Improving Colorectal Cancer Screening Among the Medically Underserved: A Pilot Study within a Federally Qualified Health Center

Kishore Khankari, MD[1], Mickey Eder, PhD[1], Chandra Y. Osborn, PhD[2], Gregory Makoul, PhD[2], Marla Clayman, PhD, MPH[2], Silvia Skripkauskas, BA[2], Linda Diamond-Shapiro, AM, MBA[1], Dan Makundan, MD[1], and Michael S. Wolf, PhD, MPH[2]

[1]Access Community Health Network, Chicago, IL, USA; [2]Health Literacy and Learning Program, Center for Communication and Medicine, Institute for Healthcare Studies, and Division of General Internal Medicine, Feinberg School of Medicine at Northwestern University, Chicago, IL, USA.

BACKGROUND: Colorectal cancer screening rates remain low, especially among low-income and racial/ethnic minority groups.

OBJECTIVE: We pilot-tested a physician-directed strategy aimed at improving rates of recommendation and patient colorectal cancer screening completion at 1 federally qualified health center serving low-income, African-American and Hispanic patients. Colonoscopy was specifically targeted.

DESIGN: Single arm, pretest–posttest design.

SETTING: Urban.

PATIENTS: 154 screening-eligible, yet nonadherent primary care patients receiving care at an urban, federally qualified health center.

INTERVENTION: 1) manually tracking screening-eligible patients, 2) mailing patients a physician letter and brochure before medical visits, 3) health literacy training to help physicians improve their communication with patients to work to resolution, and 4) establishing a "feedback loop" to routinely monitor patient compliance.

MEASUREMENT: Chart review of whether patients received a physician recommendation for screening, and completion of any colorectal cancer screening test 12 months after intervention. Physicians recorded patients' qualitative reasons for noncompliance, and a preliminary cost-effectiveness analysis for screening promotion was also conducted.

RESULTS: The baseline screening rate was 11.5%, with 31.6% of patients having received a recommendation from their physician. At 1-year follow-up, rates of screening completion had increased to 27.9 percent ($p<.001$), and physician recommendation had increased to 92.9% ($p<.001$). Common reasons for nonadherence included patient readiness (60.7%), competing health problems (11.9%), and fear or anxiety concerning the procedure (8.3%). The total cost for implementing the intervention was $4,676 and the incremental cost-effectiveness ratio for the intervention was $106 per additional patient screened by colonoscopy.

CONCLUSIONS: The intervention appears to be a feasible means to improve colorectal cancer screening rates among patients served by community health centers. However, more attention to patient decision making and education may be needed to further increase screening rates.

KEY WORDS: physician–patient communication; colorectal cancer; screening; intervention; FQHC; health literacy; underserved.
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According to the U.S. Preventive Services Task Force, men and women ages 50 and older are recommended to routinely undergo colorectal cancer screening with either periodic flexible sigmoidoscopy or annual fecal occult blood test (FOBT) or both; colonoscopy; or air-contrast barium enema.[1,2] These guidelines are supported by the American Cancer Society and the American Gastroenterological Association.[3,4] Despite the evidence and recommendations supporting these procedures, approximately half of Americans at risk (by age or family history or both) have not received screening.[5]

This problem may be exacerbated among those that are socioeconomically disadvantaged and belonging to racial/ethnic minority groups. In particular, the African-American population has the highest morbidity and mortality rate owing to colorectal cancer, and the Hispanic population has the lowest screening rates, putting this group at greater risk for late-stage presentation of the disease.[6–10] Our research team recently investigated screening completion rates among a network of 31 federally qualified health centers (FQHCs) whose mission is to provide comprehensive primary care in areas where there are large volumes of low-income and medically underserved populations.[10,11] The screening rates among these predominantly African-American and Hispanic communities were the lowest recorded in the literature to date; only 7% of eligible patients were found to be compliant with colorectal cancer screening (predominantly FOBT). Most nota-

ble was the remarkably low rate of physician recommendation of colorectal cancer screening for these patients (9%), coupled with the high completion rate among those who actually did receive a recommendation (76%).

