

Decision Support and Navigation to Increase Colorectal Cancer Screening Among Hispanic Patients



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Abstract

Background: Effective strategies are needed to raise colorectal cancer screening rates among Hispanics.

Methods: We surveyed and randomized 400 Hispanic primary care patients either to a Decision Support and Navigation Intervention (DSNI) Group ($n = 197$) or a Standard Intervention (SI) Group ($n = 203$). Both groups received a colorectal cancer screening kit [bilingual informational booklet, fecal immunochemical stool blood test (SBT), and colonoscopy screening instructions]. The DSNI Group received a telephone contact from a patient navigator. The navigator clarified screening test preference and likelihood of test performance, helped to develop a screening plan, and provided guidance through test performance. An endpoint telephone survey and medical chart review were completed. Multivariable analyses were conducted to assess 12-month

screening adherence, change in decision stage, and knowledge and perceptions.

Results: Screening adherence was significantly higher in the DSNI Group than the SI Group [OR, 4.8; 95% confidence interval (CI), 3.1–7.6]. The DSNI Group, compared with the SI Group, also displayed higher SBT screening [OR, 4.2; 95% CI, 2.6–6.7], higher colonoscopy screening (OR, 8.8; 95% CI, 4.1–18.7), and greater forward change in screening decision stage (OR, 4.9; 95% CI, 2.6–9.5). At endpoint, study groups did not differ in screening knowledge or perceptions.

Conclusions: The DSNI had a greater positive impact on colorectal cancer screening outcomes than the SI.

Impact: Health system implementation of DSNI strategies may help to reduce Hispanic colorectal cancer screening disparities in primary care.

Introduction

Colorectal cancer screening can find colorectal adenomas, which can be removed before progressing to colorectal cancer, and can detect early-stage tumors, when the disease can be cured. Both the United States Preventive Services Task Force (USPSTF) and the American Cancer Society (ACS) recommend periodic colorectal cancer screening for average-risk individuals between the ages of 50 and 75 (1, 2). Achieving high levels of screening is an important public health goal (3). Primary care physicians most commonly recommend colonoscopy every 10 years or annual stool blood test (SBT) use for colorectal cancer screening (4).

Colorectal cancer is the second leading cause of cancer-related deaths among Hispanics, and disparities in colorectal cancer screening and mortality exist between Hispanic and non-Hispanic whites that persist even after adjusting for education, income, and insurance status (5–7). Adherence to colorectal cancer screening in the United States is rising in the general population, but remains low among Hispanics. Effective, patient-centered interventions are needed to make it possible for Hispanic primary care patients to realize the potential benefits of colorectal cancer screening (3, 8).

Systematic reviews of cancer screening interventions have concluded that combining mailed contacts and reminders with patient navigation is likely to be more effective than using passive interventions alone, especially in populations experiencing disparities (9–11). Such combined strategies have generated screening rates outside the context of a scheduled office visit ranging from 27% to 41% (12–14). It has also been suggested that making both SBT and colonoscopy screening options readily available in primary care, helping to clarify the individual's preferred test, and navigating patients through performance of their preferred test could further increase colorectal cancer screening rates (12–22). When multiple test options are presented, patient performance of a given colorectal cancer screening test is influenced by the patient's deliberation about attributes of the tests and selection of the test that makes sense to the individual. (23). Tools that facilitate patient preference clarification can help to engage patients and their providers (or agents, such as patient navigators) in shared decision making about screening (24). Systematic

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Clinicaltrials.gov identifier: NCT02272244

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doi: 10.1158/1055-9965.EPI-18-0260

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reviews have identified few randomized controlled trials of colorectal cancer screening interventions among Hispanics (15, 25), and none has used patient preference elicitation and decision support as part of the intervention strategy. As a result, the potential impact of different strategies intended to boost colorectal cancer screening in this diverse population group is not well-documented.

In this study, we report the results of a randomized controlled trial that evaluated the impact of decision support and navigation, designed to increase colorectal cancer screening adherence among Hispanic primary care patients. The intervention combined a mailed intervention with patient navigator contacts that supported the identification and facilitated the performance of the individual's preferred screening test.

