Published in final edited form as:

J Immigr Minor Health. 2017 October ; 19(5): 1100–1108. doi:10.1007/s10903-016-0453-8.

Colorectal Cancer Screening Preferences among Black and Latino Primary Care Patients

Sumedha V. Chablani¹, Noah Cohen², Drusilla White³, Steven H. Itzkowitz^{1,3}, Katherine DuHamel², and Lina Jandorf³

¹Division of Gastroenterology, Department of Medicine, Icahn School of Medicine at Mount Sinai, New York, NY, United States

²Department of Psychiatry & Behavioral Sciences, Memorial Sloan Kettering Cancer Center, New York, NY, United States

³Division of Cancer Prevention and Control, Department of Oncological Sciences, Icahn School of Medicine at Mount Sinai, New York, NY, United States

Abstract

Background—Colorectal cancer (CRC) screening rates in the U.S. have historically been lower among blacks and Latinos than whites. The advent of a new stool-based test, Cologuard, calls for research to determine which CRC screening test minority individuals might prefer.

Methods—Ninety black and Latino patients who had undergone screening colonoscopy were personally educated about four CRC screening tests and subsequently asked about their test preference, attributes that influenced preference, and strength of preference.

Results—Cologuard (31.1%) and colonoscopy (64.4%) were preferred over computerized tomographic colonography and fecal immunochemical tests. Preference was influenced by distinct test attributes. Individuals who selected Cologuard over colonoscopy were more likely to be > 60 and have greater strength of test preference.

Discussion—There was an overriding preference for Cologuard and colonoscopy among black and Latino individuals who had undergone screening colonoscopy. To further improve CRC screening in these populations, patient preferences should guide recommendations.

Keywords

colorectal cancer screening; preferences; blacks; Latinos

INTRODUCTION

Screening average-risk individuals over age 50 decreases the incidence of, and mortality from, colorectal cancer (CRC) by detecting and removing polyps and early stage cancer (1). Current guidelines recommend either an invasive structural exam (colonoscopy, flexible

sigmoidoscopy, computed tomographic colonography [CTC], or double contrast barium enema) or a non-invasive stool-based exam (2). For decades, the only stool tests available were chemical-based, guaiac fecal occult blood tests (FOBT) and fecal immunochemical tests (FIT). Cologuard, a multi-target stool DNA test, was approved in 2014 by the Food and Drug Administration, and clinicians are beginning to order the test. Imperiale and colleagues reported the results of a prospective trial that compared Cologuard to FIT and demonstrated the superior sensitivity of Cologuard for CRC, advanced adenomas, and serrated polyps, albeit with a somewhat lower specificity (3). The screening interval of Cologuard has been recommended to be three years compared to annually for FOBT and FIT (4).

While CRC screening rates have been rising in the U.S., only 59% of average-risk individuals age 50 and older were up-to-date with recommended testing as of 2010 (1). As such, the National Colorectal Cancer Roundtable has been promoting a campaign to achieve a national CRC screening rate of “80% by 2018” (5). Even before the onset of this campaign, the screening rate in some regions had increased to approximately 70% (1, 6). However, recent data suggests that this rate may be leveling off, especially in regions where colonoscopy is the main option (7). Even in environments where patients have insurance, a colonoscopy referral, and a patient navigator to facilitate colonoscopy completion, rates of colonoscopy do not exceed approximately 70% (8). This suggests that in order to achieve the 80% target, new approaches are needed.

As of 2010, the CRC screening rate for either FOBT or colonoscopy among blacks (55.5%) and Latinos (47.0%) was significantly lower than the rate among whites (61.5%) (1). Researchers, including our group, have demonstrated that a concerted effort to enhance screening colonoscopy among minorities of NYC can help eliminate ethnic disparities (9–11). However, there is still a need to identify barriers that may account for the observed plateau phenomenon. One factor is patient preference; some patients prefer the non-invasive FOBT and are more likely to adhere to screening when presented with this option (1, 12–14). In consideration of this, national CRC screening guidelines endorse shared decision making to determine the ideal method of screening for each individual (1, 2, 15). Yet, most health clinics and health providers offer and recommend limited options, and colonoscopy remains the most utilized test (1, 16).

Although blacks and Latinos comprise 30% of the U.S. population (17), little is known about their preference for Cologuard as well as CTC and FIT. While Latinos are the largest and fastest growing immigrant population in the U.S. (18), previous studies have not adequately explored whether language (i.e., English and Spanish) is associated with screening preference. Additionally, the test attributes and socio-demographic factors associated with screening preference are not well established in these populations. If CRC screening preferences among blacks and Latinos were better understood, this knowledge could guide screening efforts, delineating which tests to make accessible and recommend to them.

