ABSTRACT

Barriers and Facilitators of Colorectal Cancer Screening in a
Federally-Qualified Health Center: Patient and Clinician Perspectives

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Colorectal cancer (CRC) is a leading cause of cancer-related mortality in the United States. Current screening recommendations for individuals aged 50 to 75 years include colonoscopy every ten years, flexible sigmoidoscopy every five years, and/or annual stool-based testing. Stool-based testing, and specifically fecal immunochemical tests (FIT), are cost effective, easy to perform at home, and non-invasive. Efforts to enhance CRC screening has been effective the past few decades. Yet, many patients fail to return testing kits and remain unscreened. The purpose of the thesis was to evaluate perceived barriers and facilitators of FIT return in a Federally-Qualified Health Center. Patients who received a FIT order from January 1, 2017 to July 1, 2017 were enumerated (n=1498). After exclusion criteria, analysis of FIT returners (n=440) and FIT non-returners (n=435) was conducted to compare sociodemographic and health characteristics. Telephone surveys assessed barriers and facilitators of the CRC screening process for non-returners (n=121).

Barriers and Facilitators of Colorectal Cancer Screening in a Federally-Qualified Health Center:
Patient and Clinician Perspectives

by

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A Thesis

Approved by the Department of Health, Human Performance, and Recreation

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Page bearing signatures is kept on file in the Graduate School.

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DEDICATION

To healthcare providers who care for the poor and marginalized,
demonstrating that their patients deserve the best standard of care

To patients (regardless of sex, age, race/ethnicity, insurance status, income level, sexual
orientation, among others) that you may have an efficient, more comfortable CRC
screening process

To my parents who give everything so that I may pursue my dreams

CHAPTER ONE

Introduction

Manuscript Contributions

The thesis contains a manuscript in chapter four. I served as the primary author of the work including background research, analysis plan, data collection, statistical analyses, data interpretation, conclusions, and recommendations. Second author is Dr. Kelly Ylitalo, who assisted with data collection and interpretation as well as the statistical analyses on SAS Version 9.4. Third and fourth authors are Dr. Renee Umstattd Meyer and Dr. Lauren Barron, who contributed to research knowledge, survey design, and analysis plan. The fifth author is Gabriel Benavidez, who translated informed consent and patient survey questions to Spanish and conducted interviews with Spanish-speakers.

Significance and Purpose

Colorectal cancer (CRC) is the third most commonly diagnosed cancer in the United States for both sexes (Siegel et al., 2017). The American Cancer Society estimates that 135,430 CRC cases will occur in 2017 (Siegel et al., 2017). CRC is the second most common type of cancer-related death for men and the third most common for women (Siegel et al., 2017). CRC is attributed to over 50,000 deaths a year (Siegel et al., 2017).

The incidence and mortality rates vary by demographics. Males are more likely to be diagnosed with CRC (46.9 per 100,000 average annual incidence rate) compared to females (35.6 per 100,000 average annual incidence rate) (Siegel et al., 2017). Males have a higher likelihood for death (17.7 per 100,000 average annual mortality rate) than

females (12.4 per 100,00 average annual mortality rate) (Siegel et al., 2017). Additionally, incidence and mortality rates differ among racial and ethnic subgroups. Non-Hispanic black and American Indian groups have disproportionately higher incidence and death rates compared to non-Hispanic whites (Siegel et al., 2017). Non-Hispanic black males have average incidence rates of 58.3 per 100,000 and average mortality rates of 25.0 per 100,000 (Siegel et al., 2017). Non-Hispanic black females have average incidence rates of 42.7 per 100,000 and average mortality rates of 16.9 per 100,000 (Siegel et al., 2017). American Indian males are 51.4 per 100,000 and 19.5 per 100,000 and females are 41.2 per 100,000 and 14 per 100,000, respectively (Siegel et al., 2017).

Federally-Qualified Health Centers (FQHCs) serve individuals and families living within the Federal Poverty Guidelines. FQHCs have approximately a 38.3% colon cancer screening rate (National Colorectal Cancer Roundtable, 2016). The drastic difference in CRC screening is problematic for achieving the Healthy People 2020 screening rate goal of 70.5%. Thus, investigating CRC screening practices and barriers among patients at a FQHC may yield important findings for improving health outcomes among vulnerable populations.

CRC occurs when abnormal cells rapidly grow and divide within the large intestine (colon and rectum), hence "colorectal cancer." (Siegel et al., 2017). The colon consists of the cecum, ascending colon, transverse colon, descending colon, and sigmoid (Siegel et al., 2017). Nutrients and water are absorbed through the colon sections and waste is produced from the sigmoid to the rectum (Siegel et al., 2017). Over time, the

unregulated cell growth creates a polyp, or abnormal growth within the inner lining of the colon or rectum (Stryker et al., 1987; Winawer & Zauber, 2002).

Adenomas are the most common types of polyps (Siegel et al., 2017). Adenomas form from uncontrolled glandular (mucous) cell growth in the colon or rectum lining (Siegel et al., 2017). Adenomas can become cancerous, with larger adenomas at greatest risk (Pickhardt et al., 2013). Nearly 96% of CRC is result of cancerous adenomas (Stewart, Wike, Kato, Lewis, & Michaud, 2006).

CRC is characterized by four stages: in situ (has not invaded the lining), local (infiltrated lining but not spread to other tissues), regional (invaded lining and spread to tissues in proximity), and distal (spread to different organ systems) (Siegel et al., 2017). Common symptoms involve bloody or dark stools, rectal bleeding, diarrhea, constipation, loss of appetite, weight loss, among others (Siegel et al., 2017). The risk for CRC increases with age (Siegel et al., 2017).

The U.S. Preventive Services Task Force (USPSTF) recommendations indicate that colorectal cancer screening should begin at age 50 and continue until age 75 at varying intervals depending on the screening test (USPSTF, 2017). The screening process can include colonoscopy, flexible sigmoidoscopy, stool-based tests (fecal occult blood tests, fecal immunochemical tests, or stool DNA tests), or a combination of the three (USPSTF, 2017). The USPSTF advises yearly high-sensitivity fecal occult blood testing, sigmoidoscopy every five years with FOBT every three years, or a colonoscopy every ten years (USPSTF, 2017). Positive FOBT or flexible sigmoidoscopy tests require a follow-up colonoscopy for a definitive diagnosis (USPSTF, 2017). Other screening options may include computed tonographic colonography (CTC) and double-contrast barium enema;

however, we limit the scope of this paper to include only USPSTF-recommended screening tests for CRC (USPSTF, 2017).

Colonoscopies are the most effective CRC screening method for identifying polyps and cancer (Rex, Johnson, Lieberman, Burt, & Sonnenberg, 2000). Patients must perform bowel preparation (laxatives and clear liquid diet) 24 hours ahead of the procedure (American Cancer Society, 2017). Once sedated, a gastroenterologist inserts a half-inch wide, flexible colonoscope into the rectum to view the entire colon (from rectum to cecum). If the specialist observes irregular tissue growth such as adenomas, a biopsy will be conducted to confirm diagnosis. The test is approximately 100% in both sensitivity (the ability to identify those with the disease) and specificity (the ability to correctly distinguish those without the disease) (American Cancer Society, 2017). Yet, the process is invasive, burdensome, costly, and limited in some communities (Rex, Johnson, Lieberman, Burt, & Sonnenberg, 2000). Tangka and colleagues discovered colonoscopies cost an average of $654 to $1600 across five FQHCs, considerably more expensive than other screening alternatives (Tangka et al., 2013).

The flexible sigmoidoscopy (FS) is typically more available across community health clinics (CHC) due to the lack of surgical necessities like anesthesia and primary care physicians' ability to perform them (Knox, Hahn, & Lane, 2006). However, FS is performed less often due to rising prevalence of colonoscopies since 2000 (Iovanescu, 2016). Patients perform bowel preparation to a lesser extent than colonoscopies. Patients forgo the laxatives, clean via enema, and refrain from eating hours prior to the procedure (Siegel et al., 2017). A primary care provider inserts a thin, flexible sigmoidoscope to observe the rectum and lower colon (sigmoid) (American Cancer Society, 2017). The

sensitivity of FS is ranges from 58.0% to 75.0% and specificity is 93.33% (Iovanescu, 2016; Whitlock et al., 2008). FS presents similar challenges as colonoscopies to patients such as cost and the invasive procedure (Siegel et al., 2017). Flexible sigmoidoscopies cost an average of $500 to $750 (National Cancer Institute, 2017).

Stool-based tests are portable screening kits that provide stool collection cards, instructions, and can be performed in the comfort of one's home. The screen is returned via mail or in-person. Fecal Occult Blood Tests (FOBTs) encompass three screening tests: the guaiac fecal occult blood test (gFOBT), the immunochemical fecal occult blood test (iFOBT) now referred to as the fecal immunochemical test (FIT), and the fecal DNA test. FOBTs are generally cost-effective, easy to perform, non-invasive, and more accessible (Siegel et al., 2017). The average cost of FOBT's average cost across 5 FQHC's was between $48 to $149 (Tangka et al., 2013). However, fecal DNA tests (Cologuard®) cost $649 and are the most expensive of the stool-based tests (Cologuard, 2017).

gFOBT's contain guaiac, a derivative of wood resin, that turns blue when heme, the iron-binding component of blood, is present (Song & Li, 2016). If hydrogen peroxide is broken down, the card changes and indicates a positive result (Song & Li, 2016). Positive gFOBT's cannot locate bleeding origins, have medication and dietary restrictions to avoid false positives, and requires a colonoscopy follow-up (Siegel et al., 2017; Song & Li, 2016). The specificity of gFOBT ranges from 86.7% to 97.7% and sensitivity ranges from 12.9% to 79.4% (Ahlquist et al., 1993; Harcastle et al., 1996; Kronborg, Fenger, Olsen, Jørgensen, & Søndergaard, 1996; Liberman et al., 2009; Mandel et al., 1993).

FIT screens for CRC differently than gFOBTs. Specifically, FITs use antibodies that react with the protein subunit of hemoglobin, heme (Song & Li, 2016). The reaction is more specific to CRC and avoids gFOBT problems like false positives from upper digestive bleeding (ie: the stomach) (Song & Li, 2016). FITs are generally considered more accurate for CRC screening than gFOBTs. Thus, providers use FITs more often across CHCs (Song & Li, 2016). Unlike gFOBTs, FITs do not require dietary or medication modifications (Siegel et al., 2017). Yet, a positive FIT still requires a colonoscopy follow-up. Nineteen studies demonstrated the sensitivity and specificity of FITs to be approximately 79% and 94%, respectively (Allison, Tekawa, Ransom, & Adrain, 1996; Song & Li; 2016).

Fecal DNA tests identify abnormal DNA or epigenetic markers from colorectal lesions (Song & Li, 2016). Cologuard encompasses molecular assays that screen for abnormalities in DNA, methylation, or hemoglobin (Song & Li, 2016). The sensitivity and specificity of Cologuard is 92.3% and 89.8% for CRC, respectively (Imperiale, 2014). Yet, fecal DNA tests remain in a similar price range of flexible sigmoidoscopies and colonoscopies (Siegel et al., 2017).

The USPSTF recommendations indicate no preference for CRC screening tests, and instead leave the decision to healthcare providers and patients (USPSTF, 2017). Screening participation rates may be influenced by the type of test recommended to the patient (Siegel et al., 2017). Physicians may recommend colonoscopy over various alternatives because it is considered to be the "gold standard" diagnostic test for CRC (Brown et al., 2015). Brown and colleagues found that most healthcare providers recommend colonoscopies, even if the test is unrealistic due to cost and availability for

their patient populations. In addition, minority patients may be more likely to prefer a noninvasive test (FOBT) over the invasive ones (May et al., 2015). The recommendation and preference disconnect between provider and patient has been observed throughout the literature (Briant et al., 2015; Davis et al., 2012; TBCCN et al., 2015; Jackson, Oman, Patel, & Vega, 2016; May, Almario, Ponce, Spiegel, 2015). Researchers emphasize the importance of tailored CRC screening for the marginalized patient populations.

Nearly 60% of colorectal cancer deaths could be prevented if all eligible individuals received CRC screening (Troyer, Williamson, Merchant, & Lengerich, 2014). It takes approximately ten to twenty years for abnormal cells to proliferate into CRC (Siegel et al., 2017). Colorectal cancer incidence and mortality has declined the past decade due to timely detection and removal of precancerous lesions or early-stage cancer (American Cancer Society, 2017; Siegel et al., 2017). In 2015, 62.4% of the USPSTF eligible population was screened for CRC (Healthy People 2020, 2015), which represents a ten percent increase from baseline (52.1% in 2008) (Healthy People 2020, 2015). Yet, CRC screening rates differ for marginalized populations (racial, ethnic, socioeconomic, education, insurance status), who get screened at lower rates than the national average (Jackson, Oman, Patel, & Vega, 2016; May, Almario, Ponce, Spiegel, 2015). National Health Interview Survey data demonstrate that American Indians, Hispanics, Asians, and individuals with low socioeconomic position have screening rates less than 50% (National Health Center for Statistics, 2016). Latino patients have considerably lower population-level screening rates in comparison to whites (Jackson, Oman, Patel, & Vega, 2016; May, Almario, Ponce, Spiegel, 2015). The greatest disparity exists between insured (61% screened) and uninsured (25.3% screened) (National Health Center for Statistics,

2016; Spiegel et al., 2017). The barriers to CRC screening for underserved populations include cost, access to health facilities, insurance status, lack of clinician recommendation, and psychosocial factors.

African-Americans and American Indians have the highest incidence and mortality rates from CRC (Jackson, Oman, Patel, & Vega, 2016; May, Almario, Ponce, Spiegel, 2015). American Indians have the lowest screening participation (48.7%) and Non-Hispanic blacks have the second highest (60.6%) (Jackson, Oman, Patel, & Vega, 2016; May, Almario, Ponce, Spiegel, 2015). Disparities within health care access, utilization, and treatment for marginalized subgroups increase the burden of CRC (Tammana, 2014). Differences in medical procedures (surgical resection, chemotherapy), screening tests (colonoscopy, FIT, follow up), tumor biology (younger diagnoses, proximal tumor locations, high grade tumors), and lifestyle factors may contribute to racial and ethnic disparities of CRC (Tammana, 2014).

The Waco Family Health Center (WFHC) is a FQHC located within Central Texas and provides care to over 58,000 patients (Family Health Center, 2016). The Waco Family Health Center's 2020 initiative for CRC screening is to increase the percentage of patients age 50 to 75 years who had appropriate screening for CRC (includes colonoscopy every 10 years, flexible sigmoidoscopy every 5 years, or annual fecal occult blood test) from 29% (the 2014 rate) to 40% (Family Health Center, 2016). The present CRC screening rate (via colonoscopies, flexible sigmoidoscopies, and FOBTs) is 34.76% (Family Health Center, 2016). The clinic currently offers two screening tests: the flexible sigmoidoscopy and the FIT. FITs are cost-effective, easy-to-use CRC screening tools, but return rates remain suboptimal (nearly a 50% chance for FIT return). Among low-income

patient populations, patients may struggle to afford the screening test. Without insurance, a patient pays nearly $80 (Family Health Center, 2016). Approximately 16.3% of patients lacked health insurance and were afforded care through a "Good Health Card," which is a discounted fee program that expanded coverage to 26.8% of the FHC patient population (Family Health Center, 2016). Varying levels of the Good Health Card range from $0 to $40. Medicare patients pay $4.33 (Family Health Center, 2016). An insured patient or Medicaid beneficiary is provided the test at no cost. Exploring the perceived barriers and facilitators to CRC screening is relevant to informing intervention practices and meeting the clinic's 2020 initiative. The purpose of the study was to identify patient characteristics between those who returned and those who failed to return a FIT. The secondary purpose of the study was to identify clinician perceptions of patient barriers and facilitators, FIT awareness, and CRC screening recommendations.

