Physician and Patient Factors Associated with Ordering a Colon Evaluation After a Positive Fecal Occult Blood Test

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OBJECTIVE: Successful colorectal cancer screening relies in part on physicians ordering a complete diagnostic evaluation of the colon (CDE) with colonoscopy or barium enema plus sigmoidoscopy after a positive screening fecal occult blood test (FOBT).

DESIGN: We surveyed primary care physicians about colorectal cancer screening practices, beliefs, and intentions. At least 1 physician responded in 318 of 413 (77%) primary care practices that were affiliated with a managed care organization offering a mailed FOBT program for patients aged ≥ 50 years. Of these 318 practices, 212 (67%) had 602 FOBT+ patients from August through November 1998. We studied 184 (87%) of these 212 practices with 490 FOBT+ patients after excluding those judged ineligible for a CDE or without demographic data. Three months after notification of the FOBT+ result, physicians were asked on audit forms if they had ordered CDEs for study patients. Patient- and physician-predictors of ordering CDEs were identified using logistic regression.

MEASUREMENTS AND MAIN RESULTS: A CDE was ordered for only 69.5% of 490 FOBT+ patients. After adjustment, women were less likely to have had CDE initiated than men (adjusted odds, 0.66; confidence interval, 0.44 to 0.97). Physician survey responses indicating intermediate or high intention to evaluate a FOBT+ patient with a CDE were associated with nearly 2-fold greater adjusted odds of actually initiating a CDE in this circumstance versus physicians with a low intention.

CONCLUSIONS: Primary care physicians often fail to order CDE for FOBT+ patients. A CDE was less likely to be ordered for women and was influenced by physician's beliefs about CDEs.

KEY WORDS: colorectal neoplasms; primary health care; occult blood; mass screening; attitude of health personnel. *J GEN INTERN MED* 2003;18:357-363.

Despite randomized controlled trial evidence of a significant mortality reduction from periodic fecal occult blood test (FOBT) screening and complete diagnostic evaluation of the colon (CDE) for persons with an abnormal FOBT result,¹⁻³ colorectal cancer caused the death of 28,066 men and 28,614 women in 1999.⁴ Annual or biennial FOBT screening also has been shown to reduce the incidence of colorectal cancer.⁵ Sadly, the realization of the potential benefits of FOBT screening has been thwarted by poor use of this colorectal screening approach. In a national sample of persons eligible for FOBT screening in 1997, researchers from the Centers for Disease Control and Prevention reported that less than one fifth completed a FOBT.⁶ In 1 survey, only 51% of primary care physicians replied that they would recommend a colonoscopy to patients with a positive colon cancer screening test result.⁷ These data suggest that efforts to reduce the burden of colorectal cancer should address not only underutilization of FOBT screening but also the use of CDE after a positive FOBT. According to expert guidelines, CDE should include either a colonoscopy or a flexible sigmoidoscopy plus double-contrast barium enema.^{8,9}

Survey data from physicians can be helpful in distinguishing a group of providers who are less likely to obtain colorectal cancer screening tests. In an earlier study, we found that board certification, longer time in practice (i.e., >10 years), stronger belief in the efficacy of CDE, lower concern about CDE-related costs, and belief that CDE is standard practice were positively associated with physician intention to recommend CDE after a positive FOBT.¹⁰ This study examines the association of physician intention to recommend a CDE, other physician-related beliefs, practice-related factors, and patient characteristics with primary care physician actually ordering a CDE for a patient with a positive FOBT.

METHODS

Primary Care Practice Eligibility and Recruitment

Eligible primary care practices were located in southeastern Pennsylvania and southern New Jersey, treated patients enrolled in a large managed care organization (MCO), and had at least 3 such MCO-enrolled patients with a positive FOBT from January 1, 1994 through June 30, 1996. The patients were identified through the MCO's colorectal cancer screening program that annually sent a set of 3 FOBT cards to enrollees aged ≥ 50 years. A central laboratory tested the cards and notified the patient that the results were available through his or her provider. Of 584

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eligible primary care practices, 413 (71%) practices cooperated with our study.

