

Changes in Colorectal Cancer Screening Knowledge, Behavior, Beliefs, Self-Efficacy, and Barriers among Community Health Clinic Patients after a Health Literacy Intervention

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Abstract

Objective: The objective in this pre- and post-survey assessment was to compare the effectiveness of a health literacy-directed intervention designed to increase knowledge, beliefs, barriers, self-efficacy and behavior associated with CRC screening with FOBT among patients cared for in predominantly rural community clinics and the change in these characteristics over the first 15 months after enrolling in a study designed to assess screening strategies.

Methods: Between 2008 and 2011, a quasi-experimental intervention was conducted in 8 predominantly rural Federally Qualified Health Centers. Patients were orally administered a 15-minute survey at enrollment by a clinic research assistant (RA) and at 15 months by phone by a central RA. Participants included 428 community clinic patients aged 50-85 (mean 58.5); the majority (79%) were female, 69% were African American, and 54% had limited health literacy.

Results: There was significant improvement across all groups with the number of patients reporting they had been given information /education on CRC testing ($p<0.0001$), been given an FOBT kit ($p<0.0001$), and completed an FOBT ($p<0.0001$) with significant improvement in having a doctor recommendation in all groups except usual care. Confidence in an FOBT's potential to decrease chances of dying from CRC improved across all groups as well ($p<0.002$). In addition, patients' belief that they would get CRC in their lifetime' decreased across all groups post-intervention ($p<0.03$) as did their worry that they may find out they have CRC ($p<0.04$).

Conclusion: Overall these low income FQHC patients who were not up-to-date with screening had heard of CRC screening, had positive attitudes toward screening and wanted to know if they had cancer. Results demonstrate the value of giving patients a recommendation and a kit; patients in all groups reported significant increases at 15 months in completing CRC screening (>83%) as confirmed by study records.

Keywords: Colorectal cancer; Screening; Knowledge; Attitudes; Behavior

Introduction

Colorectal cancer (CRC) is the third most common cancer in men and women and the second most common cause of cancer death in the United States [1]. Recent increases in use of cancer screening is reducing CRC death rates but disparities persist among low income individuals, those with less education minorities and those living in rural areas [2]. Knowledge about cancer screening, perceived susceptibility, and health-promoting behavior have been found to be positively correlated with CRC screening adherence [3-15]. Physician recommendation also has a positive influence on completion of CRC testing [16].

Numerous studies have investigated barriers to CRC screening among low income populations [17-30]. However, most are only one time assessments and did not reassess after a screening intervention. Also, most took place in urban settings

The objective in this pre- and post-survey assessment was to compare the effectiveness of a health literacy-directed intervention designed to increase knowledge, behavior, attitudes, self-efficacy and behavior associated with CRC screening with Fecal Occult Blood Test (FOBT) among patients cared for in predominantly rural community clinics and the change in these characteristics over the first 15 months after enrolling in a quasi-experimental evaluation designed to assess screening strategies.

Methods

Study design

This study took place between May 2008 and August 2011 in North Louisiana. Two health literacy intervention strategies were tested in a three arm study: 1) enhanced usual care, where patients were given a recommendation for CRC screening and an FOBT kit; 2) an educational strategy, where patients were given enhanced usual care plus brief education that included pamphlet, video and simplified FOBT instructions; or 3) the nurse support arm, where patients

received enhanced usual care, the educational strategy and additional nurse support and follow-up to encourage completion of CRC screening.

Three Federally Qualified Health Centers (FQHCs) participated in this study. As part of this three-arm, quasi-experimental evaluation, each FQHC was randomly assigned to one of the three study arms. Each study FQHC was affiliated with multiple clinics which were assigned to the same arm as their parent FQHC. The eight participating clinics were in eight towns across the state. Six clinics were in rural areas, two in low-income areas of small cities. Baseline rates of CRC screening at each of the eight study clinics ranged from 1 to 2%.