Study Overview

The study will describe patients who do not complete CRC screening, and explore patient and clinician perspectives on barriers and facilitators to FIT in a large, FQHC through telephone surveys to patients and online surveys to clinicians. Potential barriers are identified from the literature and consist of test cost, test instructions, transportation, test time, limited drop-off sites, hours of operation, and psychosocial factors. Potential facilitators are community outreach methods to encourage return rates such as pre-paid postage, more drop-off sites, reminders, better test instructions, more educational materials, and more time spent with the clinician. The surveys also include an open-ended question to account for unforeseen barriers or facilitators to the patient and clinician experience.

Study Limitations

Several potential limitations exist within the study. Telephone survey data collection is subject to interviewer bias (Davis, Couper, Janz, Caldwell, & Resnicow, 2010). The tone or attitude of the interviewer can affect patient responses. The interviewer may bias survey response by his or her own characteristics or perceived views of a priority patient population (Davis, Couper, Janz, Caldwell, & Resnicow, 2010). The data collectors for the study are diverse and may influence the cluster of their respective respondent data (Davis, Couper, Janz, Caldwell, & Resnicow, 2010). Interviewers measure the patient's health attitudes toward FITs. In public health data collection, patients may want to portray a positive self-image in healthcare settings (Davis, Couper, Janz, Caldwell, & Resnicow, 2010). Researchers contribute the phenomena to patients fear of diagnosis, stigmatization for their health behavior, or loss of access to medical services (Davis, Couper, Janz, Caldwell, & Resnicow, 2010).

Lower response rates limit the range of the study. Pew Research Center revealed that response rates for telephone surveys have plateaued at approximately 9 percent, roughly 25 percentage points less than in 1997 (Pew Research Center, 2017). Nonresponse rates to telephone surveys can introduce bias. Many patients have inaccurate phone numbers currently listed in the EHR system, Epic, such as out-of-service phones, past employer numbers, or intentionally wrong numbers provided to the clinic. The nonresponse bias occurs whether the study participants who agree to answer the survey differ from the participants who refuse or cannot be reached. Statistical analyses will help control for bias, but may result nonetheless.

Prevarication bias affects the validity and reliability of the study (Aday & Cornelius, 2006). Patients who exaggerate their survey responses may affect conclusions drawn. Open-ended inquiries of barriers and facilitators are subject of the patient.

Public Health Benefits

FQHC's serve individuals and families living within the Federal Poverty Guidelines. As the Healthy People 2020 goals and objectives aspire to reach a national screening rate of 70.5%, CRC screening rates at FQHCs continue to lag behind: less than 40% of patients at FQHCs meet the USPSTF screening guidelines. The screening gap places poor and minority patients at greater risk for advanced CRC progression due to inadequate screening processes. Colonoscopies and flexible sigmoidoscopies are generally expensive, invasive, and difficult to schedule for underserved patient populations. By utilizing yearly FOBTs, specifically FITs, FQHCs can create innovative strategies to screen hard-to-reach patient populations through a cost-effective and easy-to-perform approach. Identification of patient characteristics, potential barriers, and potential facilitators of FITs may increase screening rates and identify subgroups that could benefit from tailored health education approaches. The study complements the growing research literature on CRC screening for vulnerable patient populations and resource-limited CHCs to improve health outcomes.

Research Questions and Hypotheses

The purpose of the paper is to compare patient sociodemographic characteristics between FIT returners and FIT non-returners and examine reported barriers and facilitators of FITs for patients and clinicians. Study questions and hypotheses are:

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1. What are the sociodemographic and health behavior differences between patients who return the FIT and patients who do not return the FIT?

    1a. FIT returners are more likely to be privately insured

    1b. FIT returners are more likely to have healthier BMI values

    1c. FIT returners are less likely to smoke than FIT non-returners

2. Among patients who did not complete FIT screening, what are patient barriers to completing the FIT at a Federally-Qualified Health Center?

    2a. Uninsured patients will report more barriers than insured patients.

    2b. Ethnic and racial minorities will report more barriers to returning FITs than individuals who identify as non-Hispanic white.

    2c. Fear of abnormal results will be the most reported barrier.

    2d. Among Spanish-speaking patients, test instructions will be most reported barrier.

3. Among patients who did not complete FIT screening, what are patient facilitators to increase participation rates at a Federally-Qualified Health Center?

    3a. Prepaid postage and return address on the FOBT will be the most reported facilitator.

4. What are clinician knowledge and recommendations to improve FIT return rates?

    4a. Clinicians will not distinguish fecal occult blood tests (FOBTs) from fecal immunochemical tests (FIT).

    4b. Clinicians will report similar barriers and facilitators as their patients.

    4c. Clinicians will recommend colonoscopies over fecal occult blood tests.

CHAPTER TWO

Systematic Literature Review

Introduction

Colorectal cancer (CRC) is a largely preventable disease (Rex, Johnson, Lieberman, Burt, & Sonnenberg, 2000). Yet, CRC continues to disproportionately affect individuals across sociodemographic lines due to low screening utilization CRC (Jackson, Oman, Patel, & Vega, 2016; Tammana, 2014). The lack of CRC screening recommendation for low-income patients may contribute to the gap (Brown et al., 2015). The screening disparity between the general population and the underserved community is wide. Approximately 38% of patients at Federally-Qualified Health Centers (FQHC) are screened, while 62.4% of the general population is screened. (National Cancer Roundtable, 2016; Healthy People 2020, 2015). Health insurance status composes the lowest category of screened individuals when compared to the population analyzed by sex, race, age group, educational attainment, family income, family type, sexual orientation, marital status, among others (Jackson, Oman, Patel, & Vega, 2016; Healthy People 2020, 2015). The Healthy People 2020 objectives target ambitious CRC screening, incidence, and mortality rates. To meet these goals, public health professionals must pioneer interventions to bridge the screening gap between uninsured, low socioeconomic patients, and the remainder of the population. Successful interventions can offer enhanced screening rates and alleviate the burden of disease for vulnerable individuals.

The purpose of this review is to investigate the RCT and non-RCT interventions for increasing stool-based test outcomes for the poor and marginalized. In addition, studies on clinician perspectives involving FIT will be assessed. The review will evaluate a wide array of factors that impact FIT screening in the underserved patient population. Through social and behavioral science theories, interventions are backed with extensive research in how to enhance FIT return. The efficacy of these interventions will be evaluated through their reported results within the intervention groups. Most studies evaluate outcomes of intervention compared to "usual care." Usual care is the typical CRC screening method (simply a FIT kit without outreach) for the respective CHCs and serves as the control group. The systematic literature review connects the diverse style of CRC randomized and non-randomized intervention practices for underserved patient populations.

Methods

Search Strategy

A literature search was conducted via EbscoHost, PubMed, ScienceDirect, Web of Science, and Google Scholar databases beginning 15 May 2017 and ending 1 August 2017 utilizing the search terms "colorectal cancer screening" and "underserved" to identify studies of CRC outreach and in-reach interventions in the underserved population as well as clinician insights. Studies with abstracts, background information, and methods that appeared pertinent to increasing CRC screening by FIT in underserved communities were selected for full text review. Reference lists of all designated articles were also reviewed for additional applicable studies. The Preferred Reporting Items for

Systematic Reviews and Meta-Analyses (PRISMA) was employed as the basis for the systematic review methods (Liberati et al., 2009).

Selection Criteria

Selected studies were evaluated using the following criteria: (1) identified a low socioeconomic or FQHC patient sample; (2) measured FIT completion as a primary outcome variable; (3) published in a peer-reviewed journal within the last 6 years (2012-2017); and (4) implemented an outreach or in-reach CRC intervention design or (5) evaluated perceptions from patients and clinicians to CRC screening.

Data Extraction

Each study was assessed and data were extracted to incorporate: article citations, study purpose, sample characteristics, study design, variable(s) measurement, intervention description, intervention results, and key findings. An annotated bibliography briefly describes the study's intervention, results, and ways for improvement. Tables were constructed to assess authors, study purpose, sample characteristics (study participants and setting), variables measured, intervention description and results, and key findings of the research. The research literature is categorized as randomized (see table 1) and non-randomized clinical studies (see table 2).
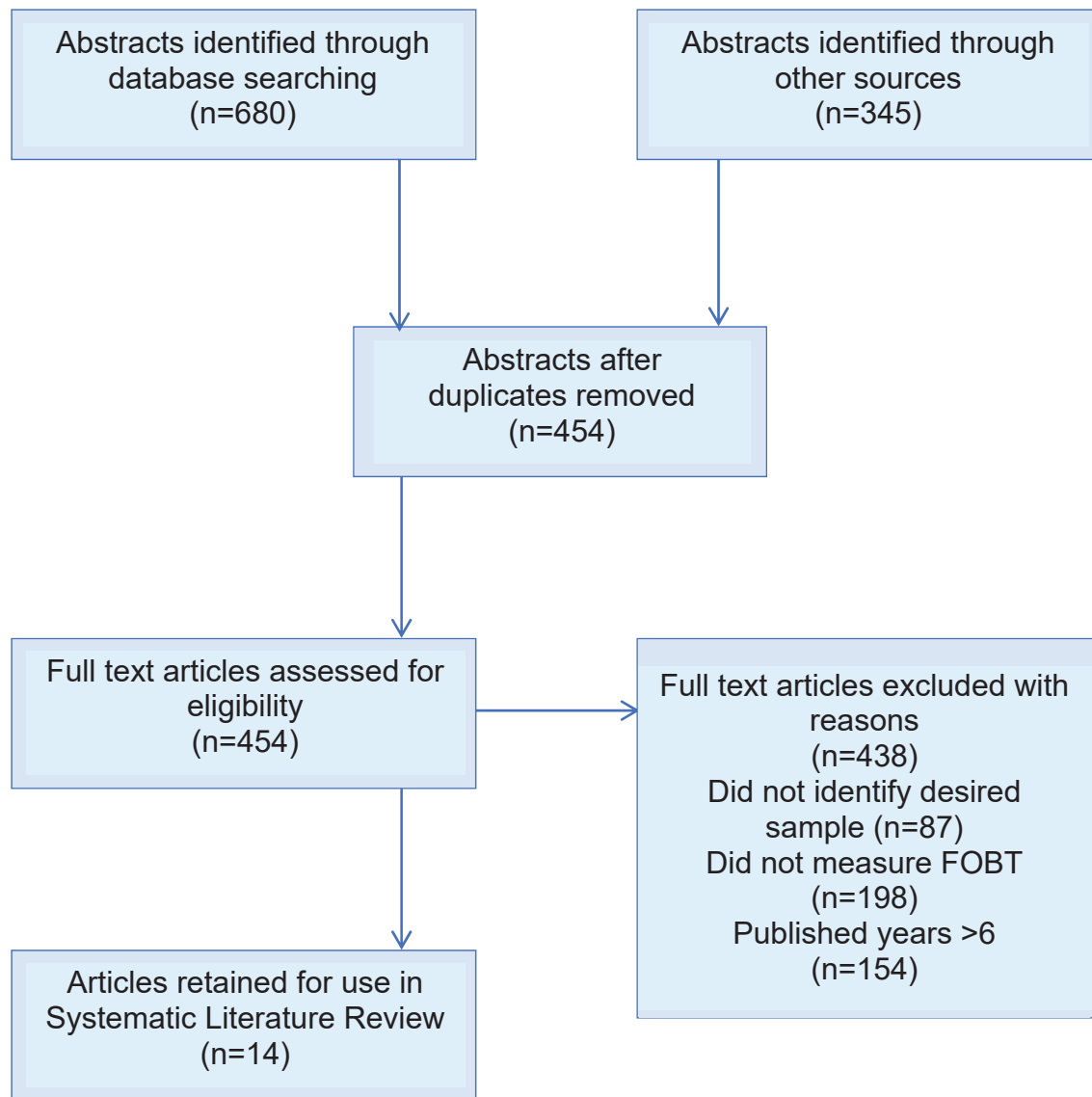
Figure 1. PRISMA flow chart for article selection

Randomized-Controlled Trials

Coronado, G. D., Rivelli, J. S., Fuoco, M. J., Vollmer, W. M., Petrik, A. F., Keast, E., …
    Jimenez, R. (2017). Effect of Reminding Patients to Complete Fecal
    Immunochemical Testing: A Comparative Effectiveness Study of Automated and
    Live Approaches. *Journal of General Internal Medicine*.
    https://doi.org/10.1007/s11606-017-4184-x

The purpose of the randomized controlled trial was to assess the efficacy between

varying styles of reminders for fecal immunochemical tests (FIT). The study targeted

English and Spanish speaking patients within a community health center in Washington.

The intervention mailed an explanatory letter and FIT to study participants out of CRC

screening compliance at four health centers. If the FIT was not returned within three

weeks, study participants were randomly selected to one of the following: reminder letter,

two automated telephone calls, two text messages, live telephone call, reminder letter

with telephone call, two automated calls with one live telephone call, or two text

messages and live phone call. The FIT return rates were analyzed 6 months after

randomization to specified group. Researchers found that live phone call was most

effective at FIT return (34.6%, $p<.05$) in comparison to written forms of communication

reminders. Additionally, Coronado and colleagues echoed past research literature with

findings that validate Spanish-speaking patients returning FITs at a higher rate than

English-speaking counterparts.

Goldman, S. N., Liss, D. T., Brown, T., Lee, J. Y., Buchanan, D. R., Balsley, K., … Baker, D. W. (2015). Comparative Effectiveness of Multifaceted Outreach to Initiate Colorectal Cancer Screening in Community Health Centers: A Randomized Controlled Trial. *Journal of General Internal Medicine*, *30*(8), 1178–1184. https://doi.org/10.1007/s11606-015-3234-5

The purpose of the randomized controlled study is to evaluate the efficacy between several outreach methods for fecal immunochemical tests in a vulnerable, largely uninsured patient population. The study authors sought to determine any difference between the usual FIT screening method or outreach through automated phone call after FIT mailing, text message two days following, electronic medical record system identification after two weeks of non-return, and live telephone call three months after non-return. Researchers measured a 36.7% FIT completion rate for outreach study groups than 14.8% of the control (p<.001). Patients had no prior experience with CRC screening and demonstrated lower return results than targeting patients with past FIT completion. The study can be enhanced by implementing the intervention throughout other FQHCs, larger sample size, and determination of reasons for non-return of FIT (via focus groups, interviews, etc.).

Gupta, S., Halm, E. A., Rockey, D. C., Hammons, M., Koch, M., Carter, E., … Sugg Skinner, C. (2013). Comparative Effectiveness of Fecal Immunochemical Test Outreach, Colonoscopy Outreach, and Usual Care for Boosting Colorectal Cancer Screening Among the Underserved: A Randomized Clinical Trial. *JAMA Internal Medicine*. https://doi.org/10.1001/jamainternmed.2013.9294

The purpose of the randomized clinical study was to clarify if organized mailed outreach boosts CRC screening compared with usual care and if FIT is a better outreach than colonoscopies for CRC screenings among the underserved. The quantitative study comprised of a post-test only methodology, where an intervention was imposed on two groups and CRC cancer screening completion was measured up to 12 months after

treatment. Participants were randomly assigned to three groups: mailed FIT outreach,

mailed colonoscopy outreach, and usual care (control). The screening participation rates

were highest for FIT (40.7%) in comparison to colonoscopy (24.6%) and usual care

(12.1%) (p<.001). Researchers emphasized the effectiveness for mailed outreach in

vulnerable patients, especially FIT outreach when compared to colonoscopy and usual

care.

