

# Effect of a Mailed Brochure on Appointment-Keeping for Screening Colonoscopy

## A Randomized Trial

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**Background:** Even when primary care physicians have face-to-face discussions with patients before referring them for screening colonoscopy, patient nonadherence can be substantial. Often, primary care physicians lack sufficient time to educate patients and address their potential misconceptions and fears about this procedure.

**Objective:** To test whether an informational brochure sent to patients' home addresses after referral for screening colonoscopy would increase patient completion of the procedure.

**Design:** Randomized, controlled trial.

**Setting:** 2 general internal medicine practices affiliated with the University of Colorado Health Sciences Center.

**Patients:** 781 consecutive patients 50 years of age or older referred by their primary care physicians for screening colonoscopy.

**Intervention:** Patients were randomly assigned to receive usual care (control group) versus usual care plus an informational brochure (intervention group). The brochure was mailed within 10 days of referral for screening colonoscopy; it mentioned the name of the patient's primary care physician and encouraged patients to schedule a procedure. It also described colorectal cancer and polyps and the similar lifetime risks for colorectal cancer for men and women,

colonoscopy and risk for perforation, the nature of bowel preparation for the procedure, and alternative screening tests.

**Measurements:** Rates of adherence to screening colonoscopy in the 2 study groups.

**Results:** The overall adherence rate was 11.7 percentage points (95% CI, 5.1 to 18.4 percentage points) greater in the intervention group than in the control group (70.7% vs. 59.0%). Older patients were more adherent than younger patients. Patients with low-income insurance plans, such as Medicaid, were less adherent despite being sent a brochure.

**Limitations:** The small number of clinical practices and minority patients may limit generalizability. In addition, it was not possible to determine the degree to which adherence was influenced by a reminder to schedule a procedure versus detailed information about colonoscopy.

**Conclusions:** An inexpensive mailed brochure is an effective way to increase patient adherence to primary care physician referral for screening colonoscopy.

*Ann Intern Med.* 2006;145:895-900.

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Trial Registration Number: NCT00308568.

As of 2004, almost 45% of adults age 50 years or older were not up-to-date with colorectal cancer (CRC) screening (1). In community settings, a key barrier to screening is the absence of a primary care physician recommending screening (2). Nonetheless, previous work has demonstrated that adherence is low even when patients have face-to-face discussions with and receive referrals for screening from their primary care physicians (3). This observation is particularly true for colonoscopy, a high-intensity procedure that requires considerable advance preparation. We have reported in our clinical system the reasons for not adhering to colonoscopy referrals, including the belief that one is not at risk for CRC because of an absence of symptoms or a family history of disease, fear of pain associated with the procedure, perceived unpleasantness of the bowel preparation, forgetfulness, and uncertainty about who is responsible for scheduling the procedure (3). Nonadherence to referrals for coloscopy represents a missed opportunity to realize public health goals and achieve quality of care for individual patients and also entails unnecessary administrative time and expense to complete, transmit, and archive referral forms and obtain insurance preauthorization.

Although mailed prompts and informational material

have been shown to be effective in promoting other types of cancer screening tests (4–9), we are unaware of previous studies that have tested this strategy for patients who receive referrals for screening colonoscopy. In an effort to reduce nonadherence to screening colonoscopy, we developed a 1-page, 2-sided brochure to be mailed to patients shortly after receiving referrals for the procedure. The brochure was meant to educate patients about CRC and colonoscopy; to address their most common questions and concerns, which were identified by our previous research and that of others (3, 5); and to remind them to schedule a procedure. A secondary objective was to clearly inform patients ahead of time about bowel preparation and the

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Appendix Figure  
Conversion of figure and tables into slides

**Context**

Many patients do not schedule appointments for screening colonoscopy after referral for the procedure by their primary care physicians. A simple method to improve patient adherence to colonoscopy referral would be useful.

