of cancer-related mortality, resulting in an estimated 11,700 deaths annually (1). In parallel with global trends, the incidence and mortality rates of CRC in Türkiye have gradually increased in recent years, highlighting the need for effective preventive strategies (2).

Screening plays a critical role in reducing the CRC burden, as methods such as colonoscopy allow for the early detection of malignancy and removal of precancerous polyps (3). Although Türkiye has an established national CRC screening program targeting adults aged 50-70 years, participation remains suboptimal (4,5). Barriers to screening arise at both the patient and healthcare system levels.

While these barriers have been individually acknowledged, there is a lack of comprehensive studies that simultaneously examine both patient and healthcare provider perspectives within the Turkish context (6,7). Within the Turkish healthcare system, general surgeons play a central role in the CRC screening cascade, frequently acting as the primary point of referral for colonoscopy and often performing the procedure themselves. Therefore, this study aimed to investigate the barriers to CRC screening across multiple points in the screening pathway, with particular attention to the role of general surgeons. By evaluating awareness, attitudes, practice patterns, perceived obstacles, and suggestions for

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improvement among patients and surgeons, we sought to identify key determinants of low screening participation and to inform strategies to enhance early detection efforts.

MATERIAL and METHODS

Study Design and Patient Population

This descriptive, cross-sectional study was conducted between January and June 2025 in the general surgery outpatient clinics and endoscopy unit of a single tertiary research and training hospital. This study aimed to explore the knowledge, attitudes, and perceived barriers related to CRC screening from both patient and surgeon perspectives using a pragmatic survey-based approach. Three distinct participant groups were included. Participants were recruited using consecutive sampling during routine outpatient visits and endoscopy scheduling throughout the study period.

The outpatient group included 100 screening-naïve patients aged 50-70 years who presented to the general surgery outpatient clinic for non-emergency reasons and had no prior history of colonoscopy. Patients with a previously known diagnosis of colorectal cancer, inflammatory bowel disease, or cognitive impairment that could affect their comprehension of the questionnaire were excluded.

The colonoscopy group comprised 100 patients aged 50-70 years who were scheduled for diagnostic or screening colonoscopy. All participants in this group were undergoing their first colonoscopy. Each participant completed two surveys: one before and one immediately after the procedure. Patients who underwent urgent or therapeutic colonoscopy or those with known malignancies were excluded.

The surgeon group comprised general surgery specialists practicing in Türkiye who had formal training in colonoscopy and were actively performing or referring patients for the procedure. Surgeons were invited via professional networks and email. A total of 200 surgeons were invited on two separate occasions, and 50 surgeons responded, yielding a 25% response rate.

Data Collection Tools

Three structured questionnaires were developed by the study investigators based on the current CRC screening guidelines and relevant literature. The questionnaires included multiple-choice and Likert-type items addressing awareness, attitudes, perceived barriers, clinical practices, and suggested improvement strategies related to CRC screening and colonoscopy.

The outpatient questionnaire assessed demographic characteristics, awareness of CRC screening, perceived personal risk, sources of information, and willingness to undergo screening. The colonoscopy questionnaire evaluated the indications for the procedure, pre-procedural concerns, bowel preparation experience, perceived educational impact, and post-procedural satisfaction. The surgeon questionnaire focused on professional background, colonoscopy practice patterns, patient education practices, perceived patient- and system-level barriers, and recommendations for improving screening uptake.

The questionnaires were pilot-tested to assess clarity and face validity and were reviewed by practicing surgeons for clinical relevance. No formal psychometric validation was performed, and the instruments were used for exploratory and descriptive purposes. The complete survey instruments used for the outpatient, colonoscopy patient, and surgeon groups are provided in Supplementary Appendix.

Data Collection Procedure

Outpatient and colonoscopy patient surveys were administered in person by trained research staff in a private setting to ensure the confidentiality of the participants. Pre- and post-procedure surveys for the colonoscopy group were completed on the same day as the procedure. All colonoscopies were performed under sedation using propofol administered by an anesthesiologist according to institutional practice. Post-procedure questionnaires were administered only after patients had fully recovered from sedation and were ready for discharge to ensure that responses were not influenced by residual sedative effects. The surgeon survey was distributed electronically via a secure online platform, and the responses were collected anonymously.

Statistical Analysis

Data were analyzed using R (version 4.1.1). Given the exploratory objectives of the study, the analysis was limited to descriptive statistics, and no inferential comparisons were performed. The sample size was determined pragmatically based on feasibility and patient volume during the study period rather than by formal power calculation. Continuous variables are expressed as mean ± standard deviation or median (interquartile range), as appropriate. Categorical variables are presented as frequencies and percentages.