Survey on Fecal Occult Blood Testing and Complete Diagnostic Evaluation of the Colon

The baseline survey incorporated constructs from the Diagnostic Evaluation Model, an explanatory framework that integrates features of the Social Cognitive Theory¹¹ and the Theory of Reasoned Action.¹² Practice environment measures addressed administrative arrangements, participation in an integrated health care delivery system, and geographic location. Physician intention to order a CDE was evaluated by 10 scenarios presenting different circumstances in which a positive FOBT result occurred (e.g., when a patient had only 1 out of 3 positive FOBT slides) and asking if he or she would order or recommend a CDE in each situation. Physician background and experience variables included age, gender, race/ethnicity, years practicing medicine, medical specialty, board certification status, recent experience with colorectal cancer and polyp patients, and early detection of colorectal cancer. Single-item questions evaluated physician experience with colorectal cancer screening and treatment including number of newly-diagnosed colorectal polyp patients seen in the previous 12 months, percentage of newly-diagnosed colorectal polyp patients identified by FOBT screening, number of newly-diagnosed colorectal cancer patients seen in the previous 12 months, and percentage of newly-diagnosed cancer patients identified by FOBT screening. Physician knowledge and opinions related to FOBT screening and CDE were measured as single items and scales. Physician social support and influence was measured by a question about whether the respondent thought that the test was a standard medical practice of primary care physicians. Finally, characteristics of patients managed by the provider were also evaluated. Details of the survey are presented elsewhere.¹³

Survey Administration and Response

In the spring and summer of 1998, a survey on colorectal cancer screening and CDE was administered to 776 primary care physicians in the 413 eligible practices that consented to participate. One or more physicians ($N = 470$; 61%) in 318 (77%) of these practices completed the survey either by mail ($n = 357$) or phone interview ($n = 113$). On average, we had 1 physician respond per practice. The respondents and nonrespondents were compared regarding administrative arrangement (solo vs group practice), geographic location (Pa vs NJ), median physician age, proportion of male practitioners, median years in medical practice, and proportion of board-certified physicians. The only significant difference was that more solo than group practices responded ($P < .001$).

Of the 318 surveyed practices, 212 (67%) had at least 1 patient with a positive FOBT in the colorectal cancer screening program during the study timeframe from

August to mid-November 1998. Those practices with a positive FOBT differed significantly only by practice type, with more group than solo practices having such patients ($P < .001$). These 212 practices had 602 patients with a positive FOBT. We then excluded patients with a CDE procedure within the previous 3 years ($n = 46$), a medical condition that the provider said contraindicated CDE ($n = 9$), or who left or were unknown to the practice ($n = 6$). Of the remaining 530 patients, 50 were excluded because they had no demographic data (i.e., gender and age). No racial-ethnic data were available. Our final study sample involved 184 practices (87% of practices with a positive FOBT) with a total of 490 patients who had a positive FOBT.

Data on Patient Characteristics and CDE Recommendation

After a positive FOBT result for a patient in a study practice, we asked providers to complete a chart audit form that inquired about follow-up procedures that were recommended, ordered, and/or performed within 180 days after the patient's FOBT+ result date. We considered a report of CDE recommendation as evidence of ordering the test. We also inspected MCO administrative claims data to ascertain whether the patient had received a colonoscopy during the defined timeframe. If the test had been done, we considered this as evidence that the physician had ordered the test. These data sources also were used to identify patients who did not need a follow-up CDE because of a recent evaluation. Providers were another source of information about ineligibility for CDE. Details on the assessment of CDE from chart audit and administrative data are reported elsewhere.¹³

Study Variables

Our dependent variable represented a physician having ordered a CDE that includes either colonoscopy or flexible sigmoidoscopy with a double-contrast barium enema. Because the MCO administrative data only linked a patient to a practice but not to his or her physician, we averaged physician responses within each practice to create practice-level measures. We developed 5 scales from survey responses to physician perceptions of FOBT screening and CDE using a principal components factor analysis with varimax rotation. These scales addressed: uncertainty about recommending CDE (4 items, $\alpha = 0.87$); belief that CDE-related costs may affect utilization (2 items, $\alpha = 0.79$); concern about patient CDE-related discomfort and non-adherence (2 items, $\alpha = 0.84$); belief in the benefit of FOBT screening (2 items, $\alpha = 0.86$); and belief that CDE requires substantial physician and patient time (2 items, $\alpha = 0.87$). Details of the creation of these scales have been previously reported.¹² For several practice-level variables, we created logical categorical variables, such as dividing continuous measures at the median. We categorized patient age into quartiles for analysis.