The overall objectives of this study were to 1) provide an assessment of CRC screening preferences among blacks, English-speaking Latinos, and Spanish-speaking Latinos for Cologuard, colonoscopy, CTC, and FIT; 2) describe the test attributes that influence their

preferences; 3) assess the strength of their preference; and 4) determine whether preference is associated with their socio-demographic characteristics, background knowledge of CRC, or CRC screening history.

METHODS

Participants

This cross-sectional survey was conducted from March–April 2015 at the primary care clinic at The Mount Sinai Hospital in NYC, where the patient population consists primarily of low-income minorities with public insurance. Participant eligibility included average-risk, asymptomatic English and/or Spanish-speaking black and Latino individuals between 50–74 years of age who had undergone screening colonoscopy within the past five years. Patients with a history of colorectal neoplasia or inflammatory bowel disease, or a family history of colorectal neoplasia were excluded. Inclusion and exclusion criteria were based on participants' self-report.

As this was a hypothetical study in which participants were not offered screening with the four considered tests, we only recruited individuals who had already undergone screening by colonoscopy within the past five years. Further, while we have demonstrated that a patient navigation program can improve screening colonoscopy rates among blacks and Latinos (9, 11), we wanted to learn whether these patients, who are aware of what colonoscopy entails, would prefer colonoscopy or an alternative test for subsequent screening. A colonoscopy satisfaction scale was included in the survey, and the results of this scale were considered when analyzing screening preference data.

Data collection

The research staff of trained health educators, many of whom are bilingual, recruited eligible subjects from the clinic waiting room with an IRB-approved flyer that was written in both English and Spanish. The health educator first inquired about the subject's language preference in English. Based on the stated preference, the remainder of the exchange was conducted in either English or Spanish. Written consent was obtained by the health educator.

Subjects partook in a 20–30 minute, three-part interview with the health educator. The first component was a pre-education survey to determine the subject's socio-demographic background, knowledge of CRC, and CRC screening history. The second component included education about CRC and CRC screening tests with print materials that compared the tests based on test attributes deemed important in the literature (see Figures 1–2) (2, 12–14, 19–29). The final component was a post-education survey to assess CRC screening test preference, attributes that influenced preference, and strength of preference. The consent form, surveys, and print materials were available in both English and Spanish.

The health educator read through the survey and print materials with the subject and answered questions to the best of their ability. The survey and print materials were based on our previous study materials designed with evidence-based features that enhance understandability in low health literacy populations (30, 31). The cost and insurance coverage of the considered tests were excluded from the educational materials so as to

determine screening preference among minorities unencumbered by financial concerns, with the hope that this knowledge could guide which tests to offer and recommend to black and Latino patients. Subjects received a \$20 gift card upon interview completion.

Measures

Socio-demographic and health care: Self-identified age, gender, race/ethnicity, language preference, marital status, employment status, education, and income level were assessed. Insurance coverage and CRC screening history were also noted.

Knowledge—Knowledge of CRC was assessed using nine true/false items adapted from a study by Manne et al that explored decision making regarding CRC screening among siblings of individuals with early onset CRC (Figure 3) (32).

Colonoscopy satisfaction scale—Questions regarding colonoscopy satisfaction were assessed with a 5-point scale ranging from 1 (Strongly Agree) to 5 (Strongly Disagree) and were adapted from a study by Eckardt and colleagues regarding factors associated with patient satisfaction and pain during colonoscopy (33).

Screening preference—Screening test preference, attribute preference, and strength of preference were evaluated. Subjects identified which of the four modalities they would prefer to undergo for future CRC screening. They also indicated pre-determined attributes and open-ended reasons that contributed to preference. Open-ended reasons were coded into pre-determined attributes or new attributes based on consensus among the study authors. Questions regarding strength of test preference were asked with a 5-point scale and were adapted from a study by DeBourcy and colleagues that examined preference for FOBT versus colonoscopy (12).

Analysis

Statistical calculations were performed using SPSS version 22 (IBM SPSS Inc, Chicago, IL). Missing data, which were minimal due to the interview format, were excluded from the analysis. Categorical data were analyzed by Chi-square analysis. Continuous data were analyzed by Student's *t*-test. Significant variables in the univariate analysis were included in the multivariate logistic regression model predicting screening test preference.

The research protocol was approved by the Institutional Review Board at Icahn School of Medicine at Mount Sinai prior to data acquisition.