As a response to our findings, we pilot tested a physician-directed intervention aimed at improving recommendation and subsequent colorectal cancer screening completion at 1 of the FQHC sites. Colonoscopy was specifically targeted, as it has been perceived as a "practice standard" by many physicians, and its recommended testing interval would extend the period of compliance for these patients who face persistent social and economic barriers often impeding the routine use of primary health care services.[12] The cost-effectiveness of this screening promotion strategy was also initially investigated.

METHODS

Overview

Beginning in early 2005, a physician-directed continuous quality improvement (CQI) strategy was implemented at 1 FQHC site. The CQI strategy and the physician communication training component were adapted from a previously successful colorectal cancer screening intervention implemented among Veterans.[13,14] The strategy involved: 1) manually tracking screening-eligible (by age) patients and identifying those nonadherent with screening recommendations (fecal occult blood test [FOBT], flexible sigmoidoscopy, colonoscopy, or double-contrast barium enema); 2) distributing a physician letter and patient education materials before medical visits to "prime" eligible individuals on the need for colorectal cancer screening; 3) a brief, informal training with physicians to review health literacy communication principles and "best practices" for helping patients understand colorectal cancer and screening tests, and to elicit potential barriers to adherence and arrive at a plan of action; and 4) establishing a "feedback loop" for the clinic to routinely monitor improvement in screening recommendation and completion rates. These efforts were managed by the senior attending physician (Khankari) at the clinic. Three residents, 3 attending family practice physicians, 1 General Internist, and 1 obstetrics/gynecologist were involved in the study. All were oriented to the intervention and its implementation.

Intervention and Procedure

As part of the CQI process, a chart review of all clinic patients over the age of 50 (identified by the FQHC Decision Support System [DSS]) who received care at the specified FQHC between January 1, 2002 and January 28, 2005 was first conducted (N= 282). Patients were deemed eligible if they had 3 or more visits to the clinic during this time period. A total of 174 patients met this criteria and were therefore eligible for more in-depth baseline chart review. Specifically, charts were checked for documentation (lab test results, physician orders and notes) regarding colorectal cancer screening. "Pertinent positives" during the review included mention of colorectal cancer screening methods (FOBT, sigmoidoscopy, double-contrast barium enema, or colonoscopy) in the notes or a sigmoidoscopy or both, double-contrast barium enema or colonoscopy referral in the referral section. The review tracked the incidence of colorectal cancer screening, time of last screening and present compliance (FOBT = past 12 months; flexible sigmoidoscopy = past 5 years; colonoscopy = past 10 years), and physician recommendation regarding colorectal cancer screening.

Regardless of level of discussion by the physician, charts that did not have completion of colorectal cancer screening were flagged with a blank referral placed in the chart for a colonoscopy. Whereas colonoscopy was the targeted screening strategy for this intervention by the clinic providers, FOBT and flexible sigmoidoscopy were also offered as available and efficacious alternative test options. After the chart review, 20 patients were identified as having already been appropriately screened for colorectal cancer. These remaining 154 patients were viewed as currently nonadherent with screening and were sent a letter encouraging them to come to the clinic to both pick up their referrals and talk to their doctor about colorectal cancer screening. Enclosed with this letter were Spanish or English or both versions of a Centers for Disease Control and Prevention (CDC)-developed brochure from the "Screen for Life" campaign, which provided explanations of the options available for screening.[15]

Physicians at the clinic were simultaneously prepared by 1 of the study investigators to promote colorectal cancer screening among those patients whose charts had been flagged for screening eligibility and for whom a referral had already been placed in the chart. This included an hour-long training and education session that reviewed the current American Cancer Society screening recommendations and the use of specific communication skills identified in health literacy initiatives (e.g., avoidance of medical jargon, teach back, layering of health information).[16] Colonoscopy was viewed as the preferred recommendation. However, FOBT and flexible sigmoidoscopy were also available and considered equally viable screening tests for patients. To support patients without medical insurance or whose payer would not cover the cost of a screening colonoscopy, the FQHC network had established a prior understanding with an affiliated community hospital to offer the procedure and any necessary follow-up care on a sliding fee scale, which would yield a significantly discounted charge.

