

Prevalence of appropriate colorectal cancer screening and preferences for receiving screening advice among people attending outpatient clinics

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Colorectal cancer (CRC) is the third most common cancer in the world.¹ Each year, more than 16,000 Australians receive a diagnosis of CRC and over 4,000 die from the disease.² CRC mortality rates have declined significantly in Australia over the past 20 years.³ This decline is in part attributed to screening for and subsequent treatment of CRC.³ Screening for CRC using biennial faecal occult blood testing (FOBT) reduces mortality from this disease by 13% to 33%.^{1,4-6} A meta-analysis of 11 observational studies suggests that screening with colonoscopy also reduces mortality from CRC when compared to not screening with colonoscopy (61% relative risk reduction).⁷

Australian CRC screening guidelines

Australian CRC screening guidelines, published by the National Health and Medical Research Council (NHMRC), provide screening recommendations based on level of risk, defined by personal and family history.⁸ Those at average or slightly above average risk (herein after referred to as average risk) aged 50 and older are advised to screen for CRC using biennial faecal occult blood test (FOBT) and to consider five-yearly sigmoidoscopy.⁸ More recent Australian guidelines recommend biennial FOBT only.⁹ Approximately 98% of the Australian population is considered to be at average risk.¹⁰ Colonoscopy may be recommended for: those at greater than average risk;

Abstract

Objective: To examine among people attending outpatient clinics aged 50–74 at average risk of colorectal cancer (CRC): 1) The proportion who report: a) faecal occult blood test (FOBT) within the past two years; and b) colonoscopy within the past five years, including the reasons for undergoing colonoscopy; 2) characteristics associated with under-screening; 3) For those who are under-screened, the proportion who are: a) willing to receive help and the acceptability of different methods of receiving help, and; b) unwilling to receive help and reasons for this.

Methods: Cross-sectional survey of 197 participants attending a major regional hospital in New South Wales, Australia. Multivariable logistic regression was used to determine correlates of under-screening.

Results: A total of 59% reported either FOBT in the past two years or colonoscopy in the past five years. Of those reporting colonoscopy in the past five years, 21% were potentially over-screened. Males were more likely than females to be under-screened. Of those under-screened (41%), fewer than half were willing to receive screening advice.

Conclusions and implications for public health: A significant proportion of people attending outpatient clinics are under-screened for CRC, with some people also over-screened. There is a need to explore strategies to overcome both under- and over-screening.

Key words: colorectal cancer, early detection of cancer, outpatient

symptoms suggestive of CRC; investigation of a positive FOBT; or if abnormalities have been previously detected during colonoscopy.⁸

Previous data on CRC screening rates

Australian data on screening rates has been provided by government reports and studies conducted in community and general practice settings.¹¹⁻¹⁴ The National Bowel Cancer Screening Program (NBCSP) is a population-based screening program that provides FOBT to Australians turning 50,

54, 55, 58, 60, 64, 68, 70, 72 and 74. The full roll-out will provide biennial FOBT to all those aged 50–74 by 2020.¹¹ Recent data from the NBCSP suggests that 39% of those invited to participate return a completed a FOBT.¹¹ However, the denominator used to calculate this rate may include individuals for whom FOBT may be inappropriate, such as those at greater than average risk of CRC. In addition, the data do not capture screening that occurs outside of the program such as via general practice, pharmacies or other community programs.

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Studies conducted in Australian community^{12,14} and general practice settings¹³ have shown variable screening rates, which may be due to differences between studies in age groups and risk categories included in the samples, as well as the time-period over which screening was examined. One community-based study including 699 asymptomatic, average-risk individuals aged 56–88 reported 20% of these as having an FOBT in the past two years,¹² while another community study of 8,762 participants from any risk category aged 50–74, reported 21% of participants had an FOBT in the past 12 months.¹⁴ A study of 2,269 general practice patients (any risk category) aged 50 and older found that 40% of participants had completed FOBT in the past three years.^{13,12} The most recent Australian study to assess CRC screening was collected in 2011.¹⁵ Given the expansion of the NBCSP and increased promotion of bowel cancer screening,^{16,17} it is timely to examine whether screening according to NHMRC guidelines has changed in this time.