Participants

Patients age 50 to 85 were asked by a medical assistant if they would be willing to talk to an onsite research assistant (RA) about participating in a CRC screening study prior to their physician encounter. Those who were interested met with the RA, who screened them for further eligibility: 1) English-speaking, 2) Current clinic patient, 3) Not requiring screening at an earlier age according to American Cancer Society (ACS) guidelines [1], 4) Not up-to-date with United States Preventives Services Task Force [31] CRC screening recommendations (i.e., a FOBT annually, flexible sigmoidoscopy every 5 years or colonoscopy every 10 years), 5) Not having an acute medical concern.

The Louisiana State University Health Sciences Center–Shreveport Institutional Review Board approved the study. Each patient received \$10 for their participation in the baseline survey and \$5 for responding to a post follow-up phone survey that was given at 15 months.

Structured pre- and post-survey

The pre-and post-survey was administered orally at enrollment by clinic RA and by phone at 15 months by central RA. It included demographic and basic health status questions as well as 47 colon cancer and CRC-screening questions designed utilizing the Health Belief Model and Social Cognitive Theory [32-34]. A detailed description of the survey, which was written on a 4th grade level and administered orally has been reported previously [35-36]. Questions about cancer screening knowledge, behavior, attitudes, self-efficacy and barriers were modified for use with colon cancer from validated questionnaires used in previous studies by the authors. The 3 self-efficacy questions were modified from items included in Champion and colleagues' Self-Efficacy Scale [37]. Specifically, items assessed patients' CRC cancer screening knowledge, beliefs, self-efficacy, barriers as well as recommendation and education given for CRC screening. Response options for knowledge, recommendation and education items were 'yes', 'no', 'don't know' or open ended. Beliefs, barriers and self-efficacy questions used a 5-point Likert scale to assess intensity of agreement. Items for barriers and self-efficacy were combined to determine a scale for each with high values indicating a high level of barriers or a high level of self-efficacy.

Literacy was assessed using the Rapid Estimate of Adult Literacy in Medicine (REALM) [38]. Raw REALM scores (0-66) can be converted into reading grade levels that correlate with health literacy skills.

Both pre- and post-surveys took approximately 15 minutes to administer.

Study arms

Enhanced usual care arm: At enrollment, after completing the structured interview, the clinic-based RA gave patients a recommendation to complete CRC screening, the FOBT kit, and a suggestion to talk with their primary care provider about screening during their visit that day. Patients returned FOBTs to the clinic by mail using a pre-addressed stamped envelope. Regular clinic protocol was followed for positive test results and if diagnostic testing was needed.

Educational arm: At enrollment, in addition to enhanced usual care the clinic RA gave patients a brief health literacy-informed educational intervention that included simplified written FOBT instructions and a colorful, illustrated CRC pamphlet written on a 5th grade level that provided actionable information organized from a patient's perspective as well as a short video developed by the authors that captured FQHC patients discussing barriers and facilitators to screening, and a physician making a recommendation while showing key steps in FOBT completion. The education also included the RA giving a concrete demonstration of FOBT instructions. The RA employed health literacy techniques such as 'teach back' to confirm the accuracy and completeness of patients' understanding. Patients returned FOBTs to the clinic by mail. Tracking and follow-up was done the same manner as the EUC arm.

Nurse support arm: At enrollment, the nurse manager provided the same materials and FOBT instructions as those in the education arm prior to patient's physician visit. The nurses used motivational interviewing techniques to identify and problem-solve barriers and motivate patients to complete FOBTs. To promote comprehension and confidence, the nurses often showed patients how to complete the FOBTs and called within a week to ask if they had questions and, if necessary, to review the instructions. If patients did not return their FOBT, the nurses followed up by phone within two weeks and again in one month. If results were positive, the nurse manager called patients to discuss results, facilitate appointments with their primary care provider and if indicated, schedule patients for a diagnostic colonoscopy at the appropriate treatment center.