Jean-Jacques, M., Kaleba, E. O., Gatta, J. L., Gracia, G., Ryan, E. R., & Choucair, B. N. (2012). Program to Improve Colorectal Cancer Screening in a Low-Income, Racially Diverse Population: A Randomized Controlled Trial. *The Annals of Family Medicine*, *10*(5), 412–417. https://doi.org/10.1370/afm.1381

The purpose of the randomized controlled study was to determine whether direct mailing

of fecal occult blood testing (FOBIT) kits for patients overdue for screening is conducive

for screening in the underserved population. The quantitative study encompassed a post-

test only methodology where researchers randomly assigned eligible patients to usual

care or outreach intervention (treatment) and measured outcome by completion of CRC

screening by FOBT, sigmoidoscopy, or colonoscopy. Nearly 30% of patients in the

outreach group had completed CRC screening during study period in comparison to 5%

of the usual care group (p<.001). FOBT kits are effective for promoting CRC screenings

in underserved and marginalized groups. Researchers resolved interventions outside the

clinic are advantageous toward alleviating the disparities of CRC screening (outreach).

Rat, C., Pogu, C., Le Donné, D., Latour, C., Bianco, G., Nanin, F., … Nguyen, J.-M. (2017). Effect of Physician Notification Regarding Nonadherence to Colorectal Cancer Screening on Patient Participation in Fecal Immunochemical Test Cancer Screening: A Randomized Clinical Trial. *JAMA*, *318*(9), 816. https://doi.org/10.1001/jama.2017.11387

The purpose of the randomized clinical trial is to gauge whether notifying providers to

patients that are noncompliant to CRC screening increases fecal immunochemical test

return. The cluster randomized study measured three experimental groups to providers: list of patients, nonspecific reminders, and no reminders or usual care. The variable of interest was patient participation in FIT one year following intervention. The results yielded patient-specific reminders to general practitioners as a small but significant increase in FIT participation (p<.001). The remaining groups, generic reminders and usual care, did not display statistically significant results.

Reuland, D. S., Brenner, A. T., Hoffman, R., McWilliams, A., Rhyne, R. L., Getrich, C., … Pignone, M. P. (2017). Effect of Combined Patient Decision Aid and Patient Navigation vs Usual Care for Colorectal Cancer Screening in a Vulnerable Patient Population: A Randomized Clinical Trial. *JAMA Internal Medicine*, *177*(7), 967. https://doi.org/10.1001/jamainternmed.2017.1294

The purpose of the randomized clinical trial is to evaluate the collective impact of CRC decision aids and patient navigation when compared to a control group. The English and Spanish-speaking patients noncompliant to USPSTF recommendations at community health centers in North Carolina and New Mexico were selected and randomized to experimental or control groups. Researchers measured CRC screen completion through medical records 6 months following the implemented intervention. Decision aids composed of 3 fifteen minute videos emphasizing importance of CRC screening, comparisons of test options, and choosing the brochure corresponding to their level of readiness for screening. Patient navigation consisted of a system whereby an individual employed by the clinic was tasked with orienting patients after appointment with the tools to get screened. The intervention group (decision aid and patient navigation) screened 68% of study participants compared to 27% of the control group (p<.05). Within the intervention group, FOBT/FIT (54%) was the primary screening test used.

The authors express the significance of pre-and post-activities to increase the success of CRC interventions.

Singal, A. G., Gupta, S., Skinner, C. S., Ahn, C., Santini, N. O., Agrawal, D., … Halm, E. A. (2017). Effect of Colonoscopy Outreach vs Fecal Immunochemical Test Outreach on Colorectal Cancer Screening Completion: A Randomized Clinical Trial. *JAMA*, *318*(9), 806. https://doi.org/10.1001/jama.2017.11389

The purpose of the randomized clinical trial is to examine the efficacy of colonoscopy outreach and FIT outreach for improving CRC screening participation within 3 years. Study participants were randomly assigned to mailed FIT outreach, mailed colonoscopy outreach, or the control usual care groups. The study measured screening completion as well as detection rates for adenomas and neoplasia. The results revealed differences between all three groups. Colonoscopy outreach demonstrated better screening results than FIT outreach and usual care groups(p<.001). The study furthers Singal and colleagues' initial findings that reported screening rates of 58.8% of the patients in the FIT outreach, 42.4% for colonoscopy outreach, and 29.6% for the usual care group (p<.001). The three-year research shows that FIT outreach may attenuate over time. The colonoscopy outreach indicated higher prevalence of adenomas and neoplasia in patients but no differences in cancer were observed between any groups. Singal and colleagues acknowledged that screening completion rates remained lower than 40% for all groups. Thus, the need for improvements in CRC interventions and research is pertinent.

Non-Randomized Controlled Trials

Allen, G. K., V, G. M., Aaron, E., Angela, W., Melissa, F., Makosky, D. C., … Marci, C. (2012). A computerized intervention to promote colorectal cancer screening for underserved populations: Theoretical background and algorithm development. *Technology and Health Care*, (1), 25–35. https://doi.org/10.3233/THC-2011-0653

The purpose of the non-randomized controlled study was to gauge the factors patients, intending to undergo a CRC screening, considered significant and use the data to create a computer-based intervention. The qualitative study administered a semi-structured interview that focused on aspects of preparing for CRC screening. The researchers used triangulation and consensus to draw important themes. Personal concerns, reminders, communication with healthcare providers and obtaining test results were primary themes for FOBT and colonoscopy planning. Researchers discovered patients need extensive information on CRC screening to recognize possible difficulties in completing screening procedures. Furthermore, minority patients may require greater care for follow-up than average at-risk patient.

Briant, K. J., Espinoza, N., Galvan, A., Carosso, E., Marchello, N., Linde, S., … Thompson, B. (2015). An Innovative Strategy to Reach the Underserved for Colorectal Cancer Screening. *Journal of Cancer Education*, *30*(2), 237–243. https://doi.org/10.1007/s13187-014-0702-2

The purpose of the non-randomized controlled study was to provide CRC information, education, and fecal occult blood (FOBT) kits to study participants of Hispanic heritage in a rural, three county area of Washington State. The pretest-posttest design evaluated CRC familiarity for study participants after walkthrough of a large, inflatable colon at approximately 47 community health fairs. Interventionists provided 300 free FOBT to eligible community members. Over 75% of the FOBT were returned with 226 completed FOBT. When adjusting for age, ethnicity, gender, education, regular physician, regular

health clinic, and insurance status, those who are over the age of 50, Hispanic, and see a regular physician have self-reported post-tests that show likelihood of intent to be screened for CRC. Researchers posit the success in FOBT kits return (75.3%) attributable to increased awareness through educational visuals, no cost, and no required documentation of income or citizenship status.

Brown, T., Lee, J. Y., Park, J., Nelson, C. A., McBurnie, M. A., Liss, D. T., … Baker, D. W. (2015). Colorectal cancer screening at community health centers: A survey of clinicians' attitudes, practices, and perceived barriers. *Preventive Medicine Reports*, *2*, 886–891. https://doi.org/10.1016/j.pmedr.2015.09.003

The purpose of the non-randomized controlled, cross-sectional study was to survey clinicians in a network of community health centers to understand their attitudes, practice patterns, and perceived patient barriers to CRC screening. Most clinicians considered colonoscopy as the most effective CRC screening method in comparison to flexible sigmoidoscopy, immunochemical FOBT, and guaiac-based FOBT (which were regarded primarily as "somewhat effective"). A major barrier reported that many clinicians perceived their patients do not deem CRC as a serious health treat and over half are unaware of the screening process. Health maintenance flow sheets remind clinicians which patients need CRC screening as well as implementing the electronic medical record system. The findings demonstrate negative attitudes toward FIT are adversely affecting CRC screening rates and educating clinicians on FOBT terminology (immunochemical versus guaiac) is essential to increasing CRC screening rates.

Cole, A. M., Tu, S.-P., Fernandez, M. E., Calo, W. A., Hotz, J., & Wolver, S. (2015). Reported Use of Electronic Health Records to Implement Evidence Based Approaches to Colorectal Cancer Screening in Community Health Centers. *Journal of Health Care for the Poor and Underserved*, *26*(4), 1235–1245. https://doi.org/10.1353/hpu.2015.0120

The purpose of the non-randomized controlled, cross-sectional study was to describe the number of community health centers that report specific capabilities with electronic health records (EHR) and the level of ease implementing these systems for CRC screening. Specifically, community health centers were collected via the Cancer Prevention and Control Research Network's (CPCRN) Clinic Characteristics Survey. Roughly a quarter of the community health centers find EHR systems on CRC screening as accurate. Yet, a majority find EHR an easy method to perform CRC screening activities. The authors discovered inferior EHR data documenting CRC screening as a significant barrier. EHR systems are viable solutions to offering evidence-based approaches to screening in the future.

Davis, T. C., Arnold, C. L., Rademaker, A. W., Platt, D. J., Esparza, J., Liu, D., & Wolf, M. S. (2012). FOBT Completion in FQHCs: Impact of Physician Recommendation, FOBT Information, or Receipt of the FOBT Kit: FOBT Completion in FQHCs. *The Journal of Rural Health*, *28*(3), 306–311. https://doi.org/10.1111/j.1748-0361.2011.00402.x

The purpose of the non-randomized controlled study was to evaluate the impact on FOBT completion among rural versus urban Louisianan clinics in three outcomes: physicians' verbal recommendation, educational information on FOBTs, or physician delivering FOBT kit. The surveys assessed self-reports by patients of whether the three prior listed scenarios had impact on their FOBT experience. Researchers discovered statistically significant results from multivariate analyses in rural patients who received FOBT information ($p=.001$), physician recommendation ($p=.002$), and physician providing

FOBT (p<.0001). However, study authors only found physician delivering FOBT to be effective for FOBT completion in urban patients (p<.0001). Patients whom receive FOBT kits directly from the physician appear more likely to successfully return test. The study can be improved by a larger sample size that encompasses more males and racial diversity.

Tampa Bay Community Cancer Network (TBCCN), Gwede, C. K., Koskan, A. M., Quinn, G. P., Davis, S. N., Ealey, J., … Meade, C. D. (2015). Patients' Perceptions of Colorectal Cancer Screening Tests and Preparatory Education in Federally Qualified Health Centers. *Journal of Cancer Education*, *30*(2), 294–300. https://doi.org/10.1007/s13187-014-0733-8

The non-randomized controlled study investigated patients' perceptions on CRC screening tests such as fecal immunochemical tests. Researchers conducted focus groups with 53 study participants in FQHCs. The focus groups were recorded, coded, and analyzed. The authors used previous research literature to form the moderator's line of probing. Specifically, focus groups measured FQHC patient perceptions on barriers and facilitators to CRC screening, knowledge of screening tests, and desired preliminary education CRC screening. Patients lack of need for screening and physician recommendation for test were the most common barriers to screening. Authors observed interpersonal motivators like clinician recommendation and intrapersonal motivators such as familial support. Other than supporting previous research, the novel aspect of the study revealed that participants had a generally positive sediment toward FIT as a method for CRC screening. The efforts can be enhanced by interviewing Spanish-speaking patients and increasing external validity.

Tampa Bay Community Cancer Network (TBCCN) Partners, Gwede, C. K., Davis, S. N., Quinn, G. P., Koskan, A. M., Ealey, J., … Meade, C. D. (2013). Making It Work: Health Care Provider Perspectives on Strategies to Increase Colorectal Cancer Screening in Federally Qualified Health Centers. *Journal of Cancer Education*, *28*(4), 777–783. https://doi.org/10.1007/s13187-013-0531-8

The purpose of the non-randomized controlled study was to explore clinician's perspectives about their patient's enablers to CRC screening and the response to preparatory education. The mixed-methods study implements in-depth interviews, focus groups, and a short survey to explore health care providers' perspectives on CRC screening. Researchers discovered fear of abnormal findings as greatest barrier and offering less invasive testing and test-specific educational materials for motivators. Clinicians relied on symptomatic cues for CRC screening recommendations. The authors concluded multi-level interventions are necessary for FQHC's to meet UDS recommendations for CRC screening and better approval of FOBT screens for the medically disadvantaged. The study is furthered by a larger sample size and random recruitment of clinician perspectives.

Table 1. FOBT interventions: randomized controlled trials (n=7).

In-Text Citation	Study Purpose and Sample Characteristics	Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
Coronado, Schneider, Sanchez, Petrik, & Green, 2015	Purpose: evaluated the efficacy of live versus automated intervention methods for reminding patients in a fecal immunochemical test (FIT) program Participants: n=2010 adults noncompliant with USPSTF recommendations; Age 50 to 75; Nearly 25% Hispanic and 20% Spanish-Speaking Setting: Sea Mar Community Health Centers in Washington, USA	Variable(s): FIT return rates 6 months following intervention for seven experimental groups Description: All groups were provided introductory letter on CRC screening and FIT kit to complete. Those who did not return FIT within three weeks were randomized to outreach groups listed: reminder letter (n=262), automated telephone call (n=309), text message (n=307), live call (n=280), reminder letter with live call (n=287), and text with live call (n=299)	Results: FIT completion rates: reminder letter 25.5%, automated phone call 23.3%, text message 16.9%, live phone call 31.8%, reminder letter with live phone call 27.4%, automated phone call with live phone call 28.9%, text message with live phone call 27.1%, and non-randomized patient portal 20.7% (p<.05) 1. Nearly 512 of randomized study participants returned their FIT for a return rate of 25.5% 2. The randomized and non-randomized study sample has roughly a 32.7% return rate. 3. Intention-to-treat analyses demonstrated 50% greater odds of FIT completion for live phone call reminders than written, 34% lower chance for text reminders 4. Live calls yield higher FIT return than mailed reminders.

