Promoting Colorectal Cancer Screening Discussion
A Randomized Controlled Trial

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Background: Provider recommendation is a predictor of colorectal cancer (CRC) screening.

Purpose: To compare the effects of two clinic-based interventions on patient–provider discussions about CRC screening.

Design: Two-group RCT with data collected at baseline and 1 week post-intervention.

Setting/participants: African-American patients that were non-adherent to CRC screening recommendations (n=693) with a primary care visit between 2008 and 2010 in one of 11 urban primary care clinics.

Intervention: Participants received either a computer-delivered tailored CRC screening intervention or a nontailored informational brochure about CRC screening immediately prior to their primary care visit.

Main outcome measures: Between-group differences in odds of having had a CRC screening discussion about a colon test, with and without adjusting for demographic, clinic, health literacy, health belief, and social support variables, were examined as predictors of a CRC screening discussion using logistic regression. Intervention effects on CRC screening test order by PCPs were examined using logistic regression. Analyses were conducted in 2011 and 2012.

Results: Compared to the brochure group, greater proportions of those in the computer-delivered tailored intervention group reported having had a discussion with their provider about CRC screening (63% vs 48%, OR=1.81, $p<0.001$). Predictors of a discussion about CRC screening included computer group participation, younger age, reason for visit, being unmarried, colonoscopy self-efficacy, and family member/friend recommendation (all p-values <0.05).

Conclusions: The computer-delivered tailored intervention was more effective than a nontailored brochure at stimulating patient–provider discussions about CRC screening. Those who received the computer-delivered intervention also were more likely to have a CRC screening test (fecal occult blood test or colonoscopy) ordered by their PCP.

Trial registration: This study is registered at www.clinicaltrials.gov NCT00672828.
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Introduction

Tailored interventions are more effective than nontailored materials in promoting behavior change, including cancer screening.[1–5] The current RCT compared the efficacy of a clinic-based, computer-delivered tailored interactive program with a nontailored brochure to promote patient–provider discussions about colorectal cancer (CRC) screening among African-American patients. Demographic, clinic, and health belief variables were examined as predictors of a

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discussion. CRC screening test orders written during the visit also were examined. It was hypothesized that (1) individuals who received the computer-delivered tailored intervention would be more likely to engage in CRC screening discussions with their primary care provider (PCP) than those in the brochure group and (2) PCPs of individuals who received the computer-delivered tailored intervention would be more likely to write orders for colon tests than PCPs of those in the brochure group.

Methods

A total of 693 African-American patients of 118 PCPs were enrolled between 2008 and 2010. Patients were eligible if they self-identified as black or African-American and were aged 51–80 years, English-speaking, and currently non-adherent to CRC screening guidelines. Exclusion criteria were personal history of CRC or adenomatous polyps requiring surveillance colonoscopy; medical condition precluding CRC screening; cognitive, speech, or hearing impairment; and current adherence to CRC screening guidelines. Sample sizes were determined based on detecting a difference in CRC screening at 15 months of 25% versus 15% for the computer-delivered tailored interactive program and nontailored brochure, respectively. Observed power for the patient–provider discussion outcome was 95%.

Procedure

The Indiana University IRB approved the study; all procedures were Health Insurance Portability and Accountability Act (HIPAA)–compliant. Patients were recruited from 11 Midwestern urban primary care clinics (five Veterans Affairs [VA] clinics and six non-VA). Potentially eligible participants were identified via clinic databases and approved for contact by their PCPs. Patients with upcoming PCP appointments were mailed an introductory letter, a study brochure, and an informed consent form.

Trained recruiters telephoned patients within 1 week of mailing letters to explain the study, answer questions, assess eligibility, and obtain verbal consent. After providing verbal consent, patients completed the baseline interview before their clinic visit. Randomization, stratified by site, gender, and age, occurred following the baseline interview. Research staff met patients in the clinic 45 minutes before their scheduled PCP visit to obtain written consent and HIPAA authorization, assess health literacy, and deliver interventions.

Data Collection

Trained interviewers collected data using a computer-assisted telephone interview system. Baseline data were collected after verbal consent was obtained but prior to intervention. The second telephone interview was conducted 1 week following intervention delivery.