Potential over-screening for CRC

Over-screening is screening more frequently than recommended, or via screening tests that are more intensive than recommended, such as colonoscopy in the absence of clinical indicators such as symptoms suggestive of CRC. Unnecessary colonoscopy places patients at undue risk of clinical complications, such as bleeding, bowel perforation and adverse reactions to anaesthetics.^{18,19} Further, it reduces the capacity of the healthcare system to provide colonoscopy in a timely manner for those in clinical need.²⁰ Unnecessary colonoscopy is not quantifiable using Medicare Benefits Schedule data.²¹ One previous Australian study of 699 average-risk individuals in a community setting showed that 14% are potentially over-screened for CRC.¹² Exploring the reasons for colonoscopy referral will provide insight into potential rates of over-screening.

Characteristics associated with under-screening for CRC

Examining the characteristics of individuals who are more likely to be under-screened can assist in the development of strategies to target specific sub-groups of the population. Several factors appear to be associated with under-screening for CRC in Australia, including younger age and lower levels

of education.^{13,14} Contact with healthcare providers may also be a contributing factor, with studies in general practice settings identifying that continuity of care is associated with higher rates of CRC screening.²² However, given the limited Australian data on factors associated with under screening, additional exploration is warranted.

Willingness to receive CRC screening advice

For individuals who are under-screened, provision of advice with screening can reduce knowledge gaps, which may encourage screening uptake.²³ However, individuals who are under-screened may vary in the extent to which they perceive they need help with screening. Exploring willingness of individuals attending outpatient clinics to receive specific CRC screening advice can establish if simple informational interventions are likely to be well-received among this population. Further, asking about a person's preferences for how they would like to receive this advice can provide information about the acceptability of different approaches. Previous studies suggest that there may be a number of reasons why people may be reluctant to receive screening advice. Commonly reported barriers include lack of knowledge about CRC and CRC screening recommendations,^{23,24} lack of provider recommendation²⁵ and perception that they are not at risk of CRC.²⁵ Identifying the reasons why some individuals may be unwilling to receive screening advice can add to this evidence and assist in shaping intervention strategies to overcome these barriers.

Why examine CRC screening in an outpatient setting?

In 2014–2015, there were close to 35 million occurrences of non-admitted care across 610 Australian hospitals and 41 other services.²⁶ More than one-third of individual service events occurred in those within the NBCSP target age range of 50–74 years.²⁶ Further to this, many outpatients attend their appointments accompanied by support persons (e.g. friends or family) who may also be in the target age range for CRC screening. Therefore, exploring screening rates according to NHMRC guidelines among outpatients and accompanying support persons will provide an indication of screening rates in a broad cross-section of the community.

Objectives

To examine among people attending outpatient clinics aged 50–74 and at average risk of CRC:

1. The proportion who report: a) FOBT within the past two years; and b) colonoscopy within the past five years, and if so, the reasons for undergoing colonoscopy
2. Whether participant sociodemographic characteristics, frequency and continuity of GP visits are associated with under-screening (i.e. no FOBT in past two years nor colonoscopy in past five years)
3. For those who are under-screened, the proportion who are: a) willing to receive help, and the acceptability of different methods of receiving help, and; b) unwilling to receive help, and the reasons for this.

Methods

Design and setting

Cross-sectional survey conducted in outpatient clinics at one regional hospital in New South Wales, Australia. The outpatient clinics included a range of specialties such as cardiology, respiratory, gastroenterology, rehabilitation, orthopaedics, vascular and general surgery. The current study was conducted as part of a larger study examining health concerns and behaviours among people attending outpatient clinics. Data were collected from November 2016 to January 2017. This study received ethics approval from the Hunter New England (16/09/21/4.10) and the University of Newcastle (H-2016-0388) Human Research Ethics Committees.

Participant eligibility

Participants eligible for the larger study were: 1) aged 18 years and over; 2) English speaking; 3) able to provide informed consent; 4) an outpatient or support person accompanying an outpatient to an appointment; 5) mentally and physically well enough to complete a touchscreen survey.

