Physician Recommendation and Patient Adherence for Colorectal Cancer Screening

Shawna V. Hudson, Ph.D.[1,2], **Jeanne M. Ferrante, M.D., MPH**[1,2], **Pamela Ohman-Strickland, Ph.D.**[1,2,3], **Karissa A. Hahn, MPH**[2], **Eric K. Shaw, Ph.D.**[2], **Jennifer Hemler, MA**[1], and **Benjamin F. Crabtree, Ph.D.**[1,2]

[1]The Cancer Institute of New Jersey, UMDNJ -Robert Wood Johnson Medical School, New Brunswick, NJ

[2]Department of Family Medicine and Community Health, UMDNJ -Robert Wood Johnson Medical School, New Brunswick, NJ

[3]Biometrics Division, UMDNJ -School of Public Health, Piscataway, NJ

Abstract

Background—Physician recommendation is one of the strongest, most consistent predictors of colorectal cancer (CRC) screening. Little is known regarding characteristics associated with patient adherence to physician recommendations in community and academic based primary care settings.

Methods—Data were analyzed from 975 patients, aged 50 and over, recruited from 25 primary care practices in New Jersey. Chi-square and generalized estimate equation (GEE) analyses determined independent correlates of receipt of and adherence to physician recommendation for CRC.

Results—Patients reported high screening rates for CRC (59%). More than three-quarters of patients reported either screening or having received a screening recommendation (82%). Men (P=.0425), non-smokers (P=.0029), and patients who were highly educated (P=.0311) were more likely to receive a CRC screening recommendation. Patients more likely to adhere to CRC screening recommendations were older adults (P<.0001), non-smokers (P=.0005), those who were more highly educated (P=.0365), Hispanics (P=.0325), and those who were married (P<.0001).

Conclusions—Community and academic primary care clinicians appropriately recommended screening to high risk patients with familial risk factors. However, they less frequently recommended screening to others (i.e., women and smokers) also likely to benefit. To further increase CRC screening, clinicians must systematically recommend screening to all patients who may benefit.

Introduction

Colorectal cancer (CRC) is the third leading cause of new cancer cases and deaths from cancer in the United States,[1–4] with an estimated 143,460 new cases and 51,690 deaths occurring in 2012.[3] Preventive screening for CRC (e.g., colonoscopy, sigmoidoscopy and fecal-occult blood testing (FOBT)) has been shown to reduce mortality in randomized

Corresponding Author information: Shawna V. Hudson, Ph.D., The Cancer Institute of New Jersey, 195 Little Albany Street, New Brunswick, NJ 08903-2681, phone: 732-235-9591, fax: 732-235-8808, hudsonsh@umdnj.edu.

controlled trials and case controlled studies. [5,6] However, screening for CRC remains low [4,7] with only 39% of CRC cases detected at an early, localized stage. [1]

Physician recommendation is one of the most significant predictors of CRC screening. [8–11] Numerous studies have focused on factors that affect physician recommendation and screening adherence. For example, a number of studies have found that the type of screening modality (e.g., colonoscopy versus FOBT) recommended to patients is mediated by demographic factors such as age, race, and gender. [8,11–16] Physicians are also less likely to recommend CRC screening to particular groups of patients,[11,17–19] including those with chronic diseases,[20] lower levels of education,[11,12] lower socioeconomic status,[8] and the uninsured.[8,12] In addition, psychosocial factors in physician recommendation have been identified. For example, physicians are less likely to recommend CRC screening to patients who lack knowledge about the risks and benefits [21,22] or who have refused in the past. [23,24]

Increasing physician recommendations has been the focus of targeted interventions and research. [23,25–30] Yet, few studies specifically investigate differences in patients who receive recommendations for screening versus those who adhere to physician recommendations for CRC screening. [8,11,18,20,31] Studies that report adherence to particular CRC screening modalities show that sigmoidoscopy and colonoscopy have higher adherence rates than FOBT.[8,11] The current study explores the gap between recommendation and adherence focusing on patients in community and academic primary care practices. Our research question focuses on identifying patient populations that are not being adequately addressed in terms of CRC screening. Our objective is to aid physicians and their practices in identifying patient populations that could benefit from further attention to CRC screening, increasing the number of patients who are up-to-date with screening.