In-Text Citation	Study Purpose and Sample Characteristics	Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
Goldman et al., 2015	Purpose: one of the first studies to evaluate the effectiveness of an FIT outreach intervention on patients who have no medical history of CRC screening

Participants: n=420 adults with no previous CRC screening; Age 50 to 75; 66% Female; 62.1% Latino; 70.7% Uninsured; 20.3% Spanish-speaking

Setting: Erie Family Health Center (EFHC), a federally-qualified health center in Chicago, IL. | Variable(s): FOBT completion by weeks: 0-2, 2-13, 13-26, 26-52; FOBT completion by months 6 and 12; Total CRC screening by months 6 and 12

Description: FIT kits with provider letter and instructions were mailed to patients. Patients were then randomized to groups

Intervention: (n=210) Study participants experienced automated call three days after mailed FIT, automated text message two days after call, use of EHR for automated call and text two weeks after text, and lastly live call by patient navigation after three months of nonadherence | Results: The percent of FOBT completion in outreach patients is 36.7% after 6-month follow-up and 40% after 12-month whereas usual care group comprised 14.8% and 22.4%, respectively (p<.001)
1. FIT completion rates were higher for patients with more frequent clinic visits (p<.001)
2. Patients answering automated telephone reminders are more likely to complete a FIT within 13 weeks than those without completed call (p=.006)
3. Patients receiving a text message were more likely to complete FIT than those who did not (p=.004) |

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In-Text Citation	Study Purpose and Sample Characteristics	Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
Gupta et al., 2013	Purpose: The study assesses the impact of mailed outreach for CRC screening compared to a control group, specifically comparing FIT outreach to colonoscopy outreach for improved screening processes Participants: n=5970 adults noncompliant with USPSTF recommendations; Aged 54 to 64 years old; 64% Female, 41% White, 24% 29% Hispanic Setting: The John Peter Smith Health Network System in Texas serving 13 community and hospital-based primary care health centers	Variable(s): CRC screening participation for FIT, colonoscopy, and usual care groups; neoplasia detection rates; completion of follow-up diagnostic testing Description: Patients were randomized to three groups: Intervention: FIT outreach (n=1593) received mailed invitation, two automated calls at time of mailing and two weeks following, two live calls after three weeks, and FIT kit with pre-paid postage Colonoscopy outreach (n=479) received mailed invitation, two automated calls at time of mailing and two weeks following, two live calls after three weeks, and aid scheduling and understanding preparation for colonoscopy	Results: Screening participation rates were: 40.7% for FIT outreach, 24.6% for colonoscopy outreach, and 12.1% for usual care (p<.001). Eleven of 60 study participants with abnormal FIT results did not complete colonoscopy follow-up 1. Mailed, organized outreach (mailed invitations and telephone follow-ups) demonstrated positive results as the FIT group tripled CRC screening rates and the colonoscopy group doubled CRC screening rates 2. FIT outreach held significantly higher screening among men, women, whites, blacks, Hispanics

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In-Text Citation	Study Purpose and Sample Characteristics	Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
Jean-Jacques et al., 2012	Methods: Quantitative, Post-Test Only Design Participants: n=202 USPSTF noncompliant patients with at least 2 clinic visits from July 2008 until December 2009; Aged 50 to 80; 62% Female; 27.2% African American, 26.2% Caucasian, 20.3% Hispanic; 67.8% uninsured; 61.4% non-English speakers Setting: Heartland International Health Center (HIHC), a federally-qualified health center in Chicago, IL	Control: (n=3898) visit-based screening Variable(s): percentage of study participants who completed CRC screening (FOBT, sigmoidoscopy, or colonoscopy) 4 months following intervention Description: Patients were randomized to one of two groups: FOBT outreach or usual care Intervention: (n=104) patients received a letter from their medical provider about CRC, a CDC issued fact sheet, a guaiac-based FOBT, and manufacturer instructions. Within 2 weeks, patients received three live calls two weeks apart. If still not returned FOBT in 6 weeks, patients received another FOBT	Results: The intervention group had 30 completed FOBTs, one completed colonoscopy compared to the usual care who had 4 FOBTs, and one colonoscopy 1. Outreach for mailed FOBT kits can be effective for populations afflicted with high rates of poverty, uninsured individuals, limited English proficiency, and racial or ethnic disparities 2. The study adds to the growing literature of superiority of patient-driven outreach compared to clinician reminders

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In-Text Citation	Study Purpose and Sample Characteristics	Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
Rat et al., 2017	Purpose: determine the efficacy of patient-specific reminder lists and general notifications (regional rates) for the physician on CRC screening participation. Participants: n=31,229 patients non-adherent to French CRC recommendations (FIT screening every 2 years for 50 to 74 year olds); Age 50 to 74, Mean Age 60.9 years; Nearly 25% live with a chronic disease; Setting: General medical practitioners from Loire-Atlantique and Vendée, France	Control: (n=98) visit-based screening colonoscopy Variable(s): percentage of study participants who participated in FIT one year following intervention Description: Patients were randomized to three general practitioner groups: patient-specific reminders, general reminders, or usual care Intervention: Patient-Specific: (n=10,476) patients were allocated to physicians that were given patient names to contact for CRC screening via informatics reminders and live calls from medical secretaries General Reminders: (n=10,606) patients randomized to physicians with general lists about CRC	Results: After one year, 24.8% of patient-specific reminders intervention group, 21.7% of the general reminders, and 20.6% in the control groups completed a FIT kit (p<.05) 1. Patient-specific reminder lists for physicians have small but significant impacts to increase FIT completion when compared to generic reminders and usual care groups.

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In-Text Citation	Study Purpose and Sample Characteristics	Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
		screening rates and no preferred method of contact Control: (n=10,147) practitioners received nothing to contact the patients	
Reuland et al., 2017	Purpose: Gauge the effectiveness of a clinical trial that provided pre-appointment patient decision aids and follow-up patient navigation compared to the usual care control group Participants: n=265 patients non-adherent to USPSTF recommendations; Age 50 to 75, Mean Age 58 years; 65% Female; 62% Latino; 78% household income less than $20,000; 34% uninsured Setting: Community health centers in Albuquerque, New Mexico and Charlotte, North Carolina	Variable(s): percentage of study participants who completed a CRC screen within 6 months following intervention Description: Patients were randomized to an intervention and control group Intervention: (n=133) Study participants received pre-appointment visual decision aid on CRC and post-appointment patient navigator for live call, order FOBT/FIT kits, and live calls every 2 weeks until refused or cannot be reached (5 times) Control: (n=132) visit-based screening	Results: After 6 months of index visit, intervention patients achieved a CRC screening rate at 68% (54% FOBT/FIT, 14% colonoscopy) to 27% of the control groups (21% FOBT/FIT and 6% colonoscopy) (p<.05) 1. The collective impact of both visual pre-appointment decision aid and the outreach by patient navigation demonstrated significant CRC completion rates across difficult to screen groups (low-SES, Spanish-speakers, low health literacy, uninsured) 2. The study adds to the mounting literature conclusions that FOBT/FIT options greatly enhance CRC screening rates for difficult patient populations

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In-Text Citation	Study Purpose and Sample Characteristics	Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
Singal et al., 2017	Purpose: determine any difference in CRC screening completion for FIT (bilingual invitation letter, kit instructions, and live call reminders after two weeks) and colonoscopy outreach (bilingual invitation letter, scheduling information, live call reminders after two weeks) intervention groups Participants: n=5,999 patients non-adherent to USPSTF recommendations; Age 50 to 64, Mean Age 56 years; 62% Female; 49% Hispanic, 24% Black; 100% had primary care visit within year prior to intervention start Setting: Parkland Health and Hospital System in Texas	Variable(s): percentage of study participants who completed a CRC screen within 3 years following intervention Description: patients were randomized to one of three groups: FIT outreach, colonoscopy outreach, and usual care Intervention: FIT outreach: (n=2400) participants received mailed FIT kit, invitation letter with CRC risk, return envelope with pre-paid postage, live calls after mailing (two total attempts), and abnormal FIT results scheduled for colonoscopy follow-up Colonoscopy outreach: (n=2400) participants received invitation letter with CRC risk and phone number to schedule colonoscopy, live calls after mailing (two total	Results: The initial results after a one year follow-up discovered a 58.8% of FIT, 42.4% of colonoscopy, and 29.6% for usual care who completed the CRC screening (p<.001). After 3 years of follow-up, 38.4% of the colonoscopy outreach group, 28% of FIT outreach group, and 10.7% in control group completed 1. Comparing initial follow-up to three-year follow-up, FIT group's CRC screen completion decreases more over time than colonoscopy group 2. Both mailed invitations for colonoscopy and FIT increased CRC participation when compared to usual care 3. The study revealed that colonoscopy outreach was more effective for increasing screening completion than FIT, contradicting Singal and colleagues' previous findings 4. Screening rates remained suboptimal with under 40% completed and strengthens the need for future improvements Continued

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In-Text Citation	Study Purpose and Sample Characteristics	Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
		attempts), co-payment information ($0 to $50), and free bowel prep kit if scheduled	
		Control: (n=1199) visit-based screening	

Table 2. FOBT interventions: non-randomized controlled trials (n=8)

In-Text Citation	Study Purpose and Sample Characteristics	Design; Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
Allen et al., 2012	Purpose: explore aspects of FOBT and colonoscopy screening in a semi-structured interview with patients recruited from a primary care clinic and use data to inform a computer-based intervention Participants: n=50 study participants non-compliant with USPSTF recommendations; Age≥50 years, 60 average years of age; 52% Female; 28% Spanish-speaking; 20% African American, 32% Hispanic Setting: University of Kansas primary care outpatient clinic	Design: qualitative Variable(s): factors patients deemed "important" when undergoing CRC screening Description: n=50 participants were recruited via a sampling stratification system for equal representation and preferred test (colonoscopy or FOBT) Semi-structured verbal interviews were conducted to analyze aspects of CRC screening specific to preferred test	Results: Interviews discovered themes including: personal concerns, reminders, communication with healthcare providers, and obtaining test results FOBT specific themes comprise: sample collection and sample return Colonoscopy specific themes consist of: scheduling procedure, intervention questions, bowel preparation, and transportation 5. Barrier themes (personal concerns, scheduling, or transportation) are vital to CRC screening intervention 6. Process themes (sample collection, return, and colonoscopy preparation) may delay CRC screening 7. Accessory themes (communication with clinician, receiving test results) are significant to patient self-efficacy and comfort

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In-Text Citation	Study Purpose and Sample Characteristics	Design; Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
Briant et al., 2015	Purpose: increase CRC awareness, education, screening behaviors, and conduct follow-up on study participants through live call results of FOBT Participants: n=947 community members; Age≥18; 76.6% Female; 76.4% Hispanic, 46.9% had less than a high school education Setting: The Center for Community Health Promotion (CCHP) of Fred Hutchison Cancer Research Center in rural, agricultural area of Washington State	Design: quasi-experimental Variable(s): pre- and post-test familiarity with CRC screening; self-reports of likelihood to be screened Description: (n=947) community members over the age of 18 were presented CRC familiarity pre-tests prior to entering inflatable colon with educational opportunities and CRC familiarity post-tests after exiting 300 of the 947 individuals over the age of 50 were given free FOBT kits	Results: Individuals demonstrated statistically significant results in knowledge of colon polyps, colon cancer, CRC screening tests, and survival of CRC with early detection by gender, ethnicity, and age (except early detection for over 50 group) 4. An inflatable colon is an innovative method to acquaint low health literacy populations with CRC and screening processes 5. The FOBT return rate (75.3%) indicates that when minority populations are given the opportunities and services, screening utilization is possible)
Brown et al., 2015	Purpose: assess clinician attitudes, practice patterns, and perceived barriers of CRC screening Participants: n=180 eligible primary care clinicians (physicians, physician assistants, and advanced practice nurses);	Design: cross-sectional Variable(s): perceived importance of CRC screening to other preventive medicine; perceived effectiveness of CRC screening tests; typical CRC screening practice;	Results: 73.3% of clinicians found that CRC screening was important as breast and cervical cancer screenings; 63% recommended CRC screening to over 75% of eligible patients (although only 44% of clinicians have over 50% of patients compliant to USPSTF recommendations); 37% recommend Continued

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In-Text Citation	Study Purpose and Sample Characteristics	Design; Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
	62% Female; Average 11.5 years in practice; cared for a weekly average of 58.5 patients; 57% were medical doctors Setting: Twelve CHCs in the CHARN network	perceived barriers to screening; beliefs about strategies to improve screening Description: (n=180) Of the 376 eligible CHC clinicians, 180 completed the online survey for a response rate of 47.9%	only colonoscopy as a proper means of screening; 92.7% find the colonoscopy as very effective compared to Flexible Sigmoidoscopy (24%), FIT (24.6%), and guaiac-based FOBT (16%) 1. CHC clinicians overwhelmingly supported colonoscopy as the preferred test, although FOBT screening has proven to lower CRC mortality 2. The clinician's belief in colonoscopy as the "gold standard" for CRC screening is unclear and contrasts with patient access and barriers to colonoscopies 3. Majority of clinicians surveyed believe use of the EHR is helpful in interventions to increase CRC screening
Cole et al., 2015	Purpose: describe the number of CHCs utilizing EHR systems and the level of ease in adapting them for CRC screening Participants: n=50 CHCs; 64% serve over 5,000 patients; 42% serve over 50% of uninsured patients; 38% serve patients with	Design: cross-sectional Variable(s): proportions of CHCs using EHR data to: measure CRC screening, deliver reports, and provide patient reminders	Results: Of the surveyed CHCs, 90% employ EHR systems, most CHC's reported ease with generating patient panels by provider, non-adherent patients, and calculate CRC screening rates 3. Only 27% of CHC's perceived sending patient CRC reminders

In-Text Citation	Study Purpose and Sample Characteristics	Design; Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
	limited English proficiency; 62% have above 3 clinics in a Federally-Qualified Health Center Setting: Cancer Prevention Control Research Network's (CPCRN) community health center Clinic Characteristics Survey	Description: Surveys were administered to 50 of the 75 eligible CHCs in a 10-week timeframe Surveys measured EHR use, capabilities, and perceived accuracy of the system	via EHRs easily 4. Annual CHC screening rates for CRC may be underestimated due to the complex nature of CRC screening tests (varying time for respective tests) and EHR data typically lower than self-reported data 5. Only a quarter of surveyed CHC's perceived EHR reports on CRC screening data as "very accurate"
Davis et al., 2012	Purpose: to evaluate the effectiveness of physician recommendation, FOBT education, or direct receipt of FOBT from clinician has on FOBT completion in urban and rural clinics Participants: n=849 study participants noncompliant with USPSTF recommendations; Age≥50, median age of 57 years; 77.4% Female; 68.2% African American; 33% did not graduate from high school; nearly 50% had low literacy tests	Design: qualitative Variable(s): participant self-reports on receiving physician provided recommendations for CRC screening, FOBT information, and FOBT kit directly from physician Description: nurse's aide recruited eligible participants (who had scheduled appointments at the clinic) to answer survey questions on whether they received a physician recommended CRC screening test, FOBT	Results: In rural clinics, all self-reported questions were predictive of CRC screening completion (physician recommendation p=.002, FOBT information p=.001, physician providing FOBT p<.001) 1. In urban clinics, solely physician providing the FOBT was predictive of FOBT completion 2. The most effective method to increase FOBT completion in these FQHCs was the physician directly providing the FOBT kit to the patient 3. Successful CRC screening involves screening education,

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In-Text Citation	Study Purpose and Sample Characteristics	Design; Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
	Setting: Eight Federally-Qualified Health Centers in one of seven parishes in north Louisiana	educational materials (video, health fair flyers, pamphlet, discussion, etc.), been given an FOBT directly from a physician, or completed an FOBT	information, and counseling
Tampa Bay Community Cancer Network (TBCCN) et al., 2015	Purpose: explore patients' perceptions on CRC screening tests and in-clinic education in a Federally-Qualified Health Center Participants: n=53 FQHC patients between the ages of 50 and 75; mean age 56.7; 51% Female; 41.5% Black, 35.8% White, 13.2% Hispanic; 73.1% had an annual household income less than $20,000; 43.4% were up-to-date with CRC screening Setting: National Cancer Institute-Funded Community Network Program Center's community-based participatory research project in three southwestern Florida counties	Design: qualitative Variable(s): perceptions of barriers and facilitators to CRC screening, awareness and reaction to CRC tests, preference of CRC screening education Description: Eight focus groups measured qualitative input from 53 individuals (5 to 8 assigned to a group) The focus groups were audiotaped, transcribed, coded, and analyzed	Results: three themes emerged: barriers and facilitators to CRC screening, test preference, and preference for in-clinic CRC screening education Facilitators discovered were at the intrapersonal (age, affected relative), interpersonal (physician recommendation), and environmental (billboards, commercials, newspaper ads) Impediments comprised lack of clinician recommendation and lack of perceived need to screen. Most participants preferred FOBT/FIT over the colonoscopy because it's less invasive 3. Participants expressed video with an accompanying pamphlet as the best educational experience for CRC screening