Analyses

The denominator for analyses is the number of patients in each arm, who completed both the pre- and post-survey (Enhanced Care n=97, Education n=120, Nurse n=211). A self-efficacy scale was calculated using three questions concerning the ability to get, use and mail the FOBT test. This scale ranged from 3 to 15; high values indicating high self-efficacy for the participant. A barrier scale was calculated using four questions concerning confusion, embarrassment, trouble and messiness related to the FOBT test. This scale ranged from 4 to 20; high values indicating the participant thought these were barriers. To examine whether patients in study arms differed on baseline characteristics, generalized estimating equations (GEE) accounting for clustering by clinic was used. To examine whether patients in the study arms changed from pre to post on survey questions, Bowker's test for symmetry was used [39].

Results

Patient characteristics are compared among groups in Table 1. Patients ranged in age from 50-85, 79% were female. The majority (69%) were African American.

Characteristic	All Patients (n=428)	Study Arm			p-value
		Enhanced Usual Care (n=97)	Education (n=120)	Nurse (n=211)	
Age, Mean (sd)	58.8 (7.1)	58.6 (7.3)	58.4 (6.5)	59.2 (7.3)	0.60
Self-Efficacy, Mean (sd)	12.3 (1.0)	12.0 (1.1)	12.8 (1.2)	12.1 (0.8)	<0.0001
Barrier, Mean (sd)	9.0 (2.5)	9.4 (2.5)	7.8 (2.1)	9.5 (2.6)	<0.0001
	N (%)	N (%)	N (%)	N (%)	
Age Categories					
50-59	264 (61)	66 (68)	74 (62)	123 (58)	0.27
60-69	126 (29)	22 (23)	36 (30)	68 (32)	
70-85	39 (9)	9 (9)	10 (8)	20 (9)	
Female	337 (79)	74 (76)	100 (83)	163 (77)	0.004
Years of Education (4 categories)					
Less than high school	137 (32)	38 (39)	35 (29)	64 (30)	<0.0001
High school grad	2203 (47)	35 (36)	64 (53)	104 (49)	
Some College	65 (15)	17 (18)	17 (14)	31 (15)	
≥ College Graduate	23 (5)	7 (7)	4 (3)	12 (6)	
Race					
African-American	296 (69)	70 (72)	51 (43)	175 (83)	<0.0001
Caucasian/Hispanic	132 (31)	27 (28)	69 (57)	36 (17)	
Marital Status (4 categories)					
Single	124 (29)	19 (20)	20 (17)	85 (40)	0.014
Married	161 (38)	45 (46)	65 (54)	51 (24)	
Separated	23 (5)	3 (3)	6 (5)	14 (7)	
Divorced	64 (15)	12 (12)	17 (14)	35 (17)	
Widowed	56 (13)	18 (18)	12 (10)	26 (12)	
Literacy					
<9 th grade	232 (54)	63 (65)	40 (33)	129 (61)	<0.0001

≥ 9 th grade	196 (46)	34 (35)	80 (67)	82 (39)	
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Table 1: Characteristics of study sample at baseline, stratified by study arm.

Approximately one third (32%) had less than a high school education, however, over half (54%) had limited literacy (i.e.<9th grade level). There were significant differences across groups for race/ethnicity, marital status, educational status and literacy.

At baseline awareness of CRC was high with almost all patients (>95%) reporting they had heard of CRC. There was significant improvement in having heard of tests to find CRC among patients in the education and nurse support groups (p=0.037 and p=0.0001 respectively).

There was significant improvement across all groups with the number of patients reporting they had been given information/education on CRC testing (p<0.0001), been given an FOBT kit (p<0.0001), and completed an FOBT (p<0.0001) with significant improvement in having a doctor recommendation in all groups except usual care. Interestingly, 10% of patients, post-survey, reported they had never been given a kit despite the fact all had been given one at enrollment and had been mailed a second one a year after enrollment.

At baseline a majority (>87%) of patients in all groups indicated they would want to know if they had CRC and over 70% expressed confidence that the FOBT test will help find CRC problems early, with no significant changes in these responses over time. Confidence in an FOBT's potential to decrease chances of dying from CRC improved across all groups as well (p<0.002). In addition, patients 'belief that they would get CRC in their lifetime' decreased across all groups post-intervention (p<0.03) as did their worry that they may find out they have CRC (p<0.04).