Methods

We conducted a secondary analysis of cross-sectional data collected at baseline and year one, from January 2006 through December 2008, from a quality improvement intervention study, Supporting Colorectal Cancer Outcomes through Participatory Enhancements (SCOPE). The SCOPE study used a multi-method assessment process [32] to inform a facilitated team-building intervention [33] aimed at improving guideline adherence for preventive cancer screening among 25 community and academic primary care practices in New Jersey. The University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School Institutional Review Board approved this study. Written informed consent to participate in the study was received from the medical directors and/or lead physicians of each practice as well as from patients and staff members who participated in the study.

Data Collection

Clinical outcome data were collected via patient survey and medical record review. Thirty consecutive patients 50 years of age or older were recruited in the waiting rooms of each practice. We recruited 1437 patients; however, patients who were missing demographic data (n=36, 2.5%), reported a history of colorectal cancer (n=20, 1.4%), or reported a history of colorectal problems (n=406, 28.3%) were excluded from the analysis, resulting in a working sample size of 975. Study methods, including patient recruitment methods are discussed more fully elsewhere.[34–37] The overall study recruitment rate was 81%. Participants and those who refused to participate were similar in gender, but differed in age. Older patients were more likely to participate than younger patients (68% of patients age 50–59 agreed to participate compared with 90% of those age 60–69, and 85% of those age 70 and over). Those who consented to participate in the study were asked to complete a survey that took approximately 15 minutes. The survey asked about their health and medical history, their satisfaction with care provided in the practice and their recollection of receipt or

recommendation for preventive cancer screening for colorectal cancer in addition to breast and cervical cancers for women and prostate cancer for men. The patient survey was the source of data for colorectal cancer screening and recommendations for screening, gender, marital status, education level, race, smoking status, family history of colorectal cancer (1st degree relative), age, insurance, and body mass index (BMI). Each patient also consented to have their medical record reviewed. For all patients, nurse chart auditors from the research team noted patient's weight, length of enrollment in the practice, number of visits in the past 2 years, and medical illnesses. The medical record was the source of data for comorbidities, length of enrollment in practice, and the number of visits in the past 2 years.

In addition to the medical record review, practice managers and lead physicians completed a 46-item practice information survey that solicited information regarding the practice such as patient population (e.g., payer mix, race/ethnicity), number of clinicians, type of practice and ownership, years in existence, and use of electronic medical records.

Statistical Analyses

Variables

1) Screening: We examined CRC screening using the US Preventive Services Task Force clinical considerations [38] and the American Cancer Society screening recommendations [39] regarding age and appropriate time interval to evaluate whether patients had been screened. The American Cancer Society recommendations are similar to the US Preventive Services Task Force recommendations, with the exception of including CT colonography and fecal DNA as possible screening methods. These methods have not been included for the purposes of our analysis. Patients were considered to be up to date on their CRC screening if they reported receiving one of the following tests within the recommended time period from the index visit: (1) colonoscopy within 10 years; (2) sigmoidoscopy within 5 years; or (3) at home FOBT within the past year. Because patients may have been referred by other physicians, screening was assessed via patient survey. Patients were asked, "A colonoscopy is an exam where a tube is inserted into the rectum to view the ENTIRE bowel for signs of cancer; some medication is usually given through a needle in your arm to make you sleepy and you are told to have someone drive you home. Did you have a colonoscopy in the past 10 years?" The definition of a colonoscopy was taken from the Behavioral Risk Factor Surveillance Survey. Similar questions were asked for FOBT and sigmoidoscopy. Because patients and physicians were not blinded to the focus of the study, we avoided Hawthorne effects by assessing CRC screening retrospectively with the index visit considered the last visit prior to date of recruitment. For each eligible patient in the practice, a binary variable was created to indicate whether CRC screening had occurred according to United States Preventive Services Task Force/American Cancer Society recommendations (0 = no, 1 = yes).