Ethical Considerations

The study was approved by the Local Institutional Ethics Committee of Ankara Bilkent City Hospital (approval number: 451, date: 07.08.2024). Written informed consent was obtained from all participants prior to their participation. All procedures were performed in accordance with the principles of the Declaration of Helsinki.

Artificial Intelligence (AI) Use Statement

During the preparation of this manuscript, ChatGPT (OpenAI) was used for language editing and clarity. All authors critically reviewed and verified the content and take full responsibility for the accuracy, integrity, and originality of the manuscript.

RESULTS

Outpatient Survey

A total of 100 screening-naïve outpatients were enrolled in the study (median age: 55 years; range: 50-65; 51% female). Educational attainment included primary school in 31%, high school in 32%, and university or higher education in 37%. Thirty-three percent were current smokers, and 17% had a family history of cancer. The baseline characteristics, screening awareness, perceived barriers, and motivators are presented in Table 1.

Overall, awareness of CRC screening was limited. Fifty-four percent of the participants reported no prior awareness of CRC screening, and 65% were unable to identify the recommended starting age. Only 19% of the respondents correctly identified 50 years as the appropriate age to begin screening. Perceived personal risk was low, with only 24% believing they were at increased risk for CRC and 36% uncertain. Notably, among participants with a family history of cancer, 29% did not perceive themselves to be at increased risk.

Knowledge of CRC risk factors varied. Smoking (67%), red meat consumption (60%), and older age (52%) were commonly identified as risk factors, although 20% of participants incorrectly considered a high-fiber diet a risk factor. Overall, 40% of the respondents correctly identified three or more established CRC risk factors.

The most common sources of information on CRC were non-medical, including friends or acquaintances (29%) and media (22%). Only 14% reported receiving information from a healthcare professional. Consistent with this finding, only 28% of the participants stated that a physician had ever recommended CRC screening.

Concerns related to colonoscopy were common but did not appear to be absolute barriers. Fear of a serious diagnosis (45%) and pain or discomfort (40%) were the most frequently reported concerns, followed by fear of complications (33%) and privacy concerns (27%). Only 7% reported bowel preparation as a major concern. Despite these fears, 86% of participants stated that such concerns would not prevent them from undergoing screening. Among the 14% who expressed unwillingness, the most common reasons were fear of the procedure (n=8) and the belief that screening was unnecessary (n=6).

Symptom development was the strongest motivator for undergoing colonoscopy (94%), followed by a family member's cancer diagnosis (60%). When asked how physicians could better encourage screening, participants most frequently suggested providing more information (73%), emphasizing the importance of screening (67%), and addressing fears related to the procedure (54%).

Table 1. Demographic characteristics and screening awareness among outpatients

Variable	(n=100) (%)
Age (years), median (range)	55 (50-65)
Female sex	51 (51)
Education level	
Primary school	31 (31)
High school	32 (32)
University or higher	37 (37)
Current smoker	33 (33)
Family history of cancer	17 (17)
Prior awareness of CRC screening	46 (46)
Correctly identified starting age (50 years)	19 (19)
Perceived increased risk for CRC	24 (24)
Knowledge of ≥3 risk factors	40 (40)
Incorrectly identified high-fiber diet as risk factor	20 (20)
Sources of information about CRC	
Friends/acquaintances	29 (29)
Media	22 (22)
Healthcare professional	14 (14)
Received physician recommendation for CRC screening	28 (28)
Main fears about colonoscopy	
Fear of serious diagnosis	45 (45)
Pain/discomfort	40 (40)
Privacy concerns	27 (27)
Fear of complications	33 (33)
Bowel preparation	7 (7)
Would these fears prevent screening? (yes)	14 (14)
Motivators for undergoing colonoscopy	
Development of symptoms	94 (94)
Family member's cancer	60 (60)
Desire for more information	31 (31)
Suggestions for physicians to encourage screening	
Provide more information	73 (73)
Address fears	54 (54)
Emphasize importance	67 (67)

CRC: Colorectal cancer.

Pre- and Post-colonoscopy Patient Survey

A total of 100 patients undergoing colonoscopy were included (median age: 52 years; range: 51-65; 54% male). All patients in this group were undergoing their first lifetime colonoscopy. The pre- and post-procedure knowledge, attitudes, and colonoscopy-related experiences of patients undergoing their first colonoscopy are presented in Table 2.