RESULTS

Ninety patients consented and enrolled in the study. After being educated about the four screening tests, 58 (64.4%) preferred colonoscopy, 28 (31.1%) preferred Cologuard, 2 (2.2%) preferred CTC, and 2 (2.2%) preferred FIT. Given the predominant preference for Cologuard and colonoscopy, the four individuals who selected CTC and FIT were omitted from further analyses. The mean age of the cohort was 62.4 years and 69.8% were female (Table I). There were nearly equal numbers of blacks ($N = 28$), English-speaking Latinos ($N = 29$), and Spanish-speaking Latinos ($N = 29$). Most participants were not married, were

unemployed, received public insurance, and completed some level of high school. On prior colonoscopy, 23.5% of participants self-reported that they had benign polyps, and the remainder reported no findings.

Prior to education regarding CRC and CRC screening tests, participants were asked about their background knowledge of CRC, CRC screening history, and satisfaction with their prior colonoscopy. Regarding knowledge, the mean percentage of questions answered correctly was 83.6%. Regarding screening history, only 12.8% had previously completed FOBT or FIT. Regarding colonoscopy, on average, participants strongly agreed or agreed that they would be willing to repeat the exam in the future; the percentage of participants that strongly agreed or agreed with statement was 97.7%. On average, participants strongly agreed or agreed that they would recommend colonoscopy to family and friends; the percentage of participants that strongly agreed or agreed with this statement was 97.7%.

On univariate analysis, preference for Cologuard versus colonoscopy was influenced by age, race/ethnicity, and language of interview (Table I). The majority of individuals who preferred Cologuard were > 60 years old, whereas the number of individuals who preferred colonoscopy was almost evenly distributed among those older and younger than age 60 ($p = 0.04$). While Latinos comprised 82.1% of the patients who preferred Cologuard, they comprised only 60.3% of the patients who preferred colonoscopy ($p = 0.04$). An equal number of English and Spanish-speakers preferred Cologuard whereas 74.1% of individuals who preferred colonoscopy were English-speakers ($p = 0.03$). Furthermore, individuals who preferred Cologuard had greater strength of preference than their colonoscopy-preferring counterparts, and were less willing to be screened again with their non-preferred test ($p = 0.01$). Neither background knowledge of CRC, prior stool test, nor satisfaction with colonoscopy was associated with preference for these exams.

The most common reasons for selecting Cologuard included preparation, procedure, and benefits/limitations (Table II). The most common reasons for selecting colonoscopy included accuracy for detecting CRC, benefits/limitations, and frequency of testing if normal results. The benefits listed for Cologuard on the print materials included its non-invasiveness and its ability to be completed at home (Figure 2). The benefits listed for colonoscopy included its ability to examine the full colon and to remove polyps and some cancers. Curiously, some of the apparent limitations of colonoscopy contributed to preference for this test. Some individuals explained that they appreciate sedation, as this ensures no pain. Others appreciated that the test is performed at the hospital, as this ensures completion. Furthermore, two new categories were created for preference for colonoscopy: “prior experience with test” and “doctor recommendation.”

Variables significantly associated with CRC screening test preference in the univariate analysis were included in the multivariate regression analysis predicting preference for Cologuard versus colonoscopy: age, race/ethnicity, language of interview, and intent to screen with non-preferred test. Neither race/ethnicity nor language was associated with Cologuard preference on the multivariate regression analysis. When language was removed from the model given its potential overlap with race/ethnicity, the strength of association for age and intent to screen with non-preferred test was greater (Table III). On multivariate

regression models, individuals aged > 60 were more likely to prefer Cologuard compared to individuals aged ≤ 60 (odds ratio [OR] 3.49; confidence interval [CI], 1.12 – 10.83). Those who selected Cologuard reported that they would be approximately half as likely to undergo screening again with their non-preferred test (*OR* 0.50; *CI*, 0.30 – 0.84).

DISCUSSION

Among a cohort of average-risk black and Latino individuals who had previously undergone screening colonoscopy, the majority preferred either Cologuard or colonoscopy after an educational interview describing CRC screening tests. Most studies investigating preference among these minority populations in the U.S., using methods similar to those in the present study, have illustrated participants' preferences for a stool-based test (FOBT or FIT) and/or colonoscopy (14, 20, 23, 24, 29). For example, Palmer and colleagues demonstrated an overriding preference for FOBT and colonoscopy among blacks after education about colonoscopy, double contrast barium enema, flexible sigmoidoscopy, and FOBT (29). DeBourcy's group and Hawley's group demonstrated a distinct preference for FOBT among Latinos after learning about colonoscopy and FOBT (12); and colonoscopy, CT colonography, double contrast barium enema, FIT, FOBT, and flexible sigmoidoscopy, respectively (20).