Materials and Methods

Study design and setting

This randomized controlled trial, was conducted in the Lehigh Valley Health Network (LVHN), a large health system in eastern Pennsylvania, with almost 40 primary care practices. Five primary care practices with relatively large numbers of Hispanic/Latino patients were selected for the study. The study was approved by the Institutional Review Boards (IRB) of both Thomas Jefferson University (Philadelphia, PA) and LVHN (Pennsylvania). In accordance with guidance provided by the IRBs, participants were not required to provide written informed consent. All participants did provide verbal informed consent.

Recruitment and enrollment

Electronic health records were used to identify patients of Hispanic/Latino ethnicity who were 50 to 75 years of age, had not been diagnosed with colorectal cancer, had no personal or family history of colon cancer or polyps, and were not up-to-date with colorectal cancer screening (i.e., no SBT within 12 months or colonoscopy within 10 years). These patients were mailed a letter from LVHN written in English and Spanish that described the study, invited the recipient to participate, and provided an opportunity to opt out of further study-related contact. Fifteen days after the mailing, a bilingual research assistant called potential participants. The research assistant verified patient eligibility for colorectal cancer screening, described details about the research study, obtained verbal consent for participation, and administered a brief baseline survey.

Study activities and randomization

Study activities were initiated during the research assistant call with consented participants who completed the baseline survey. Following an approach used in prior studies (13, 22), the research assistant described SBT and colonoscopy screening options, and then elicited each respondent's colorectal cancer screening decision stage for each test (decided not to do, not considering, undecided, or decided to do). These responses defined the individual's overall screening preference and preferred screening modality (i.e., SBT or colonoscopy). For example, if a participant reported having decided to do colonoscopy screening and was undecided about SBT, the overall screening preference was assigned as "decided to screen," and the preferred test was considered to be colonoscopy. Data on participant sociodemographic characteristics, health literacy, and preferred language were also collected.

Participants were then randomly assigned to either a Decision Support and Navigation Intervention (DSNI) Group or a Standard Intervention (SI) Group in a 1:1 ratio. The randomization sequence was computer-generated by the study's biostatistician. Randomization was stratified by primary care practice and used blocking. The randomization sequence was then provided electronically to the study's research coordinator. The study's patient navigator was not blinded to each participant's group allocation, as she only interacted with DSNI participants, but all staff members who conducted endpoint assessments were blinded.

SI Group participants were mailed a standard set of materials, which included a letter from the participant's primary care practice that encouraged colorectal cancer screening; an informational brochure on colorectal cancer screening; instructions for arranging a screening colonoscopy; and an immunochemical fecal immunochemical test (FIT) kit with testing instructions. Print materials were provided in both English and Spanish. At 45 days following randomization, screening nonadherers were mailed a screening reminder letter.

DSNI Group participants were mailed the same set of standard print materials as those provided to SI Group participants. In addition, a bilingual patient navigator attempted to call DSNI Group participants within 7 days after the initial mailing. During the call, the patient navigator followed a script to review the colorectal cancer informational booklet and verify the participant's preferred colorectal cancer screening test. The patient navigator then accessed an online Decision Counseling Program (DCP) software, which uses Analytic Hierarchy Processing to guide decision making (26). Following a standard DCP script, the patient navigator elicited major factors that would influence the participant to complete or not to complete the preferred screening test, determined the level of relative importance of each factor, computed a screening likelihood score, and engaged the participant in developing a test-specific screening plan tailored to address factors that decreased the likelihood of adherence.

For participants who preferred colonoscopy screening, the patient navigator offered to schedule a prescreening orientation visit; while for those who preferred SBT screening, the patient navigator reviewed steps for performing and returning the enclosed SBT kit. After completing this navigation call, the patient navigator sent a summary of the participant's colorectal cancer screening plan to the participant, and also uploaded a copy of the plan directly into the participant's electronic health record. Following completion of the navigation call, patient navigator follow-up contacts with each participant was dictated by the personal screening plan. As with the SI Group, a colorectal cancer screening reminder was mailed to nonadherers at 45 days following randomization.