Interventions

Trained research staff delivered interventions in the clinic immediately prior to the PCP visit. Details of the intervention design and delivery have been published elsewhere.[6] Briefly, the computer intervention delivered messages tailored to the patient's age; gender; objective CRC risk (family history); perceived CRC risk; and barriers to screening. The program produced a tailored printout that summarized the user's CRC risk factors and risk-based test recommendations, and encouraged them to discuss CRC screening with their PCP. The usual-care group received a nontailored CRC screening brochure.[7]

Measures

Demographic characteristics were collected during the baseline interview. CRC knowledge was measured using 11 items (α=0.63). Perceived CRC risk was measured using three items (α= 0.83).[8,9] Objective CRC risk was determined based on two items assessing strength of family history of CRC.[10] Perceived barriers to fecal occult blood testing (FOBT) and colonoscopy were measured using nine items (α=0.82) and 15 items (α=0.89), respectively.[11] Perceived benefits of FOBT and colonoscopy were measured using three items (α=0.76) and four items (α=0.67), respectively.[11] Self-efficacy for FOBT and for colonoscopy was measured with eight items and 11 items, respectively (both α=0.87).[11]

Cancer fatalism was measured with 11 items (α=0.858).[12–14] Single items were used to assess whether a family member/friend had encouraged CRC screening and whether participants had ever received a PCP recommendation for CRC screening. Health literacy was measured using the shortened version of the Rapid Estimate of Adult Literacy in Medicine.[15,16] At 1 week post-intervention, patients were asked whether they talked with their PCP about a colon test. Test order outcomes for FOBT and colonoscopy were collected from medical records.

Data Analysis

Analyses were performed using data from randomized patients who received the intervention and completed the 1 week post-intervention interview (95%); missing data were not imputed. Patients who were randomized but never received the interventions because they failed to attend their clinic visit (n=124) were excluded from analyses. Those who did not complete the 1 week post-intervention interview (n=34) also were excluded (Figure 1).

Demographics were examined using descriptive statistics. Logistic models were estimated using the generalized estimation

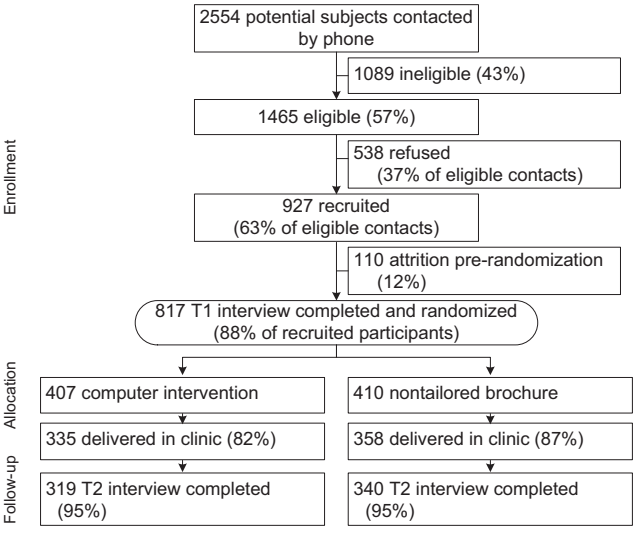

Figure 1. Study flowchart

Note: T1=initial interview; T2=follow-up interview 1 week after intervention
T, timepoint

Table 1. Demographic characteristics of participants in intervention trial to evaluate CRC screening discussions, *n* (%) unless otherwise indicated

Variable	Computer group (*n*=319)	Brochure group (*n*=340)	*p*-value
Age (years), M (SD)	56.8 (6.0)	57.8 (6.4)	**0.046**
Years of education, M (SD)	12.2 (1.8)	12.3 (1.9)	0.683
Gender			0.785
Male	154 (48)	161 (47)	
Female	165 (52)	180 (53)	
Married/partnered			0.5814
Yes	95 (30)	108 (32)	
No	224 (70)	232 (68)	
Employed			0.792
Yes	71 (22)	73 (21)	
No	248 (78)	268 (79)	
Insurance			0.208
Yes	291 (91)	300 (88)	
No	28 (9)	40 (12)	
Income ($)			0.350
<15,000	185 (60)	180 (55)	
15,000–30,000	84 (27)	106 (32)	
>30,000	38 (12)	40 (12)	
Site			0.192
VA	72 (23)	63 (18)	
Non-VA	247 (77)	278 (82)	

Note: *t*-tests were performed for continuous variables (age, years of education); chi-square tests were performed for categoric variables (all others).
CRC, colorectal cancer; VA, Veterans Affairs

equation methodology to account for clustering by PCP. Univariate logistic regression models determined predictors of patient–provider discussion about CRC screening. Potential predictors included intervention group; age; gender; education; insurance status; marital status; employment status; site (VA versus non-VA); BMI; number of doctor visits in past year; reason for visit; objective CRC risk; health literacy; perceived CRC risk; FOBT benefits, barriers, and self-efficacy; colonoscopy benefits, barriers, and self-efficacy; cancer fatalism, CRC knowledge, PCP recommendation of FOBT, colonoscopy, and sigmoidoscopy; and family member/friend encouragement of CRC testing.

Regression analyses of each predictors' univariate effect on the outcome variable having a *p*-value <0.20 were entered into the final multivariable logistic regression model. In addition, univariate logistic regression was used to assess intervention effect on PCP orders of CRC screening tests. All data were analyzed using SAS 9.3 in 2011 and 2012.