2) Receipt of screening recommendation: A binary variable was created to indicate whether patients had received a recommendation for CRC screening (0 = no, 1 = yes). Patients that reported having had screening were assumed to have physician recommendations and scored as yes. [11,31] In addition, patients who had not received CRC screening (i.e., FOBT, sigmoidoscopy or colonoscopy) within the ACS/USPSTF recommended interval were asked, "If you did not have a ___, has anyone in this practice ever recommended that you have one?" (0 = no, 1 = yes). Those who indicated yes were scored as yes on the receipt of screening recommendation variable.

3) Adherence to screening recommendations: A final binary variable was created to assess patient adherence to screening recommendation (0 = no, 1 = yes). Patients were

scored as adherent to screening recommendations if they received a recommendation and were up to date on CRC screening.

4) Patient characteristics: We examined gender, marital status, education level, race, smoking status, family history of colorectal cancer (1st degree relative), age, insurance, body mass index (BMI), length of enrollment in practice, number of visits in past 2 years, and number of co-morbidities as predictors of screening. Patients were asked to select one of the following categories for marital status: married, single, divorced, widowed, or other. For the purposes of our analysis, we condensed the categories to married versus unmarried. Family history of CRC was assessed using the following question, "Do you have any close blood relatives (parent, brother, sister, child) who have or had the following cancers? (choose all that apply)" with response choices breast cancer, colorectal cancer, prostate cancer, other cancer. Comorbidities of interest included diabetes with or without end organ damage, hypertension, and heart disease (defined as myocardial infarction, peripheral vascular disease, stroke, chronic heart failure, and coronary artery disease). Nurses reviewed the first visit, problem list, and past 5 years of progress notes, consult letters, and diagnostic tests in the medical record and patients were given a comorbidity score ranging from 0 to 3, depending on how many of the 3 comorbidities of interest were documented in the medical record. We also included indicator variables for the year of recruitment and whether the patient was recruited from an intervention or control group practice.

5) Practice characteristics: Number of clinicians, practice ownership, use of an electronic medical record (EMR), practice type, average number of years the practices had been in existence and whether the practice provides on-site flexible sigmoidoscopy were reported as descriptors of the sample practices.

Analysis—Descriptive statistics, including proportions for all categorical descriptors and means with standard deviations for continuous descriptors, were calculated to describe both the study population of patients as well as the practices. Subgroups of patients were defined by categories of each patient characteristic. Frequencies and percentages of: (1) those who have received a recommendation; and, (2) those up to date on CRC screening are reported within each subgroup.

Generalized estimating equations were used to model both bivariate and multivariate regressions investigating associations between the screening and/or recommendation status and the patient predictors of interest, including gender, age, etc. This analysis produces regression coefficients that may be interpreted as population-averaged effects. The models, using logit links and working correlation matrices with sandwich estimators to estimate standard errors, modeled the log-odds of screening/recommendation as a function of the patient predictors. Two separate sets of analyses were performed: (1) comparing patients who received recommendations for screening versus those who did not and (2) out of those who received recommendations, comparing those who actually were screened versus those who were not. In the last analysis, by assuming that anyone who was screened received a screening recommendation and combining those patients with the population of patients who were not screened but received a screening recommendation, we were able to focus on what patient characteristics predicted patient adherence with screening recommendations. The SAS/STAT software (SAS system for Windows, Version 9.1.3) was used for all statistical analyses, with the Genmod procedure for the generalized estimating equations using a backwards stepwise regression technique with an exit alpha level of (P=.1).

Results

The majority of the 25 practices in this study were group practices (88%) with an average of 4.3 (SD=3.1) clinicians per practice. Most practices were physician owned (88%) by family medicine physicians (80%). The average practice had been in existence 11 years (SD=8.5). Under half of practices (44%) used electronic medical records. Five of 25 practices (20%) had on-site flexible sigmoidoscopy available.

Table 1 describes the 975 patients recruited for the study. The average patient eligible for this study in the practices was 63.0 years (SD=9.8). Most were white (71%), married (63%), non-smokers (89%), had attended at least high school or some college (89%), and had private (52%) or Medicare insurance (34%). Nine percent of patients reported a family history of colorectal cancer.

