

## Research Article

## Is Discussion of Colorectal Cancer Screening Options Associated with Heightened Patient Confusion?

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## Abstract

**Background:** Clinical guidelines recommend offering patients options for colorectal cancer (CRC) screening, but the modalities vary by frequency, accuracy, preparations, discomfort, and cost, which may cause confusion and reduce screening rates. We examined whether patients reported confusion about the options and whether confusion was associated with socio-demographic characteristics, number of options discussed, and adherence.

**Methods:** Patients ages 50 to 75 years who had visited a clinician within 2 years were randomly selected for a cross-sectional study ( $n = 6,100$ ). A questionnaire mailed in 2007 asked the following: whether a clinician had ever discussed CRC screening options; which of four recommended tests (i.e., fecal occult blood testing, flexible sigmoidoscopy, colonoscopy, and barium enema) were presented; and whether the options were confusing. Analyses were restricted to respondents who reported discussing one or more screening options ( $n = 1,707$ ). Weighted frequencies were calculated and multivariate logistic regression was done.

**Results:** The sample was 55.5% female, 15.6% African American, and 83.2% adherent to screening recommendations, and 56.0% had discussed two or more screening options. In adjusted analyses, nonadherent patients reported greater confusion than adherent patients ( $P < 0.01$ ). Adults who discussed two or more options were 1.6 times more likely to be confused than those who discussed one option [95% confidence interval (CI), 1.08-2.26]. Patients who reported being confused were 1.8 times more likely to be nonadherent to screening than those who did not (95% CI, 1.14-2.75).

**Conclusions:** Our study provides the first empirical evidence linking multiple options with confusion and confusion with screening adherence.

**Impact:** Confusion may act as a barrier to screening and should be considered in public health messages and interventions. *Cancer Epidemiol Biomarkers Prev*; 19(11); 2821-5. ©2010 AACR.

## Introduction

Colorectal cancer (CRC) is the second leading cause of cancer death (1). Although efficacious early detection screening methods exist (2), known barriers to screening contribute to whether people undergo recommended CRC screening modalities (e.g., refs. 3-5). Public education efforts have raised awareness about the importance of CRC screening, and several studies have evaluated interventions to increase screening uptake (6, 7). Despite these efforts, screening rates are lower than those for breast and cervical cancer (8).

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Expert panels and professional organizations recommend several options for CRC screening [e.g., fecal occult blood testing (FOBT), flexible sigmoidoscopy, and colonoscopy]. They further recommend that clinicians offer and discuss the options with patients and let patients choose the one they prefer (2, 9). This approach was adopted because there was inadequate evidence that any one test offered substantially greater clinical effectiveness and cost-effectiveness over another and because personal preferences of patients vary (10, 11). Some argue that giving patients a choice may enhance uptake (12), whereas others argue that offering too many choices may confuse patients and result in inaction (13). Not only do multiple CRC screening options exist, but the options vary by frequency, accuracy, preparations, discomfort, and cost, which may engender confusion (14).

Although limited, there is some empirical support for the view that the "menu of options" may cause confusion and may partially explain low rates of CRC screening (15). Data from the 2005 Health Information National Trends Survey found that 49% of adults who had not had CRC agreed that the number of options for CRC screening made it difficult to know which one to

choose (16). Lafata et al. (17) found that patients offered multiple screening options were less likely to be screened compared with those offered one choice [odds ratio (OR), 0.57; 95% confidence interval (CI), 0.37-0.86]. Similarly, based on tape-recorded patient-physician encounters, McQueen and colleagues (18) hypothesized that patients' confusion may contribute to low CRC screening rates.

We conducted a secondary analysis of data collected for a study of patient barriers to CRC screening (5) to explore whether patients who discussed CRC screening with their clinician discussed multiple screening options, which options they discussed, and whether they reported being confused about the options. We also examined whether confusion was associated with socio-demographic characteristics, the number of options discussed, and self-reported adherence.

