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Correlates of Colorectal Cancer Screening Adherence Among Men Who Have Been Screened for Prostate Cancer

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Abstract

Background—Prostate cancer screening rates are higher than colorectal cancer screening rates, despite the established benefit of screening in reducing colorectal cancer incidence and mortality.

Methods—We used data from the 2006 Behavioral Risk Factor Surveillance System (BRFSS) to identify correlates of colorectal cancer screening among men who have undergone prostate cancer screening.

Results—Our sample included 41,781 men aged 50 years and older who reported undergoing prostate cancer screening in the last year. More than two-thirds (69.2%) of the men were up to date with colorectal cancer screening. On multivariable analysis, men who were younger, Hispanic, less educated, not married or partnered, employed, not a veteran, did not have a personal doctor, lacked a recent medical checkup, smoked, or were sedentary were less likely to be adherent to colorectal cancer screening.

Conclusion—Tailored interventions targeted towards men who have already undergone prostate cancer screening may improve rates of colorectal cancer screening in a group that may be already aware of, and interested in, the benefits of cancer risk prevention. The prostate cancer screening encounter may represent a “teachable moment” to increase colorectal cancer screening rates.

Introduction

Despite uniform recommendations for regular colorectal cancer (CRC) screening by major medical organizations,^{1–3} and convincing data regarding its effectiveness in preventing CRC incidence and mortality,⁴ screening adherence is far from universal. For example, among men aged 50 years and older, an estimated 57% have ever been screened for CRC⁵ and only 46.5% are up to date with CRC screening.⁶

In contrast to CRC screening, the clinical benefit of prostate cancer screening is more controversial. Two large randomized controlled studies have suggested very modest benefits coupled with a high risk of over-diagnosis.^{7, 8} Adding to the confusion, professional societies issue conflicting and often vague guidelines that reflect the uncertainty regarding the benefit of screening. For example, the American Cancer Society (ACS) 2010 guidelines do not recommend routine screening for prostate cancer, but state that men age 50 and older should make an informed decision with their health care provider about prostate cancer screening.⁹ The American Urologic Association recommends prostate cancer screening for “well informed men who wish to pursue early diagnosis.”¹⁰ On the other hand, the U.S.

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Preventive Services Task Force concluded that there is insufficient evidence to recommend for or against routine prostate cancer screening.¹¹ The ACS recommends that men at higher risk of prostate cancer (based on African American race or family history) discuss prostate cancer screening starting at age 45, or earlier if the man has a strong family history.⁹

Despite this lack of consensus, rates of prostate cancer screening in the general population are still high; among U.S. men aged 50 years and older, 51.1% and 55.4% report past-year receipt of a DRE and PSA test, respectively. Although rates of CRC screening are higher among men who report past-year prostate cancer screening, one-third are still not adherent to CRC screening.¹² Therefore, regardless of their reason for undergoing prostate cancer screening (e.g., actively seeking out screening versus passively receiving it as part of a battery of routine tests), for these men, the prostate cancer screening encounter may represent a “teachable moment.” Specifically, these patients are already interacting with the health care system and may be particularly receptive to advice and recommendations to undergo CRC screening.¹³ However, little is known about the factors associated with CRC screening adherence among men who undergo prostate cancer screening. Teachable moments, such as existing health care encounters, have been used by other investigators to promote other healthy lifestyle interventions, both in cancer survivors¹⁴ and non-cancer patients.¹⁵

In the current study, we used data from the 2006 Behavioral Risk Factor Surveillance System (BRFSS) to identify correlates of CRC screening among men who have undergone past-year prostate cancer screening. Based on prior research,¹⁶ we studied demographics, health care access factors, behavioral risk factors, and receipt of needed social and emotional support. Identification of correlates of CRC screening in this population who have recently received prostate cancer screening will provide valuable information regarding subgroups for whom tailored interventions may be designed to promote CRC screening uptake.