Self-efficacy decreased significantly in the education group with patients indicating less strong agreement that they could get an FOBT (p=0.001) complete it (p=0.0003) and mail in results (p<0.001). Self-efficacy increased significantly in the nurse support group with patients indicating they could get an FOBT, complete it and mail in results (all p<0.0001).

Patients in the education arm increased their perception of barriers over time with higher levels of 'disagree' meaning they felt more strongly that there was a barrier. This was the case for all barrier questions (instructions will be confusing; the test will be embarrassing; the test will be a lot of trouble, all p<0.0001; or the test would be messy (p=0.0005). Patients in the nurse support group were less likely to report barriers to FOBT screening (all p<0.0001). Accordingly, the barrier scale increased significantly in the education group and decreased significantly in the nurse support group.

Discussion

Although awareness of CRC was high among these low-income community clinic patients, baseline knowledge of CRC screening was low and few reported they ever had received information on CRC screening. Less than half reported that had ever received a physician recommendation for screening or been given an FOBT kit-two of the strongest determinants of screening completion [16,36,40-45]. In each of the study arms patients were given a recommendation for screening and an FOBT kit by study staff. This significantly improved patients

reporting during post-survey that they had received an FOBT kit and completed the test.

Previous studies have indicated that CRC screening completion is influenced not only by patients' knowledge but their beliefs about screening and their confidence in being able to obtain and complete the test [16,36,40,41]. After the study intervention, patients in all three

arms patients were more likely to view FOBTs positively, reporting that the test aids in decreasing the chances of dying from CRC. Interestingly only patients in the education and nurse arms were significantly more likely to indicate the more nuanced concept of FOBTs helping to find cancer early (Table 2).

	EUC			Education			NCM		
	Pre	Post	p-value	Pre	Post	p-value	Pre	Post	p-value
	n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
KNOWLEDGE									
Have you ever heard of CRC?									
Yes	94 (96.9)	92 (94.9)	0.36	114 (95.0)	115 (95.8)	0.74	209 (98.6)	204 (96.2)	0.13
No	3 (3.1)	2 (2.1)		6 (5.0)	5 (4.2)		3 (1.4)	8 (3.8)	
Don't Know	0	3 (3.1)		0	0		0	0	
Have you ever heard of any tests to find CRC?									
Yes	40 (41.2)	47 (48.5)	0.12	79 (65.8)	85 (70.8)	0.037	117 (55.5)	187 (88.6)	<0.0001
No	54 (55.7)	44 (45.4)		41 (34.2)	29 (24.2)		89 (42.2)	24 (11.4)	
Don't Know	3 (3.1)	6 (6.2)		0	6 (5.0)		5 (2.4)	0	
RECOMMENDATION/BEHAVIOR/EDUCATION									
Have you ever been given information of education on CRC testing?									
Yes	11 (11.3)	60 (61.9)	<0.0001	13 (10.8)	80 (66.7)	<0.0001	59 (28.0)	135 (64.0)	<0.0001
No	84 (86.6)	36 (37.1)		106 (88.3)	39 (32.5)		148 (70.1)	61 (28.9)	
Don't Know	2 (2.1)	1 (1.0)		1 (0.8)	1 (0.8)		4 (1.9)	15 (7.1)	
Has a doctor ever recommended you get screened CRC?									
Yes	31 (32.0)	44 (45.4)	0.09	27 (22.5)	54 (45.0)	0.0023	106 (50.2)	146 (69.2)	0.0008
No	64 (66.0)	53 (54.6)		90 (75.0)	64 (42.3)		104 (49.3)	63 (29.9)	
Don't Know	2 (2.1)	0		3 (2.5)	2 (1.7)		1 (0.5)	2 (1.0)	
Has a doctor ever given you an FOBT to do?									
Yes	19 (19.6)	91 (93.8)	<0.0001	5 (4.2)	105 (87.5)	<0.0001	110 (52.1)	159 (75.4)	<0.0001
No	78 (80.4)	5 (5.2)		113 (94.2)	15 (12.5)		99 (46.9)	48 (22.8)	
Don't Know	0	1 (1.0)		2 (1.7)	0		2 (1.0)	4 (1.9)	
Have you ever done an FOBT?									
Yes	18 (18.6)	90 (92.8)	<0.0001	9 (7.5)	114 (95.0)	<0.0001	104 (49.3)	176 (83.4)	<0.0001
No	79 (81.4)	6 (6.2)		111 (92.5)	6 (5.0)		105 (49.8)	31 (14.7)	
Don't Know	0	1 (1.0)		0	0		2 (1.0)	4 (1.9)	
BELIEFS									
If you had CRC would you want to know about it?									
Yes	86 (88.7)	87 (89.7)	0.57	113 (94.2)	109 (90.8)	0.25	183 (87.1)	179 (85.2)	0.07