## Materials and Methods

### Study population and data collection

Twelve family medicine practices affiliated with the Virginia Ambulatory Care Outcomes Research Network,

a practice-based research network, participated in a study to assess the importance of patient-reported barriers to CRC screening. The sampling frame for the parent study, data collection methods, and the relative importance of screening barriers for each of four CRC screening modalities are reported elsewhere (5).

Briefly, the sampling frame consisted of patients, age 50 to 75 years old, who had an office visit in the last 2 years. Beginning in February 2007, a questionnaire was distributed to 6,100 randomly selected adults using a modified Dillman sequential mailing protocol, with a \$2 unconditional incentive enclosed (19, 20). A total of 3,357 patients completed the questionnaire. The subsample selected for this study was the group who reported discussing at least one option for CRC screening with a clinician ( $n = 1,707$ ). The questionnaire, which is available online (21), included items asking participants (a) whether their healthcare provider ever discussed different choices or options for CRC screening, (b) which of four recommended CRC screening tests (i.e., FOBT, flexible sigmoidoscopy, colonoscopy, and barium enema) they had discussed as options, and (c) whether they would "strongly agree," "somewhat agree," "neither agree nor

**Table 1.** Multivariate logistic regression of the association between patient characteristics and discussion of screening options with confusion about CRC screening recommendations ( $n = 1,707$ )

	Self-reported confusion about CRC screening options		OR (95% CI)*
	Weighted frequency		
	Confused	Not confused	
Gender			
Male	845	5,099	1.00 (reference)
Female	882	6,492	1.53 (1.05-2.22)
Race			
White	1,228	9,434	1.00 (reference)
Black	385	1,663	0.75 (0.48-1.18)
Other	114	494	0.49 (0.22-1.10)
Age (y)			
50-64	1,247	8,508	1.00 (reference)
65-75	480	3,083	1.25 (0.88-1.77)
Highest level of education			
High school	584	2,422	0.66 (0.42-1.01)
Some college or higher	1,140	9,128	1.00 (reference)
Annual household income			
Less than \$20,000	310	906	0.46 (0.27-0.80)
\$20,000 or more	1,347	10,221	1.00 (reference)
Insured			
Yes	1,695	11,022	1.00 (reference)
No	15	383	5.87 (1.96-17.6)
Number of screening options discussed with physician			
1	934	4,867	1.00 (reference)
2-4	418	3,576	1.57 (1.08-2.26)

\*Multivariate analyses are also weighted given probabilistic sampling scheme.

disagree," "somewhat disagree," or "strongly disagree" with the following statement: "The information about the different colon cancer screening options was confusing." CRC screening history questions (22) and demographics were also assessed.

The study was approved by the institutional review boards of Virginia Commonwealth University and Riverside Medical Center.

### Statistical analysis

All analyses were done using SAS/STAT software (version 9.2; SAS Institute, Inc.). Given the probabilistic sampling scheme, procedures SurveyFreq, SurveyReg, and SurveyLogistic were used to calculate weighted frequencies of the proportion of adults who talked to their clinician about screening options and which of the four modalities they discussed.

Responses to the question about confusion were rated on a five-point scale (strongly agree to strongly disagree), where higher scores reflect greater confusion. Due to a skewed distribution, the response categories "strongly agreed" and "somewhat agreed" were combined and compared with the other three categories.

Based on published guidelines in effect at the time (23), respondents were classified as nonadherent if they did not report a FOBT within the last year, flexible sigmoidoscopy or barium enema within the last 5 years, or colonoscopy within the last 10 years. Finite population adjustments were made to SEs using the sampling rates, and sampling weights were adjusted for nonresponse.

Multivariate logistic regression (OR and 95% CI) was done to determine whether confusion was independently associated with patient characteristics (i.e., gender, age, race, education, annual income, insurance coverage, and number of screening options discussed with the clinician) and with screening adherence.