Methods

Data Source

Study participants were drawn from the 2006 BRFSS, which included questions about screening for prostate cancer and CRC in the core module that is administered to all participants. The BRFSS is an annual, cross-sectional, random-digit-dial, telephone-based survey of behavioral risk factors conducted by the Centers for Disease Control and Prevention (CDC) in collaboration with state and territory health departments. In 2006, the BRFSS was conducted with adults (aged 18 years and over) in all 50 U.S. states, the District of Columbia, Puerto Rico, and the Virgin Islands. The median response rate across the 53 states and territories include in the 2006 BRFSS was 51.4%.¹⁷ Additional details regarding the methodology of the BRFSS are available elsewhere.¹⁸

Participants

The total sample size for the 2006 BRFSS was 355,710. For the purposes of the current study, we excluded females ($n = 220,302$), individuals who were under the age of 50 years or who did not provide their age ($n = 59,981$), individuals with a personal history of prostate cancer or who were missing data for that variable ($n = 7,028$), individuals who did not report being screened for prostate cancer (either with a PSA test or a DRE) in the past year or were missing data for that variable ($n = 26,004$), and individuals who were missing data regarding their CRC screening status ($n = 614$). The final cohort for analysis was 41,781 men. This represents a 64.6% past-year screening for prostate cancer (either with a PSA test or a DRE) among men aged 50 years and older who reported no personal history of prostate cancer.

Measures

Demographics—Participants indicated their age, race/ethnicity, education level, marital status, employment status, and US Armed Forces veteran status.

Health care access—Participants indicated whether they had any kind of health care coverage (commercial or public), whether they have one person who they think of as their personal doctor, whether there was a time in the past 12 months when they needed to see a doctor but could not because of the cost, and whether they had a general medical checkup in the past year.

Behavioral risk factors—Individuals who reported currently smoking cigarettes every day or some days were denoted as current smokers; individuals who reported smoking at least 100 cigarettes in their lifetime, but were not currently smoking, were denoted as former smokers.¹⁹ We denoted individuals as being sedentary if they reported engaging in no leisure-time physical activities in the past month. Participants indicated their frequency of consuming alcoholic beverages and the number of drinks consumed on an average occasion. We denoted individuals as engaging in risky drinking if they reported consuming more than two alcoholic drinks per day on average.^{20–21}

Social/Emotional support—A single item asked participants to report how often (from *never* to *always*) they get the social and emotional support they need.

Colorectal cancer screening—Participants indicated whether they had ever had a sigmoidoscopy or colonoscopy (asked as a single item) or a fecal occult blood test (FOBT) using a home kit. Individuals who reported having ever had a test were asked when they last had that test. Based on responses to these questions, we denoted individuals as being adherent to CRC screening recommendations (sigmoidoscopy or colonoscopy in the past 10 years or FOBT in the previous year) or not adherent to CRC screening recommendations. Current CRC screening guidelines for average risk individuals include sigmoidoscopy every 5 years or colonoscopy every 10 years.²² Since the BRFSS items do not distinguish between receipt of sigmoidoscopy and colonoscopy, consistent with prior research,^{23–24} we used 10 years as the cutoff for undergoing endoscopy.

Weighting and Statistical Analyses

The BRFSS utilizes a complex sample survey design and includes post-stratification adjustments for age, gender, and race/ethnicity. All percentages reported in the Results section are weighted and all sample sizes are unweighted. Analyses were conducted using SUDAAN (version 9.0.1; Research Triangle Institute, Research Triangle Park, NC). Given the large sample size ($N = 41,781$), we used a cutoff of $p < .001$ to determine statistical significance for all analyses.

We first report frequencies for all of the study variables. Next, we report the results of a series of chi-square analyses examining the association between each correlate and CRC screening status. Finally, significant correlates from the chi-square analyses were included as independent variables in a single multiple logistic regression analysis with CRC screening status as the dichotomous outcome variable.

Results

Frequencies for Study Variables

The frequencies of the study variables are shown in Table 1. Most of the study participants reported having access to the health care system, with fewer than 10% reporting having no

health care coverage, having no personal doctor, being unable to visit a doctor in the past year due to the cost, or not having a medical checkup in the past year. Fewer than one in seven participants (13.2%) reported being a current smoker, just under a quarter (22.9%) were sedentary, and very few (3.9%) were denoted as risky drinkers. More than half (57.1%) of the study participants reported always getting the social/emotional support they needed.

Chi-Square Analyses Examining the Association Between each Correlate and Colorectal Cancer Screening Adherence

Overall, more than two-thirds of the sample (69.2%) was up to date with CRC screening. The results of a series of chi-square analyses examining the association between each correlate and CRC screening adherence are shown in the rightmost column in Table 1. With the exception of the risky drinking variable, each correlate was significantly associated with CRC screening adherence. Across all variables, at least half or more of the participants in each category reported being up to date with CRC screening.