**Contribution**

The authors randomly assigned patients who were referred for colonoscopy to receive usual care or a brochure that reminded them to schedule an appointment and provided information about colon cancer and the potential benefits and harms of colonoscopy. Of the 781 patients, 70.7% in the intervention group and 59.0% in the usual care group completed colonoscopy.

**Cautions**

The authors did not evaluate the effect of different aspects of the content of the brochure.

**Implications**

An informative mailed reminder letter improves patient adherence to referral for screening colonoscopy.

—The Editors

risk for bleeding and perforation associated with the procedure. Typically, patients do not learn about risks until asked to consent to the procedure, that is, after they have completed preparation for colonoscopy. Whereas most simple patient information materials emphasize the benefits of screening (10), we favored prominently mentioning risks associated with colonoscopy as well (11). We conducted a randomized, controlled trial to assess the effects of the brochure on adherence to colonoscopy referral and conducted further analysis of the trial to identify sociodemographic variables also related to adherence.

**METHODS****Principal Hypothesis and Primary Outcome**

We conducted a randomized, controlled trial to evaluate the hypothesis that adherence to colonoscopy referrals is at least 10% greater among patients who receive a mailed brochure that includes a description of colonoscopy and a reminder to schedule a procedure than among patients who do not.

**Educational Brochure**

We developed a 1-page, 2-sided brochure to address previously identified reasons for nonadherence to screening colonoscopy in a patient population similar to the one that was the focus of this study (3). The brochure (**Appendix Figure**, available at [www.annals.org](http://www.annals.org) and at [www.uchsc.edu/gim/CRC\\_MAILER.pdf](http://www.uchsc.edu/gim/CRC_MAILER.pdf)) was personalized to include the name of the patient's primary care physician in the introductory paragraph. On the brochure, we used color, large font, a cartoon diagram of the large intestines and colono-

scope, and text written at an eighth-grade level to inform patients of the following: the similar lifetime risk for CRC for men and women at average risk; the concept of cancer prevention (finding and removal of benign polyps that might develop into cancer), as well as early detection of cancer; the typically asymptomatic nature of polyps and early-stage cancer; how screening may help prevent death; a description of colonoscopy, including the use of conscious sedation to minimize discomfort; and fecal occult blood testing and sigmoidoscopy as alternatives to colonoscopy. We concluded the brochure with a statement encouraging patients to call the endoscopy laboratory to schedule a colonoscopy or their primary care providers to obtain additional information (telephone numbers provided). In the brochure, we mention the possibility for colon perforation, quoting an institutional average of 1 in 2500 procedures and describing this risk as "very small." Finally, we mentioned that the liquid preparation required for colonoscopy necessitates frequent use of the bathroom the night before the procedure. In our experience, these details, especially risk for perforation, are seldom mentioned in the relatively succinct handouts and brochures that patients sometimes review in advance of the procedure. Two general internists and a gastroenterologist helped to develop the content. This involved carrying out cognitive interviews with 6 patients and amending the wording and layout of the brochure to maximize patient comprehension.

**Study Setting and Population**

Patients were identified in 2 ambulatory general internal medicine practices associated with the University of Colorado Health Sciences Center in Denver, Colorado. Both practices used the same electronic medical record system and identical procedures for generating colonoscopy referrals. We included asymptomatic men and women 50 years of age and older who received referrals for screening colonoscopy. Patients referred because of gastrointestinal symptoms, iron-deficiency anemia, positive fecal occult blood test results, or any other diagnostic purpose were excluded. Under usual care in this setting, patients who have face-to-face discussions with primary care physicians and receive referrals for colonoscopy are given written instructions to call the endoscopy laboratory to schedule a procedure. Referrals, with rare exceptions, are transmitted to the university-affiliated endoscopy laboratory. The system is "direct access," meaning that patients schedule and obtain colonoscopies without previous consultation with gastroenterologists (12). Patients were responsible for calling to schedule procedures, and the endoscopy laboratory did not send reminders. During the study period, the average waiting time to obtain a colonoscopy was 8 to 12 weeks.