Participants eligible for the current study were: 1) aged 50–74 years; 2) with no personal history of CRC or inflammatory bowel disease; 3) at average risk of CRC according to NHMRC criteria.⁸ Those at average risk were identified as having: 1) no first degree relative diagnosed with CRC aged <55; 2) no more than two first degree relatives diagnosed with

CRC at any age on either side of the family; 3) no more than one first degree relative and one second degree relative diagnosed with CRC at any age from the same side of the family.⁸

Data collection

Consecutive patients and support persons were approached by a research assistant while they waited for their appointment and were assessed for eligibility for the larger study. The gender and age group of non-consenters was recorded. Consenting participants completed a web-based survey administered on a touch-screen computer in the outpatient waiting room. Consent was provided electronically at the commencement of the survey. Participants meeting the eligibility criteria for the current study were identified by a series of branching questions. Only those meeting the eligibility criteria for the current study received CRC questions. Participants who were called in to their appointment prior to completing the survey could complete this following their appointment.

Measures

Previous FOBT: Participants were asked: "When was the last time you had a faecal occult blood test?" A lay description of FOBT was provided. Response options included: Never had an FOBT; In the past year; 1–2 years ago; 2–3 years ago; 4–5 years ago; More than 5 years ago; Not sure.

Previous colonoscopy: Participants were asked: "When was the last time you had a colonoscopy?" A lay description of the colonoscopy procedure was provided. Response options included: <5 years ago; 6–10 years ago; >10 years ago; Not sure. Those who reported they had a colonoscopy in the past five years were asked: "Why were you referred for a colonoscopy?" Participants could select more than one option from the following: I have a family history of bowel cancer; I had symptoms suggestive of bowel cancer; I had a positive FOBT result; I had an abnormal X-ray or CT scan; I have previously had colorectal adenomas/polyps; Other.

Screening status: Participants reporting no FOBT in the past two years nor colonoscopy in the past five years were deemed under-screened. While guidelines do not recommend colonoscopy as a routine screening test for those at average risk, those receiving colonoscopy for other reasons are unlikely to require any additional screening

tests such as FOBT within the years following colonoscopy. Therefore, in an effort to be conservative, people who had undergone colonoscopy regardless of the reason were considered screened regardless of the FOBT screening status.

Preferences for receiving CRC screening advice: Participants who were identified as not having FOBT in the past two years or colonoscopy within the past five years received the following question: "Your answers suggest that you may be overdue for bowel cancer screening. Would you be willing to receive help addressing this?" with response options: Yes; No; I am already addressing this. Participants who responded 'Yes' were asked: "How would you like to receive help to address this?" Participants could select more than one response from the following: Information mailed to my home; Information emailed to me; Notification sent to my GP; Other (please specify).

Participants who responded 'No' were asked: "Why would you be unwilling to receive help to address this?" Participants could select more than one response from the following: Bowel cancer is not relevant to me; I find the idea of bowel cancer screening unpleasant; I don't think bowel cancer screening is effective at detecting cancer; I can't afford bowel cancer screening; Worried I would not know how to do the test; Would rather not know if I had cancer; My doctor hasn't recommended I undertake bowel cancer screening; Other (please specify).

Explanatory variables: Sociodemographic items: Age, gender, whether they held private health insurance or a health care concession card, highest level of education, and employment status were self-reported. To determine frequency of GP care, participants were asked: "How many times have you seen your GP within the past 12 months?" Response options included: 0–3 times, 4–6 times, 7–9 times; 10 or more times. As an indicator of continuity of care participants were asked to select from the following: I always see the same GP; I usually see the same GP; I see whichever GP is available.

Data analysis

The characteristics of consenting participants and non-consenters were compared using chi-squared tests.

Descriptive statistics including frequencies and percentages were calculated for each variable of interest. Proportions were

calculated (with 95% confidence intervals) of those reporting screening with: 1) FOBT within the past two years; 2) colonoscopy within the past five years, and the reason for this colonoscopy; and 3) preferences for receiving CRC screening advice.