Overall, 59% of patients (n=575) reported being up-to-date on CRC screening while 82% of patients (n=799) reported having at least received a recommendation for colorectal cancer screening. Table 2 provides bivariate results of predictors of screening recommendation and adherence to screening recommendation for patients. Male gender (p=.0127), being married (p=.0221), higher education (p=.0034), having health insurance other than Medicaid (p=.0247) and being a non-smoker (p=.0011) were significant predictors of receiving a recommendation for CRC screening. Of those patients who were recommended for screening, predictors of whether they received screening included being married (p=.0002), being a non-smoker (p<.0001), having a BMI in the normal or obese categories (p=.0242), having Medicare insurance (<.0001), and being older (p<.0001). Gender, education level, race, family history of CRC, length of time as a patient in the practice, number of visits in the past 2 years, and the comorbidity score did not effect whether patients adhered to screening recommendations.

Table 3 contains significance of the predictors using multivariate models. For all patients, gender, education, and smoking remained significant predictors of which patients received a recommendation that they be screened. The odds of receiving a recommendation were greater for men (OR=1.465) and non-smokers (OR=1.876). Patients with less than college level education were less likely to receive a recommendation (OR=.658). Marital status and insurance were no longer significant independent predictors of receipt of physician recommendations in multivariate analysis. Variables that were significant predictors of adherence to screening recommendations in the bivariate models remained significant in the multivariate model, with the exception of insurance and BMI. In addition, education level was a significant predictor of adherence to recommendations, with patients with less than a college education being less likely to adhere (OR=.682). Hispanic patients were also more likely to adhere to recommendations as compared to White patients (OR=2.315).

Discussion

Consistent with previous studies [20,40,41] generated in academic [14,17] and integrated health care systems, [42,43] we found that patients of community and academic practices with a family history of CRC were likely to receive and adhere to physician recommendations. This study also found, however, important mismatches between recommendation and adherence in community and acadmic primary care practices.

First, our findings point to a potential role for interpersonal relationships in enhancing CRC screening. We found that unmarried patients were less likely to adhere to CRC screening recommendations. Bazargan and colleagues also found that married or partnered patients were more likely to complete CRC screening in a study of underserved African-American and Hispanic urban minority populations.[44] Our findings support that interpersonal

relationships impact CRC screening decision making, [45] and highlight the need to increase outreach to un-partnered patients to facilitate CRC screening and ensure adherence.

Like Shokar et al,[17] we found that men were more likely to be recommended for CRC screening. However, our study found that despite receiving recommendations more often, men were not more likely to adhere to screening recommendations. Our results differ from those found in two large national studies [8,40] and may be due to differences in the study setting.

We found no differences in screening recommendations to patients of various races, but Hispanic patients in our study were more likely to adhere to CRC screening recommendations than White patients. This is in contrast to previous findings that Hispanics are less likely to be screened for CRC.[18,46] Our result may be explained in part by previous findings that Hispanics are more likely to over report CRC screening[47] or, perhaps, may be a result of small sample size because Hispanics represented only a small proportion of our patient sample.

Finally, we identified patients not previously highlighted in the literature as having lower adherence to physician recommendations: younger patients (<70 years). This may be because younger patients (aged 50–69) who are in better health than older patients have fewer opportunities to interact with physicians and therefore have fewer opportunities for CRC screening to be addressed and encouraged. For example, younger patients not yet eligible for Medicare may have higher copays for office visits and CRC screening which have been shown to decrease screening rates.[48,49] These patients may also feel less vulnerable to developing CRC and therefore, delay screenings. [50] However, younger patients are more likely to be diagnosed with late stage CRC [51] and they are most likely to reap extended benefits from preventive screening exams.[52] Our finding highlights a need for physicians to direct not only CRC recommendations towards this age group but also a need to rigorously encourage these patients to adhere to recommendations.