In these prior studies, the attributes contributing to preference for stool-based tests and colonoscopy were similar to those contributing to preference for Cologuard and colonoscopy in our study. The most cited reasons for selecting FOBT and FIT included convenience, non-invasiveness, and lack of discomfort (12, 14, 20, 23). Individuals in the present study likewise selected Cologuard for its lack of test preparation, procedure as a stool test, and ability to be completed at home, all of which could reasonably be interpreted as convenience, as well as its non-invasiveness. The most cited reasons for selecting colonoscopy included accuracy, frequency of testing, and the ability to diagnose and treat polyps, and these were the three most popular attributes for colonoscopy in the current study (12, 14, 20, 23, 24).

Despite these similarities, this study has new findings with important clinical implications. First, Cologuard was preferred to FIT among the stool-based tests. Like FIT, Cologuard is convenient, non-invasive, and lacks discomfort. However, Cologuard is also the most sensitive stool-based test (3) and its recommended screening interval is every three years as opposed to annually for FIT (4). Although accuracy and frequency of testing did not rank high for overall preference for Cologuard, it is possible that these attributes contributed to the preference for Cologuard over FIT for those preferring a stool-based test, especially considering that colonoscopy was valued for these reasons. Therefore, it could be argued that Cologuard fulfills the criteria for selecting FOBT and FIT (convenient, lacks discomfort, non-invasive) as well as colonoscopy (accurate, moderate screening interval), which would make Cologuard an ideal option for individuals valuing all of these attributes.

Another important finding was that individuals > 60 preferred Cologuard versus colonoscopy. We cannot confirm whether this observation was related to the fact that all patients had undergone colonoscopy. Nonetheless, this is the first study to our knowledge to

demonstrate an association between age and screening preference among blacks and Latinos. As average-risk individuals are recommended to undergo CRC screening from ages 50–75, it is important to consider preferences of the screening population as it ages. To ensure that individuals > 60 continue to comply with screening and surveillance, it may be useful to offer an alternative to colonoscopy, such as Cologuard. Furthermore, despite the fact that all participants were generally satisfied with their experience with colonoscopy, those who preferred Cologuard had a stronger preference for their preferred test such that they would be less likely to undergo CRC screening again if not given this option. Thus, even among individuals who were satisfied with their colonoscopy, it may be worthwhile to offer choices to ensure adherence to screening.

The “80% by 2018” campaign emphasizes the importance of providing CRC screening options. Previous studies demonstrate that individuals are more likely to undergo screening with their preferred test, validating this recommendation (1, 12–14). That said, there are limitations to discussing all of the CRC screening modalities, ranging from time constraints to information overload. The present findings, if confirmed in larger studies, suggest that primary care physicians may want to tailor their CRC screening recommendations for black and Latino patients to include an accurate stool based test, such as Cologuard, as well as colonoscopy. We realize that the ability to recommend preferred screening tests is contingent on the availability of these tests. Participants in this study were mainly insured by Medicare or Medicaid. Although colonoscopy is currently covered by Medicare and Medicaid, stool-based tests, including Cologuard, FIT, and FOBT, are covered by Medicare while Medicaid coverage varies by state. In an effort to reduce the ethnic screening disparity and meet the goal of screening 80% of eligible individuals by 2018, policy makers, insurers, health clinics, and physicians should work together to make preferred and accurate tests more widely available.

A strength of this study is that all participants were educated with print materials that compared the tests based on influential attributes cited in the literature. This enabled participants to make informed decisions as corroborated by other studies (12, 20, 23, 24). Additionally, strength of test preference was assessed, including likelihood of being screened again with preferred and non-preferred modalities, which provided a sense of intended screening behavior even though ultimate screening behavior was not evaluated. Another strength is the inclusion of Cologuard, as well as CTC and FIT, which have not been adequately explored in screening preference studies to date, especially among minorities. Finally, participants were interviewed in their language of choice, enabling the inclusion of Spanish-speaking Latinos and the investigation of the association of language with test preference.

A limitation of this study is that all participants had been screened with colonoscopy, which may have affected their future test preference. However, previous studies have demonstrated mixed results as to the influence of CRC screening history on future CRC screening preference (12, 23, 29). Nonetheless, a newly coded attribute for colonoscopy was “prior experience with the test,” putting colonoscopy at an advantage over the other options. An additional limitation was the lack of inclusion of the cost and insurance coverage of the four CRC screening tests in the print materials. We recognize that cost and insurance coverage

are test attributes that patients strongly consider when making decisions pertaining to their health. However, because we wanted to determine CRC screening preferences among minority subjects unencumbered by financial concerns, these test attributes were purposely excluded from the print materials. Also, despite the racial and ethnic diversity of the study population, the generalizability of these results may be limited as all patients were recruited from a single health clinic within a geographic region of New York. Finally, although our sample size was based on previous CRC screening preference studies, the N of 90 may also limit the generalizability of the results.