Measures

Colorectal cancer screening outcomes retrieved via manual review of the medical chart included: 1) physician recommendation given for any screening test, as documented in the medical chart or physician progress notes (yes or no, baseline, and at 12 months postintervention); 2) scheduling of an endoscopic procedure or distribution of stool cards (yes or no; 12 months postintervention); and 3) subsequent completion of a screening test by the patient within 12 months of intervention (yes or no). The number of chart-documented discussions on colorectal cancer screening per patient during the study period was also tracked. Retrospective review of physician recommendation and patient screening history was determined by each test: FOBT (past 12 months), flexible sigmoidoscopy (past 5 years), and colonoscopy (past 10 years). The Institutional Review Board at Mount Sinai Medical Center, affiliated with the FQHC site, approved the study.

Analysis Plan

The mean and standard deviation were calculated for patient age, whereas frequencies and percentages were determined for

all other categorical data. Bivariate analyses using a chi-square test or Student's *t* test were conducted to examine differences in screening recommendation and completion by pre and postintervention time periods, patient characteristics (age, gender, race/ethnicity), and number of attempted discussions during the study period (one, 2 or more). All statistical analyses were performed using STATA, version 9.0 (College Station, TX).

Qualitative Substudy of Reasons for Screening Nonadherence. As a secondary, formative assessment of the intervention, physicians at the clinic were encouraged to document reasons for screening nonadherence or refusal of a colorectal cancer screening recommendation whenever possible. These qualitative descriptors were written in the physician progress notes and later abstracted and coded by study investigators (Eder, Wolf) to support later modifications to the intervention.

Cost-Effectiveness of Intervention. Recognizing that this is a pilot test, preliminary cost-effectiveness analyses were conducted to provide an initial evaluation of the cost-effectiveness of this intervention within the FQHC setting. We modeled an approach to evaluate the economics of screening promotion efforts as identified by Andersen and colleagues.[17] Before the analysis, basic assumptions in costs for delivering the intervention were established. Assumptions did not include any charity coverage provided to certain patients for the cost of the screening procedures. These assumptions are consistent with other published cost-effectiveness studies.[14,17–21]

The costs associated with the initial manual chart audit to identify clinic compliance rates for colorectal cancer screening were based on a clinic primary care physician's annual salary and hourly cost (based on a 55-hour work week). Time estimates were provided by the investigator team for accessing the DSS database to identify patients by age, reviewing chart records to determine screening compliance, and flagging nonadherent charts. The cost of implementing components of the intervention were based on personnel (physician, medical assistant) time, costs associated with training and mailing (letterhead, envelopes, postage), and reproduction of patient education materials (brochure). Finally, the targeted, follow-up chart audit to determine clinic screening rates at 1-year follow-up ("Feedback Loop") were again based on the physician's time estimates for manual review. Sensitivity analyses were also conducted to provide estimates for both the initial and follow-up chart reviews that would consider the cost of using a medical assistant's time instead of the physician's, as this may be the a more feasible and realistic means to implement the study at other clinics.

RESULTS

The mean age of the baseline sample was 60.1 years (SD= 7.3 years, *N*=174). Over 2/3 (67.8%, *n*=118) of patients were female, 51.7% were African American, and 44.8% were Hispanic. Half (50.8%) of patients were enrolled in Medicaid, 18.4% in Medicare, and 8.0% had private insurance. The remaining 22.8% of patients were uninsured and received care on a sliding fee scale from the clinic.

The baseline colorectal cancer screening rate for patients was 11.5%; and less than a third (31.6%) of patients had received a screening recommendation from their physician (Table 1). Twenty patients were identified as adherent with screening at baseline, and all had received colonoscopy.