**Study Procedures**

Patient enrollment took place between 1 February and 12 November 2005. Each week, a research assistant re-

viewed the colonoscopy referral forms completed in the 2 general internal medicine practices. Patient eligibility was determined by an “asymptomatic screening” check box marked by the PCP on the referral form, subsequently verified by medical record review of recent clinic notes. Patients who met the eligibility criteria were entered, unsorted, into an Excel (Microsoft Corp., Redmond, Washington) database along with the sex of the referring PCP. Using a random-number generator (13), the research assistant then randomly and sequentially assigned each of the patients to a usual care (control) group versus an intervention group consisting of usual care plus the mailed brochure. Immediately after recording the study group assignments, the research assistant prepared and posted the brochures in the U.S. mail. All brochures were mailed within 10 days of the referral date. If the post office returned a brochure as undeliverable, no further mailings were sent, but the patient was retained in the sample for an intention-to-treat analysis. Patients receiving more than 1 referral during the study period were retained in the sample but were counted as not adhering in relation to their original referrals. Subsequent referrals for these patients were ignored.

### Determination of the Sample Size

We hypothesized that patients in the intervention group would have at least 10% greater adherence to colonoscopy referral than patients in the usual care group. We estimated that adherence in the usual care group would be 55%, based on a 50% rate described in an earlier study of a similar population (3) plus an additional 5% to account for secular trends occurring since the earlier study was completed. To test our hypothesis, the target sample size was 792 patients (or 396 in each group) using a 2-sided chi-square test with 80% power and  $\alpha$  value set at 0.05.

### Variables

A hospital claims record was generated within an average of 4 weeks for each colonoscopy procedure completed. If no claims record was generated within a minimum of 4 months following referral, we coded the procedure as not completed. We used the administrative data component of the electronic medical record, cross-referenced with each patient’s medical record number, to obtain patient demographic information, including age, sex, race or ethnicity, marital status, type of health insurance, and ZIP code, which we used to impute median household income according to U.S. Census data from 2000. Blinded manual review of claims data was unnecessary because the primary outcome was based on the presence and tabulation of electronic claims generated within 4 months of patient enrollment.

### Statistical Analysis

Analyses were performed in SAS, version 9.1 (SAS Institute, Inc., Cary, North Carolina). Comparisons between the study groups were performed by using chi-square tests,

and the Cochran–Armitage test for trend was used for the income category comparison. Bivariate and multivariate risk ratios for colonoscopy completion were calculated by using a generalized linear models procedure (Proc Genmod in SAS) with a binomial distribution and a log link function. Variables with a bivariate  $P$  value less than 0.25 were entered into a multivariate model. Variables potentially predicting colonoscopy completion included whether a mailer had been sent, the demographic variables mentioned earlier, and sex concordance between the PCP and the patient. We used the Breslow–Day statistic to assess whether strata of each predictor variable modified the effect of the mailer on colonoscopy completion. Finally, we included 95% CIs when reporting results.

### Human Participants

As a quality improvement initiative, the Colorado Institutional Review Board granted exemption of Health Insurance Portability and Accountability Act (HIPAA) authorization and informed consent, in part, because of the following: 1) the minimal risk associated with a mailer that included only standard informed consent elements for patients who had previously agreed to receive a colonoscopy referral; 2) a guarantee of at least usual care for all patients; and 3) a legally defined treatment relationship between patients and the principal investigator, who was a physician member of the 2 group practices included in the study. The institutional review board approved publication of the results following de-identification of personal health information. We registered the trial at the National Institutes of Health clinical trials Web site (ClinicalTrials.gov: NCT00308568) and followed the Consolidated Standards of Reporting Trials (CONSORT) guidelines for reporting the results of a randomized trial (14).

### Role of the Funding Source

The study was performed without a sponsor, and the authors bear sole responsibility for the manuscript. Funding was provided in part by a grant from the American Cancer Society, which had no role in the design or conduct of the study or in the decision to submit the manuscript for publication.

