Predictors of Nonadherence to Screening Colonoscopy

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BACKGROUND: Colonoscopy has become a preferred colorectal cancer (CRC) screening modality. Little is known about why patients who are referred for colonoscopy do not complete the recommended procedures. Prior adherence studies have evaluated colonoscopy only in combination with flexible sigmoidoscopy, failed to differentiate between screening and diagnostic procedures, and have examined cancellations/no-shows, but not nonscheduling, as mechanisms of nonadherence.

METHODS: Sociodemographic predictors of screening completion were assessed in a retrospective cohort of 647 patients referred for colonoscopy at a major university hospital. Then, using a qualitative study design, a convenience sample of patients who never completed screening after referral ($n=52$) was interviewed by telephone, and comparisons in reported reasons for nonadherence were made by gender.

RESULTS: Half of all patients referred for colonoscopy failed to complete the procedure, overwhelmingly because of nonscheduling. In multivariable analysis, female sex, younger age, and insurance type predicted poorer adherence. Patient-reported barriers to screening completion included cognitive-emotional factors (e.g., lack of perceived risk for CRC, fear of pain, and concerns about modesty and the bowel preparation), logistic obstacles (e.g., cost, other health problems, and competing demands), and health system barriers (e.g., scheduling challenges, long waiting times). Women reported more concerns about modesty and other aspects of the procedure than men. Only 40% of patients were aware of alternative screening options.

CONCLUSIONS: Adherence to screening colonoscopy referrals is suboptimal and may be improved by better communication with patients, counseling to help resolve logistic barriers, and improvements in colonoscopy referral and scheduling mechanisms.

KEY WORDS: colon cancer screening; colonoscopy; adherence.
DOI: 10.1111/j.1525-1497.2005.0164.x
J GEN INTERN MED 2005; 20:989–995.

Experts have endorsed the use of fecal occult blood tests and direct or radiologic visualization of the colorectum to screen for colorectal cancer (CRC).[1,2] Survey data indicate that CRC screening rates in the U.S. are substantially lower than for other cancers for which screening is recommended.[3] For average-risk subjects, completion rates for any form of CRC screening are about 40% compared with about 75% for mammography.[4] The vast majority of prior work on clinical behavior has sought to understand the reasons for nonadherence to fecal occult blood testing (FOBT), and to develop interventions to increase FOBT utilization within general clinic and community populations.[5–8] Meanwhile, little research has focused on the large numbers of patients who actually discuss *colonoscopic* screening with their primary care providers, receive referrals, but then fail to complete procedures.

The few studies that have examined this phenomenon have evaluated colonoscopy only in combination with flexible sigmoidoscopy, failed to differentiate between screening and diagnostic procedures, and have evaluated only cancellations/no-shows, rather than nonscheduling, as mechanisms of nonadherence. No-show rates have generally fallen between 25% and 35% in a number of studies of academic and VA medical centers.[9–13] None of these studies have systematically characterized sociodemographic factors and patient beliefs and attitudes that predict nonadherence to physician recommendation for colonoscopy, specifically. Understanding the predictors of nonadherence is important because the use of colonoscopy for routine screening has been increasing in recent years,[14] because colonoscopy is distinct from sigmoidoscopy in terms of risk, preparation, cost, and convenience, and because nonadherence to colonoscopy appears to be a significant problem in many settings.

Among primary care physicians at the University of Colorado, colonoscopy has become the preferred CRC screening modality. Accordingly, this institution offers a unique opportunity to describe within a single clinic population both sociodemographic and patient-reported factors influencing adherence to referrals for this procedure. Based on prior literature,[15] we hypothesized that the following sociodemographic characteristics would predict nonadherence to colonoscopy: younger age, female gender, nonwhite race/ethnicity, insurance type, unmarried status, and lower socioeconomic status (SES). Using in-depth interviews of a sample of patients who never completed colonoscopy, we also sought to characterize attitudes, beliefs, and barriers that influence adherence and to describe differences based on gender. We hypothesized that patients who do not adhere to referrals would be likely to have poor knowledge and many fears and concerns about colonoscopy. Finally, based on a recent, large community-based study showing lower rates of lower endoscopy utilization among women compared with men,[16] and another study indicating that fear of pain was a negative predictor of any form of CRC screening utilization among women,[17] we hypothesized that women in our clinical population would be less adherent than men to colonoscopy and would report more practical barriers and fears about the procedure.