In-Text Citation	Study Purpose and Sample Characteristics	Design; Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
			4. Most participants were not knowledgeable about CRC risk factors 5. Negative attitudes toward CRC screening are due to nature of test preparation, affordability and lack of insurance, invasive and uncomfortable procedures, and embarrassment 6. Many voiced the desire for physician-directed in-clinic interventions on CRC screening
Tampa Bay Community Cancer Network (TBCCN) Partners et al., 2013	Purpose: consider health care providers' perceptions on barriers and facilitators to CRC screening and response to preparatory education Participants: n=17 Federally-Qualified Health Center clinicians; 41 average years of age; 94% female; 56% White; 23.5% Black; 41.2% physicians, 11.8% physician assistants, 35.3% nurse practitioners; Three-year average working at a FQHC	Design: mixed-methods qualitative Variable(s): providers' perspectives on patients' knowledge of CRC information, barriers and facilitators to patient-provider discussion of CRC, strategies to improve educational CRC screening materials, patient barriers and facilitators, and communication methods for proper follow-up	Results: four themes surfaced: receptivity to patient preparation prior to clinic visit, factors influencing follow-up, providers' communication strategies to patients, necessary clinic resources 1. Most commonly discovered CRC screening impediment to the patient was fear of results 2. Providers emphasized patient-centered strategies based on patient's gender, education, and language 3. Clinicians reported preference to colonoscopy despite mounting Continued

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In-Text Citation	Study Purpose and Sample Characteristics	Design; Variable(s) Measured, and Intervention Description	Intervention Results and Key Findings
	Setting: Tampa Bay Community Cancer Network (TBCCN) community-based participatory research in western central Florida	Description: Two focus groups (six and seven individuals each) and four single interviews were conducted for 30 minutes Two questions were asked to each provider: rate the importance of ten patient-related criteria that influence CRC screening and the occurrence of recommending CRC screening tests to average-risk, asymptomatic patients	evidence of patient comfort with FOBTs

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Summary of Review

CRC screening is highly effective for diminishing mortality rates and the burden of disease through use of FOBT, flexible sigmoidoscopy, and colonoscopy. CRC screening tests have been underutilized particularly within the racially diverse and socioeconomically disadvantaged populations (Jackson, Oman, Patel, & Vega, 2016). Minority populations have not received the full benefits of CRC screening. The review provides greater insight concerning CRC barriers and facilitators, FOBT specific strategies for the underserved, and health care providers' feedback.

CRC Screening Barriers

The research literature demonstrates the significant impact of CRC screening on Americans over the age of 50 (American Cancer Society, 2017; Siegel et al., 2017). The CRC mortality rates have steadily declined the past decade due to widely available testing in primary care clinics (American Cancer Society, 2017; Siegel et al., 2017). States that exhibited decreases in CRC incidence rates had higher colonoscopy screening rates (Siegel et al., 2017). Nonuse of screening is estimated to be attributed to over 60% of CRC mortality (Reiner et al., 2015).

The literature demonstrates that fear is the largest barrier to screening completion (TBCCN et al., 2015; TBCCN et al., 2013). Fear of abnormal results and colonoscopy follow-up after positive FOBT play a pivotal role in patient screening. Other psychosocial factors like embarrassment or disgust by the nature of the screen heavily influence CRC screening participation (TBCCN et al., 2015; TBCCN et al., 2013). Limited knowledge of CRC screening or why it is necessary if asymptomatic were also

primary concerns (Allen et al., 2012; Briant et al., 2015; TBCCN et al., 2015; TBCCN et al., 2013).

Studies indicate that CRC is largely preventable through screening strategies (Coronado et al., 2017; Goldman et al., 2015; Gupta et al., 2013; Jean-Jacques et al., 2012; Rat et al., 2017; Reuland et al., 2017; Singal et al., 2017). Researchers emphasize the priority to match current screening tactics to the underserved populations to alleviate CRC disparities. The absence of a universal approach to identify unscreened individuals in disadvantaged communities may widen the screening gap (Allen et al., 2012; Briant et al., 2015; Cole et al., 2015). The systems to identify the unscreened patients favors the insured (Allen et al., 2012; Briant et al., 2015; Cole et al., 2015). Uninsured individuals are commonly unable to visit their healthcare provider on a regular basis and are easily neglected by current screening methods (Goldman et al., 2015; Reuland et al., 2017).

Presently, EHRs are predominantly used throughout the healthcare field to efficiently track patients (Cole et al., 2015). CHCs use the EHR system to administer preventive care (Cole et al., 2015). EHR data can develop panels of patients by provider that is resourceful for identifying patients that need screened (Cole et al., 2015). Yet, many CHCs are unable to use the EHR to send reminders for CRC screening (Cole et al., 2015). Few (24%) CHCs perceive EHR data as very accurate (Cole et al., 2015). The current EHR system stands as a barrier to improving CRC disparities, but researchers speculate this will change (Cole et al., 2015).

CRC Screening Facilitators

Patient motivators encompass intrapersonal, interpersonal, and environmental levels (Brown et al., 2015; Davis et al., 2012; TBCCN et al., 2013). Intrapersonal

facilitators included age of the patient or if the patient knows of someone affected by CRC (Brown et al., 2015). The most significant interpersonal motivator is the physician's specific recommendation for a CRC screening test. Davis and colleagues strengthened the physician's role in encouraging patients to complete CRC screening, by demonstrating the effectiveness for when a physician directly delivers an FOBT to the patient (Davis et al., 2012). Environmental factors that may influence patient uptake of CRC screening include billboards, newspaper ads, radio announcements, and commercials, among several other media platforms (Davis et al., 2012).

FOBT Specific Strategies

The research literature is unclear whether the colonoscopy or FIT screening tests are most effective for increasing participation within the underserved communities (Singal et al., 2017). The traditional methods of CRC screening have consisted of face-to-face meetings with the primary care physician (Goldman et al., 2015). Community outreach outside of regular healthcare visits are optimal for the large and diverse patient populations.

Randomized controlled trials have evaluated the efficacy of community outreach (mailed FIT kits, mailed colonoscopy materials, reminders, patient navigation, decision aids) compared to usual care. The trials have demonstrated statistically significant results in improving screening rates with the mailed FIT and colonoscopy experimental groups to the usual care control groups. Screening participation is highest among FIT outreach, followed by colonoscopy outreach, then usual care (Coronado et al., 2017; Gupta et al., 2013). Although, a recent study by Singal and colleagues found FIT outreach screening rates attenuated over time (Singal et al., 2017). Mailed FIT outreach provides a valuable

one-time measure for CRC (Gupta et al., 2013; Jean-Jacques et al., 2012). Colonoscopy outreach had improved rates for complete CRC screening relative to the usual care groups (Coronado et al., 2017; Gupta et al., 2013; Singal et al., 2017). Unfortunately, the trials may fail to track positive FIT kits (Coronado et al., 2017; Gupta et al., 2013; Singal et al., 2017). Participants may have higher chance of one-time screening but may never complete entire CRC process if test returns positive (Singal et al., 2017). Studies with longer follow-up are desired to compare effectiveness for full CRC screening rather than an initial measure (Singal et al., 2017).

In-clinic outreach can further enhance the CRC screening process through educational experiences, available screening kits, and physician interventions (Briant et al., 2015; Davis et al., 2012; Golman et al., 2015; TBCCN et al., 2013). Health workers supplemented free FOBTs to at-risk community members after walkthroughs of an inflatable colon to illustrate the detriments of CRC (Briant et al., 2015). The visual prompted higher compliance to CRC screening and substantiated the importance of health education. Physician and patient interactions can promote proper discussions that facilitate higher CRC screening participation rates (Davis et al., 2012). Specifically, Rat and colleagues found that French primary care physicians, who were provided patient specific reminder lists of noncompliant patients, were better equipped to enhance CRC screening within their respective clinics (Rat et al., 2017).

Qualitative studies explore the concerns arising from FOBT and colonoscopy screening measures. The themes highlight patient concerns of the screening procedure, reminders for the screen, communication with clinicians, and receiving test results (Allen et al., 2012). The colonoscopy themes identified several more challenges for study

participants than the FOBT themes (Allen et al., 2012). The interviews support the ease

of FOBTs and the difficulty in full completion of the screening through the colonoscopy

(Allen et al., 2012).

Health Care Providers' Feedback

Health care providers are divided on screening methods conducive to CHCs and

those serving the disadvantaged (Brown et al., 2015; TBCCN et al.; 2013). Many

clinicians find the less invasive FIT kits to be less effective for detecting presence of

CRC in relation to the colonoscopy screening test, whereas others stress the importance

of FIT kits due to the accessibility (Brown et al., 2015). Many health care providers do

not believe colonoscopies are easily available for their patients (Brown et al., 2015; Cole

et al., 2015). This is a stark finding when clinicians favor the colonoscopy as the

definitive screening tool for CRC (Brown et al. 2015; Cole et al., 2015). The clinicians

noted that referral to screening practices is effective in furthering participation rates

(Brown et al. 2015; Cole et al., 2015). Nevertheless, healthcare providers reported

reliance on patients' described symptoms to recommend CRC screening (Brown et al.,

2015).

Conclusion

This literature review expresses the magnitude of CRC screening. CRC is largely

treatable if caught early and affects individuals disproportionately across racial, ethnic,

and socioeconomic lines. Screening methods have shown to be effective in diminishing

the burden of the disease except for marginalized populations. Early detection and

screening procedures must adapt to improve the health equity for underserved populations.

Barriers to CRC screening require future research to develop adequate identification services for healthcare providers serving the disadvantaged. CRC screening studies must develop longer follow-up periods to evaluate whether study participants are undergoing a colonoscopy if the FIT kit returns positive. Healthcare providers should acquaint themselves with the FOBTs to increase their perceptions on efficacy. CRC screening facilitators need to be incorporated into more randomized clinical trials for assessment of efficacy.

Low CRC screening rates, particularly for marginalized populations presents a multilevel problem that requires innovative solutions. Researchers, in each included study, acknowledge the need for tailored interventions that will increase screening completion within underserved communities. CRC screening approaches must focus on the unscreened, provide an accessible test for the patient's specific situation (in or out of clinic), and offer viable treatment options if CRC is diagnosed.

CHAPTER THREE

Methods

The study has been approved by the Institutional Review Board at Baylor University
(IRB Reference #1125461)

Research Site Background

McLennan County is in Central Texas and has a population of approximately 247,934 (United States Census Bureau, 2016). The Waco Family Health Center (WFHC), a Federally-Qualified Health Center (FQHC), provides care for over 58,000 patients, which comprises approximately 39.6% of county residents (Family Health Center, 2016). Patients reside in over 79 zip codes (including 47 outside of McLennan County) and are of all ages (Family Health Center, 2016). Over 90% of the patients live at or below 200% of the Federal Poverty Guidelines (Family Health Center, 2016). Thirty percent (30%) of patients identify as Non-Hispanic white, 24.3% as Non-Hispanic black, 40.7% as Hispanic or Latino, and 5% as other (Family Health Center, 2016). In 2015, the FHC medical staff delivered medical care to 58,164 patients (Family Health Center, 2016). In that year 1,475 patients were homeless and 6,349 patients resided in public housing (Family Health Center, 2016). The most common diagnoses were hypertension (11.9% of patients) and diabetes mellitus (5.5% of patients) (Family Health Center, 2016). Approximately 16.3% of patients lacked health insurance and were afforded care through a "Good Health Card," which is a discounted fee program that expanded coverage to 26.8% of the FHC patient population (Family Health Center, 2016).

Patient Participant Recruitment

The WFHC utilized the EHR system, Epic, to query all fecal immunochemical tests (FITs) ordered from January 1, 2017 until July 1, 2017, including complete, canceled, or blank orders. The query generated a report with FIT test information as well as patient age, sex, race/ethnicity, insurance status, body mass index, and smoking status. In total, there were 1,489 FIT orders. After removing duplicate patients, 440 patients returned the FIT test and 435 patients did not return the FIT test. FQHC patients aged ≥50 years who did not return the FIT test, and who were therefore non-compliant with USPSTF CRC screening recommendations, were eligible to participate in a telephone study. The patients were English or Spanish-speakers. Figure 2 is a visual representation of the study's sample size.

Clinician Participant Recruitment

FHC clinicians (physicians, physician assistants, and nurse practitioners) were sent an online invitation by the FHC director and completed the *Qualtrics* survey.

Survey Design

The patient telephone survey was informed by previous research literature investigating barriers and facilitators to colorectal cancer screening (Allen et al., 2012; Briant et al., 2015; Davis et al., 2012; Reuland et al., 2017; TBCCN et al., 2015; TBCCN et al., 2013). Specifically, patients were contacted via telephone and given information about the survey. Once patients provided verbal informed consent (see Appendix A and B), interviewers followed a script to assess patient perceptions of the FIT kit (see Appendix C and D). The interviewers began with an open-ended question on the general

difficulty of FITs. Then, interviewers asked patients about specific potential barriers, such as FIT cost, FIT instructions, transportation issues to return sites, time to complete FIT, limited drop-off sites, limited return site hours of operation, fear of abnormal findings, embarrassment, lack of motivation, and forgetfulness. The potential facilitators included a pre-paid postage with return address, more drop-off sites, reminders by phone, email, text, mail, enhanced FIT instructions, additional CRC screening educational materials, or more time spent with the clinician. The patients' responses were logged via *Microsoft* Excel. Responses were dichotomous (documented yes or no) to the set list of barriers and facilitators. Additionally, two open-ended questions account for any unforeseen barriers or facilitators (E.g. what about the FIT process was difficult for you; what would help you in the FIT process?).

The clinician online *Qualtrics* survey is adapted from previous research studies evaluating providers' perception on patients and CRC screening (Brown et al., 2015; Guerra et al., 2007; TBCCN, 2013). The survey measures what clinicians believe are the barriers and facilitators for their patients, the preferred CRC screening test dependent on patient's insurance status (colonoscopy, flexible sigmoidoscopy, FOBT/FIT, other), and FIT awareness (see Appendix E).

Measures

The sociodemographic characteristics of patients were extracted from the EHR report on FIT orders in the six-month timeframe. The variables included age, sex, race/ethnicity, insurance status, body mass index (BMI), and smoking status. Age was reported in years. Sex was described as female and male. Race/ethnicity was characterized as non-Hispanic white, non-Hispanic black, Hispanic/Latino, and Other.

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Patient insurance status was described as private insurance, public insurance, and self-payer. Private insurance comprised commercial options (Blue Cross Blue Shield, Humana, United, etc.). Public insurance described Medicare and Medicaid. Self-payers included patients without insurance and those covered by good health cards, county cards, non-profit organizations, and other regional grant funding that provide subsidized care at the clinic. BMI values were measured in kg/m^2. Smoking status was defined as never smoker, former smoker, and current smoker. The analytic sample comprised 875 patients who met inclusion criteria and had received a FIT order from January 1, 2017 to July 1, 2017.