New Contributions to the Literature

To our knowledge, this is the first study to investigate CRC screening preference for Cologuard among English- and Spanish-speaking blacks and Latinos. While previous studies demonstrated preference for chemical-based stool tests, including FOBT and FIT, as well as colonoscopy among these minority groups, this study demonstrated preference for Cologuard and colonoscopy. Cologuard encompasses the main test attributes valued by these populations including convenience, lack of discomfort, non-invasiveness, accuracy, and moderate screening interval, which makes it an ideal screening option, especially for those looking for an alternative to colonoscopy. This study also showed that black and Latino patients > 60 were more likely than those ≤ 60 to prefer Cologuard versus colonoscopy, and that approximately 1/3 of individuals who were satisfied with their colonoscopy preferred Cologuard after education regarding CRC screening. Both of these findings highlight the importance of continuing to offer CRC screening options. Finally, this study reinforced the utility of a print material that compares screening tests based on characteristics, allowing patients to differentiate among options in an organized fashion.

Acknowledgments

This study was supported by an independent investigator grant to Sumedha V. Chablani from the Digestive Disease Research Foundation. The authors would like to thank the study participants and research staff of recruiters and interviewers, including Clarissa Martinez, Suky Martinez, Helen Nunez, Zeida Quintero-Canetti, Dylan Sperling, Pathu Sriphanlop, and Cristina Villagra.

References

1. American Cancer Society. Colorectal Cancer Facts & Figures. Atlanta: American Cancer Society; 2014.
2. Levin B, Lieberman DA, McFarland B, Smith RA, Brooks D, Andrews KS, et al. Screening and Surveillance for the Early Detection of Colorectal Cancer and Adenomatous Polyps, 2008: A Joint Guideline from the American Cancer Society, the US Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology*. CA: A Cancer Journal for Clinicians. 2008; 58(3):130–160. [PubMed: 18322143]
3. Imperiale TF, Ransohoff DF, Itzkowitz SH, Levin TR, Lavin P, Lidgard GP, et al. Multitarget stool DNA testing for colorectal-cancer screening. N Engl J Med. 2014; 370(14):1287–1297. [PubMed: 24645800]
4. Centers for Medicare & Medicaid Services. Decision memo for screening for colorectal cancer - stool DNA testing. 2014. Available at: <http://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=277>
5. National Colorectal Cancer Roundtable. 80% by 2018 Fact Sheet. 2014. Available at: http://nccrt.org/wp-content/uploads/80-by-2018-FACT-SHEET.FINAL_.pdf