Table 2. Demographics, knowledge, and experience of patients undergoing colonoscopy	
Variable	**(n=100) (%)**
Age (years), median (range)	52 (51-65)
Male sex	54 (54)
Education level	
Primary school	42 (42)
High school	30 (30)
University or higher	28 (28)
Current smoker	35 (35)
Family history of cancer	19 (19)
Previously completed FOBT	25 (25)
Reason for colonoscopy	
Diagnostic (symptomatic)	77 (77)
Routine screening	23 (23)
Knowledge of ≥3 CRC risk factors	55 (55)
Incorrectly identified high-fiber diet as risk factor	11 (11)
Adequately informed by physician before procedure	
Yes	12 (12)
Some information	73 (73)
None	15 (15)
Source of information about CRC	
Friends/acquaintances	9 (9)
Media	13 (13)
Healthcare professional	78 (78)
Felt more informed about CRC during bowel preparation	68 (68)
Pre-procedure anxiety	24 (24)
Believed colonoscopy reduces future cancer risk	62 (62)
Additional information desired	
Potential complications/risks	63 (63)
Procedure details	52 (52)
Potential benefits	38 (38)
Post-procedure satisfaction	
Very good	81 (81)
Good	15 (15)
Negative	4 (4)
Would undergo colonoscopy again if needed	100 (100)
Would recommend colonoscopy to relatives	
Definitely	88 (88)
Somewhat	12 (12)

CRC: Colorectal cancer, FOBT: Fecal occult blood test.

Most colonoscopies were performed for diagnostic rather than screening purposes, with 77% of patients undergoing colonoscopy due to symptoms and only 23% for routine screening. Rectal bleeding was the most common presenting symptom. Prior participation in fecal occult blood testing was limited (25%).

Knowledge of CRC risk factors was limited, with only 17% of patients recognizing family history as a risk factor. Although physicians were the main source of CRC information (78%), only 12% of patients reported feeling adequately informed about the procedure beforehand, and 73% reported receiving only partial information. Pre-procedure anxiety was reported by 24% of patients, and bowel preparation was rated difficult by 49%. During the preparation process, 68% reported increased awareness of CRC screening, and 62% believed that colonoscopy would reduce their future cancer risk.

The post-procedure experience was highly positive. Overall satisfaction was rated as very good by 81% of patients, and 100% stated that they would undergo colonoscopy again if needed and would recommend the procedure to their relatives. No procedure-related complications were observed during the study period.

Surgeon Survey

A total of 50 general surgeons participated in the survey. Most respondents were male (78%) and worked in training and research hospitals (68%), followed by university hospitals (18%) and district state hospitals (14%). The majority were within their first five years of independent practice (72%). The demographic characteristics and CRC screening practices of the participating surgeons are shown in Table 3, while surgeon-reported patient- and system-level barriers and proposed improvement strategies are detailed in Table 4.

Nearly all surgeons reported access to a colonoscopy unit at their institution (98%), and 58% performed colonoscopy regularly. The average procedural volume was 10±3 colonoscopies per day and 70±15 per month, with 62% allocating at least 15 minutes per procedure. Patient education practices varied, with 40% of respondents providing detailed face-to-face counseling, while bowel preparation instructions were frequently delegated to non-physician staff.

Despite general support for CRC screening, only 68% of surgeons routinely recommended colonoscopy for eligible patients. When asked whether they actively attempted to persuade reluctant patients to undergo colonoscopy, 46% of surgeons reported doing so routinely, while 40% stated that they did so occasionally. The most commonly cited barriers preventing surgeons from routinely recommending or actively encouraging CRC screening were lack of time (84%) and low motivation or burnout (30%) (Table 4).

Surgeons also commonly perceived patient-related reasons for refusal. The most frequently cited concerns were fear of pain or complications (78%) and concerns related to privacy or

Table 3. Demographic and practice characteristics of participating surgeons	
Variable	**(n=50) (%)**
Male sex	39 (78)
Institution type	
Training and research hospital	34 (68)
University hospital	9 (18)
District state hospital	7 (14)
Hold academic title	7 (14)
Years in independent surgical practice	
0-5 years	36 (72)
6-10 years	5 (10)
>10 years	9 (18)
Have colonoscopy unit at institution	49 (98)
Perform colonoscopy personally	
Regularly	29 (58)
Sometimes	16 (32)
Never	5 (10)
Average procedures	
Daily	10±3
Monthly	70±15
Allocate ≥15 min per procedure	31 (62)
Method of providing patient information	
Detailed face-to-face	20 (40)
Written materials	11 (22)
Delegated to other staff	19 (38)
Who provides bowel prep instructions	
Nurse	16 (32)
Endoscopy personnel	13 (26)
Other surgeon staff	11 (22)
Surgeon personally	10 (20)
Adequate bowel prep among patients	
76-100%	11 (22)
51-75%	26 (52)
25-50%	8 (16)
25%	5 (10)
Colonoscopy in adults >70 years	
Depends on condition	22 (44)
Yes, should continue	17 (34)
No	11 (22)

embarrassment (68%). Moreover, 80% of surgeons believed that public knowledge of CRC screening was inadequate.