### Results

The sample was 55.5% female, 15.6% were African American, 26.9% were age 65 to 75, 22.8% had no more than a high school education, and 83.2% were adherent to screening recommendations. A total of 56.0% had discussed two or more screening options with their clinician. Of those who discussed options, the majority discussed colonoscopy (94.7%), followed by FOBT (50.3%), flexible sigmoidoscopy (31.8%), and barium enema (14.7%). Overall, 13.0% strongly agreed or somewhat agreed that the information about various screening options was confusing. Adults who discussed two or more screening options (weighted  $n = 7,556$ ) with their clinician were 1.57 times more likely to be confused than those who discussed one option (weighted  $n = 5,930$ ; 95% CI, 1.08-2.26). The test for linear trend was statistically nonsignificant ( $P = 0.17$ ). However, whereas the ORs were similar when only one option was presented compared with two (OR, 1.59; 95% CI, 1.02-2.49; weighted  $n = 4,010$ ) or three

(OR, 1.24; 95% CI, 0.73-2.11; weighted  $n = 2,313$ ) options, confusion was greater when four options were discussed (OR, 2.33; 95% CI, 1.14-4.77; weighted  $n = 1,233$ ).

Confusion about the options was reported by 17.8% of patients who were nonadherent to CRC screening recommendations and 12.0% of those who were adherent. People who reported being confused were 1.77 times more likely to be nonadherent to screening compared with people who were not confused (95% CI, 1.14-2.75).

As shown in Table 1, women reported greater confusion about screening options than men (OR, 1.53; 95% CI, 1.05-2.22). Respondents with education beyond high school or higher annual household incomes ( $\geq \$20,000$ ) were more likely to report confusion than those with no more than a high school education or lower income. However, the uninsured were six times more likely to express confusion than those with insurance coverage (95% CI, 1.96-17.6). Although statistically significant, the CI for that estimate was very wide because few members of the sample population were uninsured.

### Discussion

Although the majority of patients did not report being confused about CRC screening options, our findings are consistent with the results of qualitative studies that suggest that presenting multiple options for CRC screening may increase patient confusion (3, 18). In our sample, respondents who reported discussing only one screening option were significantly less likely to report confusion than those who discussed two to four options, as recent guidelines recommend (24). Our findings also are consistent with those of Lafata et al. (17) who reported that offering multiple screening options reduced the likelihood of screening adherence. To our knowledge, however, our study provides the first empirical evidence linking multiple options with confusion and linking confusion with screening adherence.

Our findings are consistent with the view expressed by Schwartz (25) who described a "paradox of choice" in which people desire choices but become overwhelmed and "paralyzed" by the number of options during the decision-making process. This observation supports Neugut and Lebwahl recommendation that clinicians recommend only one test (i.e., colonoscopy) to patients and that the review of a menu of options be eliminated from guidelines (26). Another argument for promoting a single test is that some screening options are not being used or are not widely available (e.g., flexible sigmoidoscopy or double-contrast barium enema). In general, we observed a threshold effect when more than one option was presented. We saw no evidence of a linear dose-response association between confusion and the number of options presented; however, discussing four options resulted in much greater confusion than one option. Our analyses did not take into account which combination of two or three screening modalities were actually discussed. Further, perhaps clinicians discussed screening options without necessarily

giving equal weight to each modality. Thus, although our findings suggest that presenting one screening option may reduce confusion, our data do not indicate which modality should be recommended.

Women were more likely to report confusion than men as were the uninsured, and respondents who reported higher household incomes and more education also were more likely to report being confused. Further research is needed to understand these patterns and to make sense of potentially inconsistent findings (e.g., the uninsured are more likely to have low incomes). Confusion has cognitive and affective components and as such likely encompasses much more than simple knowledge transfer. Psychological and sociological research on the causes and determinants of confusion is important to understand how gender, socioeconomic status, and related covariates (e.g., health literacy) might influence one's desire and ability to obtain information about options and the risk of becoming confused or overwhelmed by the volume or complexity of information. In the context of a choice presented by a clinician, as in the case of CRC screening, a related question is whether patients' gender, socioeconomic status, or related covariates influence practitioner behavior in ways that contribute to confusion. In short, although explanations of the complexity of screening need to be improved, it is crucial to better understand the various components of confusion to ultimately aid in patient-physician communication.