As in our previous analyses of physician intention to order a CDE,¹⁰ we created the following 3 categories after averaging the responses of the same practice's physicians: low (≤ 0.4), moderate (0.4–0.8), and high (≥ 0.8) intention. For other scales, the responses from each practice were averaged and divided at the midpoint of the Likert scale into low (≤ 3) versus high (> 3).

Analyses

Univariate associations of patient-, physician-, and practice-level variables to the outcome variable, CDE ordered for an eligible patient with a positive FOBT, were estimated in separate models using the generalized estimating equations approach to account for clustering of patients within practices. For variables with more than 2 response categories, we report an overall *P* value from the generalized score test. We estimated separate multivariable models using the generalized estimating equations approach for covariates in 5 categories of variables: practice characteristics, physician background and experience, physician knowledge and belief representations, physician social support and influence, and patient characteristics. The final multivariable model considered only variables from these 5 categories that were at least weakly associated with outcome (*P* .35). We then used a backward stepwise procedure that eliminated covariates if *P* > .05, with the exception of retaining all patient and physician demographic variables. We also estimated logistic models with interactions involving main effects from the final model.

RESULTS

Of the 184 primary care practices, most were group practices and not affiliated with an integrated medical care delivery system (Table 1). Physicians in these practices were primarily men, white, and board certified. Not shown, the median age and years in practice of responding physicians across study practices were 45.5 years and 18.5 years, respectively. Responding physicians had generally seen 3 or more colorectal cancer patients and 10 or more patients with colorectal polyps in the prior year. More than half had patients who were diagnosed with colorectal cancer or polyps as a result of FOBT screening. Most respondents held favorable views of FOBT screening and CDE. However, many were concerned about patient adherence to obtaining a CDE, the amount of physician and patient time required for CDE, and physician accountability for CDE results. Over one third of the responses from study practices questioned the value of CDE in detecting colorectal cancer and polyps. Perceived social support and influence relative to CDE was high among practice physicians. Importantly, only about one quarter of responding physicians indicated that their intention to recommend CDE was high.

Of 490 patients with an FOBT+ result in study practices, a CDE was ordered for 341 (69.5%). Few provider

or practice characteristics were associated with a physician ordering a CDE for a patient with a positive FOBT (Table 1). Patients of solo practitioners were somewhat less likely to have a CDE ordered, but this was not statistically significant. CDE was actually ordered for only 59% of patients with a positive FOBT in practices where the provider(s) had previously evidenced a low intention to order a CDE on the survey compared with approximately 70% of patients in practices with moderate or high intention. As shown on Table 2, bivariate associations of patient characteristics with an initiated CDE showed that a lower proportion of women had this test ordered than men, but this difference was not statistically significant.

The multivariate models include type of practice (solo vs group), median physician age in practice, proportion of board-certified physicians in practice, patient age, patient gender, physician belief that FOBT screening identifies colon cancer in most affected patients, and level of intention to order complete diagnostic evaluation of the colon in a patient with a positive FOBT. In the adjusted analysis, women had 34% lower adjusted odds of having a CDE initiated than men (Table 3). Practices with physicians with moderate or high intention to order CDE had 87% and 97% higher adjusted odds, respectively, of reporting that they actually ordered a CDE than physicians in practices that had a low intention to pursue a FOBT+ result with a CDE.