System-level constraints were identified as major barriers to effective CRC screening implementation. Long waiting times for colonoscopy appointments were reported by 90% of surgeons, and limited consultation time by 54%. In addition,

Table 4. Perceived barriers and improvement strategies reported by surgeons	
Variable	**(n=50) (%)**
Common patient concerns	
Pain/complications	39 (78)
Privacy concerns	34 (68)
Preparation burden	33 (66)
Belief procedure unnecessary	7 (14)
Perception of patient knowledge (inadequate)	40 (80)
National screening program effectiveness	
Effective	6 (12)
Partly effective	38 (76)
Not effective	6 (12)
Routinely recommend colonoscopy for eligible patients	34 (68)
Attempt to persuade reluctant patients	
Yes	23 (46)
Sometimes	20 (40)
No	7 (14)
Reasons for not recommending/encouraging	
Lack of time	42 (84)
Low motivation/burnout	15 (30)
Limited access to colonoscopy	10 (20)
Doubt about patient receptivity	7 (14)
System-level barriers	
Long waiting times	45 (90)
Limited consultation time	27 (54)
Lack of robust national program	21 (42)
Complex referral process	18 (36)
Perceived adequacy of colonoscopy access	
Adequate only in major cities	25 (50)
Limited nationwide	21 (42)
Adequate overall	4 (8)
Number of trained endoscopists sufficient	4 (8)
Suggested strategies to improve screening	
Organized national reminder systems	46 (92)
Increase media awareness	39 (78)
Proactive family physician referrals	32 (64)
Strategies to enhance provider motivation	
Increase consultation time	46 (92)
Provide concise guidelines and seminars	43 (86)
Redistribute workload to more hospitals	27 (58)

42% of surgeons cited the absence of a robust national screening program, describing it as largely opportunistic and not systematically integrated into the primary care. Furthermore, 92% stated that the number of physicians trained to perform

colonoscopy was insufficient. Half of the respondents (50%) believed that access to colonoscopy was adequate only in major cities, while 42% reported limited access nationwide (Table 4).

To improve CRC screening uptake, surgeons most frequently emphasized the need for organized national screening and reminder systems (92%), increased media-based public awareness (78%), and stronger involvement of family physicians in proactive referral (64%). To enhance provider motivation and capacity, the suggested strategies included increasing consultation time (92%), providing concise guideline documents and regular educational seminars (86%), and redistributing the screening workload across additional hospitals (58%).

DISCUSSION

This study demonstrates a clear gap between patients' willingness to undergo CRC screening and the capacity of the healthcare system to effectively deliver and promote preventive screening in Türkiye. Although patient awareness of CRC screening and individual risk factors was limited, most respondents reported a willingness to undergo colonoscopy when recommended by a physician. Simultaneously, surgeons identified organizational and capacity-related constraints, rather than patient refusal, as the primary barriers to effective screening implementation. Consistent with these findings, CRC screening in practice appears to be largely symptom-driven rather than preventive.

Despite the presence of a national CRC screening program in Türkiye, participation is limited. A recent meta-analysis reported that only 19.3 percent of eligible individuals were aware of stool-based screening tests, and only 13.2 percent had ever completed one, while awareness of colonoscopy was higher at 31.7 percent, with an uptake of only 10 percent (8). Our findings closely reflect this trend. More than half of the screening-naïve outpatients reported no prior awareness of CRC screening, most were unable to identify the recommended starting age, and nearly one-third of individuals with a family history did not perceive themselves to be at increased risk. Sources of information were predominantly non-medical, whereas physician-mediated education was infrequent. Taken together, these findings indicate that the national screening program is not consistently integrated into routine clinical encounters, limiting its effectiveness in reaching the target population.

In addition to limited awareness, psychological and perceptual factors influence screening behavior. Fear of pain or discomfort, embarrassment, and anxiety related to a potential cancer diagnosis have been consistently reported as common barriers, and qualitative research suggests that asymptomatic individuals often assign low priority to preventive screening (9-11). Similarly, in our cohort, concerns related to receiving a serious diagnosis, procedural discomfort, and embarrassment were frequently reported by patients. Importantly, most participants indicated that these concerns would not ultimately prevent them from undergoing colonoscopy if recommended by a physician. Notably, once patients underwent the procedure, their experience was largely positive and educational, and many reported an increased understanding of CRC and screening. In contrast to this strong desire for information, only a small proportion of patients felt adequately informed prior to colonoscopy, suggesting that patient-level concerns are modifiable when clear communication and guidance are provided in the healthcare system.