METHODS

Study Population

Our goal was to understand the factors influencing adherence among average-risk patients ≥ 50 years referred for first-time

The authors have no conflicts of interest to report.

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See editorial by Walsh, p. 1068

Received for publication February 7, 2005
and in revised form March 21, 2005 Accepted for publication March 22, 2005

colonoscopic screening. The overwhelming majority of colonoscopy referrals are for this group of patients. Other types of patients are expected to have a markedly different set of motivations to complete screening. Thus, we excluded patients referred for follow-up of positive FOBT, surveillance following a previously detected adenoma or neoplasm, and for work-up of any specific gastrointestinal sign or symptom.

Review of Colonoscopy Referrals

We reviewed all referral forms received by our university endoscopy suite over a 4-month period (August to November 2003) and, cross referencing to the electronic medical record, constructed a sociodemographic database that included patient age, race/ethnicity, gender, health plan, co-pay amount, zip-code-imputed median household income, and marital status. The primary outcome variable was whether patients had completed a colonoscopy within 6 months following the date of the original referral. Using SAS statistical software (SAS Institute Inc., Cary, NC), we determined descriptive statistics, bivariate predictors, and multivariate predictors of colonoscopy completion using backwards logistic regression with the following variables: gender, age, race, insurance, marital status, and income. Odds ratios are reported with 95% confidence intervals, and all statistical tests are assessed for significance at the .05 level.

Individual Patient Interviews

We then carried out a qualitative study of patient-reported reasons for not completing colonoscopy. We selected patients for interview based on a convenience sample obtained from 74 consecutive, noncompleted referral forms generated from the beginning of March through the middle of April 2004. All contact attempts were made by telephone. In general, at least 20 subjects is considered a reasonable sample size for hypothesis generation and exploratory research geared toward informational redundancy and the identification of recurrent themes;[18] thus, we sought to interview 20 female and 20 male noncompleters in order to increase our chances of identifying the most salient differences within and between gender groups.

The principal investigator (T.D.D.) developed the prototype interview, which was then pilot tested and refined using 6 patients. During pilot testing, debriefing questions were used to assess and enhance respondents' comprehension of interview queries and concepts.[19] To ensure uniformity in the conduct of the interview, the principal investigator held a training session for each interviewer, which included providing feedback on the first interview performed by each. The interviewers were a professional research assistant (T.V.M.), a second-year medical resident (K.B.), and a gastroenterology fellow (J.M.C).

The interview explored several topics, including: (1) *knowledge* about personal and population risks for CRC, alternative CRC screening tests, and the risks, benefits, and mechanics of colonoscopy; (2) the nature of the *provider-patient CRC screening discussion*; (3) *insurance coverage* for colonoscopy; and (4) *beliefs*, *attitudes*, and *barriers* pertaining to scheduling and completing colonoscopy. As an example of the interview format, we asked noncompleters to tell us why they did not carry through with colonoscopy. They were allowed to volunteer as many reasons and details as they wished. The interviewer then probed patients' responses in order to capture additional information. This open-ended format was meant to help ensure that no important reasons would be missed and because we anticipated that patients might volunteer their most compelling reasons first. Each open-ended question was followed by a fixed-item response section. For example, based on a literature review, we included an extensive list of beliefs, attitudes, and barriers that might influence screening behaviors. Item by item, the interviewer asked the patient whether he or she agreed (yes or no) with a particular item and, if so, to elaborate on the reasons why. Framing these as concerns that other patients have sometimes had, we anticipated some respondents would be willing to endorse them when they applied.

Interviewers noted patient responses in real time on a standardized data collection form. Following interview completion, each interviewer independently used a summary form to specify key themes, frequencies of individual item responses, and patient quotations that exemplified recurring patient concerns and questions. Jointly, the investigators then reviewed the summaries to produce a consensus-coding document. This process, based on grounded-theory methodology,[18] involved comparing findings, discussing divergent coding, and resolving differences of interpretation. Two of the investigators (T.D.D. and T.V.M.) then re-reviewed all interview forms in order to amend tabulations and coding as necessary. Whenever feasible, we performed between-group comparisons of fixed-item responses (by *t*-tests, χ^2, and Fisher's exact tests) in order to identify differences that might be especially deserving of hypothesis testing in larger, follow-up studies.