Six months following randomization, research study staff completed a medical record review (for both the SI and DSNI Groups) and created a Screening Status Report, which was then uploaded into the participant's electronic health record and routed to the primary care physician. Also, at 6 months after randomization, a research assistant contacted each participant by telephone to administer an endpoint survey. This survey included items on colorectal cancer screening decision stage, as described above for the baseline survey, and on self-reported colorectal cancer screening adherence. As in prior published studies (22, 27), we combined electronic health record data with patient 6-month survey data to assess adherence to colorectal cancer screening. In

addition, the survey assessed participant knowledge and perceptions about colorectal cancer screening (27).

At 12 months after randomization, a study research assistant completed an endpoint medical records review for all participants. Information from this review was used to assess overall and test-specific colorectal cancer screening adherence, which was defined as completion of any ACS or USPSTF guidelines-recommended colorectal cancer screening test.

Main outcome measures

The primary study endpoint was overall colorectal cancer screening adherence within 12 months after the individual's randomization date. A secondary study endpoint was defined as screening test-specific adherence. Medical records data were supplemented by self-reported survey information to capture tests that might have occurred outside the system (note: in practice, there were only 17 participants for whom self-report only was used to assess screening adherence). Additional secondary endpoints included the baseline-to-endpoint change in colorectal cancer screening decision stage and the endpoint scores on knowledge (percent correct of 10 true/false items) and perceptions screening (17 items on 1–5 Likert scale, yielding a total score, as well as 5 subscores: salience, response efficacy, susceptibility, worries and concerns, and social support and influence).

Power calculations

The study was designed with the assumption that 12-month screening adherence rates would be 45% in the DSNI Group versus 30% in the SI Group. On the basis of these assumptions, the target sample size of 400 had 85% power for overall screening adherence (with an allowance for up to 5% missing screening data).

Statistical analysis

Overall screening adherence was analyzed via logistic regression. The prespecified analysis plan in the protocol defined that the following variables would be included in the main model: study group, practice, gender, age, and any baseline characteristic that appeared to be substantially different across the two study groups. Test-specific colorectal cancer screening adherence (SBT, colonoscopy, or no screening) was analyzed via multinomial (polytomous) logistic regression. We also conducted analyses using the Generalized Estimating Equations approach, using the robust variance in the logistic regression models to account for potential within-practice clustering. The results were practically identical with or without accounting for clustering, so only the latter are presented. All main analyses followed the intention-to-treat principle, but secondary "as treated" analyses were also conducted.

Overall screening decision stage was assessed at both the baseline and 6-month participant surveys. Because few "backward" changes (from higher to lower decision stage) were expected, per protocol, "backward" changes were combined with the "no change" category. Any "forward" change (from lower to higher decision stage) was then analyzed versus "backward or no change" via logistic regression. The total knowledge and perceptions scores were analyzed via linear regression. Because the perception subscales were highly skewed, they were dichotomized and analyzed via logistic regression. Information on these secondary endpoints was obtained through participant surveys, which had substantial nonresponse. Therefore, analyses included

all baseline covariates to control for imbalances between the two groups that might be introduced by potentially differential non-response patterns.

Results

Study accrual began in October 2014. All participants were enrolled by January 2015 and data collection concluded in January 2016. The flow of study participants is shown in Fig. 1. A total of 2,622 individuals were identified as potentially eligible for the study. Of those, 1,342 were reached, 656 were confirmed to be eligible and 400 were randomized (203 to the SI Group and 197 to the DSNI Group). An endpoint survey was completed with a total of 252 participants (126 participants in each study group), while endpoint medical records review was performed for all randomized participants.

Table 1 shows that most study participants tended to be female (59%), were between 50 and 59 years of age (70%), were unmarried (55%), and had less than a high school education (52%). It is notable that only 21% of participants reported being employed full-time, 69% noted annual family income of less than \$15,000, and 73% indicated that they had some form of insurance coverage. Seventy-two percent of participants said that they were born in the Caribbean, and 85% said that Spanish was the most common language spoken at home. The study groups were comparable with respect to participant baseline characteristics, with the exception of preferred colorectal cancer screening test.