At 1-year follow-up, rates of physician recommendation had increased nearly threefold (92.9%) from baseline (Table 1). The majority of referrals were for colonoscopy (90.9%); 7.6% were for FOBT and 1.5% for flexible sigmoidoscopy. More than 1 test was mentioned during 10% of recommendations. As many as 9 discussions on colorectal cancer screening were recorded for a single patient during the study period (*M*=1.3, SD=1.2). One-third (32.8%) of patients receiving a recommendation had 2 or more discussions with their physician on the matter. Similarly, screening completion had increased from 11.5% at baseline to 27.9% ($p<.001$) post intervention. Fourteen additional patients also received local consults for colonoscopy and had scheduled appointments for the procedure. Rates of adherence to screening among those who received a recommendation at follow-up (30.1% [39.9% including those currently scheduled], *N*=143) remained similar to the rates determined at baseline (36.4%, *N*=55). Patients who required 2 or more discussions on colorectal cancer screening were less likely to receive screening at follow-up compared to those with only 1 documented discussion (43.4% versus 8.5%, $p<.001$).

For 84 of the 97 patients (86.6%) who were nonadherent at follow-up, physicians provided qualitative notes in the chart to detail the reported reasons for patient nonadherence (Table 2). The most common coded reason was patient readiness (60.7%); this included patients' mention of a need to discuss screening with a spouse or family member, directly refusing the screening test or requesting to delay it, or stating the need for time to weigh between 2 recommended test options. The next most common reasons were competing health problems that required more immediate attention (11.9%) and fear or anxiety expressed about the test procedure (8.3%). No significant differences were noted by age, race/ethnicity, or gender.

The total cost for implementing the intervention was $4,676 and the incremental cost-effectiveness ratio for the intervention was $106 per additional patient screened for colorectal cancer by colonoscopy (Table 3). Sensitivity analyses revised costs for chart audits by using an hourly cost for a medical assistant instead of the primary care physician. The estimated cost per additional patient screened with this alternative mode of implementation would be $58, as total costs would be reduced to $2,583 assuming a medical assistant could be trained to conduct the chart audits.

Table 1. Physician Recommendation and Patient Completion of Colorectal Cancer Screening at Baseline versus Follow-up

Outcome	Baseline (*N*=174)		Follow-up (*N*=154)		*P* value
	n	%	*n*	%	
Physician recommendation	55	31.6	143	92.9	<.001
Patient screening completion	20	11.5	44	27.9	<.001
Screening scheduled or completed	–	–	57	37.0	<.001

Table 2. Reasons for Non-adherence with Colorectal Cancer Screening (*N*=84)

Reason	Number (*n*)	Percent (%)
Patient readiness	51	60.7
Competing health problems	10	11.9
Fear/anxiety over recommended test	7	8.3
Wait-listed for procedure	7	8.3
Patient scheduling conflicts/available time	6	7.2
Financial barriers	3	3.6

DISCUSSION

The intervention that we have described and pilot tested in this study targeted improvement in colorectal cancer screening completion rates, specifically colonoscopy, among community health centers serving the needs of indigent and racial/ethnic minority patients. Based on our findings, this strategy appears to have had a substantial impact on physician recommendation and patient screening participation, specifically for colonoscopy. This is notable, as previous studies have referred to colonoscopy as arguably a harder behavior change for patients compared to less invasive tests such as FOBT.[22–24] The cost-effectiveness estimates for promoting colorectal cancer screening within an FQHC, especially if a medical assistant conducted chart audits, were found to be similar to the lowest previously reported estimates for mammography and pap smears.[14,17] These estimates were also lower than what had been reported in the initial clinical trial of this intervention strategy among veterans.[14]

Despite sizable increases in physician recommendation and patient colorectal cancer screening completion rates, the proportion of those who completed screening after receiving a recommendation remained relatively constant from baseline to postintervention. This is much lower than what was anticipated based on our prior research among FQHCs, and what had been achieved among veterans.[10] It is possible that the emphasis on colonoscopy as the practice standard in this intervention led to a lower uptake of recommended screening. However, the increase in recommendation rates alone was enough to increase screening completion rates, reinforcing the importance of the physician's role in screening adherence. We previously found that 95% of patients within this FQHC network were screened by FOBT. This is in part supported by our qualitative findings that patient readiness was the most common reason for nonadherence to colonoscopy.