This study was approved by the Colorado Multiple Institutional Review Board after removal of personal health information.

RESULTS

Over a 4-month period, there were 647 referrals for first-time screening colonoscopies. Only about 50% of all patients referred for colonoscopy actually completed the procedure. Ten of these (about 3%) had scheduled a procedure but had subsequently canceled or failed to show up for it. The remainder never scheduled one (see Figure 1). Sociodemographic characteristics as well as rates and bivariate predictors of screening completion are shown in Table 1. In bivariate analysis, younger age and female gender were significant predictors of noncompletion. Health plan also predicted nonadherence, although we were unable to separate the influence of the co-pay amount from other characteristics of insurance. Patients on Medicaid, who tend to have more limited financial resources and significant comorbidities, had the lowest rates of completion (26%); those with a military benefit (uniformed service members and their families on Tricare Prime) had the highest completion rates (59%); and those with Medicare and an employee benefit plan through the University of Colorado had an intermediate completion rate (51% to 52%). Finally, married men were more likely than unmarried men and women of any marital status to complete colonoscopy ($P=.03$). Socioeconomic status, imputed through zip-code-linked median household income, and race/ethnicity did not predict completion although information about race/ethnicity was missing in about 37% of cases. Finally, Table 2 shows the results of multivariable logistic regression, in which female sex, younger age, and

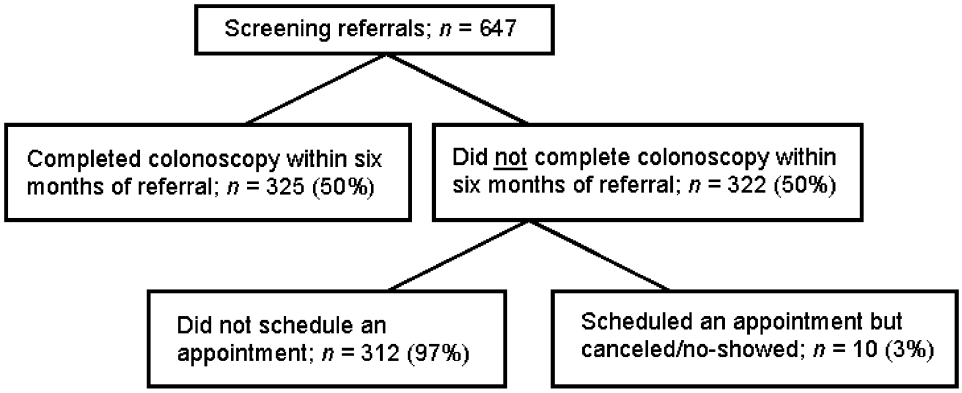

FIGURE 1. Characteristics of patients referred for first-time screening colonoscopy over a 4-month period.

type of health plan were retained as significant negative predictors of adherence.

Among the interviewed sample, 21% were $\geq$65 years old and 43% were men, closely reflecting the age and gender distribution of the referral cohort (Table 1). All patients contacted agreed to participate in an interview; however, after at least 8 attempts, we were unable to reach approximately 30% of the noncompleters on our lists. These patients were, on average, slightly younger and more likely to have a low-income health plan than the patients we did reach. Ultimately, we carried out interviews of 52 noncompleters (27 women, 25 men). In open-ended response sections, patients did not volunteer information that we had failed to include in the fixed-item sections.