## RESULTS

After we removed 25 duplicate entries for patients who received more than 1 colonoscopy referral and were therefore counted as not completing the procedure, the final sample included 781 patients. There were no patient exclusions, and only 2 mailers were returned as undeliverable. The intervention and usual care groups were evenly balanced in terms of measured demographic variables (Table 1). Receiving a mailer was associated with a rate of colonoscopy completion that was 11.7 percentage points (95% CI, 5.1 to 18.4 percentage points) greater than that seen with usual care (70.7% vs. 59.0%, respectively;  $P = 0.001$ ). Among patients who underwent colonoscopy,

Table 1. Patient Characteristics\*

Characteristic	No Mailer (n = 395), n (%)	Mailer (n = 386), n (%)
<b>Sex</b>		
Men	148 (37.5)	150 (38.9)
Women	247 (62.5)	236 (61.1)
<b>Marital status</b>		
Not married	116 (29.4)	114 (29.5)
Married	229 (58.0)	224 (58.0)
Unknown	50 (12.7)	48 (12.4)
<b>Race/ethnicity</b>		
White, non-Latino	212 (53.7)	230 (59.6)
Black, non-Latino	40 (10.1)	27 (7.0)
Latino	15 (3.8)	16 (4.2)
Other or unknown	128 (32.4)	113 (29.3)
<b>Age</b>		
50–64 y	299 (75.7)	303 (78.5)
≥ 65 y	96 (24.3)	83 (21.5)
<b>Insurance type</b>		
Commercial	55 (13.9)	57 (14.8)
Tricare†	98 (24.8)	96 (24.9)
University plan	116 (29.4)	108 (28.0)
Medicare	107 (27.1)	112 (29.0)
Medicaid or low-income	19 (4.8)	13 (3.4)
<b>Median household income by zip code of residence</b>		
<\$35 000/y	43 (10.9)	38 (9.8)
≥\$35 000/y to <\$45 000/y	123 (31.1)	126 (32.6)
≥\$45 000/y to <\$55 000/y	78 (19.8)	82 (21.2)
≥\$55 000/y to <\$65 000/y	52 (13.2)	60 (15.5)
≥\$65 000/y to <\$75 000/y	45 (11.4)	31 (8.0)
≥\$75 000/y	54 (13.7)	49 (12.7)
<b>Sex concordance of PCP and patient</b>		
Female PCP and female patient	182 (46.1)	178 (46.1)
Female PCP and male patient	34 (8.6)	36 (9.3)
Male PCP and female patient	66 (16.7)	57 (14.8)
Male PCP and male patient	113 (28.6)	115 (29.8)

\* 781 patients were enrolled in the study. On the basis of chi-square tests for categorical variables, there were no statistically significant differences between the study and control groups for patient characteristics. PCP = primary care physician.

† Tricare is a managed health care program for active duty and retired members of the uniformed services and their families.

there was no difference between the usual care and intervention groups in terms of wait time following referral (69 days [CI, 63 to 75 days] in the usual care group vs. 65 days [CI, 62 to 68 days] in the intervention group; *t*-test, *P* = 0.32).

Table 2 shows, for the pooled sample, absolute rates and bivariate and multivariate relative risks for completing colonoscopy according to study group assignment and patient characteristics. In the multivariate model, patients receiving a mailer were 20% more likely to complete colonoscopy than those patients not receiving a mailer. Patients at least 65 years of age were 18% more likely to complete a procedure than patients 50 to 64 years of age, and patients with Medicaid or another low-income health

plan were 60% less likely than those with Medicare to complete a procedure. No patient characteristics seemed to modify the effect of the mailer on colonoscopy completion.