No	3 (3.1)	5 (5.2)		7 (5.8)	7 (5.8)		21 (10.0)	14 (6.7)	
Don't Know	8 (8.3)	5 (5.2)		0	4 (3.3)		6 (2.9)	17 (8.1)	
How helpful do you think it is to find CRC early?									
Very Helpful	82 (84.5)	76 (78.4)	0.92	112 (93.3)	107 (89.2)	0.79	155 (74.9)	163 (72.5)	0.99
Helpful	10 (10.3)	15 (15.5)		6 (5.0)	11 (9.2)		46 (21.8)	45 (21.3)	
Not too Helpful	0	0		0	0		1 (0.5)	0	
Not Helpful at All	0	1 (1.0)		1 (0.8)	1 (0.8)		2 (1.9)	1 (0.5)	
Don't Know	5 (5.2)	5 (5.2)		1 (0.8)	1 (0.8)		4 (1.9)	2 (1.9)	
How worried are you that you might find out you have CRC?									
Very Worried	7 (7.2)	3 (3.1)	<0.0001	9 (7.5)	0	0.001	6 (2.9)	4 (1.9)	0.04
Somewhat Worried	17 (17.5)	14 (14.4)		30 (25.0)	13 (10.8)		23 (11.0)	25 (11.9)	
Not Worried	36 (37.1)	79 (81.4)		60 (50.0)	87 (72.5)		66 (31.4)	86 (41.0)	
Not Worried at All	35 (36.1)	1 (1.0)		19 (15.8)	18 (15.0)		113 (53.8)	89 (42.4)	
Don't Know	2 (2.1)	0		2 (1.7)	2 (1.7)		2 (1.0)	6 (2.9)	
I feel I will get CRC sometime in my life									
Strongly Agree	1 (1.0)	1 (1.0)	0.03	3 (2.5)	0	0.01	0	1 (0.5)	0.001
Agree	21 (21.7)	16 (16.5)		37 (30.8)	26 (21.7)		67 (32.0)	30 (14.3)	
Disagree	38 (39.2)	55 (56.7)		50 (41.7)	81 (67.5)		80 (38.1)	63 (30.0)	
Strongly Disagree	11 (11.3)	0		16 (13.3)	0		27 (12.9)	47 (22.4)	
Don't Know	26 (26.8)	25 (25.8)		14 (11.7)	13 (10.8)		36 (17.1)	69 (32.9)	
Having an FOBT will help me find CRC problems early									
Strongly Agree	17 (17.5)	0	0.16	35 (29.2)	1 (0.8)	<0.0001	33 (15.7)	72 (32.3)	<0.0001
Agree	71 (73.2)	93 (92.9)		83 (69.2)	111 (92.5)		169 (80.5)	122 (58.1)	
Disagree	1 (1.0)	2 (2.1)		0	4 (3.3)		2 (1.0)	10 (4.8)	
Strongly Disagree	0	0		0	0		1 (0.5)	0	
Don't Know	8 (8.3)	2 (2.1)		2 (1.67)	4 (3.3)		5 (2.4)	6 (2.9)	
Having an FOBT will decrease my chances of dying from CRC									
Strongly Agree	9 (9.3)	0	0.002	27 (22.5)	1 (0.8)	0.0002	19 (9.1)	52 (24.8)	0.0002
Agree	54 (55.7)	89 (91.8)		71 (64.2)	99 (82.5)		157 (74.8)	115 (54.8)	
Disagree	67 (69.1)	85 (87.6)		11 (9.2)	14 (11.7)		20 (9.5)	17 (8.1)	
Strongly Disagree	12 (12.4)	0		0	0		2 (1.0)	0	
Don't Know	3 (3.1)	2 (2.1)		5 (4.2)	6 (5.0)		12 (5.7)	26 (12.4)	
I am afraid of doing an FOBT test because I might find something wrong									
Strongly Agree	2 (2.1)	1 (1.0)	0.055	4 (3.3)	0	0.002	5 (2.4)	5 (2.4)	0.0009
Agree	13 (13.4)	9 (9.3)		20 (16.7)	13 (10.8)		23 (11.0)	41 (19.5)	
Disagree	67 (69.1)	85 (87.6)		72 (60.0)	105 (87.5)		134 (63.8)	95 (45.2)	