Multiple Logistic Regression Examining Correlates of Adherence to Colorectal Cancer Screening

With the exception of the risky drinking variable, all of the correlates were entered as independent variables in a single multiple logistic regression analysis, with CRC screening adherence as the dichotomous outcome. As shown in Table 2, the results of the logistic regression analysis were largely consistent with the results of the chi-square analyses, although the health care coverage, being unable to visit a doctor due to cost, and frequency of getting needed social/emotional support variables were not associated with CRC screening adherence.

Discussion

Although CRC screening rates are higher among men who report a recent screening for prostate cancer, a third of these men remain non-adherent to CRC screening guidelines.¹² In this study, we identified the demographic, health care access and behavioral risk factor characteristics of men who reported undergoing past-year screening for prostate cancer but were not up to date with CRC screening. Specifically, individuals were less likely to be up to date with CRC screening if they were younger (50–64 years, compared to older patients), Hispanic, less educated, single, employed, not a veteran, did not have a personal doctor, lacked a recent medical checkup, smoked, or were sedentary. Although some of these factors, such as age, education, race/ethnicity and lack of a recent medical check-up have previously been identified as predictors of CRC screening in other populations,^{12, 25, 26} it is important to note that these factors continue to be associated with lower rates of CRC screening even among men who have undergone prostate cancer screening. Therefore, our results highlight subgroups of men who have been screened for prostate cancer but are not adherent to CRC screening guidelines. This group of men may gain particular benefit from CRC screening interventions that capitalize on, or are coordinated with, visits to a health care provider for prostate cancer screening.

Targeting CRC screening interventions towards these patients may have a greater likelihood of success for two reasons: (1) they may already be interested in, and accepting of, screening for one type of cancer; and (2) they are already interacting with the health care system. This may be helpful in overcoming the significant barriers to increasing CRC screening rates. Unlike PSA screening, which requires a blood test and/or DRE which can be performed at a single patient visit, CRC screening requires a greater investment of time and effort on the part of the patient. The FOBT testing requires patients to complete the test at home and return samples for analysis, while sigmoidoscopy and colonoscopy both require visits to a

gastroenterologist (with the exception of the patients whose family practitioners perform sigmoidoscopy) and a bowel preparatory regimen. In addition, a colonoscopy requires intravenous sedation and a family member to accompany the patient home post-procedure. Given these challenges, it is not surprising that CRC screening rates lag behind those for prostate cancer screening, despite the larger body of evidence to support the benefits of the former. We believe the prostate cancer screening encounter may be an underutilized opportunity to increase the rates of CRC screening in these men.

Access to the health care system may not be the only reason for under-utilization of CRC screening. A study of men attending a free prostate cancer screening event found that only half of the men were adherent to CRC screening guidelines.²⁷ However, 76% of the non-adherent men had regular physicians and/or health insurance, which provides optimism that they would be able to follow up on a CRC screening recommendation. Patients without a personal doctor or recent medical check up may face greater educational barriers. Given the complexities of CRC screening, it may require several encounters with a physician before a patient agrees to screening, and this clearly requires a multifaceted approach. Therefore, prostate cancer screening may represent one such teachable moment to educate patients about the importance of CRC screening, similar to proposals aimed at increasing CRC screening rates in women undergoing mammography or cervical cancer screening.^{13, 28} Potential teachable moments have been explored in other settings, such as incorporating skin protection education into a smoking cessation program²⁹ and using the birth of a child to promote smoking cessation among parents.³⁰

The BRFSS does not provide information about health care provider characteristics, and prostate cancer screening may be conducted by non-primary care providers who normally do not counsel patients about CRC screening (e.g., urologists) as well as by public health screening campaigns that are unaffiliated with a patient's primary care provider (e.g., free screening events hosted by the National Prostate Cancer Coalition). Since it is likely that a significant number of these patients receive their prostate cancer screening through non-primary care providers, it may be possible to increase patients' awareness by educating these providers about the importance of CRC screening. Discussions about the risks and benefits of prostate cancer screening themselves are already very complex.³¹ However, it is possible that educational materials that promote informed decision making about prostate cancer screening might actually be strengthened by discussing the ample evidence surrounding the benefits of CRC screening. For example, the known benefit of CRC screening in reducing cancer-related mortality through early detection and removal of polyps and treatment of curable lesions could be discussed as a preamble to an explanation regarding the ambiguity of the benefit of prostate cancer screening. Therefore, education about the risks and benefits of cancer screening in general may help patients make more informed decisions about prostate cancer screening. However, for patients to be fully informed about both the risks and benefits of prostate cancer screening, it is important that these materials also acknowledge that there are certain populations who are at higher risk of prostate cancer than the general population and should more strongly consider screening.