Cognitive-Emotional Factors

The proportion of patients who endorsed apprehensions about colonoscopy was greater among women compared with men, and included fear of pain, disagreeable preparation, concerns about modesty, and fears about perforation (Table 3). Although the sample size was relatively small and these differences were not significant for most individual items (except for

Table 1. Demographic Characteristics of Study Patients (*n*=647)

Variable	Completers (*n*=323)	Noncompleters (*n*=324)	% Adherence*	*P*
Gender				
Male (43.2%)	155 (47.8%)	124 (38.4%)	56	
Female (56.8%)	169 (52.2%)	198 (61.5%)	46	.01
Age category (y)				
50 to 54 (34.0%)	92 (28.5%)	127 (39.4%)	42	
55 to 59 (21.1%)	71 (22.0%)	65 (20.2%)	52	
60 to 64 (18.6%)	66 (20.4%)	54 (16.8%)	55	
65 to 69 (13.0%)	48 (14.9%)	36 (11.2%)	57	
70+ (13.3%)	46 (14.2%)	40 (12.4%)	53	.01
Race				
White (47.3%)	158 (48.9%)	148 (45.7%)		
Black (6.8%)	20 (6.2%)	24 (7.4%)	52	
Hispanic (3.9%)	11 (3.4%)	14 (4.3%)	45	
Other (5.4%)	18 (5.6%)	17 (5.3%)	44	
Missing (36.6%)	116 (35.9%)	121 (37.4%)	51	.79
Insurance†				
Medicare [$0] (28.8%)	97 (30.0%)	89 (27.5%)	52	
University-managed care [$100 to $250]* (19.9%)	66 (20.4%)	63 (19.4%)	51	
Tricare prime [$25] (26.6%)	101 (31.3%)	71 (21.9%)	59	
Medicaid [$0] (3.6%)	6 (1.9%)	17 (5.3%)	26	
Other [var] (21.2%)	53 (16.4%)	84 (25.9%)	39	.001
Marital status				
Married (57.7%)	193 (59.8%)	180 (55.6%)	52	
Unmarried (23.5%)	71 (22.0%)	81 (25.0%)	47	
Missing (18.9%)	59 (18.3%)	63 (19.4%)	48	.54
Gender/marital status				
Married male (26.9%)	99 (30.7%)	75 (23.2%)	57	
Unmarried male (8.0%)	25 (7.7%)	27 (8.3%)	48	
Married female (30.8%)	94 (29.1%)	105 (32.4%)	47	
Unmarried female (15.5%)	46 (14.2%)	54 (16.7%)	46	
Missing (18.9%)	59 (18.3%)	63 (19.4%)	48	.31
Median Income	$51,159.00	$47,525.00		.10

**Two sample t tests were used for the comparison of continuous variables except median income, where the Wilcoxon's rank sum test was used; χ^2 were used for the comparison of categorical variables.*

†The co-pay amount associated with each insurance plan is in brackets.

Table 2. Summary of Logistic Regression Predicting Adherence to Screening Colonoscopy*

Variable/Model	OR (95% CI)
Total, *N*	647
Gender	
Male	(REF)
Female	0.67 (0.49 to 0.93)
Age category (y)	
50 to 54	(REF)
55 to 59	1.61 (1.04 to 2.51)
60 to 64	1.86 (1.16 to 2.97)
65 to 69	2.65 (1.39 to 5.09)
70+	2.35 (1.19 to 4.63)
Insurance	
Medicare	(REF)
University-managed care	1.55 (0.85 to 2.84)
Tricare prime	2.05 (1.14 to 3.69)
Medicaid	0.43 (0.15 to 1.19)
Other	0.93 (0.51 to 1.68)

**Completion of colonoscopy within 6 months of referral; backwards regression includes gender, age, race, insurance, marital status, and income; variables retained in the model are displayed.*
OR, odds ratio; CI, confidence interval.

concerns about modesty and perforation), the consistency of differences across items was noteworthy. Almost half of the men and women did not believe they were at any personal risk for CRC because they did not have any symptoms or a family history.

Logistic Obstacles

The most common logistic obstacle reported by 31% of the sample was being busy/not getting around to it (Table 3). This obstacle was endorsed by men significantly more often than women. Although 2 patients mentioned difficulties arranging time off from work, the remainder gave nonspecific explanations such as "vacation," "had to go out of town," and "keep putting things off." On further questioning, most of these patients gave other compelling reasons, such as "I need a ride," "I'm stressed because of my bipolar son," "I'm scared they might find cancer," and "the procedure seems embarrassing." Thus, being "busy" was readily invoked but often obscured more specific issues and concerns, many of which were directly related to colonoscopy.