Colorectal cancer screening adherence

Table 2 summarizes results of the intention-to-treat analyses for overall and test-specific colorectal cancer screening adherence. At 12 months, colorectal cancer screening was substantially higher in the DSNI Group than the SI Group (78% vs. 43%), with an adjusted OR of 4.8 (95% confidence interval (CI), 3.1–7.6; $P = 0.001$). Furthermore, compared with the SI Group, the DSNI Group was more likely to screen with both an SBT (57% vs. 37%) and a colonoscopy (20% vs. 6%).

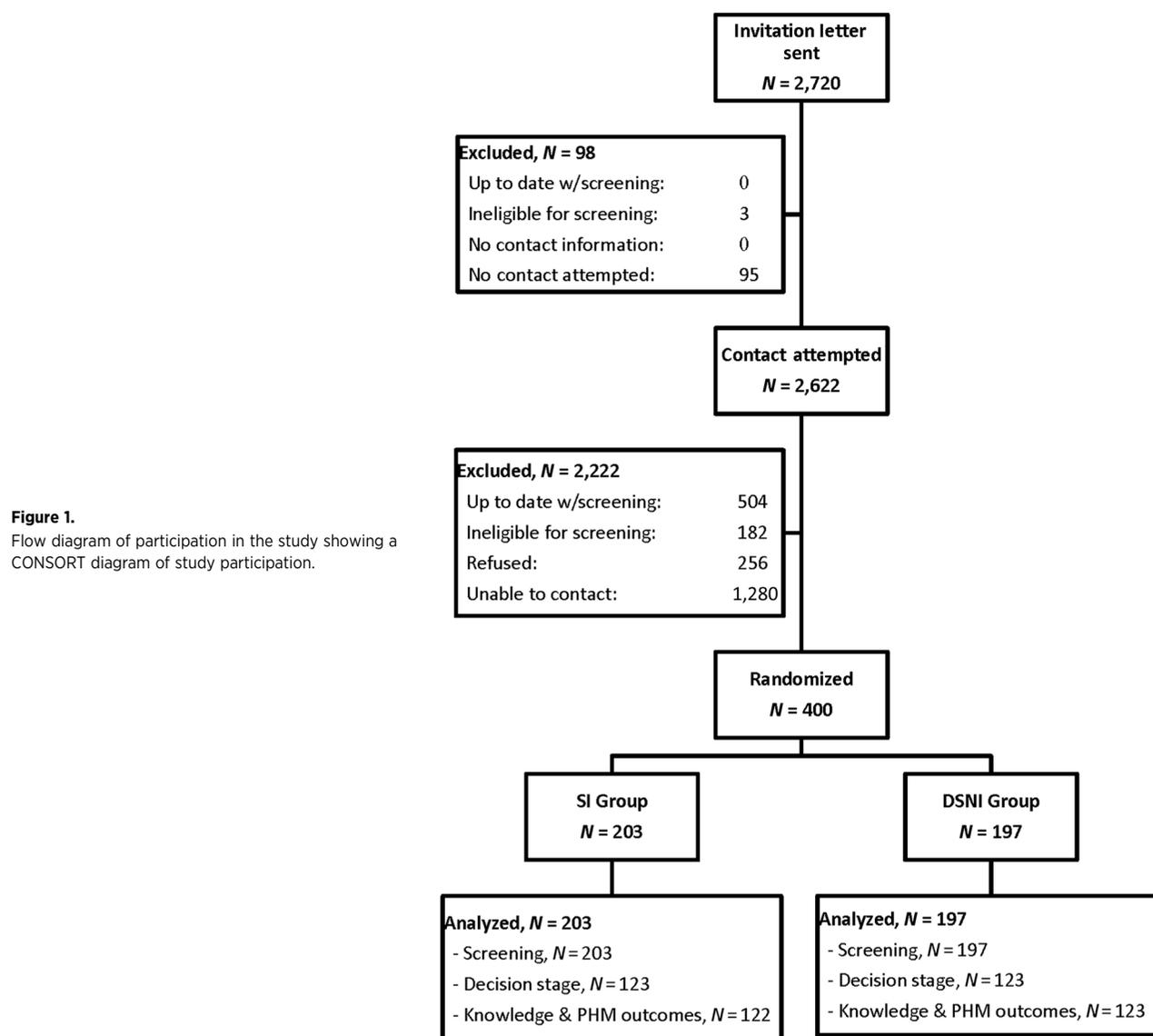
The study patient navigator successfully achieved contact with 166 of the 197 (84%) participants in the DSNI Group. Eighty percent of these contacts took place in Spanish. That group included 38 participants who had already scheduled or completed screening (97% screened) prior to receiving the patient navigator call. The group also included 128 participants who received the full patient navigator-delivered intervention contact (83% screened). The patient navigator was unable to speak with the remaining 31 DSNI Group participants, who received only the standard mailed screening materials, and a voicemail message on the home telephone number to encourage screening adherence (32% screened).