6. Siegel R, DeSantis C, Jemal A. Colorectal cancer statistics, 2014. CA: A Cancer Journal for Clinicians. 2014; 64(2):104–117. [PubMed: 24639052]
7. New York City Department of Health and Mental Hygiene. Colonoscopy in New York City. 2010. Available at: <http://www.nyc.gov/html/doh/downloads/pdf/cancer/colonoscopy-brochure.pdf>
8. New York State Department of Health. One out of four NYS adults aged 50–75 years have never received life-saving colorectal cancer screening tests. 2015. Available at: https://www.health.ny.gov/statistics/prevention/injury_prevention/information_for_action/docs/2015-01_ifa_report.pdf
9. Braschi CD, Sly JR, Singh S, Villagra C, Jandorf L. Increasing colonoscopy screening for Latino Americans through a patient navigation model: a randomized clinical trial. Journal of Immigrant and Minority Health. 2014; 16(5):934–940. [PubMed: 23736964]
10. Richards CA, Kerker BD, Thorpe L, Olson C, Krauskopf MS, Silver LS, et al. Increased screening colonoscopy rates and reduced racial disparities in the New York Citywide campaign: an urban model. Am J Gastroenterol. 2011; 106(11):1880–1886. [PubMed: 22056567]
11. Jandorf L, Braschi C, Ernstoff E, Wong CR, Thelemaque L, Winkel G, et al. Culturally targeted patient navigation for increasing African Americans' adherence to screening colonoscopy: a randomized clinical trial. Cancer Epidemiol Biomarkers Prev. 2013; 22(9):1577–1587. [PubMed: 23753039]
12. DeBourcy AC, Lichtenberger S, Felton S, Butterfield KT, Ahnen DJ, Denberg TD. Community-based preferences for stool cards versus colonoscopy in colorectal cancer screening. Journal of General Internal Medicine. 2008; 23(2):169–174. [PubMed: 18157581]
13. Inadomi JM, Vijan S, Janz NK, Fagerlin A, Thomas JP, Lin YV, et al. Adherence to colorectal cancer screening: a randomized clinical trial of competing strategies. Arch Intern Med. 2012; 172(7):575–582. [PubMed: 22493463]
14. Wolf RL, Basch CE, Brouse CH, Shmukler C, Shea S. Patient preferences and adherence to colorectal cancer screening in an urban population. Am J Public Health. 2006; 96(5):809–811. [PubMed: 16571715]
15. U.S. Preventive Services Task Force. Final Recommendation Statement: Colorectal Cancer: Screening. 2008. Available at: <http://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationstatementFinal/colorectal-cancer-screening>
16. Wolf MS, Baker DW, Makoul G. Physician–patient communication about colorectal cancer screening. Journal of General Internal Medicine. 2007; 22(11):1493–1499. [PubMed: 17851721]
17. United States Census Bureau. State and County Quickfacts. 2015. Available at: <http://quickfacts.census.gov/qfd/states/00000.html>
18. Siegel R, Naishadham D, Jemal A. Cancer statistics for Hispanics/Latinos, 2012. CA: A Cancer Journal for Clinicians. 2012; 62(5):283–298. [PubMed: 22987332]
19. Ghanouni A, Smith SG, Halligan S, Plumb A, Boone D, Magee MS, et al. Public perceptions and preferences for CT colonography or colonoscopy in colorectal cancer screening. Patient Educ Couns. 2012; 89(1):116–121. [PubMed: 22705250]
20. Hawley ST, Volk RJ, Krishnamurthy P, Jibaja-Weiss M, Vernon SW, Kneuper S. Preferences for colorectal cancer screening among racially/ethnically diverse primary care patients. Med Care. 2008; 46(9):S10–S6. [PubMed: 18725820]
21. Ling BS, Moskowitz MA, Wachs D, Pearson B, Schroy PC. Attitudes toward colorectal cancer screening tests. Journal of General Internal Medicine. 2001; 16(12):822–830. [PubMed: 11903761]
22. Pooler BD, Baumel MJ, Cash BD, Moawad FJ, Riddle MS, Patrick AM, et al. Screening CT colonography: multicenter survey of patient experience, preference, and potential impact on adherence. AJR Am J Roentgenol. 2012; 198(6):1361–1366. [PubMed: 22623549]
23. Schroy PC 3rd, Lal S, Glick JT, Robinson PA, Zamor P, Heeren TC. Patient preferences for colorectal cancer screening: how does stool DNA testing fare? Am J Manag Care. 2007; 13(7):393–400. [PubMed: 17620034]
24. Shokar NK, Carlson CA, Weller SC. Informed decision making changes test preferences for colorectal cancer screening in a diverse population. Ann Fam Med. 2010; 8(2):141–150. [PubMed: 20212301]

25. Taber JM, Aspinwall LG, Heichman KA, Kinney AY. Preferences for blood-based colon cancer screening differ by race/ethnicity. *Am J Health Behav.* 2014; 38(3):351–361. [PubMed: 24636031]
26. Hawley ST, McQueen A, Bartholomew LK, Greisinger AJ, Coan SP, Myers R, et al. Preferences for colorectal cancer screening tests and screening test use in a large multispecialty primary care practice. *Cancer.* 2012; 118(10):2726–2734. [PubMed: 21948225]
27. Imaeda A, Bender D, Fraenkel L. What is most important to patients when deciding about colorectal screening? *Journal of General Internal Medicine.* 2010; 25(7):688–693. [PubMed: 20309740]
28. Pignone M, Bucholtz D, Harris R. Patient preferences for colon cancer screening. *Journal of General Internal Medicine.* 1999; 14(7):432–437. [PubMed: 10417601]
29. Palmer RC, Midgett LA, Mullan ID. Colorectal cancer screening preferences among African Americans: which screening test is preferred? *Journal of Cancer Education.* 2010; 25(4):577–581. [PubMed: 20229075]
30. Cooperman JL, Efuni E, Villagra C, DuHamel K, Jandorf L. Colorectal cancer screening brochure for Latinos: focus group evaluation. *Journal of Cancer Education.* 2013; 28(3):582–590. [PubMed: 23821134]
31. Sriphanlop, P., Hennelly, MO., Sperling, D., Villagra, C., Jandorf, L. Increasing referral rate for screening colonoscopy through patient education and activation at a primary care clinic in New York City. Submitted 2015
32. Manne S, Markowitz A, Winawer S, Meropol NJ, Haller D, Rakowski W, et al. Correlates of colorectal cancer screening compliance and stage of adoption among siblings of individuals with early onset colorectal cancer. *Health Psychology.* 2002; 21(1):3. [PubMed: 11846342]
33. Eckardt AJ, Swales C, Bhattacharya K, Wassef WY, Phelan NP, Zubair S, et al. Open access colonoscopy in the training setting: which factors affect patient satisfaction and pain? *Endoscopy.* 2008; 40(2):98–105. [PubMed: 18253904]