Pre-specified barriers and facilitators were reported as a numeric value (yes, no, prefer not to answer). Among surveyed FIT non-returners, participants were asked if FIT cost, FIT instructions, transportation to return site, time to complete FIT, limited number of return sites, operation hours of return sites, fear of FIT results, embarrassment of FIT, lack of motivation to complete FIT, and forgetfulness of FIT affected their experience. They were also asked to identify if pre-paid postage with return address on FIT, more return sites, live call reminders, text message reminders, e-mail reminders, mail reminders, better test instructions, more educational materials (videos, pamphlets), or more time with the clinician would improve their FIT experience and chance of return. FIT non-returners were asked "what about the FIT process was difficult for you" and "what would help you in the FIT process?" to identify other barriers and facilitators not mentioned in the telephone survey. Open-ended responses were logged (lack of symptoms, family history, nurses aid, etc.). The number of phone calls made to each FIT non-returner (six call limit), the number of patients not answering their phone, and the

number of patients who refused to partake in the study were recorded. The number of patients who claim they never received a FIT was dichotomized (yes vs. no). The number of Spanish-speakers was determined after first completed call and referred to Spanish interviewer. The analytic sample encompassed 121 patients who met inclusion criteria and provided their consent to the telephone survey (see Appendix A and B).

The clinician survey (see Appendix E) measured responses by selecting all applicable answer choices. Pre-specified barriers and facilitators were the same as patient telephone survey. Provider preference for CRC screening test was measured by choosing one option for insured and uninsured patients (colonoscopy, FIT, guaiac FOBT, flexible sigmoidoscopy, patient preference, no preference, none of these). FIT awareness was measured by asking clinicians whether the WFHC offers the FIT (yes vs. no). The reasons for recommending FOBTs over flexible sigmoidoscopy and/or colonoscopy was measured by selecting all applicable answer choices (access, time, cost, patient age, insurance status, sex, race/ethnicity, other).

Analysis

Microsoft Excel and SAS Version 9.4 were used to conduct the statistical analysis. Descriptive statistics, including the means (proc means) and frequencies (proc freq) were generated for all study variables. Specifically, mean age and BMI as well as frequencies of sex, race/ethnicity, insurance status, and smoking status described all patients (n=875), FIT returners (n=440), and FIT non-returners (n=435). Bivariate relationships, comparing FIT returners with non-returners, were assessed using chi-square statistics (proc freq) for sex (male or female), race/ethnicity (Hispanic or Latino, Non-Hispanic black, Non-Hispanic white, other), insurance status (private, public, or

self-payer), and smoking status (never, former, current). Independent t-tests (proc ttest) analyzed age and BMI between FIT returners and non-returners. Logistic regression (proc logistic) was used to generate odds ratios, confidence intervals, and p values to determine if variables predict odds of returning FIT. Multiple logistic regression (proc logistic) generated odds ratios, confidence intervals, and p values to determine if study variables predict odds of returning FIT when controlling for all other variables. Frequencies (proc freq) was used to measure surveyed barriers and facilitators for patients and clinicians. Clinician responses will be assessed via *Qualtrics* data analysis.

Chi square tests were used to measure bivariate associations between variables. Odds ratios at the 95% confidence interval were constructed to define patients' odds of FIT return based on sociodemographic data. Casewise deletion were utilized for missing data. Statistical significance is two-sided and defined at an α=0.05 level. Fisher's exact test were used to determine differences between surveyed groups by insurance status, race/ethnicity, and language. All data analyzed was based on the EHR report for FIT orders from January 1, 2017 until July 1, 2017 at the Waco Family Health Center and FHC clinicians surveyed.

Research Questions and Hypotheses

1. What are the sociodemographic and health behavior differences between patients who return the FIT and patients who do not return the FIT?

    1a. FIT returners are more likely to be privately insured

    1b. FIT returners are more likely to have healthier BMI values

    1c. FIT returners are less likely to smoke than FIT non-returners

Using SAS Version 9.4, sociodemographic and health behavior differences between FIT returners (n=440) and non-returners (n=435) were analyzed via chi-square and independent t tests. Proc freq (chi-square) assessed sex, race/ethnicity, insurance status, and smoking status. Proc ttest (independent t test) evaluated age and BMI. Proc logistic determined bivariate and multivariate associations. Table 3 displays demographic characteristics between FIT returners and non-returners. Table 4 and 5 demonstrates bivariate and multivariate analyses to determine odds of FIT return based on study variables.

2. Among patients who did not complete FIT screening, what are patient barriers to completing the FIT at a Federally-Qualified Health Center?

2a. Uninsured patients will report more barriers than insured patients

2b. Ethnic and racial minorities will report more barriers to returning FITs than individuals who identify as non-Hispanic white

2c. Fear of abnormal results will be the most reported barrier

2d. Among Spanish-speaking patients, test instructions will be most reported barrier

Using SAS Version 9.4, proc freq analyzed surveyed FIT non-returners (n=121) by insurance status and race/ethnicity as well as determined the most reported barrier overall and for Spanish speakers. Table 6 presents the reported barriers of surveyed FIT non-returners. Tables 7-9 displays barriers by insurance status, race/ethnicity, and language.

3. Among patients who did not complete FIT screening, what are patient facilitators to increase participation rates at a Federally-Qualified Health Center?

3a. Prepaid postage and return address on the FIT will be the most reported

facilitator

Using SAS Version 9.4, proc freq evaluated the most reported facilitators. Table 6

demonstrates the reported facilitators by surveyed FIT non-returners.

4. What are clinician knowledge and recommendations to improve FIT return rates?

4a. Clinicians will not distinguish fecal occult blood tests (FOBTs) from fecal

immunochemical tests (FIT)

4b. Clinicians will report similar barriers and facilitators as their patients

4c. Clinicians will recommend colonoscopies over FITs.

Using SAS Version 9.4, the most commonly reported barriers and facilitators for

clinicians from *Qualtrics* online survey, presented in table 6.

CHAPTER FOUR

Manuscript

Barriers and Facilitators of Colorectal Cancer Screening in a
Federally-Qualified Health Center: Patient and Clinician Perspectives

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The number of words of the abstract: 250
The number of figures: 1
The number of tables: 8

Abstract

Purpose: Colorectal cancer (CRC) is a leading cause of cancer-related mortality in the United States. Current screening recommendations for individuals, 50 to 75 years, include colonoscopy every ten years, flexible sigmoidoscopy every five years, and/or annual stool-based testing. Stool-based testing, including fecal immunochemical tests (FITs), are cost effective, easy to perform at home, and non-invasive, yet, many patients fail to return testing kits and go unscreened. The purpose of the study was to evaluate perceived barriers and facilitators of FIT return.

Methods: Patients in a large, federally-qualified health center who received a FIT between January 1, 2017 and July 1, 2017 were enumerated (n=1489). After exclusion criteria and duplicate removal (n=875), analysis of FIT returners (n=440) and FIT non-returners (n=435) was conducted. Telephone surveys of FIT non-returners (n=121) identified potential barriers (cost, knowledge, psychosocial factors) and facilitators (prepaid postage, outreach). In addition, an online survey of clinicians (n=31) assessed perceived barriers and facilitators for patients. SAS Version 9.4 was used for analysis.

Results: FIT non-returners were likely younger (p=0.04), Non-Hispanic black (p=0.01), and current smokers (p=0.001). Bivariate and multivariate analyses generated odds ratios to predict FIT return. Forgetfulness and lack of motivation were most common barriers for patients and clinicians. Prepaid postage with return address on FIT and live call reminders were highest reported facilitators. Barriers and facilitators varied greatest between English (n=94) and Spanish speaking patients (n=27).

Conclusion: Understanding barriers and facilitators to FITs is necessary to enhance screening rates for early detection of CRC in underserved patient populations.

Background

Colorectal cancer (CRC) is the second most common type of cancer-related death in men and the third most common in women; CRC is attributed to over 50,000 deaths a year.[1] Males are more likely to be diagnosed with and die from CRC (46.9 per 100,000 incidence rate; 17.7 per 100,000 mortality rate) than females (35.6 per 100,000 incidence rate; 12.4 per 100,00 mortality rate).[1] Incidence and mortality rates differ by race/ethnicity as well: non-Hispanic black and American Indian groups have the highest incidence and death rates.[1]

CRC is a largely preventable disease.[2] Nearly 60% of CRC deaths could be prevented if all eligible individuals received screening, yet in 2015 only 63% of adults aged 50 years and older participated in CRC screening.[3-4] Among underserved and low-income populations, screening is even lower: approximately 38% of patients at Federally-Qualified Health Centers (FQHCs) are screened.[5-6] Individuals without health insurance are least likely to participate in CRC screening.[6-7]

CRC continues to disproportionately affect individuals across sociodemographic lines due to low screening utilization.[8] The lack of CRC screening recommendation for low-income patients may contribute to the gap.[9] As the Healthy People 2020 goals and objectives aspire to reach a national screening rate of 70.5%, CRC screening rates at FQHCs continue to lag behind.[5,10] The screening gap places poor and minority patients at greater risk for advanced CRC progression due to inadequate screening processes.[9] Colonoscopies and flexible sigmoidoscopies are generally expensive, invasive, and

difficult to schedule for underserved patient populations.[1,3,11-12] By utilizing yearly

FOBTs, specifically FITs, FQHCs can create innovative strategies to screen hard-to-reach

patient populations through a cost-effective and easy-to-perform approach. Identification

of patient characteristics, potential barriers, and potential facilitators of FITs may

increase screening rates and identify subgroups that could benefit from tailored health

education approaches. The study complements the growing research literature on CRC

screening for vulnerable patient populations and resource-limited community health

clinics (CHCs) to improve health outcomes.

Purpose

The purpose of the study was to identify patient characteristics between those who

returned and those who failed to return a FIT. The secondary purpose of the study was to

identify clinician perceptions of patient barriers and facilitators, FIT awareness, and CRC

screening recommendations.

Study Population and Methods

The Waco Family Health Center (WFHC), a Federally-Qualified Health Center in

central Texas, provides care for over 58,000 patients, which comprises approximately

39.6% of county residents.[13] Over 90% of the patients live at or below 200% of the Federal

Poverty Guidelines.[13] In 2015, the FHC medical staff delivered medical care to 58,164

patients, including 1,475 homeless patients and 6,349 patients who resided in public

housing.[13] Approximately 16.3% of patients lacked health insurance and were afforded

care through a "Good Health Card," which is a discounted fee program that expanded

coverage to 26.8% of the FHC self-payers.[13] The WFHC CRC screening rate was 28% from January 1, 2017 to July 1, 2017.

The electronic health record system, Epic, was used to query all FITs ordered from January 1, 2017 until July 1, 2017, including complete, canceled, or blank orders (n=1489). The patient census generated a report with patient age, sex, race/ethnicity, insurance status, body mass index, and smoking status from the medical record. There were 875 non-duplicate patients aged ≥50 years. Patients who did not return the FIT test within a two-week timeframe (n=435), were defined as non-compliant with USPSTF CRC screening recommendations and were thus eligible to participate in a telephone study. Figure 2 is the visual depiction of the study's sample size.

The patient telephone survey was informed by previous research literature investigating barriers and facilitators to CRC screening.[14-22] Patients were contacted via telephone and given information about the survey in English or in Spanish. Once patients provided verbal informed consent, interviewers followed a script to assess patient perceptions of the FIT. Then, interviewers asked patients about specific potential barriers, such as FIT cost, FIT instructions, transportation issues to return sites, time to complete FIT, limited drop-off sites, limited return site hours of operation, fear of abnormal findings, embarrassment, lack of motivation, and forgetfulness. The potential facilitators included a pre-paid postage with proper return address, more drop-off sites, reminders by phone, email, text, mail, better FIT instructions, additional CRC screening educational materials, or more time spent with the clinician. The patients' responses were recorded in *Microsoft* Excel. Responses were yes, no, and prefer not to answer to the set list of barriers and facilitators Additionally, two open-ended questions accounted for any

unforeseen barriers or facilitators (E.g. what about the FIT process was difficult for you; what about the FIT process was helpful for you?).

FHC clinicians (physicians, physician assistants, and nurse practitioners) were sent an online invitation by the WFHC director to complete the *Qualtrics* survey. The clinician online *Qualtrics* survey is adapted from previous research studies evaluating providers' perception on patients and CRC screening.[23-26] The survey measured clinicians' beliefs in the barriers and facilitators for their patients, the preferred CRC screening test dependent on patient's insurance status (colonoscopy, flexible sigmoidoscopy, FOBT/FIT, other), and FIT awareness.

The study was approved by the Institutional Review Board at Baylor University (IRB Reference #1125461).
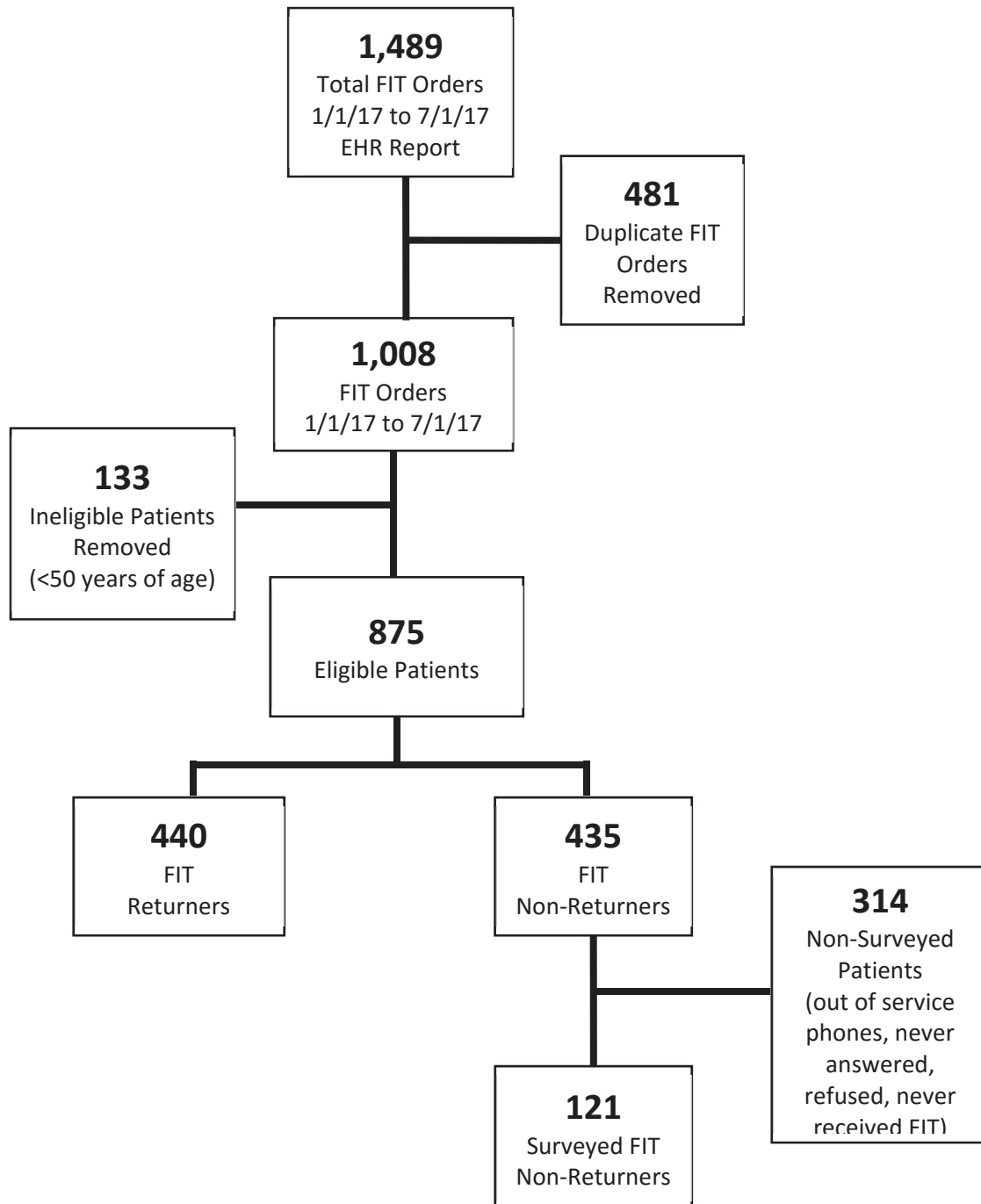
Figure 2. Sample size flowchart for FIT non-returners

Measures

The sociodemographic characteristics of patients were extracted from the EHR report on FIT orders in the six-month timeframe. The variables included age, sex, race/ethnicity, insurance status, body mass index (BMI), and smoking status. Age was reported in years. Sex was described as female and male. Race/ethnicity was characterized as non-Hispanic white, non-Hispanic black, Hispanic/Latino, and Other. Patient insurance status was described as private insurance, public insurance, and self-payer. Private insurance comprised commercial options (Blue Cross Blue Shield, Humana, United, etc.). Public insurance described Medicare and Medicaid. Self-payers included patients without insurance and those covered by good health cards, county cards, non-profit organizations, and other regional grant funding that provide subsidized care at the clinic. BMI values were measured in kg/m^2. Smoking status was defined as never smoker, former smoker, and current smoker. The analytic sample comprised 875 patients who met inclusion criteria and had received a FIT order from January 1, 2017 to July 1, 2017.