The medical literature provides few insights on how screening advice may foment confusion. The most pertinent studies have focused on gaps in information provided during such counseling. In a study of informed decision-making elements covered with men during a primary care visit for CRC screening, Ling et al. found that >50% of visits included no informed decision elements. In <6% of visits was there discussion of uncertainties, assessment of patient understanding, probing about input from trusted people, and discussion of the patient's role in the decision making (10). McQueen et al. (18) reported that patients' confusion persisted even after discussion with their physicians because questions and issues remained unaddressed.

Our findings should be considered in the context of the following limitations. First, generalizability may be limited because our sample was drawn from primary care practices. Patients must have had an office visit within the past 2 years to be included, and the sample of uninsured patients was very small. People with more limited access to care may have different experiences with how and from whom they receive information about CRC screening options. Moreover, the practices involved in the study and the geographic areas they represented may differ from other settings. Second, although a slightly larger proportion of nonadherent persons reported confusion than those who were adherent, confusion was reported by only 13.0% of patients in this sample. Further, our sample only included patients

who reported discussing options or choices for CRC screening and a large proportion of those patients was screened per recommendations (83.2%), which is much higher than national CRC screening rate (60.8%; ref. 27). Experiences about confusion could have differed in the 49.2% of the parent study sample who did not report discussing CRC screening with their clinician and were not included in this study (only 59.0% of whom were screened per recommendations). Third, this study reports secondary analysis of data originally collected for another purpose—to assess the relative importance of patient-reported barriers to CRC screening (3, 4). Confusion was measured with only one item. To limit respondent burden, we did not include questions to ask about the determinants or potential domains of confusion. Fourth, this study includes no comparison group because respondents were only asked about their confusion if they reported discussing screening options with their clinician. Fifth, cross-sectional data do not permit the assessment of temporality or causality in the association between confusion and CRC screening adherence. Finally, this study was completed when greater consistency existed among CRC screening guidelines. Now, the recommendations of the American Cancer Society–U.S. Multi-Society Task Force differ from those of the U.S. Preventive Services Task Force in that the former recommends more screening options, a situation that could exacerbate confusion for patients.

Given that current guidelines are inconsistent and recommend an even larger number of screening options, such as fecal DNA testing and virtual colonoscopy, confusion likely exists about the recommendations themselves, as well as the different modalities and what they entail (e.g., risks and benefits). One area for future research is to explore the sources and domains of confusion about CRC screening and to develop ways to measure them. Comprehensive measures of confusion about screening guidelines in general and about currently recommended modalities in particular are needed. Given that a cross-sectional association between confusion and screening rates does not prove causality, a prospective randomized trial would be of public health importance to compare screening rates among patients offered one versus multiple tests. Such findings would help determine whether guidelines, and clinicians who counsel patients, should recommend only one test or multiple options to accommodate heterogeneous preferences.

#### Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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## References