Change in colorectal cancer screening decision stage

Table 3 summarizes the baseline-to-endpoint changes in screening decision stage. Overall, 97 (79%) DSNI Group participants reported a forward change in their decision stage compared with 61 (50%) SI Group participants (adjusted OR, 4.9; 95% CI, 2.6–9.5; $P = 0.001$).

Colorectal cancer screening knowledge and perceptions

Table 4 summarizes the endpoint results for the knowledge and perceptions related to colorectal cancer and screening. The two



study groups were not statistically significantly different on any of these measures.

Discussion

The National Academy of Medicine (NAM; Washington, DC), formerly the Institute of Medicine, has encouraged research that addresses racial and ethnic disparities in health care (28), and has underscored the need to compare the effectiveness of patient decision support tools, compare the effectiveness of different strategies to engage and retain patients in care, and to delineate barriers to care, especially for experiencing health disparities. The National Quality Forum (NQF; Washington, DC) has also called for research on implementation of interventions that aim to reduce health disparities in priority populations, including racial and ethnic groups (29). The study described here is responsive to both NAM and NQF priorities.

We discovered that overall colorectal cancer screening adherence was markedly higher in the DSNI Group, compared with the

SI Group. While this result was consistent with the hypothesized impact of exposure to the combination of mailed material plus decision support and navigation contacts, the magnitude of the DSNI effect is remarkable. While high rates of colorectal cancer screening in response to patient navigation have been reported elsewhere (30, 31), those reports involved the initiation of patient navigation contacts with patients at the time of a primary care office visit. In this study, decision support and navigation contacts did not require a scheduled visit to the primary care practice and were delivered outside the context of an office visit. Thus, this effort was directed at a segment of the primary care patient population that was harder to reach. It is reasonable to believe that the magnitude of the DSNI effect on overall colorectal cancer screening adherence was due to the fact that the patient navigator reached out to DSNI Group participants on behalf of their primary care provider with mail and telephone contacts, and helped them to deliberate about and choose the test they preferred to do. Importantly, the patient navigator was also able to help develop a personalized screening plan that supported performance of their