In addition, it is informative to learn that patients who received 2 or more recommendations from their physician during the study period were less likely to complete a screening test compared to those who only discussed the topic once with their physician. This could be attributed, again, to patient readiness. Trauth and colleagues[25] estimated the prevalence of patients across the stages of change for colorectal cancer screening. Patients were more likely to be at the earlier precontemplation and contemplation stages for endoscopic procedures compared with FOBT. Among our sample of patients, many might still be struggling to accept colonoscopy as a screening procedure they can pursue, especially if they did not perceive they had less invasive options or had previous experience with the FOBT.

The inclusion of a cost-effectiveness analysis provided support for the feasibility of the intervention within a community health center. The efficacy of the intervention coupled with the relatively low cost associated with promoting colorectal cancer screening makes the strategy appealing to health care systems and clinics with few resources. The use of a medical assistant or health paraprofessional within an FQHC offers additional cost savings, pending confirmation of their ability to navigate chart information on colorectal cancer and screening. Costs could be dramatically reduced even further if the chart audit was automated.[14,26] Currently, only 8% of FQHCs have an electronic medical record. This may rise in the near future as necessary resources to implement a system become more easily attainable.[14,27,28] Both the inclusion of an automated tracking system and the use of nonphysician staff should be tested in subsequent trials.

Our study clearly has many limitations. First, screening-eligible adults were identified by age only; information on patients with an identified family history of colon cancer or polyps was not available without a much larger scale manual chart review. Second, there is a remote chance that patients sought or received screening information or services elsewhere, which would not be captured in our analyses. However, our inclusion of patients who were more frequent users of care at the FQHC, and their limited economic resources suggest the patients included in our study are not as likely to be dual users of a preventive care service like colonoscopy or FOBT.[10,22] Third, several other patient-level characteristics have been previously proposed as influencing screening adherence, but were not captured in the current research activities.[22] Fourth, we recognize the value of the support of a community hospital to provide charitable care to patients with financial restrictions was crucial for the implementation of this intervention. Finally, this was a pilot test using a single-group, pretest–posttest design only. Our findings do not represent definitive evidence of the intervention's efficacy, as the design itself cannot account for potential bias from patient selection, maturation, or other unmeasured, external influences (e.g., competing screening promotion efforts). A proper evaluation of our

Table 3. Analysis of Costs per Additional Patient Screened

Cost category	Annual cost ($)	Sensitivity analysis based on delegation of tasks to medical assistant ($)
Initial chart audit	2,496	960
Intervention implementation (total)	1,275	1,275
Personnel time (medical assistant)	240	240
Mailing (letterhead, envelopes, postage)	385	385
Educational materials reproduction	150	150
Training	500	500
Repeat (feedback loop) chart audit	905	348
Total	4,676	2,583
Cost per additional patient screened	106.2	58.7*

*Sensitivity analysis assumes a base salary of $40,000/year for a medical assistant and a benefits rate of 18.9%

strategy within the context of a controlled clinical trial at multiple FQHCs will be necessary in the future.

Our provider-directed intervention had a strong showing in this single-clinic pilot study, yet these findings suggest there are ways in which it could be improved. For instance, decision-making activities should be broadened to include physician–patient discussions of more than 1 of the available screening tests, not just colonoscopy. This might help patients find a test that is most acceptable to them.[16] Further, considerations for other patient educational materials, such as multimedia tools and those that are deemed "enhanced print" for low literacy populations, might be necessary to support the most effective screening messages to be delivered to patients.[16,29,30] Also, more intensive low-literacy communication and motivational interviewing skills training may be needed for physicians at these clinics to make more effective recommendations that coincide with messages in the patient materials.[13] These changes may lead to more marked improvement in screening recommendation and behavior, although the additional cost of this revised strategy's implementation should also be evaluated.

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Corresponding Author: *Michael S. Wolf, PhD, MPH; Health Literacy and Learning Program, Institute for Healthcare Studies &, Division of General Internal Medicine Feinberg School of Medicine, Northwestern University, 676 N. St. Clair St., Suit 200, Chicago, IL 60611, USA (e-mail: mswolf@northwestern.edu).*

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