Multivariable logistic regression analyses were performed to determine whether age, sex, private health insurance coverage, health care concession card holder, highest level of education, employment status, frequency and continuity of GP visits were independent predictors of under-screening. Missing data was handled using multiple imputation. All analysis variables were used as predictor variables in the imputation models and 50 imputed datasets were created. The multivariable logistic regression models were estimated on each of the imputed datasets, and regression coefficients pooled using Rubin's method. Pooled odds ratios, 95% confidence intervals and Wald based *p*-values are presented. All analyses were conducted using Stata IC 11.3 (Statacorp, College Station, TX). *P*-values of <0.05 were considered significant.

Results

A total of 663 people were invited to participate in the larger study, of whom 623 were eligible. Of these, 484 participants consented to participate in the study (consent rate=78%). There were no significant differences between consenters and non-consenters in relation to age ($X^2[3]=1.8$, $p=0.61$) or gender ($X^2[1]=0.42$, $p=0.51$).

Of the 484 consenting participants, 212 were eligible for the current study. A total of 272 were ineligible due to the following reasons: aged <50 or >74, ($n=193$); called away for appointment prior to answering initial eligibility screening questions ($n=25$); had a history of CRC/inflammatory bowel disease ($n=11$); or were at greater than average risk of CRC due to family history ($n=43$). A further 15 participants were excluded as they did not answer both the FOBT and colonoscopy questions, resulting in a final sample of 197 for analysis. The sample characteristics are reported in Table 1.

The proportion reporting FOBT within the past two years or colonoscopy within the past five years

A total of 92 (47%; 95%CI 40–54%) participants reported FOBT in the past

two years and 48 (24%; 95%CI 19–31%) participants reported colonoscopy in the past five years. Of these, 24 participants (21%; 95%CI 14–29%) completed both tests.

Self-reported reasons for undergoing colonoscopy in the past five years

Of those who had undergone colonoscopy in the past five years, 38 (79%) reported an appropriate reason for colonoscopy (see Table 2), including: symptoms that may indicate CRC (38%); other medical conditions (15%); follow-up of positive FOBT (13%); previous polyps/adenoma (13%). However, 10 (21%) of those reporting colonoscopy in the past five years indicated that this was done as a screening test rather than an investigative test. Eight (17%) participants reported having colonoscopy as part of routine screening

and two (4%) participants reported that the colonoscopy was undertaken due to their family history of CRC, despite being classified as average risk for CRC based on their responses to family history questions in the survey.

Variables associated with being under-screened for CRC

Eighty (41%; 95%CI 34–48%) participants reported not completing FOBT in the past two years nor colonoscopy in the past five years, and were deemed under-screened. Multivariable logistic regression with under-screening as the outcome showed that female participants had lower odds of being under-screened compared to males (OR 0.49; $p=0.02$). No other variables were significantly associated with being under-screened (see Table 3).

Preferences for receiving CRC screening advice

Of the 80 participants who were under-screened for CRC, 34 (43%; 95%CI 32–54%) were willing to receive help to address under-screening, 23 (29%; 95%CI 19–40%) were unwilling to receive help and 24 (30%; 95%CI 20–41%) said they were already receiving help with this.

For those willing to receive help to address under-screening, most preferred screening information mailed to their home, $n=22$ (65%). Smaller proportions of participants indicated they were willing to receive information emailed to them, $n=9$ (26%), or by notification sent to their GP, $n=8$ (24%).

For those unwilling to receive help to address under-screening, just over one-third $n=8$ (35%) selected 'My doctor hasn't recommended I undertake bowel cancer screening' as the reason for their choice to not receive screening advice. Other reasons included: 'I will wait until I receive FOBT from the NBCSP', $n=3$ (13%); 'I find the idea

of screening for bowel cancer unpleasant', $n=3$ (13%); and 'Bowel cancer screening isn't relevant to me', $n=2$ (9%). The options: 'I don't think bowel cancer screening is effective at detecting cancer'; 'I can't afford bowel cancer screening'; and 'I would rather not know if I had cancer' each had one participant response (4%, respectively).

Discussion

Our study aimed to determine the CRC screening practices in those aged 50–74 and at average risk of CRC in an outpatient setting, including under-screening and potential over-screening, as well as willingness and preferences for receiving CRC screening advice.