Table 1. Baseline characteristics

	SI (N = 203)	DSNI (N = 197)
Practice, n (%)		
Practice A	40 (19.7)	43 (21.8)
Practice B	47 (23.2)	45 (22.8)
Practice C	76 (37.4)	74 (37.6)
Practice D	10 (4.9)	10 (5.1)
Practice E	30 (14.8)	25 (12.7)
Gender, n (%)		
Female	118 (58.1)	117 (59.4)
Male	85 (41.9)	80 (40.6)
Age (years), mean (SD)	57.5 (6.5)	57.2 (6.4)
Age (years), n (%)		
50–59	140 (69.0)	137 (69.5)
60–69	47 (23.2)	48 (24.4)
70–79	16 (7.9)	12 (6.1)
Marital status, n (%)		
Married or living as married	104 (51.2)	88 (44.7)
Separated, widowed, or never married	99 (48.8)	109 (55.3)
Education level, n (%)		
Less than high school	90 (44.3)	102 (51.8)
High school or GED	58 (28.6)	51 (25.9)
Higher than high school	55 (27.1)	44 (22.3)
Employment status, n (%)		
Working full-time	44 (21.7)	41 (20.8)
Working part-time	41 (20.2)	35 (17.8)
Keeping house	45 (22.2)	45 (22.8)
Unable to work/disability	53 (26.1)	62 (31.5)
Retired	20 (9.9)	14 (7.1)
Family income, n (%)		
Under \$14,999	144 (71.3)	136 (69.0)
\$15,000–\$29,999	37 (18.3)	45 (22.8)
\$30,000+	21 (10.4)	16 (8.1)
Insurance status, n (%)		
Insured	140 (70.7)	141 (72.7)
Uninsured	58 (29.3)	53 (27.3)
Help needed with reading medical materials, n (%)		
Never/rarely	110 (54.2)	111 (56.3)
Sometimes	45 (22.2)	44 (22.3)
Often/always	48 (23.6)	42 (21.3)
Length of time living in the United States (years), n (%)		
≤10	33 (16.3)	43 (21.8)
>10	145 (71.8)	132 (67.0)
US-born	24 (11.9)	22 (11.2)
Region of birth, n (%)		
United States	24 (11.8)	22 (11.2)
Caribbean–Puerto Rico	81 (39.9)	79 (40.1)
Caribbean–Dominican Republic or Cuba	65 (32.0)	63 (32.0)
Central America or Mexico	19 (9.4)	18 (9.1)
South America	14 (6.9)	15 (7.6)
Language most commonly spoken at home, n (%)		
Spanish	163 (80.3)	168 (85.3)
Spanish and English equally/other	26 (12.8)	15 (7.6)
English	14 (6.9)	14 (7.1)
Preferred test, n (%)		
Stool blood test	53 (26.1)	33 (16.8)
Equal preference	133 (65.5)	142 (72.1)
Colonoscopy	17 (8.4)	22 (11.2)
Decision stage (for preferred test), n (%)		
Decided not to do	2 (1.0)	2 (1.0)
Not considering	7 (3.4)	2 (1.0)
Haven't decided	20 (9.9)	27 (13.7)
Decided to do	174 (85.7)	166 (84.3)

NOTE: Counts may not sum to the total in each group because of occasional missing data.

preferred screening test. Regarding colonoscopy screening, the patient navigator was also empowered to schedule a prescreening colonoscopy appointment and the actual screening examination for DSNI participants. A similar approach was reported by Singal and colleagues (32), with positive effects on colonoscopy screening. Moreover, the patient navigators arranged to meet the participant at the prescreening colonoscopy appointment to ensure that the participant understood next steps in the screening process.

In a review of intervention studies on colorectal cancer screening, Powe and colleagues (33) observed that culturally tailored behavioral intervention strategies helped African Americans to overcome personal barriers to colorectal cancer screening. In a randomized trial, Myers and colleagues (22) showed that colorectal cancer screening rates increased significantly among African American primary care patients, when a culturally concordant patient navigator contacted participants, elicited each their preferred colorectal cancer screening test (SBT or colonoscopy), and helped participants complete their preferred screening test. In this study, a culturally concordant patient navigator contacted Hispanic primary care participants and elicited their preferred colorectal cancer screening test. During this contact, the patient navigator also determined the likelihood of preferred test performance. Then, the patient navigator helped participants complete the test they preferred and were most likely to do.

When provided with information about and access to both colonoscopy and SBT screening, many study participants preferred the latter, and followed through on this preference. This finding is not surprising, as the SBT is more readily accessible, less invasive, less expensive, and more convenient than colonoscopy. Another novel finding from this study is that, compared with the SI group, the DSNI group had higher odds of screening via colonoscopy and much higher odds of screening via SBT. The literature includes a report showing that exposure to intervention strategies intended to boost colorectal cancer screening rates have increased either colonoscopy or SBT screening rates. To our knowledge, however, this study is the first to report that both colonoscopy and SBT screening rates increased substantially as a result of deploying an intervention designed to boost colorectal cancer screening rates. Implementation science research is needed to advance our understanding of how to increase the use of both screening tests in health systems.