Pre-specified barriers and facilitators were reported as a numeric value (yes, no, prefer not to answer). Among surveyed FIT non-returners, participants were asked if FIT cost, FIT instructions, transportation to return site, time to complete FIT, limited number of return sites, operation hours of return sites, fear of FIT results, embarrassment of FIT, lack of motivation to complete FIT, and forgetfulness of FIT affected their experience. They were also asked to identify if pre-paid postage with return address on FIT, more return sites, live call reminders, text message reminders, e-mail reminders, mail reminders, better test instructions, more educational materials (videos, pamphlets), or

more time with the clinician would improve their FIT experience and chance of return.

FIT non-returners were asked "what about the FIT process was difficult for you" and

"what would help you in the FIT process?" to identify other barriers and facilitators not

mentioned in the telephone survey. Open-ended responses were logged (lack of

symptoms, family history, nurses aid, etc.). The number of phone calls made to each FIT

non-returner (six call limit), the number of patients not answering their phone, and the

number of patients who refused to partake in the study were recorded. The number of

patients who claim they never received a FIT was dichotomized (yes vs. no). The number

of Spanish-speakers was determined after first completed call and referred to Spanish

interviewer. The analytic sample encompassed 121 FIT non-returners who met inclusion

criteria and provided their consent to the telephone survey.

The clinician survey measured responses by selecting all applicable answer

choices. Pre-specified barriers and facilitators were the same as patient telephone survey.

Provider preference for CRC screening test was measured by choosing one option for

insured and uninsured patients (colonoscopy, FIT, guaiac FOBT, flexible sigmoidoscopy,

patient preference, no preference, none of these). FIT awareness was measured by asking

clinicians whether the WFHC offers the FIT (yes vs. no). The reasons for recommending

FOBTs over flexible sigmoidoscopy and/or colonoscopy was measured by selecting all

applicable answer choices (access, time, cost, patient age, insurance status, sex,

race/ethnicity, other).

Analysis

Microsoft Excel and SAS Version 9.4 were used for data management and

analysis. Descriptive statistics, including the frequencies, means, and medians were

generated for all study variables. Bivariate relationships, comparing FIT returners with non-returners, were assessed using chi-square statistics and independent t-tests. Multivariate logistic regression assessed hypotheses and adjusted for the sociodemographic covariates as needed. Casewise deletion was utilized for missing data. Statistical significance was two-sided and defined at an $\alpha=0.05$ level. First we generated sex, race/ethnicity, insurance status, and smoking status variables by chi-square statistics. Then, evaluated age and BMI variables by independent t tests. Logistic regression was used to calculate bivariate and multivariate associations. Frequencies evaluated the most reported barriers and facilitators for patients and clinicians. Fisher's exact test was used to analyze surveyed FIT non-returners (n=121) by insurance status, race/ethnicity, and language.

Results

Patients ≥50 years, who received a FIT order between January 1, 2017 and July 1, 2017 are described in Table 3. Approximately two-thirds (63.2%) were female and the median age was 59 years. Most patients (45.1%) were Hispanic/Latino, one-quarter (24.28%) were non-Hispanic black, and almost one-third (29.46%) were non-Hispanic white. Most patients were self-payers (47.43%) compared to those with private (28.11%) and public (24.46%) insurance options. Mean BMI was 30.90 kg/m^2. More patients were never smokers (52.91%) than former (24.57%) and current smokers (22.17%).

FIT returners (n=440) and FIT non-returners (n=435) were similar in terms of sex (p=0.33). FIT non-returners were younger at 58.92 mean years (SD=6.92) than FIT returners at 59.90 mean years (SD=7.26; p=0.04). FIT non-returners were more likely to be non-Hispanic black, less likely to be Hispanic/Latino, and had similar frequencies of

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non-Hispanic white and other than FIT returners (p=0.01). FIT non-returners were less likely to be self-payers or privately insured but more likely to have public insurance (p=0.07). Mean BMI values for FIT non-returners and returners were similar at 32.16 kg/m^2 and 31.67 kg/m^2, respectively (p=0.34). FIT non-returners were more likely to smoke than FIT returners (p=0.001).

Bivariate logistic regression evaluated the associations between FIT return and demographic variables, when comparing reference groups (see Table 4). For every one year increase in age, patients were 2.00% more likely to return the FIT (OR=1.02; 95% CI: 1.00, 1.04; p=0.04). Privately insured patients were 48.00% more likely to return the FIT when compared to publicly insured patients (OR=1.48; 95% CI: 1.02, 2.14; p=0.03). Self-payers were 41.00% more likely to return the FIT when compared to publicly insured patients (OR=1.41; 95% CI: 1.01, 1.97; p=0.04). Current smokers were 45.00% less likely to return the FIT when compared to never smokers (OR=0.55; 95% CI: 0.59, 1.13; p=0.01).

Multivariate logistic regression evaluated the associations between FIT return and demographic variables, when controlling for all variables (see Table 5). For every one year increase in age, patients were 2.00% more likely to return the FIT (OR=1.02; 95% CI: 1.00, 1.04; p=0.03). When controlling for all variables, current smokers were 40.00% less likely to return the FIT (OR=0.60; 95% CI: 0.42, 0.86; p=0.03) and former smokers were 14.00% less likely to return the FIT when compared to never smokers (OR=0.86; 95% CI: 0.61, 1.20; p=0.03).

Among FIT non-returners (n=435), 121 patients were surveyed by phone for perceived barriers and facilitators. Additionally, 31 clinicians (physicians, physician

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assistants, and nurse practitioners) were reached by online *Qualtrics* survey. The reported barriers and facilitators to FIT is presented in Table 6. The most common barriers for surveyed FIT non-returners were forgetfulness (61.16%), lack of motivation (51.24%), and fear of embarrassment (31.40%). Top barriers for clinicians were lack of motivation (80.65%), forgetfulness (61.29%), and fear of embarrassment as well as FIT instructions (54.84%). Patients reported pre-paid postage with return address on FIT (76.86%), live call reminders (72.73%), and reminders by text message (59.50%) as helpful to FIT screening. Clinicians reported pre-paid postage with return address (70.97%), live call reminders (51.61%), and better FIT instructions (45.16%).

The surveyed FIT non-returners' (n=121) reported barriers and facilitators were analyzed by insurance status, race/ethnicity, and language using Fisher's exact test (see Tables 7-9). Surveyed patients consist of privately insured (n=30), publicly insured (n=26), and self-payers (n=65) (see Table 7). All private, public, and self-payer insurance groups reported forgetfulness, lack of motivation, and fear of embarrassment as most common barriers. No statistically significant differences were found between insurance groups for barriers. Pre-paid postage with return address on FIT was the highest facilitator among insurance groups. Live call reminders varied by private (76.67%), public (50.00%), and self-payer (80.00%) insurance options (p=0.03).

Surveyed patients were Hispanic/Latino (n=48), non-Hispanic black (n=28), and non-Hispanic white (n=45) (see Table 8). No surveyed FIT non-returners classified as Other. Test instructions were reported by 54.17% of Hispanic/Latino patients, 14.29% of non-Hispanic black patients, and 6.67% of non-Hispanic white patients (p=0.001). Fear of embarrassment includes 56.25% Hispanic/Latino, 17.86% non-Hispanic black, and

13.33% non-Hispanic white patients (p=0.001). Lack of motivation contains 66.67% of Hispanic/Latino patients, 50.00% of non-Hispanic black, and 35.56% of non-Hispanic white patients (p=0.03). Forgetfulness was reported by 72.92% of Hispanic/Latino, 67.86% of non-Hispanic black, and 44.44% of non-Hispanic white patients (p=0.02). Pre-paid postage with return address was reported by 83.33% of Hispanic/Latino, 57.14% non-Hispanic black, and 82.22% non-Hispanic white patients (p=0.05). More drop-off sites were reported by 64.58% of Hispanic/Latino, 57.14% non-Hispanic black, and 35.56% non-Hispanic white patients (p=0.02). Better FIT instructions were noted by 54.17% of Hispanic/Latino, 14.29% of non-Hispanic black, and 6.67% of non-Hispanic white (p=0.001). More educational materials were perceived by 75.00% of Hispanic/Latino, 50.00% of non-Hispanic black, and 31.11% of non-Hispanic white patients (p=0.001). More time with the clinician were reported by 70.83% of Hispanic/Latino, 46.43% of non-Hispanic black, and 31.11% of non-Hispanic white patients (p=0.001).

Surveyed patients include English-speakers (n=94) and Spanish-speakers (n=27) (see Table 9). Significant barriers by language include FIT instructions (81.48% of Spanish-speakers and 11.70% of English-speakers, p=0.001), fear of embarrassment (81.48% of Spanish-speakers and 17.02% of English-speakers, p=0.001), lack of motivation (96.30% of Spanish-speakers and 38.30% of English-speakers, p=0.001), and forgetfulness (96.30% of Spanish-speakers and 51.06% of English-speakers, p=0.001). Other barriers did not report differences across groups. Facilitators by language include pre-paid postage (96.30% of Spanish-speakers and 71.28% of English-speakers, p=0.001), drop-off sites (85.19% of Spanish-speakers and 42.55% of English-speakers,

p=0.001), live call reminders (96.30% of Spanish-speakers and 65.96% of English-speakers, p=0.001), better test instructions (81.48%of Spanish-speakers and 11.70% of English-speakers, p=0.001), more educational materials (96.30% of Spanish-speakers and 40.43% of English-speakers, p=0.001), and more time with the clinician (85.19% of Spanish-speakers and 40.43% of English-speakers, p=0.001).

Demographic differences between FIT non-returners (n=314) and surveyed FIT non-returners (n=121) are presented in Table 10. Non-Hispanic black patients were less likely to be surveyed, which suggests a possible selection bias.

Table 3: Demographic Characteristics of FIT Returners and FIT Non-Returners

Characteristics	Total (n=875)	FIT-Returners (n=440)	FIT Non-Returners (n=435)	P Value
Sex (%)				0.33
Male	36.80	35.23	38.39	
Female	63.20	64.77	61.61	
Age (Mean Years, SD)	59.41 (7.11)	59.90 (7.26)	58.92 (6.92)	0.04*
Race/Ethnicity (%)				0.01*
Hispanic or Latino	45.11	48.85	41.34	
Non-Hispanic Black	24.28	20.87	27.71	
Non-Hispanic White	29.46	29.82	29.10	
Other	1.15	0.46	1.85	
Insurance Status (%)				0.07
Private	28.11	29.77	26.44	
Public	24.46	21.14	27.82	
Self-Payer	47.43	49.09	45.75	
BMI (Mean kg/m^2, SD)	31.91 (7.76)	31.67 (7.31)	32.16 (8.20)	0.34
Smoking (%)				<0.001*
Never	53.26	57.95	48.51	
Former	24.57	24.32	24.83	
Current	22.17	17.73	26.67	

*statistically significant at α=0.05 level

Table 4: Bivariate Logistic Regression to Evaluate Association between FIT Return and Demographic Variables

Characteristics	OR	95% CI	P Value
Sex			
Male (ref)	1.00	----	
Female	1.15	[0.87,1.51]	0.33
Age (years)			
	1.02	[1.00,1.04]	0.04*
Race/Ethnicity			
Hispanic or Latino	1.15	[0.84,1.58]	0.38
Non-Hispanic Black	0.74	[0.51,1.06]	0.10
Non-Hispanic White (ref)	1.00	----	
Other	0.24	[0.05,1.16]	0.08
Insurance Status			
Private	1.48	[1.02,2.14]	0.03*
Public (ref)	1.00	----	
Self-Payer	1.41	[1.01,1.97]	0.04*
BMI (kg/m^2)			
	0.99	[0.98,1.01]	0.34
Smoking			
Never (ref)	1.00	----	
Former	0.82	[0.40,0.78]	0.23
Current	0.55	[0.59,1.13]	0.01*

*statistically significant at α=0.05 level

Table 5: Multivariate Logistic Regression to Evaluate Association between FIT Return and Demographic Variables

Characteristics	OR	95% CI	P Value
Sex			
Male (ref)	1.00	----	
Female	1.16	[0.87,1.55]	0.25
Age (years)			
	1.02	[1.00,1.04]	0.03*
Race/Ethnicity			
Hispanic or Latino	1.02	[0.87,1.55]	0.08
Non-Hispanic Black	0.73	[0.50,1.06]	
Non-Hispanic White (ref)	1.00	----	
Other	0.34	[0.09,1.32]	
Insurance Status			
Private	1.44	[0.98,2.10]	0.13
Public (ref)	1.00	----	
Self-Payer	1.40	[0.99,1.98]	
BMI (kg/m^2)			
	0.91	[0.28,2.94]	0.15
Smoking			
Never (ref)	1.00	----	0.03*
Former	0.86	[0.61,1.20]	
Current	0.60	[0.42,0.86]	

*statistically significant at α=0.05 level

Table 6: Reported Barriers and Facilitators

Barrier and Facilitator Questions	Patients (n=121)	Clinicians (n=31)
	n (%)	n (%)
Barriers		
Cost of Test	22 (18.18)	3 (9.68)
Test Instructions	33 (27.27)	17 (54.84)
Transportation to Return Site	23 (19.01)	13 (41.94)
Time to Complete Test	26 (21.49)	1 (3.23)
Limited Return Sites	13 (10.74)	0 (0.00)
Return Site Hours of Operation	3 (2.48)	2 (6.45)
Fear of Abnormal Findings	24 (19.83)	7 (22.58)
Fear of Embarrassment	38 (31.40)	17 (54.84)
Lack of Motivation	62 (51.24)	25 (80.65)
Forgetfulness	74 (61.16)	19 (61.29)
Facilitators		
Pre-Paid Postage w/ Return Address	93 (76.86)	22 (70.97)
More Drop-Off Sites	63 (52.07)	6 (19.35)
Live Call Reminders	88 (72.73)	16 (51.61)
Text Message Reminders	72 (59.50)	8 (25.81)
Email Reminders	34 (28.10)	11 (35.48)
Mailed Reminders	51 (42.15)	4 (12.90)
Better Test Instructions	33 (27.27)	14 (45.16)
More Educational Materials	64 (52.89)	4 (12.90)
More Time w/ Clinician	61 (50.41)	9 (29.03)
Automatic Messaging by EPIC	N/A	4 (12.90)