Further, among patients undergoing prostate cancer screening, those who are smokers and sedentary report lower rates of CRC screening, reflecting their need for preventive health counseling on several fronts. Since these patients are already presenting for prostate cancer screening, they should be taught about the potential association between obesity³², cigarette smoking,³³ and prostate cancer. This may also provide an opportunity to educate them about the potential association between CRC risk and these behavioral risk factors³⁴⁻³⁵ and remind them of the importance of CRC screening. Finally, health education information in Spanish, particularly about the benefits of prostate and CRC screening, may increase screening rates among Hispanics.

Our study has several limitations. The response rate for the 2006 BRFSS varied across the 53 states and territories in which data were collected. Thus, the current study results may not apply uniformly across these regions. Data on prostate and CRC screening were self-reported and are thus subject to potential recall biases and inaccuracy. Since the BRFSS does not distinguish between sigmoidoscopy (recommended at 5 year intervals) and colonoscopy (recommended at 10 year intervals), we may overestimate CRC screening rates by using 10 years as our definition of being up to date. We also do not have information on whether patients received appropriate follow up for positive FOBT testing. However, these concerns are attenuated by the fact that the current study focused on identifying correlates of screening rather than documenting absolute rates of screening. In addition, we do not have information about specific insurance coverage (e.g., commercial insurance vs. Medicare), which may directly influence patients' decisions about cancer screening. For example, a study of Medicare patients found that those with supplemental coverage were more likely to undergo mammography screening than those who had Medicare-only coverage, likely due to the higher co-payments in patients with Medicare-only coverage.³⁶ Another limitation is that the patient population in the current study was predominately non-HispanicWhite. The study results may not be generalizable to a more diverse population.

Conclusions

Despite the effectiveness of CRC screening in reducing mortality, these tests are still underused by men who have already undergone prostate cancer screening. The prostate cancer screening encounter may provide an opportunity to capitalize on these patients' experience to improve their uptake of CRC screening.

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Table 1

Frequencies for All Study Variables for the Full Sample ($N = 41,781$ Men who were Screened for Prostate Cancer in the Past Year) and Percentage of Individuals who are Adherent to Colorectal Cancer Screening

	Sample %	Adherent to Colorectal Cancer Screening % (95% CI)
Full sample	100%	69.2 (68.3–70.1)
Age (years) **		
50–64	59.7	65.3 (64.0–66.6)
65–74	24.3	76.1 (74.7–77.5)
≥ 75	16	73.2 (71.0–75.4)
Missing (n)	0	
Race/ethnicity **		
Non-Hispanic white	80.5	71.0 (70.1–71.9)
Non-Hispanic black	7.3	68.6 (65.0–72.2)
Non-Hispanic other	4.8	62.1 (56.4–67.8)
Hispanic	7.5	55.3 (50.1–60.5)
Missing (n)	482	
Education **		
≤ High school 12 th grade	8.6	59.7 (55.9–63.5)
High school graduate	25.5	64.5 (62.7–66.3)
Some college	24.3	69.6 (67.7–71.5)
College graduate	41.7	73.6 (72.2–75.0)
Missing (n)	62	
Married/partnered **		
No	20.1	64.4 (62.3–66.5)
Yes	79.9	70.4 (69.4–71.4)
Missing (n)	88	
Employment status **		
Employed	37.7	64.6 (63.0–66.2)
Self-employed	11.5	67.5 (64.8–70.2)
Retired	44.5	74.8 (73.5–76.1)
Unable to work	6.3	65.3 (61.7–68.9)
Missing (n)	971	
Veteran status **		
Not a veteran	49.8	64.5 (63.0–66.0)
Veteran	50.2	73.7 (72.5–74.9)
Missing (n)	63	
Health care coverage **		
No	4.3	49.4 (43.4–55.4)
Yes	95.7	70.1 (69.2–71.0)