The next most common logistic obstacle, other health concerns (Table 3), was endorsed by 22% of the sample and was mentioned significantly more often by women than by men. Examples of responses varied from minor "menopausal symptoms" and "waiting for a mammogram" to more specific health conditions. Patients frequently made it clear that they preferred to focus on only one health problem at a time, and that colonoscopy would have to wait. Again, as with being busy, it was not always clear whether other health concerns reflected a patient's most cogent reason for not completing colonoscopy or whether it was instead a ready explanation that allowed other concerns to be glossed.

Concern about cost was the next most common logistic obstacle. More in-depth questioning, however, revealed that only 2 out of 9 patients who invoked this barrier actually knew whether colonoscopy was covered by their health plan and the co-pay amount. Thus, cost seemed either to be a convenient, although not particularly accurate, reason for noncompletion or else some patients may have genuinely assumed (without verifying) that the cost of colonoscopy was prohibitive.

Transportation problems were also reported by noncompleters, especially older ones. Specific examples included lack of access to a car, reluctance to take public transportation, and no friend or relative available to accompany the patient.

Health System Barriers

Scheduling challenges were endorsed by about a fifth of noncompleters (Table 3). This category included being kept on hold too long with an endoscopy scheduler or health plan representative, having to talk with too many people to arrange the procedure, and problems with the processing of the referral paperwork (e.g., incomplete forms, no referral received by the endoscopy unit). About 1 in 6 noncompleters was surprised to learn that *he* or *she* was responsible for calling the endoscopy schedulers to arrange a procedure; most said they had been

Table 3. Percent of Interviewed Male and Female Noncompleters Who Endorse Particular Practical Barriers to Completing a Colonoscopy

Barrier	Total (*n*=52) (%)	Female (*n*=27) (%)	Male (*n*=25) (%)	*P*
Cognitive-emotional				
"Not at risk for CRC": no symptoms or family history	47	46	48	.86
Fear of pain/discomfort	46	51	40	.29
Disagreeable prep	41	50	30	.07
Concerns about modesty	28	39	13	.01*
Fear of perforation	21	24	17	.39
Fear of finding cancer	7	10	3	.28
Procedure has no negative aspects	29	24	35	.31
Logistic obstacles				
Busy/"haven't gotten around to it"	31	15	48	.01*
Other personal health concerns	22	33	8	.03*
Procedure too costly	17	22	12	.33
Transportation problems	14	11	17	.61
Health-system barriers				
Scheduling challenges	22	22	21	.84
Patient unaware s/he responsible for calling to schedule	15	15	16	.91
Wait too long for procedure	15	19	12	.52

CRC, colorectal cancer.
**P*<0.05

expecting to be the *recipients* of a call. Waiting too long for procedure was the next most commonly reported health system barrier. The average waiting time for a colonoscopy was about 4 to 5 months at the time of the original referral. However, only about half of the noncompleters who invoked this explanation had actually called to schedule a colonoscopy before determining that a procedure date was too distant.

In summary, possible barriers to colonoscopy completion included a mixture of cognitive-emotional factors, logistic obstacles, and health system barriers. This last category, which is perhaps the most easily remediable, was common. Fourteen out of 52 noncompleters (approximately 25%) said they had actually taken steps to schedule a colonoscopy but found the procedure date unacceptably remote or else encountered paperwork or telephone challenges that led them to give up trying. An additional 15% were unaware that *they* were responsible for initiating a call to schedule a procedure, implying a failure of communication with the patient at the time of the original referral. Thus, about 40% of noncompleters, regardless of any fears or concerns they might have had about colonoscopy itself, encountered system barriers to arranging the procedure.