FOBT in the past two years

Almost half the sample (47%) had completed a FOBT in the past two years. This rate is higher than rates reported in Australian research conducted between 2009–2011 (20%–40%),^{12–14} and by the NBCSP (39%).¹¹ In recent years, there has been increased promotion of CRC screening and increased age groups invited into the NBCSP.²⁷ Recent data from the NBCSP reported a 2% increase in screening with FOBT among invitees between January 2014–December 2015 (representing an increase of 177,870 people completing screening).^{11,28} Therefore, increased awareness of and uptake of NBCSP invitations may have contributed to the higher FOBT completion rates found in our study.

Colonoscopy in the past five years

Forty-eight (24%) participants reported colonoscopy in the past five years. Of those, 21% ($n=10$) received potentially unnecessary colonoscopy (i.e. 5% of the sample). The majority of these indicated that they received a colonoscopy as routine screening. Previous Australian research reports a higher prevalence of potentially unnecessary colonoscopy in an asymptomatic average-risk sample (14%).¹² Given that holding private health insurance is associated with higher use of colonoscopy,¹⁴ this finding may be at least partially explained by the lower proportion of individuals with private health insurance (40%) in our study sample as compared to the Australian population (56%).²⁹ Nevertheless, the finding that some participants may have undergone unnecessary colonoscopy, exposing them to unnecessary risk, suggests

Table 1: Participant sociodemographic characteristics ($n=197$).

Characteristic	Category	n (%)
Age group	50–59	85 (43%)
	60–74	112 (57%)
Gender	Female	123 (62%)
	Male	74 (38%)
Participant type	Outpatient	112 (57%)
	Support person	85 (43%)
Marital status	In a partnered relationship (married or living with partner)	132 (67%)
	Single (widowed, divorced, separated, never married)	40 (20%)
	Missing	25 (13%)
Education	Non-tertiary (high school, trade, diploma, vocation)	139 (71%)
	Tertiary	37 (19%)
	Missing	21 (11%)
Employment	Employed	61 (31%)
	Non-employed (unemployed, non-paid activities, carers, students, disability support)	42 (21%)
	Retired	73 (37%)
	Missing	21 (11%)
Private Health Insurance	Yes	77 (39%)
	No	96 (49%)
	Missing	24 (12%)
Healthcare concession card	Yes	108 (55%)
	No	65 (33%)
	Missing	24 (12%)
Frequency of GP visits in last 12 months	0–3	65 (33%)
	4 or more	107 (54%)
	Missing	25 (13%)
Continuity of GP visits in last 12 months	Always see the same GP	98 (50%)
	Usually see the same GP	60 (30%)
	I see whichever GP is available	14 (7%)
	Missing	25 (13%)

Table 2: Self-reported reasons for undergoing colonoscopy in the past five years ($n=48$).

Reason for colonoscopy	Responses n (%)
Symptoms suggestive of CRC	18 (38%)
Routine screening*	8 (17%)
Other medical conditions	7 (15%)
Previous polyps/adenoma	6 (13%)
Follow-up of positive FOBT	6 (13%)
Perceived strong family history of CRC*	2 (4%)
Abnormal CT/X-ray	1 (2%)

*indicates potential over-screening

that strategies are needed to ensure appropriateness of referrals for this test.

Variables associated with under-screening

The multivariable logistic regression showed that female participants were significantly less likely to be under-screened compared to males. This aligns with previous data that finds males are less likely to participate in CRC screening.^{28,30,31} Given that males are more likely to be diagnosed and more likely to die from CRC,³² interventions that specifically target males are needed. No other variables were significantly associated with being under-screened; however, this does not mean the other variables are not important. The confidence intervals of their effect sizes do include potentially important values; larger studies would be necessary to gain greater precision in these estimates. While previous research has found that lower levels of education may be associated with under-screening,^{12,13} we did not find this in the current study. The proportion of those with tertiary education was comparatively lower than in previous studies,^{12,13} which may explain why we did not find this association. Being younger did not correlate to a higher rate of under-screening, which is at odds with previous findings.^{11,12} This may be due to differences in age categories used (only two age sub-groups in the current study) and/or because the NBCSP has added several younger age groups in the ongoing program expansion,²⁷ and overall participation in the NBCSP has increased in younger age groups.^{11,28}