	Sample %	Adherent to Colorectal Cancer Screening % (95% CI)
Missing (<i>n</i>)	50	
Have a personal doctor **		
No	5.3	53.5 (48.9–58.1)
Yes	94.7	70.1 (69.1–71.1)
Missing (<i>n</i>)	68	
Cost prevented a doctor's visit in the past year **		
No	94.9	69.8 (68.9–70.7)
Yes	5.1	58.1 (53.1–63.1)
Missing (<i>n</i>)	64	
Had a medical checkup in the past year **		
No	9.1	55.0 (51.8–58.2)
Yes	91	70.6 (69.6–71.6)
Missing (<i>n</i>)	237	
Smoking status **		
Current smoker	13.2	59.1 (56.3–61.9)
Former smoker	48.4	72.6 (71.4–73.8)
Never smoker	38.4	68.2 (66.6–69.8)
Missing (<i>n</i>)	162	
Sedentary **		
No	77.1	70.8 (69.8–71.8)
Yes	22.9	63.8 (61.7–65.9)
Missing (<i>n</i>)	45	
Engage in risky drinking		
No	96.1	69.1 (68.1–70.1)
Yes	3.9	68.5 (64.3–72.7)
Missing (<i>n</i>)	1013	
Frequency of getting social/ emotional support needed **		
Never	6.9	61.1 (57.2–65.0)
Rarely	2.6	61.8 (54.4–69.2)
Sometimes	8.8	64.8 (61.4–68.2)
Usually	24.7	70.1 (68.2–72.0)
Always	57.1	70.9 (69.7–72.1)
Missing (<i>n</i>)	1537	

Note: Data are drawn from the 2006 BRFSS. All percentages are weighted.

Asterisks denote a significant association between the variable and colorectal cancer screening status in a chi-square analysis: ** $p < .0001$

Table 2

Multiple Logistic Regression Examining Correlates of Adherence to Colorectal Cancer Screening in a Sample of 41,781 Men who were Screened for Prostate Cancer in the Past Year

	Wald's χ^2	Adjusted Odds Ratio (95% CI)
Age (years)	22.57*	
50–64		Ref
65–74		1.31 (1.16–1.48)
≥ 75		1.02 (0.87–1.20)
Race/ethnicity	21.03*	
Non-Hispanic white		Ref
Non-Hispanic black		1.17 (0.97–1.42)
Non-Hispanic other		0.76 (0.58–0.99)
Hispanic		0.64 (0.51–0.81)
Education	63.96**	
≤ High school 12 th grade		Ref
High school graduate		0.96 (0.80–1.15)
Some college		1.31 (1.08–1.59)
College graduate		1.52 (1.25–1.84)
Married/partnered	11.02*	
No		Ref
Yes		1.19 (1.08–1.33)
Employment status	42.66**	
Employed		Ref
Self-employed		1.13 (0.97–1.32)
Retired		1.45 (1.28–1.65)
Unable to work		1.59 (1.29–1.96)
Veteran status	38.87**	
Not a veteran		Ref
Veteran		1.36 (1.24–1.50)
Health care coverage	7.16	
No		Ref
Yes		1.36 (1.09–1.71)
Have a personal doctor	13.90*	
No		Ref
Yes		1.48 (1.21–1.83)
Cost prevented a doctor's visit in the past year	2.37	
No		Ref
Yes		0.83 (0.66–1.05)
Had a medical checkup in the past year	47.31**	
No		Ref

	Wald's χ^2	Adjusted Odds Ratio (95% CI)
Yes		1.71 (1.47–2.00)
Smoking status	39.36**	
Current smoker		Ref
Former smoker		1.58 (1.37–1.82)
Never smoker		1.41 (1.21–1.63)
Sedentary	11.80*	
No		Ref
Yes		0.82 (0.74–0.92)
Frequency of getting social/ emotional support needed	10.78	
Never		Ref
Rarely		1.04 (0.72–1.48)
Sometimes		1.32 (1.04–1.67)
Usually		1.35 (1.10–1.66)
Always		1.31 (1.09–1.58)

Note: Ref = reference category. Due to missing data for individual correlates, the sample size for this analysis was 38,279. Data are drawn from the 2006 BRFSS.

*
 $p < .001$

**
 $p < .0001$