Results

Baseline demographic data are listed in Table 1. Of the 693 primary care patients who received interventions (319 in the computer group, 340 in the brochure group), 659 (95%) completed the 1 week post-intervention interview. Univariate analysis of intervention effects on patient–provider discussions is presented in Table 2. Compared to those who received the nontailored brochure, participants who received the computer-delivered

Table 2. Differences between groups for self-reported CRC screening discussions

	Discussion of any colon test	
Predictor variables	**OR (95% CI)**	***p*-value**
Univariate model with intervention		
Intervention: computer vs brochure (ref)	**1.81 (1.32, 2.47)**	**<0.001**
Final multivariable model		
Intervention: computer vs brochure (ref)	**1.75 (1.21, 2.54)**	**0.003**
Age (years)	**0.95 (0.92, 0.98)**	**0.003**
Gender: male vs female (ref)	1.20 (0.87, 1.66)	0.274
Education	1.05 (0.96, 1.16)	0.277
Married[a]	**0.68 (0.47, 0.99)**	**0.045**
Reason for visit: acute illness vs preventive care (ref)	0.62 (0.37, 1.04)	0.070
Reason for visit: not seen by a doctor vs preventive care (ref)	**0.33 (0.14, 0.77)**	**0.011**
Objective CRC risk	1.46 (0.80, 2.67)	0.219
Perceived CRC risk	1.19 (0.99, 1.42)	0.060
FOBT benefits	1.06 (0.78, 1.43)	0.729
FOBT self-efficacy	0.84 (0.59, 1.21)	0.356
COL benefits	1.21 (0.81, 1.82)	0.354
COL self-efficacy	**1.73 (1.22, 2.44)**	**0.002**
Cancer fatalism	0.82 (0.63, 1.06)	0.135
Knowledge	1.01 (0.93, 1.10)	0.823
Doctor recommendation of FOBT[a]	1.15 (0.81, 1.63)	0.420
Doctor recommendation of COL[a]	1.34 (0.93, 1.92)	0.114
Family/friend recommendation[a]	**1.81 (1.24, 2.63)**	**0.002**

Note: Boldface indicates significance.
[a]*Yes* vs *No* (ref)
COL, colonoscopy; CRC, colorectal cancer; FOBT, fecal occult blood test

tailored intervention were more likely to report having engaged in a CRC screening discussion with their PCPs (63% vs 49%, OR=1.81, $p<0.001$).

Results from the final multivariable model also are summarized in Table 2 and show that the intervention effect remained significant after controlling for all other variables. The computer group had higher odds of having a discussion about a colon test with their PCP than the brochure group ($p=0.003$). Participants who were older ($p=0.003$) and were married or living with a partner ($p=0.045$) had lower odds of having a discussion about a colon test with their PCP. Individuals had higher odds of having a discussion about a colon test with their PCP if they were being seen for a preventive health visit ($p=0.011$); had higher colonoscopy self-efficacy scores ($p=0.002$); and had a family member/friend encourage CRC screening ($p=0.002$). PCPs of those who received the computer-delivered tailored intervention were more likely to write orders for a CRC screening test (OR=1.48; 95% CI=1.11, 1.96; p-value=0.007).

Discussion

This study compared efficacy of two clinic-based interventions to stimulate patient-reported CRC screening discussions between African-American primary care patients and their PCPs. Individuals who received the computer-delivered tailored intervention had higher odds of reporting a colon test discussion with their PCP and were more likely to have a CRC screening test ordered during the visit. This study is novel because of its focus on evaluating efficacy of an interactive CRC screening intervention to stimulate patient–provider discussions about CRC screening among African-American primary care patients as well as the test orders that resulted.[17,18]

Strengths and Limitations

Strengths of the study include the large sample size, the RCT design, and use of multiple recruitment sites. Limitations include the fact that patient–provider discussion data were based on patient self-report. However, test order outcomes were collected, thereby confirming that a discussion occurred. In addition, data were not collected regarding whether the patient or the PCP initiated the discussion. Finally, results may not generalize to populations dissimilar to participants in the current study.

Future Directions

Future research is needed to investigate whether patient–provider discussions about CRC screening include risk-based recommendations for CRC testing and/or ultimately lead to higher CRC screening test completion rates among African-American patients.[19–22] Older age was associated with lower likelihood of having a patient–provider discussion. It is unclear if this is due to older individuals being less likely to discuss CRC screening with their physicians or whether prior discussions have already occurred. Also, it may be that with increased age, there is a greater focus on other health concerns because of increased comorbidities and, therefore, less focus on CRC. Given health disparities experienced by African Americans, it is imperative that CRC screening be promoted in this population.[23,24] CRC interventions aimed at this underserved population have the potential to save lives if they can promote patient–provider CRC screening discussions and prompt patients to complete CRC screening.

Conclusion

Clinic-based computer-delivered tailored interventions can successfully promote patient–provider discussions about CRC screening and subsequent screening test orders. Future analyses from this trial will examine relationships between CRC screening discussions and test completion.

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