## DISCUSSION

To our knowledge, this is the first study to assess the effects of a mailed educational intervention on adherence to screening colonoscopy among patients receiving referrals for the procedure. Although the patients in this study had face-to-face discussions with primary care physicians and, presumably, agreed to undergo screening colonoscopy, 59% of those receiving usual care completed only the referral process. In comparison, a 1-page, 2-sided brochure that addressed previously identified patient barriers (3) to colonoscopy and mentioned the name of the patient's PCP increased adherence by 11.7 percentage points to a total of 70.7%. On the basis of other studies of mailed interventions to promote a variety of cancer screening tests (4–9), this effect is probably as large as can be reasonably expected. It is noteworthy that these results were achieved despite clearly acknowledging the small risk for bleeding and perforation associated with the procedure.

In the pooled sample, patients who were 65 years of age were more likely to complete colonoscopy than those who were 50 to 64 years of age. These findings are congruent with those of an earlier study within a similar population (3). A plausible, if partial, explanation is that younger patients are more likely than older patients to be employed and have difficulty taking time off from work to complete the procedure.

Regardless of a mailer, patients with Medicaid and forms of health insurance for low-income persons were especially likely to be nonadherent to colonoscopy referrals. Some of the low-income health plans required copayments of at least \$100, which is prohibitive for many people in this population. In addition, providers often complete referrals without recognizing that colonoscopy is not a covered benefit.

Earlier studies have identified lower rates of colorectal cancer screening among minority and socioeconomically disadvantaged patients (15–18). We did not replicate these results. Our sample probably did not adequately represent these populations. In addition, our ZIP-code-imputed measure of median household income lacks precision.

Lower rates of CRC screening among women have been described in the general population and among patients who have an established health care provider (3, 19). It is possible that concerns about modesty and bowel preparation are factors. For our study, results did not differ by sex. It was noteworthy, however, that because 33% of the women in the study had a university-based health plan, they or their spouses were likely to be health center employees and, consequently, may have been more health-conscious, familiar with health center resources, and motivated to undergo screening.

Previous studies have found that female physicians are more likely to deliver preventive services (20, 21), give patients medical information, and discuss lifestyle and social concerns with their patients (22). Accordingly, we expected that female primary care physicians might more effectively educate their patients about colonoscopy and, perhaps, address the kinds of concerns, such as modesty and fear, that seem to be more common among female patients. In fact, we found no difference in rates of adherence by sex of provider. It may be that female primary care physicians are no better than their male counterparts when it comes to influencing patient adherence to non-sex-specific cancer screening tests.

Key advantages of this intervention are its simplicity and low cost. Because each mailing cost about \$1, an ad-

ditional colonoscopy could be accomplished for every \$10 invested. Even if the investment were 2 to 3 times this amount, a brochure reminder is still an inexpensive and effective way to promote colonoscopy. In fact, it could even help to save money by cutting down on unnecessary administrative overhead related to obtaining preauthorization and processing referral forms for patients who do not complete procedures.

This study has significant limitations. Its generalizability may be limited by the small number of practices examined, by the low number of racial or ethnic minorities in the study sample, and by a relatively high proportion of patients employed by the center in which the study was performed. In addition, because we were unable to ascertain whether the patients read and understood the entire