In this study, we determined that exposure DSNI was a significant predictor of forward movement in colorectal cancer screening decision stage. Use of decision staging based on the Precaution Adoption Process Model (34, 35) has been reported elsewhere as a means to determine the readiness or intention of individuals to

Table 2. Overall and test-specific screening adherence

	SI (N = 203)	DSNI (N = 197)	OR (95% CI)	P
Any screening	88 (43.3)	153 (77.7)	4.83 (3.08–7.58)	0.001
Screening test	—	—	—	0.001
None	115 (56.7)	44 (22.3)	1.00 (REF)	
Stool blood test	76 (37.4)	113 (57.4)	4.20 (2.63–6.70)	0.001
Colonoscopy	12 (5.9)	40 (20.3)	8.79 (4.13–18.74)	0.001

NOTE: OR adjusted for practice, gender, age, preferred test, and decision stage.

Table 3. Change in overall colorectal cancer screening decision stage

Type of change	SI (N = 123)	DSNI (N = 123)	OR (95% CI)	P
	n (%)	n (%)		
Any forward change	61 (49.6)	97 (78.9)	4.91 (2.55–9.47)	0.001
Type of change				
Backward change	10 (8.1)	3 (2.4)	—	—
No change	52 (42.3)	23 (18.7)	—	—
Forward change	61 (49.6)	97 (78.9)	—	—

NOTE: OR adjusted for practice, gender, age, marital status, education, employment, income, insurance status, help needed with reading medical materials, length of time in the US, region of birth, language spoken at home, preferred test, and decision stage.

engage in colorectal cancer screening (36). We have included Precaution Adoption Process Model colorectal cancer screening decision stage in prior published studies (22, 27, 37). The inclusion of such a decision staging as a study measure or in the context of clinical care could help to identify those individuals who might need more assistance to facilitate adherence.

We did not find any impact of the intervention on participant knowledge about and perceptions related to colorectal cancer screening. Perhaps participant self-selection and subsequent exposure to mailed education materials attenuated intervention impact on these factors. It is also the case that we obtained these measures only at endpoint in a subset of participants. Respondent scores on knowledge and the perceptions subscales were skewed, and hence subject to floor/ceiling effects.

It is important to note that the endpoint survey nonresponse rate was higher than anticipated (37% instead of 20%). However, this nonresponse rate was almost identical in the two study groups, and group baseline characteristics were similar, suggesting that the nonresponse mechanisms were comparable. Nevertheless, we cannot rule out nonresponse biases linked to unmeasured characteristics.

Strengths and limitations

Important strengths of this study are the randomized design, and the choice to blind study personnel involved in intervention delivery from primary outcomes data analyses. These elements of the study reduced the risk of bias. It is also important to note that study participants were drawn from a sampling frame of under-

served primary care patients in the community, and that these individuals were contacted outside the context of a scheduled visit to their provider. In addition, the input from the Patient and Stakeholder Advisory Committee guided the study team in the design and implementation approach. Taken together, these features provided an opportunity to assess the effects of a centralized intervention approach that targeted at-risk individuals in the population served by health system primary care practices. This aspect of the study adds to findings in another recent report by Rueland and colleagues (38), which showed that a combined decision aid and patient navigation intervention strategy can have a positive impact on colorectal cancer screening adherence when delivered to patients in vulnerable populations in a scheduled office visit.

The generalizability of our findings may be limited; however, given that study participants were drawn from only five primary care practices in one health system. In addition, the Hispanic patient population served by participating practices and the health system may differ from the Hispanic patient populations (and subpopulations) that receive care in different health systems. More specifically, our population included mainly participants from Puerto Rico and the Dominican Republic, with very few participants from Mexico, Central, or South America. As in most randomized trials of behavioral interventions, study participants consented to participate in a randomized trial, thus representing a self-selected population. Consequently, the magnitude of effects may be greater than those that would be observed in the general Hispanic primary care patient