DISCUSSION

Our study finds that primary care physicians initiated a complete evaluation of the colon for a disturbingly low proportion of patients with a positive FOBT. Only 70% of approximately 500 patients with a positive FOBT had CDE ordered or performed even after excluding patients with a CDE within 3 years or with medical conditions contraindicating a CDE. Similarly, Shields et al. reported that only 59% of 940 patients with a positive FOBT test at Beth Israel Hospital in Boston had a follow-up CDE performed.¹⁴ These empiric data support experts' worries that FOBT screening for colorectal cancer might be compromised by poor rates of evaluating patients with an abnormal screening test.¹⁵ We examined 3 categories of factors in relation to physician initiation of a CDE for patients with a positive FOBT, including patient characteristics, physician and practice characteristics, and physician knowledge and attitudes regarding FOBT screening and CDE. The strongest associations were observed for patient gender and physician intention to order CDE.

Women were one third less likely than men to have had a CDE initiated by their primary care physicians. In the Beth Israel study, women with a positive FOBT also were significantly less likely than their male counterparts to have had any type of colon evaluation.¹⁴ Poor follow-up of abnormal FOBT testing may play a role in women's increased risk of being diagnosed with late-stage colon cancer compared to that of men.¹⁶ Other research has

Table 1. Practice Characteristics and Unadjusted Association with the Proportion of Study Practice Patients with a Positive Fecal Occult Blood Test (FOBT) Who Had Complete Diagnostic Evaluation (CDE) Initiated

Characteristic, Total Population	Study Practices (N = 184), %	CDE Initiated (N = 490 Patients), %	P Value
Overall		69.5	
Practice environment			
Administrative arrangement			.06
Solo	38.0	62.8	
Group	62.0	72.2	
Participation in an integrated health care delivery system			.39
No	63.6	71.1	
Yes	36.4	66.9	
Physician background and experience			
Gender			.36
All male	75.5	70.8	
All female or male + female	24.5	66.4	
Median age, y			.39
<45.5	50.0	67.5	
≥45.5	50.0	71.5	
Board certification status			.57
100%	85.3	70.2	
<100%	14.7	66.2	
Race/ethnicity			.61
All white	85.3	70.0	
Other	14.7	67.1	
Median years in medical practice			.43
≤18.5	49.5	67.4	
>18.5	50.5	71.4	
Newly diagnosed colorectal cancer patients seen in prior year, n			.12
<3	36.4	64.6	
≥3	63.6	72.0	
Colorectal cancer patients diagnosed by FOBT screening			.37
<50%	46.2	67.0	
≥50%	53.8	71.4	
Patients with newly diagnosed colorectal polyp seen in prior year, n			.23
<10	46.2	65.9	
≥10	53.8	71.8	
Colorectal polyp patients diagnosed by FOBT screening			.95
<50%	38.0	69.4	
≥50%	62.0	69.7	
Physician cognitive and psychological representations			
Uncertainty about recommending CDE*			.09
Low (average score ≤3.5)	94.6	70.4	
High (average score >3.5)	5.4	52.4	
Belief that CDE-related costs may affect utilization*			.33
Low (average score ≤3.5)	80.9	70.5	
High (average score >3.5)	19.1	64.4	
Concern about CDE-related patient discomfort and non-adherence*			.69
Low (average score ≤3.5)	39.7	70.6	
High (average score >3.5)	60.3	68.7	
Belief in the benefit of FOBT screening and follow-up*			.49
Low (average score ≤3.5)	3.3	75.0	
High (average score >3.5)	96.7	69.5	
Belief that CDE requires a lot of physician and patient time*			.39
Low (average score ≤3.5)	50.5	67.8	
High (average score >3.5)	49.5	71.9	

(Continued)

Table 1. (Continued)

Characteristic, Total Population	Study Practices (N = 184), %	CDE Initiated (N = 490 patients), %	P Value
Concern about being accountable for consequences of CDE*			.45
Low (average score ≤ 3.5)	34.8	67.2	
High (average score > 3.5)	65.2	70.9	
Belief that FOBT screening program helps in the practice of medicine			.71
100%	85.3	65.4	
<100%	14.7	69.6	
Belief that CDE will detect colorectal cancer in $> 50\%$ of FOBT+ patients			.12
No	52.2	65.8	
Yes	47.8	73.1	
Belief that CDE will detect colorectal polyps in $> 10\%$ of FOBT+ patients			.20
No	39.7	65.5	
Yes	60.3	71.8	
Physician social support and influence			
Belief that it is standard practice among primary care providers			.88
Low (average score ≤ 3.5)	3.8	70.8	
High (average score > 3.5)	96.2	69.5	
Physician intention			
Intention to order CDE			.08 [†]
Low (average score ≤ 0.4)	25.5	59.0	—
Moderate (average score 0.4–0.8)	47.3	71.9	.04
High (average score ≥ 0.8)	27.2	72.8	.04

* Responses on a 6-point Likert scale from strongly disagree to strongly agree. P value determined from univariate logistic model with GEE (see Methods) to account for clustering of patients within practices.