Overall, we were encouraged that the average rates reported for receiving physician recommendations and adhering to recommendations were higher than those reported in other survey studies. [8,11,12,17,18,53] However, since patients were approached face-to-face prior to physician visits, they may have over-reported receipt of recommendations and screenings due to social desirability. [54] Yet, we found in a previous study of this population relatively high concordance between self-report and chart audit for CRC screening (76%–83% agreement) and recommendations for CRC screening (68%). [35] Therefore, we are confident that the rates reported are accurate and reflect the experience of patients in this sample.

This study has several limitations to consider. First, our sample included mostly white, married, insured, and highly educated patients in New Jersey primary care practices. Therefore, the results may not be generalized to other populations or settings. Our relatively homogeneous population and small sample size may not have allowed us to detect differences by race or insurance status found by other studies. Second, patients in our sample were recruited from waiting rooms and represent a population that actually visits the doctor, potentially resulting in a selection bias toward more health conscious patients and data obtained was retrospective. Third, patients who were up-to-date in CRC screening were assumed to have received physician initiated recommendations, so those who asked their physicians to refer them for CRC screening may have been misclassified. For example, patients with a family history of CRC may have requested CRC screening tests. Fourth, concordance between patient reported and chart documented history of CRC and colorectal problems was 78%.[35] Because patients were slightly more likely to report a history and only 5% of patients who did not report a history of CRC or colorectal problems had a chart

documented history, we elected to use patient reported histories. This may have caused us to exclude some patients unnecessarily. Finally, we did not differentiate screening from diagnostic procedures. Testing for diagnostic reasons may have biased our results toward overstating adherence rates in some patients at higher risk of CRC who develop symptoms, such as patients with family history or co-morbid diseases (e.g., diabetes), while biasing our results toward the null in others (e.g., smokers).

In summary, this study suggests that a potentially fruitful strategy to further increase CRC screening rates in community and academic settings is for primary care physicians to systematically recommend screening to all patients who might benefit. We know that physician predictions of patient treatment adherence are inaccurate for a number of chronic illnesses. [55–57] Therefore, it is important for physicians make CRC screening recommendations systematically. Yet, there is little evidence-based information that outlines best practices for implementing such recommendations (e.g., physician-patient conversation with decision aids versus use of patient registries with reminder systems versus use of a physician extender [i.e., nurse practitioner for patient education]). We, therefore, also suggest that in addition to increasing physician recommendation, it is important to generate further prospective research focused on dissemination to examine feasibility, efficacy and cost-effectiveness of implementing various physician recommendation mechanisms in community and academic settings.

Acknowledgments

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Table 1

Characteristics of Study Sample

Characteristics	Total N	%
Total sample	**975**	**100.0%**
Gender		
Male	380	39.0%
Female	595	61.0%
Age		
50–64 years	627	64.3%
65 years and over	348	35.7%
Marital status		
Married	611	62.7%
Not married	364	37.3%
Education level		
Less than college	586	60.1%
College degree or grad school	389	39.9%
Race		
White	694	71.2%
Black	177	18.2%
Hispanic	61	6.3%
Other	43	4.4%
Smoking Status		
Non-smoker	866	88.8%
Current smoker	109	11.9%
Family history of colorectal cancer		
Positive family history	86	8.8%
Negative family history	889	91.2%
Insurance		
Medicare	330	33.9%
Medicaid	54	5.5%
Private	503	51.6%
Other or None	88	9.0%

*We recruited 1437 patients; however, patients who were missing data for any one of these characteristics, or who reported a history of CRC or colorectal problems were removed from the analysis, resulting in a working sample size of 975.

Table 2

Receipt of and adherence to physician recommendations for colorectal cancer screening : bivariate results