Strongly Disagree	12 (12.4)	0		23 (19.2)	1 (0.8)		45 (21.4)	60 (28.6)	
Don't Know	3 (3.1)	2 (2.1)		1 (0.8)	1 (0.8)		3 (1.4)	9 (4.3)	
SELF-EFFICACY SCALE									
I know for sure I can get an FOBT									
Strongly Agree	10 (10.3)	0	0.006	26 (21.7)	0	0.001	12 (5.7)	58 (27.6)	<0.0001
Agree	69 (71.1)	94 (96.9)		92 (76.7)	114 (95.0)		190 (90.5)	145 (69.1)	
Disagree	2 (2.1)	1 (1.0)		1 (0.8)	5 (4.2)		3 (1.4)	4 (1.9)	
Strongly Disagree	0	1 (1.0)		1 (0.8)	0		0	1 (0.5)	
Don't Know	16 (16.5)	1 (1.0)		0	1 (0.8)		5 (2.4)	2 (1.0)	
I know for sure I can find out how to correctly do an FOBT									
Strongly Agree	7 (7.2)	0	0.12	31 (25.8)	0	0.0003	11 (5.2)	59 (28.1)	<0.0001
Agree	80 (82.5)	95 (97.9)		89 (74.2)	118 (98.3)		195 (92.9)	144 (68.6)	
Disagree	2 (2.1)	0		0	1 (0.8)		3 (1.4)	1 (0.5)	
Strongly Disagree	0	1 (1.0)		0	0		0	0	
Don't Know	8 (8.3)	1 (1.0)		0	1 (0.8)		1 (0.5)	6 (2.9)	
I know for sure I will mail my results back									
Strongly Agree	14 (14.1)	0	0.13	46 (38.3)	0	<0.0001	12 (5.7)	60 (28.6)	<0.0001
Agree	82 (84.5)	95 (97.9)		74 (61.7)	119 (99.2)		197 (93.8)	138 (65.7)	
Disagree	0	0		0	0		0	0	
Strongly Disagree	0	1 (1.0)		0	1 (0.8)		0	0	
Self-Efficacy Scale (mean, sem)	12.0 (0.1)	11.9 (0.1)	0.40	12.8 (0.1)	11.9 (0.1)	<0.0001	12.1 (0.1)	12.7 (0.1)	<0.0001
BARRIER SCALE									
I am afraid the FOBT instructions will be confusing									
Strongly Agree	2 (2.1)	1 (1.0)	0.05	0	0	<0.0001	3 (1.4)	0	<0.0001
Agree	7 (7.2)	13 (13.4)		6 (5.0)	7 (5.8)		26 (12.4)	11 (5.2)	
Disagree	67 (69.1)	81 (83.5)		89 (74.2)	112 (93.3)		162 (77.1)	130 (61.9)	
Strongly Disagree	6 (6.2)	0		25 (20.8)	1 (0.8)		16 (7.6)	62 (29.5)	
Don't Know	15 (15.5)	2 (2.1)		0	0		6 (2.9)	7 (3.3)	
Doing an FOBT is embarrassing									
Strongly Agree	0	0	0.032	0	0	<0.0001	4 (1.9)	0	<0.0001
Agree	15 (15.5)	7 (7.2)		10 (8.3)	9 (7.5)		39 (18.6)	19 (9.1)	
Disagree	66 (68.0)	89 (91.7)		85 (70.8)	110 (91.7)		150 (71.4)	114 (54.3)	
Strongly Disagree	10 (10.3)	0		25 (20.8)	1 (0.8)		13 (6.2)	69 (32.9)	
Don't Know	6 (6.2)	1 (1.0)		0	0		4 (1.9)	8 (3.8)	
Doing an FOBT is a lot of trouble									
Strongly Agree	0	0	0.0006	0	0	<0.0001	3 (1.4)	0	<0.0001