Preferences for receiving CRC screening advice

Fewer than half of those under-screened for CRC indicated that they would be willing to receive help to address under-screening. Of these, the majority preferred written information mailed to their home. The relatively high proportion of participants who were not interested in receiving help with screening is somewhat concerning. However, unwillingness to receive help to address under-screening did not necessarily indicate unwillingness to participate in screening. Some of those indicating unwillingness to receive help did so because they were waiting to screen through the NBCSP. One-third of these patients indicated that their doctor had not recommended they undertake screening. Although based on a small sample, this is

Table 3: Multivariable logistic regression model determining factors associated with under-screening (n=197).

Participant characteristics		OR for being under-screened	P=value (95%CI)
Gender	Male	–	0.02*
	Female	0.49 (0.26–0.91)	
Age	50–59	–	0.59
	60–74	1.23 (0.58–2.58)	
Marital status	In a partnered relationship (married or living with partner)	–	0.85
	Single (widowed, divorced, separated, never married)	0.92 (0.40–2.12)	
Education	Non-tertiary (high school, TAFE/trade/diploma/ vocation)	–	0.17
	Tertiary	1.76 (.79–3.93)	
Employment	Employed	–	0.71
	Non-employed (includes unemployed, non-paid activities, disability support and students)	0.73 (0.68–1.75)	
	Retired	1.12 (0.44–2.9)	
Private health insurance	No	–	0.26
	Yes	0.66 (0.33–1.35)	
Healthcare concession card	No	–	0.86
	Yes	1.08 (0.47–2.50)	
Continuity of GP visits in last 12 months	Always see the same GP	–	0.06
	Usually see the same GP	0.67 (0.32–1.3)	
	I see whichever GP is available	0.21 (0.34–1.01)	
Frequency of GP visits in last 12 months	0–3 times per year	–	0.68
	4 or more times per year	0.86 (0.42–1.76)	

*statistically significant

consistent with the notion that physician endorsement is a key factor influencing positive screening CRC behaviours.^{33,34} Considering this, interventions that involve general practitioner endorsement of screening should be considered for those who are under-screened.

Implications for public health

Forty-one per cent of participants had not completed a FOBT in the past two years nor a colonoscopy in the past five years, suggesting that a significant proportion of people attending outpatient clinics are under-screened for CRC. Just under half of these were willing to receive screening advice, most of whom indicated they would like to receive written information posted to their home. This simple, affordable intervention is acceptable to many and similar print interventions have increased uptake of cancer screening.³⁵ Given that some participants cited lack of GP advice on screening as a reason for not wanting screening advice, general practitioner endorsement may increase the acceptability of receiving screening advice.

Limitations

Due to the brevity of family history questions used to determine CRC risk category, it is possible that a small number of participants

at average risk may have been classified as greater than average risk and vice-versa. Self-reported screening may be affected by recall bias, however, a recent meta-analysis of the accuracy of self-report of FOBT and colonoscopy compared to medical records found good to excellent accuracy of self-report (area under the curve 0.87 and 0.95 respectively).³⁶ The sample representativeness may be limited as participants were recruited from one regional hospital. Self-reported sigmoidoscopy data was not collected, however, due to the low rates of sigmoidoscopy found in previous Australian research (<1%),^{12,37} it is unlikely that this would affect our results. Finally, this study did not examine possible contraindications that may have made FOBT inappropriate, such as gastrointestinal symptoms, or the presence of late-stage disease. However, given that the proportion of individuals in our sample with these contraindications would have been low, it would not have had a significant impact on the screening rate identified.

Conclusion

FOBT screening rates in an outpatient sample were higher than those reported in the NBCSP data, however, 41% were under-screened. Females were less likely to be under-screened. Five per cent of the sample were potentially over-screened, having received a colonoscopy for screening

purposes. Fewer than half of those under-screened for CRC were willing to receive screening advice. Strategies involving general practitioners could be used to target those not interested in receiving written CRC screening advice.

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