[†] Overall P value from Type 3 Generalized Score Test with generalized estimating equations (see Methods).

CDE = colonoscopy or flexible sigmoidoscopy plus barium enema.

found that women often think that they have a lower risk of colon cancer than men and that women with a family history of breast cancer tend to dismiss colon cancer as a risk to their own health.^{17,18} In the Shields study, refusal of follow up testing was similar by gender, but the number of refusers was small ($n = 37$).¹⁴

Our analysis focuses on the physician side of the equation since we examined physician reports of initiating

a CDE instead of patient compliance. Other studies have focused on physician recommendations to women about colon cancer screening and yield contradictory results. Mandelson et al. reported that only 58% of 931 women in a large managed care plan said that their physicians encouraged them to comply with colorectal cancer screening.¹⁹ In that study, physician encouragement to have colorectal cancer screening was associated with a 12-fold increase in the odds of a woman having been screened for colorectal cancer with a FOBT (odds ratio, 12.7; 95% confidence interval, 6.6 to 24.4). However, other researchers reported that study internists recommended colon cancer screening to most of their female patients and even were recommending it at too young an age (i.e., under 50 without an increased risk).²⁰ If there is a gender gap in physicians' colon cancer screening practices, the reasons for it are unclear. Most physicians in our study did not supply us with a reason why CDE was not performed. When a reason was offered, they generally indicated that the patient ate foods that could have produced a false-positive FOBT or took medications such as aspirin that could have caused gastrointestinal bleeding. These reasons do not appear to be gender specific. It is possible that physicians also harbor a mistaken view that women are less likely to have colorectal cancer than men.

However, the medical literature offers many examples of physicians being less aggressive in their management of

Table 2. Study Patient Characteristics and Unadjusted Association with the Proportion of Study Practice Patients with a Positive Fecal Occult Blood Test (FOBT) Who Had Complete Diagnostic Evaluation (CDE) Initiated

Characteristic	Patients with CDE Initiated (N = 490), n (%)	P Value
Age, y		.74*
≤60	108 (72.2)	—
>60 to ≤69	171 (68.4)	.84
≥70	211 (69.1)	.47
Gender		.08
Male	275 (72.7)	
Female	215 (65.6)	

P value determined from multivariable logistic model with GEE (see Methods).

* Overall P value from Type 3 Generalized Score Test with GEE (see Methods).

CDE = colonoscopy or flexible sigmoidoscopy plus barium enema.

Table 3. Adjusted Odds of Physician Initiation of a Complete Diagnostic Evaluation (CDE) for Patients with a Positive Fecal Occult Blood Test (FOBT)

Variable	Adjusted Odds Ratio	95% Confidence Interval	Robust P Value
Number of physicians in primary care practice (multiple)	1.32	0.81 to 2.15	.27
Median physician age in practice, ≥ 45.5 y	1.38	0.86 to 2.20	.18
Board certification status of practice physicians (100%)	1.37	0.71 to 2.65	.35
Patient age when positive FOBT obtained, y			
60–69	0.84	0.52 to 1.37	.49
≥ 70	0.85	0.52 to 1.39	.51
Female patient with positive FOBT	0.66	0.44 to 0.97	.03
Intention to order CDE			
Moderate	1.87	1.04 to 3.36	.03
High	1.97	1.10 to 3.52	.02

Reference groups: solo physician practice, median physician age in practice <45.5 years, <100% board-certified physicians in practice, patient age <60 years, male FOBT+ patient, belief that FOBT screening identifies colon cancer for less than the majority of patients, low intention to order complete diagnostic evaluation of the colon.

the same condition in women compared with men. In response to scenarios representing patients with chest pain, Schulman et al. found that the adjusted odds of physicians responding that they would refer a patient for cardiac catheterization were 40% lower for female than for male patients.²¹ Despite documented coronary artery disease, women also appear to be less likely to receive preventive cardiology services after stress testing.²² Other examples of gender inequities in care include access to antiretroviral therapy for persons with HIV disease^{23,24} and admission to substance abuse treatment.²⁵ These examples of gender differentials in health care reinforce the need for further research into differences in CDE by gender.