Screening Test	Procedure
Cologuard	This test looks for hidden blood and abnormal DNA in the stool released from a colorectal polyp or cancer. Only one stool sample is required. The kit will be sent to your home with instructions on how to collect the stool sample and mail it to the lab.
Colonoscopy	A doctor inserts a thin, flexible tube with a camera into the rectum, and then moves it through the colon. This allows the doctor to look inside your colon and rectum for polyps or cancers. The doctor can remove most polyps and some cancers.
CT colonography	This is an x-ray test that creates 3D images of your colon and rectum as you lie on a table. Before imaging, a small, flexible tube is inserted into the rectum to open the colon. The doctor looks at the images of your colon and rectum for polyps or cancers.
Fecal immunochemical test	This test looks for hidden blood in the stool released from a colorectal polyp or cancer. It will not detect a polyp or cancer that is not bleeding. Your doctor will send you home with a kit with instructions on how to collect the stool sample and mail it back.

Figure 1.

Colorectal Cancer Screening Test	Preparation	Test accuracy ⁱ	Length of test	Physical discomfort	Immediate follow-up if abnormal	Frequency if results are normal	Potential complications and limitations	Benefits
Cologuard	None	92/100	1 bowel movement	None	Colonoscopy	Every 3 years	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Non-invasiveⁱⁱ Test done at home
Colonoscopy	Bowel preparation ⁱⁱⁱ	95/100	30-45 minutes	Medium	None	Every 10 years	<ul style="list-style-type: none"> Invasive^{iv} Test done at hospital Sedation^v Escort required 	<ul style="list-style-type: none"> Examines full colon Can remove polyps and some cancers
							<ul style="list-style-type: none"> Time off from work Small risk of bleeding, bowel tear, or infection 	
CT colonography	Bowel preparation	90/100	15-20 minutes	Low to Medium	Colonoscopy	Every 5 years	<ul style="list-style-type: none"> Invasive Test done at hospital Uses X-ray radiation 	<ul style="list-style-type: none"> Examines full colon No sedation No escort required
Fecal immuno-chemical test	None	79/100	1-2 bowel movements	None	Colonoscopy	Once a year	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Non-invasive Test done at home

Figure 2.

ⁱ**Test accuracy:** This is how good the test is in finding colorectal cancer.

ⁱⁱ**Non-invasive:** This test does not introduce a medical instrument into the body.

ⁱⁱⁱ**Bowel preparation:** This involves changing your diet, avoiding some medications, and taking an oral laxative the day before the test to clear your colon.

^{iv}**Invasive:** This test introduces a medical instrument into the body.

^v**Sedation with anesthesia:** This is given to you minutes before the test to put you to sleep.

The following questions are true or false. You can choose from “True” or “False.”

	True	False
1. Colorectal cancer is one of the most commonly diagnosed cancers in the United States.	1	2
2. If I have a parent, brother, or sister with colorectal cancer, I am more likely to get it.	1	2
3. A person can have a screening test to find out if they have colorectal cancer.	1	2
4. If colorectal cancer is found at an early stage, the chances of being cured are very good.	1	2
5. I would feel it if I had a growth in my colon.	1	2
6. If I feel fine and have no symptoms, I can't have colorectal cancer	1	2
7. Polyps are growths that are not cancer, but could become cancer someday.	1	2
8. A person can have colorectal cancer without having pain.	1	2
9. During colonoscopy, a doctor inserts a thin, flexible tube with a camera inside of your rectum.	1	2