Study population	Received physician recommendations			Adherence to physician recommendations		
	All patients n=975, 100%			Recommended patients n=799, 82%		
Variable	N	# (%)screened or recommended	bivariate p-value	N	# (%)screened	bivariate p-value
Gender			.013			.442
Male	380	326 (85.8)		326	239 (73.3)	
Female	595	47. (79.5)		473	335 (70.8)	
Age			.624			<.0001
50–64 years	627	511 (84.1)		511	337 (65.9)	
65 years and over	348	288 (82.8)		288	237 (82.3)	
Marital status			.022			.0002
Married	611	514 (84.1)		514	392 (76.3)	
Unmarried	364	285 (78.3)		285	182 (63.9)	
Education level			.003			.064
Less than college	586	463 (79.0)		463	321 (69.3)	
College or grad school	389	336 (86.4)		336	253 (75.3)	
Race			.183			.477
Black	177	140 (79.1)		140	97 (69.3)	
Hispanic	61	47 (77.1)		47	38 (80.9)	
Other	43	32 (74.4)		32	22 (68.8)	
White	694	580 (83.6)		580	417 (71.9)	
Smoking status			.001			<.0001
Non-smoker	866	722 (83.4)		722	539 (74.7)	
Smoker	109	77 (70.6)		77	35 (45.5)	
Family history of CRC			.459			.074
No family history	889	726 (81.7)		726	515 (70.9)	

	Received physician recommendations			Adherence to physician recommendations		
Study population	**All patients n=975, 100%**			**Recommended patients n=799, 82%**		
Variable	**N**	**# (%)screened or recommended**	**bivariate p-value**	**N**	**# (%)screened**	**bivariate p-value**
Family history	86	73 (84.9)		73	59 (80.8)	
Insurance			.025			<.0001
Medicare	330	267 (80.9)		267	218 (81.7)	
Medicaid	54	43 (79.6)		43	21 (48.8)	
Private	503	426 (84.7)		426	290 (68.1)	
Other or None	88	63 (71.6)		63	45 (71.4)	
BMI			.463			.024
Normal	323	265 (82.0)		265	202 (76.2)	
Overweight	370	297 (80.3)		297	197 (66.3)	
Obese	282	237 (84.0)		237	175 (73.8)	
Length of time as a patient			.745			.628
Less than 5 years	526	433 (82.3)		433	308 (71.1)	
5 years or more	449	366 (81.5)		366	266 (72.7)	
Number of visits in past 2 years			.523			.817
Less than 8 visits	657	542 (82.5)		542	388 (71.6)	
8 visits or more	318	257 (80.8)		257	186 (72.4)	
Co-morbidity score			.530			.711
0	93	77 (82.8)		77	58 (75.3)	
1	244	193 (79.1)		193	133 (68.9)	
2	352	295 (83.8)		295	213 (72.2)	
3	286	234 (81.8)		234	170 (72.7)	

Table 3

Receipt of and adherence to physician recommendations for colorectal cancer screening : multivariate results using backwards stepwise regression including adjusted odds ratio[*]

	Received physician recommendations	Adherence to physician recommendations
Study population	All patients (n=975)	Recommended patients (n=<u>799</u>)
Variable	multivariate[**]	multivariate[**]
	OR (95% CI) *Wald p-value*	*OR (95% CI)* *Wald p-value*
Gender (1 df) *Male vs. Female*	1.465 (1.013, 2.117) .0425	--
Age (1 df) <u>*50–64 years vs. 65 years and over*</u>	--	.397 (.270, .585) <.0001
Marital status (1df) *Married vs. Unmarried*	--	1.972 (1.603, 2.421) <.0001
Education level (1 df) *Less than college vs. College or grad school*	.658 (.450, .963) .0311	.682 (.477, .976) .0365
Race (3 df) *Black vs. White* *Hispanic vs. White* *Other vs. White*	--	1.434 (.949, 2.167) .0871 2.315 (1.072, 4.997) .0325 .958 (.446, 2.059) .9128
Family history of CRC (1 df) *No fam history vs. Fam history*	.677 (.426, 1.075) .0979	.556 (.291, 1.062) .0754
Smoking status (1df) *Non-smoker vs. Smoker*	1.876 (1.240, 2.840) .0029	2.592 (1.517, 4.430) .0005

-- Eliminated from multivariate model using backward stepwise regression.

[*] Adjusted for use of an electronic medical record, intervention status, year of the study, and variables as shown in table.

[**] Multivariate models created using backward stepwise regression with an exit alpha-level of 0.10.

[***] BMI, insurance, comorbidity score, number of visits in the last 2 years, and length of time in the practice had a p-value of greater than 0.10 for both models.