However, system-level barriers emerged as prominent obstacles to effective CRC screening in Türkiye. Evidence from primary care settings indicates that fewer than one-third of family physicians routinely recommend stool-based screening tests, and only a small proportion advise screening colonoscopy at appropriate intervals (12). Reflecting this limited provider engagement, a systematic review reported that only 14-28 percent of patients had ever received a physician recommendation for CRC screening, which is notable given that physician recommendation is a key determinant of screening adherence (8,13). Reflecting this broader trend, surgeons in our study cited limited consultation time and professional burnout as key constraints to routinely recommending or actively encouraging screening. This limited proactive recommendation at the provider level aligns with the low rate of clinician-provided screening information reported by screening-naïve outpatients. Furthermore, most colonoscopies in our cohort were performed for the diagnostic evaluation of symptoms rather than for primary preventive screening, underscoring the predominance of reactive, symptom-driven care over organized screening.

To address system-level barriers, surgeons emphasized the need for more organized national screening and reminder systems, increased public awareness, and stronger involvement of family physicians in proactive referrals. International experience supports this approach, as organized screening programs in Europe and East Asia employ mailed invitations, centralized registries, and coordinated public campaigns, with primary care serving a central role (9,14,15). However, improving awareness alone is unlikely to translate into higher screening uptake in the absence of adequate endoscopic capacity (16). In our study, the shortage of trained endoscopists and limited procedural availability emerged as major constraints. Although Ministry of Health data indicate that large numbers of stool-based screening tests are distributed annually, these figures do not provide information on population coverage or downstream colonoscopy completion (17). In this context, a limited endoscopic workforce represents a critical bottleneck. Evidence from international screening programs indicates that both general surgeons and gastroenterologists deliver high-quality colonoscopy and that current screening-related demand

can only be met through their complementary and shared contributions (18,19). Without the corresponding expansion of endoscopic capacity and infrastructure, efforts to scale up organized screening programs are likely to encounter substantial implementation barriers.

A key strength of this study is its tripartite design, which incorporates perspectives from screening-naïve outpatients, patients undergoing colonoscopy, and practicing surgeons, allowing for the assessment of barriers across multiple stages of the CRC screening pathway. The inclusion of patient experiences before and after colonoscopy also provided insights into modifiable patient-level barriers.

Study Limitations

This study has several limitations. First, it was conducted at a single tertiary training and research hospital, where patient presentations and referral patterns are more likely to be symptom-driven than in primary or secondary care, which may limit its generalizability. Second, most participating surgeons were affiliated with tertiary institutions, and their reported practices may not reflect the screening workflows or resource constraints in smaller or rural settings. The surgeon survey may also be subject to non-response bias, as respondents might differ systematically from non-respondents in their screening practices or perceptions. Third, although the tripartite design captured perspectives from screening-naïve outpatients, colonoscopy patients, and surgeons, the absence of family physicians and gastroenterologists limited the comprehensive assessment of the CRC screening pathway. Fourth, the descriptive design precludes causal inference and identification of independent predictors of screening behavior. Finally, the questionnaires were pilot-tested but not formally validated, which may have introduced a measurement bias. Accordingly, the findings should be interpreted as an exploratory assessment of perceived barriers rather than definitive evidence to guide nationwide screening policy.

CONCLUSION

The principal challenge in CRC screening in Türkiye appears to be the gap between patient willingness and healthcare system capacity rather than patient reluctance. While patient-level barriers are potentially modifiable, limited endoscopic capacity, including the availability of trained endoscopists, remains a critical constraint for implementing preventive screening.

Ethics

Ethics Committee Approval: The study was approved by the Local Institutional Ethics Committee of Ankara Bilkent City Hospital (approval number: 451, date: 07.08.2024).

Informed Consent: Written informed consent was obtained from all participants prior to their participation.

Footnotes

Authorship Contributions

Concept: M.O., E.Ç.; Design: M.O., E.Ç.; Data Collection or Processing: M.B.; Analysis or Interpretation: M.O. M.B.; Literature Search: M.O., E.Ç.; Writing: M.O., İ.K., E.Ç.

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Supplementary Appendix Link: https://d2v96fxpocvxx.cloudfront.net/5705d04d-c42c-4056-bb95-f3caa301e79d/documents/2-2026.2025-11-39-suppl.docx

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