Table 4. Knowledge and perceptions related to colorectal cancer and screening

	# Items	Alpha	SI (N = 122)	DSNI (N = 123)	DIFF ^a (95% CI)	P
			Mean	Mean		
Knowledge						
Percent correct	10	0.66	47	46	0.4 (–4.7–5.5)	0.880
Perceptions	—	—	—	—	—	—
Total score	17	0.75	3.8	3.8	0.0 (–0.2–0.1)	0.862
					OR^b (95% CI)	P
Perceptions subscales ^b						
Salience	3	0.68	4.8	4.7	0.72 (0.32–1.60)	0.416
Response efficacy	2	0.48	4.5	4.5	1.05 (0.57–1.90)	0.883
Susceptibility	3	0.52	2.6	2.8	1.22 (0.71–2.12)	0.472
Worries and concerns	5	0.73	3.1	3.1	0.90 (0.50–1.59)	0.708
Social support and influence	4	0.69	4.4	4.4	0.98 (0.54–1.79)	0.943

NOTE: OR adjusted for practice, gender, age, marital status, education, employment, income, insurance status, help needed with reading medical materials, length of time in the United States, region of birth, language spoken at home, preferred test, and decision stage.

^aDIFF: mean difference (adjusted for practice, gender, age, marital status, education, employment, income, insurance status, help needed with reading medical materials, length of time in the United States, region of birth, language spoken at home, preferred test, and decision stage).

^bSalience, response efficacy, and social support and influence were dichotomized as ≥ 4.5 versus < 4.5 ; susceptibility and worries and concerns were dichotomized as ≥ 3 versus < 3 .

population outside of a randomized trial. Furthermore, the DSNI was delivered by a single patient navigator. This individual completed a structured-decision counseling and navigation training program, and the research team met with the patient navigator periodically to review DSNI procedures. However, we cannot be certain that patient navigators who would seek to implement the intervention without this type of training and oversight would be able to achieve comparable outcomes. Finally, study survey measures of knowledge and perceptions about colorectal cancer screening have not been validated in Hispanic patient populations; and the decision counseling process was used for the first time with Hispanic patients. Furthermore, work to validate survey measures and the decision counseling process in this population is needed.

Conclusions

Findings from this study show that the centralized delivery of a decision support and navigation intervention can have a substantial, positive impact on colorectal cancer screening adherence and readiness to screen among Hispanic patients in health system primary care practices.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

Authors' Contributions

Conception and design: R.E. Myers, B. Stello, C. Daskalakis, R. Sifri, M. DiCarlo, M.B. Johnson, B. Careyva

Development of methodology: R.E. Myers, B. Stello, C. Daskalakis, R. Sifri, E.T. González, M. DiCarlo, M.B. Johnson, B. Careyva

Acquisition of data (provided animals, acquired and managed patients, provided facilities, etc.): R.E. Myers, B. Stello, R. Sifri, M. DiCarlo, M.B. Johnson, A. Rivera, R. de-Ortiz, L. Diaz

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Other (patient and stakeholder engagement): R. de-Ortiz

Acknowledgments

The authors want to acknowledge our consultants on the study: Carmen Guerra, MD, MSCE, FACP, Associate Professor of Medicine at the Hospital of the University of Pennsylvania, an Attending Physician, Hospital of the University of Pennsylvania, and a Member, Abramson Cancer Center, University of Pennsylvania Medical Center; John M. Inadomi, MD the Cyrus E. Rubin Professor of Medicine & Head, Division of Gastroenterology, University of Washington School of Medicine; and Sally W. Vernon, PhD, Director of the Division of Health Promotion and Behavioral Sciences at the University of Texas-Houston School of Public Health, who provided expert guidance to the research team on intervention development and implementation. We would also like to acknowledge the important contributions of the study Patient and Stakeholder Advisory Committee (PASAC): Awilda Martinez, Wally Vidarrue, Ester Vittini, Luis Sanchez, Carmelo Garcia, Vivian Montes, Elizabeth Charriez, Eddy Aybar, Olga Almadovar, Dagoberto Mosquera, and Myra Piña, who reviewed study-related processes, procedures, and materials, and provided feedback and recommendations from the patient and community perspective. This study was funded by the Patient Centered Outcomes Research Institute (AD-1306-01882), and the Pennsylvania Department of Health (SAP 4100068728). Full protocol for this study can be obtained from primary investigator Ronald Myers upon request.

Received March 30, 2018; revised June 22, 2018; accepted October 9, 2018; published first October 17, 2018.

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