**Table 2. Factors Associated with Completing Colonoscopy\***

Characteristic	Completed Colonoscopy, % (n)	Bivariate Relative Risk (95% CI)	Multivariate Relative Risk (95% CI)
<b>Received mailer</b>			
Yes (n = 386)	70.7 (273)	1.20 (1.08–1.33)	1.20 (1.09–1.33)
No (n = 395)	59.0 (233)	Reference	Reference
<b>Sex</b>			
Men (n = 298)	64.8 (193)	1.00 (0.90–1.11)	
Women (n = 483)	64.8 (313)	Reference	
<b>Marital status</b>			
Married (n = 453)	67.6 (306)	Reference	Reference
Not married (n = 230)	58.7 (135)	0.87 (0.77–0.99)	0.96 (0.81–1.15)
Unknown (n = 98)	66.3 (65)	0.98 (0.84–1.15)	0.97 (0.81–1.16)
<b>Race/ethnicity</b>			
White, non-Latino (n = 442)	64.7 (286)	Reference	
Black, non-Latino (n = 67)	62.7 (42)	0.97 (0.80–1.18)	
Latino (n = 31)	58.1 (18)	0.90 (0.66–1.22)	
Other or unknown (n = 241)	66.4 (160)	1.03 (0.92–1.15)	
<b>Age</b>			
50–64 y (n = 602)	63.0 (379)	Reference	Reference
65 y (n = 179)	71.0 (127)	1.13 (1.01–1.26)	1.18 (1.04–1.34)
<b>Insurance type</b>			
Commercial (n = 112)	63.4 (71)	0.94 (0.84–1.04)	1.00 (0.79–1.27)
Tricare† (n = 194)	62.9 (122)	0.93 (0.85–1.02)	1.00 (0.85–1.18)
University plan (n = 224)	67.9 (152)	0.98 (0.90–1.07)	1.09 (0.92–1.28)
Medicare (n = 219)	69.9 (153)	Reference	Reference
Medicaid or low-income (n = 32)	25.0 (8)	0.64 (0.54–0.76)	0.40 (0.21–0.75)
<b>Median household income by ZIP code of residence</b>			
<\$35 000/y (n = 81)	65.4 (53)	1.00 (0.89–1.13)	
≥\$35 000/y to <\$45 000/y (n = 249)	65.1 (162)	Reference	
≥\$45 000/y to <\$55 000./y (n = 160)	64.4 (103)	0.99 (0.90–1.09)	
≥\$55 000/y to <\$65 000/y (n = 112)	65.8 (73)	1.00 (0.90–1.11)	
≥\$65 000/y to <\$75 000/y (n = 76)	69.7 (53)	1.05 (0.93–1.18)	
≥\$75 000/y (n = 103)	60.2 (62)	0.95 (0.85–1.06)	
<b>Sex concordance of PCP and patient</b>			
Female PCP and female patient (n = 360)	62.2 (224)	Reference	
Female PCP and male patient (n = 70)	65.7 (46)	1.04 (0.92–1.17)	
Male PCP and female patient (n = 123)	71.5 (88)	1.10 (1.00–1.21)	
Male PCP and male patient (n = 228)	64.9 (148)	1.03 (0.95–1.11)	

\* 781 patients were enrolled in the study. All interactions were not statistically significant between receipt of a mailer and strata of patient characteristics based on the Breslow–Day statistic. The multivariable model was adjusted only for the characteristics listed in the fourth column. PCP = primary care physician.

† Tricare is a managed health care program for active duty and retired members of the uniformed services and their families.

brochure, we were unable to determine the relative degree to which adherence was influenced by the brochure's detailed description of colonoscopy, its simple reminder to schedule a procedure, or some other element. Hospital claims in our system are generally accurate, but even if underascertainment occurred at a rate of 5% (a gross overestimation), only a small number of patients not completing colonoscopy would convert to having completed the procedure in each study group, with a negligible effect on the overall results. Important strengths of the study included the randomized trial design, a large sample size, lack of exclusions, and complete follow-up.

Patients referred for screening colonoscopy were substantially more likely to complete a procedure after receiving an inexpensive, mailed brochure that included a description of the procedure and a reminder to schedule an examination. Of note, this effect was achieved despite mentioning important risks associated with the procedure. Promoting adherence to CRC screening among populations vulnerable to disease remains a vexing problem. Ultimately, targeting many interventions at the various levels of the health care system, including public policy, the organization of clinical practice, and clinicians and patients, is the most effective way of improving cancer screening (23). The intervention described here would be an important part of this strategy in settings with high baseline rates of nonadherence to colonoscopy referral.

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**Acknowledgments:** The authors thank Brenda L. Beaty, MPH, for statistical analysis and Trisha V. Melhado, BS, for data collection.

**Grant Support:** In part by the American Cancer Society MRSG-06-081-01-CPPB; Principal Investigator, Dr. Denberg.

**Potential Financial Conflicts of Interest:** None disclosed.

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