Figure 3.
Colorectal cancer knowledge questionnaire

Table I

Univariate analysis for CRC screening test preference

	Total (N = 86)	Cologuard (N = 28)	Colonoscopy (N = 58)	p value
Age, y				
60	38 (44.2)	8 (28.6)	30 (51.7)	0.04
> 60	48 (55.8)	20 (71.4)	28 (48.3)	
Gender				
Male	26 (30.2)	7 (25.0)	19 (32.8)	0.46
Female	60 (69.8)	21 (75.0)	39 (67.2)	
Race/ethnicity				
Black	28 (32.6)	5 (17.9)	23 (39.7)	0.04
Latino	58 (67.4)	23 (82.1)	35 (60.3)	
Language of interview				
English	57 (66.3)	14 (50.0)	43 (74.1)	0.03
Spanish	29 (33.7)	14 (50.0)	15 (25.9)	
Marital status				
Married/living with partner	26 (30.2)	6 (21.4)	20 (34.5)	0.22
Not married	60 (69.8)	22 (78.6)	38 (65.5)	
Employment status				
Employed	11 (12.8)	1 (3.6)	10 (17.2)	0.08
Unemployed	75 (87.2)	27 (96.4)	48 (82.8)	
Highest education				
< High school	15 (17.4)	7 (25.0)	8 (13.8)	0.14
High school or GED	48 (55.8)	17 (60.7)	31 (53.4)	
> High school	23 (26.7)	4 (14.3)	19 (32.8)	
Annual household income				
< \$ 10,000	40 (47.6)	15 (53.6)	25 (44.6)	0.44
\$10,000	44 (52.4)	13 (46.4)	31 (55.4)	
Insurance status				
Medicaid/Medicare	82 (95.3)	28 (100.0)	54 (93.1)	0.16
Private	4 (4.7)	0 (0.0)	4 (6.9)	
Colonoscopy findings				
None	65 (76.5)	20 (74.1)	45 (77.6)	0.72
Polyps	20 (23.5)	7 (25.9)	13 (22.4)	
Knowledge of CRC, % (SD)	83.6 (12.8)	82.1 (14.3)	84.3 (12.1)	0.47
Prior stool test (FOBT or FIT)	11 (12.8)	4 (14.3)	7 (12.1)	0.77
Satisfaction with colonoscopy ¹				
Willing to repeat exam in future if necessary	1.45 (0.63)	1.61 (0.83)	1.38 (0.49)	0.11
Would recommend exam to family/friends	1.37 (0.58)	1.36 (0.56)	1.38 (0.59)	0.87
Strength of Test Preference, mean (SD)				
Strength of Test Preference ²	4.33 (0.80)	4.32 (0.98)	4.33 (0.71)	0.97
Intent to Screen with Preferred Test ³	4.57 (0.68)	4.57 (0.84)	4.57 (0.60)	0.99

	Total (N = 86)	Cologuard (N = 28)	Colonoscopy (N = 58)	p value
Intent to Screen with Non-Preferred Test ³	3.77 (1.04)	3.36 (1.10)	3.97 (0.96)	0.01

Values are expressed as no. (%) unless otherwise indicated. SD: standard deviation. Income data available for 84 patients. Colonoscopy findings available for 85 patients.

¹ Measured on a 5-point scale from 1 (Strongly Agree) - 5 (Strongly Disagree).

² Measured on 5-point scale from 1 (Not Strong) - 5 (Extremely Strong).

³ Measured on 5-point scale from 1 (Not Likely) - 5 (Extremely Likely).

Table II

Attributes influencing CRC screening test preference

	Cologuard (N = 28)		Colonoscopy (N = 58)	
	Rank	N (%)	Rank	N (%)
Procedure	2	19 (67.9)	5	21 (36.2)
Preparation	1	21 (75.0)	7	11 (19.0)
Accuracy for detecting CRC	5	11 (39.3)	1	49 (84.5)
Test duration	6	4 (14.3)	7	11 (19.0)
Physical discomfort	4	14 (50.0)	6	16 (27.6)
Immediate follow-up if abnormal	6	4 (14.3)	4	22 (37.9)
Frequency if results are normal	6	4 (14.3)	3	24 (41.4)
Benefits/limitations	3	15 (53.6)	2	35 (60.3)
Prior experience with test ^I	-	-	8	9 (15.5)
Doctor recommendation ^I	-	-	9	1 (1.7)

- : Not applicable.

^I Newly coded attribute on the basis of open-ended responses.

Table III

Multivariate analysis for Cologuard preference

	<i>OR (95% CI)</i>	<i>p value</i>
Age		
60	Reference	0.03
> 60	3.49 (1.12 – 10.83)	
Race/ethnicity		
Black	Reference	0.38
Latino	1.72 (0.51 – 5.80)	
Intent to Screen with Non-Preferred Test ^I	0.50 (0.30 – 0.84)	0.01

OR: odds ratio; *CI*: confidence interval.^I Measured on 5-point scale from 1 (Not Likely) - 5 (Extremely Likely).