The nature of the CRC screening discussion with the referring primary care provider was never mentioned explicitly as a reason for noncompletion. Almost all patients recalled mention of colonoscopy by their primary care providers, even if they were unable to remember the specifics of the discussion. Most patients said that the primary purpose of colonoscopy is "to prevent colon cancer," although very few ($<10\%$) referred specifically to polyp identification and removal. Similarly, fewer than 10% (4/52) noncompleters themselves raised the topic of colonoscopy with their primary care provider. Discussions with providers were generally very brief, less than a minute in duration. About half the patients either remembered nothing about the discussion or recalled only a simple, unelaborated recommendation to "get the screening" (e.g., "you're over 50—you should have this done"; "you should get this baseline assessment for colon cancer"; "please have this test"). The remainder was generally able to recall one or two pieces of information about colonoscopy that their provider shared with them, but almost all remained unaware of many other crucial aspects of the procedure. All had very poor knowledge about personal and population-based risks of CRC; the concept of resectable polyps; the mechanics, risks, and benefits of colonoscopy; and the nature and use of conscious sedation. A few patients recalled their providers informing them that the procedure is "painless" or that they would not remember it afterwards. Especially noteworthy is the fact that only about 40% of noncompleters were aware of any alternatives to colonoscopy for CRC screening.

DISCUSSION

Based on a review of referral forms and in-depth patient interviews, we identified several sociodemographic predictors as well as possible cognitive-emotional, logistic, and health-system barriers to completing screening colonoscopies. The majority of earlier studies have focused on utilization rates and determinants of community adherence to national screening guidelines for flexible sigmoidoscopy alone or in combination with colonoscopy.[9,16,20] Ours is the first study to use a mixed research methodology to characterize, within a single clinical population, both sociodemographic predictors and patient-reported barriers to completing screening colonoscopy, specifically following physician referral. All patients in our study had discussed colonoscopy with their primary care providers and might therefore have been expected to have a unique set of attitudes and expectations about the procedure.

Our results raise important questions about adherence to screening colonoscopy in other settings. Only about half of all patients referred for colonoscopy completed a procedure. Particular subgroups had adherence rates moderately lower than the population average. As hypothesized, female gender, younger age, and insurance type predicted poorer adherence. Women were less likely than men to complete colonoscopy. This gender difference is similar in magnitude to lower female utilization of colonoscopy observed previously in community settings.[16] It is unclear whether lower community rates reflect lower rates of colonoscopy referral for women than men; however, our findings suggest that even *when* women are referred, they may be less likely to complete procedures. One possibility, for which we found some support, is that women have more apprehensions about colonoscopy than men, particularly about modesty. Conversely, it may be less socially acceptable for men to endorse these kinds of concerns. Lower adherence among younger compared with older patients also mirrors utilization patterns in community settings. Younger individuals are more likely to be employed, have children at home, and have higher co-pay amounts, all of which could be important barriers to scheduling and completing procedures. Of note, colonoscopy is fully covered under Medicare, thereby eliminating co-pay as a barrier for people ≥ 65 years. In this vein, insurance type was also a predictor of adherence in this study. Insurance plan is closely related to both patient mix and co-pay amount, but we were unable to determine the relative influence of each. We also found that married men had the highest completion rates. We are unaware of prior reports of the influence of marital status on adherence to colonoscopy referral. If future studies replicate this finding within larger populations, then elucidating the mechanisms by which married men achieve greater adherence might produce insights into improving this outcome for others. Finally, in contrast to earlier endoscopy utilization and adherence studies, race/ethnicity and SES were not predictors of adherence in this study. This may be because the number of minority patients was relatively small, because most of our patients were relatively affluent, and because zip-code-level data are only a crude measure of SES.

In summary, a variety of sociodemographic factors predicted adherence in our clinical population, and particular subgroups had moderately lower rates of adherence than others. Most crucial, however, was that overall rates of adherence were low. By itself, our review of referral forms did not elucidate the *reasons* for these findings. We did, however, identify and call into question several possibilities based on in-depth patient interviews.

We found that patient knowledge about CRC and colonoscopy's risks and benefits was remarkably poor. Particularly striking was that 60% of noncompleters did not know about alternatives to colonoscopy for screening. A large proportion recalled having had little substantive discussion with their providers. Patients described provider screening recommendations as very cursory and lacking in information. Oftentimes, patients said they were simply told to "get the screening." Only

a tiny fraction remembered asking their providers questions. Based on the reports of a few patients, some providers might have overly minimized negative, yet potentially real, aspects of the procedure, such as discomfort, inconvenience, and unpleasantness of the preparation. Although these observations are potentially biased because they are based on 6-month patient recall, it is nonetheless the case that even *if* provider-patient discussions had been more informative than patients remembered, patients remained deficient in key areas of knowledge. In other words, patient-practitioner communication appeared ineffective in many ways.