Agree	7 (7.2)	4 (4.1)		4 (3.3)	5 (4.2)		24 (11.4)	20 (9.5)	
Disagree	59 (60.8)	92 (94.9)		86 (71.7)	115 (95.8)		162 (77.1)	117 (55.7)	
Strongly Disagree	10 (10.3)	0		26 (21.7)	0		11 (5.2)	64 (30.5)	
Don't Know	21 (21.6)	1 (1.0)		4 (3.3)	0		10 (4.8)	9 (4.3)	
Doing an FOBT is messy									
Strongly Agree	1 (1.0)	0	0.001	0	0	0.005	5 (2.4)	1 (0.5)	<0.0001
Agree	15 (15.5)	14 (14.4)		14 (11.7)	9 (7.5)		58 (27.6)	32 (15.2)	
Disagree	49 (50.5)	79 (81.4)		83 (69.2)	107 (89.2)		122 (58.1)	101 (48.1)	
Strongly Disagree	7 (7.2)	1 (1.0)		21 (17.5)	0		5 (2.4)	63 (30.0)	
Don't Know	25 (25.8)	3 (3.1)		2 (1.7)	4 (3.3)		20 (9.5)	13 (6.2)	
Barrier Scale (mean, sem)	9.4 (0.3)	8.9 (0.2)	0.08	7.8 (0.2)	8.5 (0.1)	0.0005	9.5 (0.2)	7.7 (0.2)	<0.0001

Table 2: Pre- and post-survey knowledge, behavior, beliefs, self-efficacy, and barriers.

CRC screening completion, unlike other cancer screening tests requires an individual to have knowledge and confidence to complete screening independently. In busy clinical practices patients are often given a kit with instructions enclosed and providers assume they can follow the instructions. Patients are rarely instructed on how to do the test, given a demonstration or asked to confirm their understanding. Improvement was most pronounced in the education and nurse arms where patients were given simplified instructions and a demonstration with teach back.

Limitations

Our study has limitations. Differences were noted between arms in socio-demographic characteristics, perceived barriers, wanting to know if they had CRC, and belief that FOBTs would decrease chances of dying of CRC, but not for the primary outcome of screening rates. Adjustments for key variables were therefore made in statistical analysis. Other limitations relate to the generalizability of our results; we included predominantly African American and female patients receiving care from FQHCs in one state. However, this is generally representative of FQHC populations in the southern United States. The study took place before FQHCs became patient centered medical homes and incorporated electronic health records or employed health coaches.

Conclusion

Overall these low income FQHC patients who were not up-to-date with screening had heard of CRC screening, had positive attitudes toward screening and wanted to know if they had cancer. Results demonstrate the value of giving patients a recommendation and a kit; patients in all groups reported significant increases at 15 months in completing CRC screening (>83%) as confirmed by study records.

Future research in CRC annual screening strategies should investigate the feasibility and cost effectiveness of clinic based health coaches querying the EHR to send a letter as well as call or text patients to give recommendation and mail them the kit with simplified instructions.

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