A moderate or high physician level of intention to order CDE for patients with a positive FOBT as assessed by our prior survey was associated with nearly 2-fold higher adjusted odds of actually ordering CDE compared with a low intention level. The level of intention was assessed by questions to scenarios such as whether a CDE would be ordered for a patient with only 1 of 3 slides testing positive for blood. Therefore, a lower intention level might reflect poor knowledge about FOBT screening as well as biases about the performance characteristics of this test. Pignone et al. recently reported that the positive predictive value of a positive FOBT from several large trials was only 8% to 18%.²⁶ Some physicians might mistakenly believe that such a poor performance characteristic would mean that they could dismiss this result despite the evidence that FOBT screening with CDE reduces the risk of death from colorectal cancer.^{1–3} Survey data such as those obtained at our study baseline could be helpful in distinguishing a group of providers who are less likely to obtain screening tests and who might benefit from educational programs about this topic. Specific educational interventions such as information framing have been used to modify physician intention to obtain other preventive treatments.²⁷

Initiation of complete diagnostic evaluation of the colon did not differ by the gender makeup of the practice. However, we did not have any all-female physician

practices in our study. Borum reported that female residents did more rectal examinations and fecal occult blood testing in their female patients than did male residents.²⁸ On the other hand, female physicians might be more uncomfortable about doing these tests on their male patients. We also did not find differences in CDE rates according to whether the practice was group or solo. Solo practitioners might have less exposure to other physicians and might not adopt colorectal cancer screening approaches as readily. In other diseases such as hepatitis C, greater practice-level experience with this condition appears to prompt physicians to screen for the disease.²⁹ Physician gender and type of practice deserve further assessment in regard to CDE.

Our analysis has several limitations. We did not have information about patient racial/ethnic characteristics to examine the association of this important patient factor. We studied physicians in only 1 large HMO, but our results are similar to those of the Shields' study in Boston. Our outcome was whether a physician ordered a CDE and not actual completion. The latter outcome likely reflects not only physician- but also patient-related responsibility for completing a CDE. Further, we linked a patient to a practice and not to his or her own physician within the practice. However, averaging characteristics of physicians within a practice has been used in other practice-based intervention studies. In a study of menorrhagia, practice-level data were used to evaluate an academic detailing approach promoting referral for female patients with menorrhagia.³⁰ We postulate that there may be a "practice culture" that makes care delivered by providers in 1 practice more similar than that of providers in different practices.

The deficiency in follow-up assessments for FOBT+ patients that we observed was substantial, but inadequate follow-up is not unique to FOBT screening. If we assume that all the patients in our study actually received the ordered CDE, it would leave 30% who did not have their FOBT result investigated. By comparison, in a

Pittsburgh-based study of women with an abnormal Pap test, 36% were overdue for obtaining follow-up testing that had been ordered, and in a Detroit study of further testing for women with abnormal mammograms, 18% had inadequate follow-up.^{31,32}

Fecal occult blood test-based colorectal cancer screening can only be effective if patients with a positive result have an appropriate subsequent evaluation. Many patients may not be receiving the indicated CDE after a positive FOBT. Female patients may be especially unlikely to have a CDE ordered. Moreover, physicians who say they do not intend to order a CDE are frequently true to their word in actual practice and should be targeted in efforts to improve colorectal cancer screening. Our data suggest many opportunities for future research on this topic, including educational interventions for physicians,³³ assessment of physicians' attitudes toward CDE in women with positive FOBT, and exploration of the patient's role in limited CDE initiation.

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