We hypothesized that noncompleters would manifest many fears and concerns about colonoscopy. In fact, about 40% expressed concerns about pain associated with the procedure and about the unpleasantness of the preparation. Given the prominence of these concerns, we believe they deserve greater attention in patient education efforts.

The most commonly invoked logistic obstacles to colonoscopy included its (high) cost, other health problems, and competing life demands ("being busy" or "not getting around to it"). Although undoubtedly important, we observed in open-ended discussion that these particular barriers were often vague and obscured other attitudinal or practical barriers. This suggests that it is worth delving more deeply into these explanations when they are offered, ascertaining whether, for example, a patient has really investigated or knows the co-pay amount, whether other health problems are minor enough to warrant reassurance, and whether "being busy" is a euphemism for forgetting.

Health system barriers, over which patients generally have little control, appeared to be common causes of noncompletion. These included telephone- and paperwork-related obstacles to arranging a procedure date, lack of awareness among patients that *they* are responsible for calling to schedule procedures, and excessively long procedure wait times. Rectifying these problems depends on improving system operations, including the handling of paperwork, increasing the availability of telephone schedulers, more clearly communicating with patients about their role in scheduling, and hiring additional endoscopists and ancillary staff in order to increase endoscopy capacity and reduce waiting times. Because about 40% of noncompleters in our sample encountered these kinds of barriers, we believe that addressing these is crucial and may have a significant, positive impact on adherence.

Limitations

This study was carried out within a single academic institution in which patients rather than endoscopy staff initiate appointment making. This is common in many, but not all, private and academic-based endoscopy practices. We would anticipate a trade-off whereby appointment making instigated by endoscopy labs is associated with higher no-show rates than systems in which motivated patients initiate scheduling and are therefore more likely to complete procedures. Nonetheless, we suspect that many of the logistic obstacles and cognitive-emotional barriers to colonoscopy that we observed are generalizable to these other types of settings and contribute, for example, to patient refusal to schedule procedures when contacted by endoscopy staff and, when patients *do* schedule, to procedure cancellations and no-shows. Our clinic population poorly represented minorities and was not socioeconomically diverse. That adherence was so low within our relatively affluent population, however, suggests that this is likely to be an even greater problem among less socially advantaged patients. We determined patient-level influences on adherence through interviews of a small convenience sample of male and female patients, meaning that our results are not powered to draw firm conclusions. Nonetheless, this exploratory approach was warranted because no prior studies have addressed the causes of noncompletion of colonoscopy, specifically, and because our partially open-ended format allowed for greater contextualization of patient responses and avoided the imposition of researcher-defined categories. Finally, patients were interviewed at least 6 months following their original referrals, introducing possible recall bias. However, it is most likely that such a bias would entail *forgetting* reasons for noncompletion; nonetheless, all patients were able to identify several, very specific cognitive-emotional, logistic, and health system barriers that were likely to influence persistent nonadherence over at least a 6-month period.

CONCLUSION

Fear of pain, concerns about unpleasantness of the preparation, and the absence of perceived risk for CRC were very common among patients referred for screening colonoscopy who did not subsequently complete procedures. Two interventions that attempted to modify patients' false beliefs and these kinds of negative attitudes about colonoscopy had a negligible impact on adherence.[21,22] Patients themselves identify these as key reasons for nonadherence, however, so it is imperative to develop and evaluate novel approaches to overcome these challenges. Doing so might also contribute to an equally important goal of enhancing the quality of informed decision making related to a procedure that is inconvenient, has nontrivial risks, and is potentially quite costly. Other approaches could include patient counseling to overcome practical barriers and more efficient mechanisms of primary care referral and endoscopy scheduling. Ultimately, the most effective pathways to improved adherence will likely incorporate multifaceted interventions that address the multiple barriers encountered by each patient.

The authors wish to acknowledge the contributions of Joel Levine, MD; Katie Borgstrom; and Crystal Koimn to this article.

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