- American Cancer Society. Cancer facts and figures, 2010. Atlanta (GA): American Cancer Society; 2010.
- U.S. Preventive Services Task Force. Screening for colorectal cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med* 2008;149:627–37.
- Jones RM, Devers KJ, Kuzel AK, Woolf SH. Patient-reported colorectal cancer screening barriers: a mixed methods analysis. *Am J Prev Med* 2010;38:508–16.
- Jones RM, Woolf SH, Cunningham TD, et al. The relative importance of patient-reported barriers to colorectal cancer screening. *Am J Prev Med* 2010;38:499–507.
- Klabunde CN, Vernon SW, Nadel MR, Breen NL, Seeff LC, Brown ML. Barriers to colorectal cancer screening: a comparison of reports from primary care physicians and average-risk adults. *Med Care* 2005;43:939–44.
- Vernon SW, McQueen A. Colorectal cancer screening. In: Holland JC, Breitbart WS, Jacobsen PB, Lederberg MS, Loscalzo MJ, McCorkle R, editors. *Psycho-oncology*. New York: Oxford University Press; 2010, p. 71–83.
- National Institutes of Health State-of-the-Science Conference Statement: Enhancing Use and Quality of Colorectal Screening [accessed 2010 Jun 6]. Available from: [http://consensus.nih.gov/2010/images/colorectal/colorectal\\_panel\\_stmt.pdf](http://consensus.nih.gov/2010/images/colorectal/colorectal_panel_stmt.pdf).
- Meissner HI, Breen N, Klabunde CN, Vernon SW. Patterns of colorectal cancer screening uptake among men and women in the United States. *Cancer Epidemiol Biomarkers Prev* 2006;15:389–94.
- Smith RA, Cokkinides V, Brawley OW. Cancer screening in the United States, 2009: a review of current American Cancer Society guidelines and issues in cancer screening. *CA Cancer J Clin* 2009;59:27–41.
- Ling BS, Trauth JM, Fine MJ, et al. Informed decision-making and colorectal cancer screening: is it occurring in primary care? *Med Care* 2008;46 Suppl 1:S23–9.
- Hawley ST, Volk RJ, Krishnamurthy P, Jibaga-Weiss M, Vernon SW, Kneuper S. Preferences for colorectal cancer screening among racially/ethnically diverse primary care patients. *Med Care* 2008;46 Suppl 1:S10–6.
- Woolf SH. The best screening test for colorectal cancer—a personal choice. *N Engl J Med* 2000;343:1641–3.
- Sarfaty M. How to increase colorectal cancer screening rates in practice: a primary care clinician's evidence-based toolbox. National Colorectal Cancer Roundtable. Atlanta (GA): American Cancer Society/Centers for Disease Control and Prevention; 2006.
- Vernon SW, Meissner HI. Evaluating approaches to increase uptake of colorectal cancer screening: lessons learned from pilot studies in diverse primary care settings. *Med Care* 2008;46 Suppl 1:S97–102.
- Schwartz B. Information overload. *J Life Sciences* 2007;80–4.
- Health Information National Trends Survey. There are so many different recommendations about preventing colon cancer that it's hard to know which ones to follow [accessed 2009 Oct 4]. Available from: <http://hints.cancer.gov/hints/questions/question-details.jsp?qid=457&dataset=2005>.
- Lafata JE, Divine G, Moon C, Williams LK. Patient-physician colorectal cancer screening discussion and screening use. *Am J Prev Med* 2006;31:202–9.
- McQueen A, Bartholomew LK, Greisinger AJ, et al. Behind closed doors: physician-patient discussions about colorectal cancer screening. *J Gen Intern Med* 2009;24:1228–35.
- Dillman DA. *Mail and internet surveys: the total design method*. 2nd ed. John Wiley and Sons; 1999.
- Alexander GI, Divine GW, Couper MP, et al. Effect of incentives and mailing features on online health program enrollment. *Am J Prev Med* 2008;35:382–8.
- Jones RM, Woolf SH, Cunningham TD. Colon cancer screening: health questionnaire. *Am J Prev Med* [serial on the Internet] 2010;38:[about 11.]. Available from: [http://www.ajpm-online.net/article/S0749-3797\(10\)00097-8/addOns](http://www.ajpm-online.net/article/S0749-3797(10)00097-8/addOns).
- Vernon SW, Meissner H, Klabunde C, et al. Measures for ascertaining use of colorectal cancer screening in behavioral, health services, and epidemiologic research. *Cancer Epidemiol Biomarkers Prev* 2004;13:898–905.
- Pignone M, Rich M, Teutsch SM, Berg AO, Lohr KN. Screening for colorectal cancer in adults at average risk: a summary of the evidence for the U.S. Preventive Services Task Force. *Ann Int Med* 2002;137:129–31.
- Levin B, Lieberman D, McFarland B, et al. Screening and surveillance for the early detection of colorectal cancer and adenomatous polyps, 2008: a joint guideline from the American Cancer Society, the US Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology. *Gastroenterology* 2008;134:1570–95.
- Schwartz B. *The paradox of change: why more is less*. New York (NY): HarperCollins Publishing, Inc.; 2004.
- Neugut AI, Leibold B. Screening for colorectal cancer: the glass is half full. *Am J Public Health* 2009;99:592–4.
- CDC. Use of colorectal cancer tests—United States, 2002, 2004, and 2006. *MMWR Morb Mortal Wkly Rep* 2008;57:253–8.

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