Barrier and Facilitator Questions	Private Insurance (n=30)	Public Insurance (n=26)	Self-Payers (n=65)	P Value
	n (%)	n (%)	n (%)	
Barriers				
Cost of Test	9 (30.00)	4 (15.38)	9 (13.85)	0.19
Test Instructions	7 (23.33)	3 (11.54)	23 (35.38)	0.07
Transportation to Return Site	3 (10.00)	4 (15.38)	16 (24.62)	0.30
Time to Complete Test	9 (30.00)	6 (23.08)	11 (16.92)	0.30
Limited Return Sites	4 (13.33)	0 (0.00)	9 (13.85)	0.12
Return Site Hours of Operation	1 (3.33)	0 (0.00)	2 (3.08)	1.00
Fear of Abnormal Findings	7 (23.33)	2 (7.69)	15 (23.08)	0.23
Fear of Embarrassment	7 (23.33)	9 (34.62)	22 (33.85)	0.63
Lack of Motivation	17 (56.67)	9 (34.62)	36 (55.38)	0.16
Forgetfulness	21 (70.00)	14 (53.85)	39 (60.00)	0.37
Facilitators				
Pre-Paid Postage w/ Return Address	23 (76.67)	16 (61.54)	54 (83.08)	0.08
More Drop-Off Sites	15 (50.00)	14 (53.85)	34 (52.31)	0.97
Live Call Reminders	23 (76.67)	13 (50.00)	52 (80.00)	0.03*
Text Message Reminders	21 (70.00)	13 (50.00)	38 (58.46)	0.39
Email Reminders	10 (33.33)	4 (15.38)	20 (30.77)	0.20
Mailed Reminders	13 (43.33)	9 (34.62)	29 (44.62)	0.76
Better Test Instructions	7 (23.33)	3 (11.54)	23 (35.38)	0.07
More Educational Materials	14 (46.67)	13 (50.00)	37 (56.92)	0.61
More Time w/ Clinician	10 (33.33)	15 (57.69)	36 (55.38)	0.09

Table 7: Reported Barriers and Facilitators by Insurance Status

*statistically significant at α=0.05 level

Table 8: Reported Barriers and Facilitators by Race/Ethnicity

Barrier and Facilitator Questions	Hispanic or Latino (n=48)	Non-Hispanic Black (n=28)	Non-Hispanic White (n=45)	P Value
	n (%)	n (%)	n (%)	
Barriers				
Cost of Test	6 (12.50)	6 (21.43)	10 (22.22)	0.39
Test Instructions	26 (54.17)	4 (14.29)	3 (6.67)	<0.001*
Transportation to Return Site	12 (25.00)	4 (14.29)	7 (15.56)	0.42
Time to Complete Test	11 (22.92)	6 (21.43)	9 (20.00)	0.96
Limited Return Sites	3 (6.25)	2 (7.14)	8 (17.78)	0.18
Return Site Hours of Operation	1 (2.08)	0 (0.00)	2 (4.44)	0.61
Fear of Abnormal Findings	10 (20.83)	7 (25.00)	7 (15.56)	0.56
Fear of Embarrassment	27 (56.25)	5 (17.86)	6 (13.33)	<0.001*
Lack of Motivation	32 (66.67)	14 (50.00)	16 (35.56)	0.03*
Forgetfulness	35 (72.92)	19 (67.86)	20 (44.44)	0.02*
Facilitators				
Pre-Paid Postage w/ Return Address	40 (83.33)	16 (57.14)	37 (82.22)	0.05*
More Drop-Off Sites	31 (64.58)	16 (57.14)	16 (35.56)	0.02*
Live Call Reminders	40 (83.33)	19 (67.86)	29 (64.44)	0.13
Text Message Reminders	29 (60.42)	17 (60.71)	26 (57.78)	0.84
Email Reminders	12 (25.00)	9 (32.14)	13 (28.89)	0.57
Mailed Reminders	23 (47.92)	12 (42.86)	16 (35.56)	0.49
Better Test Instructions	26 (54.17)	4 (14.29)	3 (6.67)	<0.001*
More Educational Materials	36 (75.00)	14 (50.00)	14 (31.11)	<0.001*
More Time w/ Clinician	34 (70.83)	13 (46.43)	14 (31.11)	<0.001*

*statistically significant at α=0.05 level

Table 9: Reported Barriers and Facilitators by Language

Barrier and Facilitator Questions	Spanish-Speaking Patients (n=27)	English-Speaking Patients (n=94)	P Value
	n (%)	n (%)	
Barriers			
Cost of Test	4 (14.81)	18 (19.15)	0.78
Test Instructions	22 (81.48)	11 (11.70)	<0.001*
Transportation to Return Site	8 (29.63)	15 (15.96)	0.16
Time to Complete Test	9 (33.33)	17 (18.09)	0.12
Limited Return Sites	1 (3.70)	12 (12.77)	0.29
Return Site Hours of Operation	0 (0.00)	3 (3.19)	1.00
Fear of Abnormal Findings	5 (18.52)	19 (20.21)	0.79
Fear of Embarrassment	22 (81.48)	16 (17.02)	<0.001*
Lack of Motivation	26 (96.30)	36 (38.30)	<0.001*
Forgetfulness	26 (96.30)	48 (51.06)	<0.001*
Facilitators			
Pre-Paid Postage w/ Return Address	26 (96.30)	67 (71.28)	<0.001*
More Drop-Off Sites	23 (85.19)	40 (42.55)	<0.001*
Live Call Reminders	26 (96.30)	62 (65.96)	<0.001*
Text Message Reminders	17 (62.96)	55 (58.51)	0.82
Email Reminders	3 (11.11)	31 (32.98)	0.06
Mailed Reminders	11 (40.74)	40 (42.55)	1.00
Better Test Instructions	22 (81.48)	11 (11.70)	<0.001*
More Educational Materials	26 (96.30)	38 (40.43)	<0.001*
More Time w/ Clinician	23 (85.19)	38 (40.43)	<0.001*

*statistically significant at α=0.05 level

Table 10: Demographic Characteristics of Surveyed and Non-Surveyed FIT Non-Returners

Characteristics	Total (n=435)	Surveyed (n=121)	Non-Surveyed (n=314)	P Value
Sex (%)				
Male	38.25	35.54	39.30	0.47
Female	61.75	64.46	60.70	
Age (Mean Years, SD)	58.89 (6.90)	58.31 (6.00)	59.11 (7.22)	0.28
Race/Ethnicity (%)				
Hispanic or Latino	41.44	40.00	41.99	0.04*
Non-Hispanic Black	27.78	22.50	29.81	
Non-Hispanic White	29.17	37.50	25.96	
Other	1.62	0.00	2.24	
Insurance Status (%)				
Private	26.50	24.79	27.16	0.08
Public	27.88	21.49	30.35	
Self-Payer	45.62	53.72	42.49	
BMI (Mean kg/m², SD)	32.18 (8.20)	32.64 (8.13)	32.01 (8.23)	0.47
Smoking (%)				
Never	48.39	43.80	50.16	0.22
Former	24.88	30.58	22.68	
Current	26.73	25.62	27.16	

*statistically significant at α=0.05 level

The purpose of the study was to identify patient characteristics between those who returned and those who failed to return a FIT. The secondary purpose of the study was to identify clinician perceptions of patient barriers and facilitators, FIT awareness, and CRC screening recommendations.

FIT returners and non-returners had similar frequencies of sex and insurance status as well as mean BMI values (research question one). FIT non-returners differed from returners by age (younger), race and ethnicity (more likely to be non-Hispanic black), and smoking status (current smokers). The hypothesis that FIT returners were more likely to have private insurance and healthier BMI measures was primarily unsupported. Although, FIT returners were less likely to smoke than FIT non-returners.

The most common reported barriers for patients include forgetfulness of test, lack of motivation, and fear of embarrassment (research question two). WFHC self-payers have increased access to care via "Good Health Cards," County Cards," and regional grant funding that may sway results since the FIT cost is subsidized and patients are able to regularly see their provider. When analyzing the reported barriers by race/ethnicity, the hypothesis that racial and ethnic minorities will report more barriers is fairly supported. Patients demonstrated statistically significant differences in reporting test instructions ($p=0.001$), fear of embarrassment ($p=0.001$), lack of motivation ($p=0.03$), and forgetfulness ($p=0.02$) as barriers to the FIT. Hispanic/Latino and non-Hispanic black patients were more likely to report these barriers, and most others, than non-Hispanic white patients. Fear of abnormal results was not the most reported barrier as commonly observed throughout the literature.[27] When analyzing Spanish-speakers, test instructions

garnered high responses (81.48%) but lack of motivation (96.30%) and forgetfulness of the test (96.30%) were the most frequent barriers. The WFHC does not provide written Spanish instructions, but a Spanish-speaking healthcare provider orally dictates FIT instructions to patients. Findings suggest Hispanic/Latino and Spanish-speaking patients experience significantly more barriers than other racial/ethnic minorities and English-speakers. Open-ended barriers were family history, remission of symptoms, lack of perceived importance, lost kit, and busy schedule.

Among FIT non-returners, top facilitators were pre-paid postage with return address on FIT kit (76.86%) and live call reminders (72.73%). The hypothesis that pre-paid postage with return address on the FIT kit was the greatest perceived facilitator was supported. Hispanic/Latino patients were more likely to report test instructions, education materials, and more time with the clinician as conducive to the screening experience. Additionally, Spanish-speakers had statistically different reports of pre-paid postage, drop-off sites, live call reminders, test instructions, educational materials, and time with the clinician compared to English-speakers. Open-ended facilitators were commode hats and in-home nurse aids to help patients complete FIT.

The clinician survey demonstrated interesting findings for knowledge and recommendations (research question four). We investigated whether terminology (FOBT and FIT) plays a role in recommendations. The WFHC utilizes the Hemmocult® ICT, an immunochemical FOBT (same as FIT). The Epic system refers to the test as an FOBT and can provide confusion. Of the clinicians surveyed, 58.00% believed the clinic provided FITs, 35.48% did not, and 6.45% did not know. Clinicians reported similar perceptions of barriers as their patients. Almost all clinicians would recommend a

colonoscopy for insured patients (96.77%). Yet, 67.74% of clinicians would recommend

FOBTs (FITs and gFOBTs) for uninsured patients. The divergence of CRC

recommendations by insurance status reinforces the literature that clinicians will

recommend colonoscopies over stool-based tests.[25-27] The finding is important when

many patients at FQHCs lack access to colonoscopies.[28]

The prevention of CRC in minority patient populations is multifaceted. The study

demonstrates that FQHCs should target younger USPSTF-recommended individuals (50

to 60-years old), non-Hispanic black and Hispanic/Latino patients, Spanish-speakers, and

current smokers. Individuals over the age of 64 have higher CRC screening adherence

than patients aged 50-63 years.[1] Non-Hispanic black and Hispanic/Latino patients

experience disproportionate burdens of CRC incidence and prevalence as well as cultural

barriers.[1,6-7,18] Lifestyle factors, like smoking, increases CRC manifestation and thus

requires prioritizing current smokers.[29] Bilingual patient navigators that make live call

reminders to patients may mitigate forgetfulness, address psychosocial factors, and

encourage patients to return FIT. Detailed FIT instructions in English and Spanish are

necessary to enhance FIT return among Spanish-speaking patients. In addition,

disseminating accurate information and distinction about the stool-based tests to

clinicians should be a priority for FQHC's striving to increase CRC screening

participation rates via FITs.

The study informs interventions aimed at increasing CRC screening participation

rates among the underserved patient populations. The work contributes to exploring the

underlying differences between patients who return the FIT and patients who fail to

return the test. Racial and ethnic minorities as well as Spanish-speakers experience

significant barriers compared to their English-speaking, Non-Hispanic white peers. By utilizing these differences, interventions may be tailored to maximize CRC screening rates in resource-limited CHCs and achieve national screening goals.

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CHAPTER FIVE

Conclusion

Sociodemographic Differences

The Waco Family Health Center (WFHC) patients (n=875), who received a FIT

order between January 1, 2017 to July 1, 2017 and met inclusion criteria (≥50 years of

age), were more likely to be female (63.20%), Hispanic or Latino (45.11%), uninsured

(47.43%), and a never smoker (53.26%). The patients had a mean age of 59.41 years and

mean BMI of 30.90 kg/m^2. FIT returners and non-returners had statistically significant

differences in regards to age, race/ethnicity, and smoking status that reinforces and

contributes to the CRC screening literature.

FIT non-returners were younger at 58.92 mean years (p=0.04). The finding

supports past research that demonstrates CRC screening adherence increases with age

(National Center for Health Statistics, 2016). FIT non-returners comprised larger

frequencies of Non-Hispanic black patients (p=0.01). Non-Hispanic black individuals

have disproportionately higher rates of CRC incidence and prevalence (National Center

for Health Statistics, 2016; Siegel et al., 2017). Some researchers believe Non-Hispanic

black patients should be screened prior to 50, due to the increased chance for CRC, and

may require tailored interventions (Tammana, 2014; Wang, Moehring, Stuhr, & Krug, et

al., 2013). FIT non-returners were more likely to be current smokers (p=0.001). Smoking

cigarettes increases the likelihood for CRC manifestation (Hannan, Jacobs, & Thun,

2009). The results, with supporting literature, are evident that FQHC's should aim

interventions at younger USPTSF recommended individuals (50 to 60 years of age), Non-Hispanic blacks, and smokers as the patients may be at heightened risk for CRC and should be high priority for completing annual FITs.

<p style="text-align: center;">*FIT Barriers*</p>

The barriers to the fecal immunochemical tests (FITs) are well documented throughout the literature, ranging from fear of abnormal results to cost (Coronado, Schneider, Sanchez, Petrik, & Green, 2015; Khankari et al., 2007; TBCCN et al., 2015; TBCCN et al., 2013; Wang, Moehring, Stuhr, & Krug, 2013). Patients from the WFHC experienced similar and distinct adversities as other vulnerable patient populations. Fear of abnormal results has been the primary barrier to completion and return of the FIT, especially in Hispanic patients (Khankari et al., 2007; TBCCN et al., 2015; TBCCN et al., 2013; Wang, Moehring, Stuhr, & Krug, 2013). However, most surveyed FIT non-returners reported forgetfulness and lack of motivation as barriers. Forgetfulness has been a driving barrier in research on stool-based testing (Coronado, Schneider, Sanchez, Petrik, & Green, 2015; Guerra et al., 2007; TBCCN et al., 2015; TBCCN et al., 2013.) Researchers have proposed patient navigators and community outreach (live calls and kits with detailed instructions) to mitigate forgetfulness (Coronado, Schneider, Sanchez, Petrik, & Green, 2015; Goldman et al., 2015; Gupta et al., 2013; Jean-Jacques et al., 2012; Reuland et al., 2017; Singal et al., 2017). Lack of motivation is basis of several barriers, such as perceived susceptibility and severity, observed in the literature (TBCCN et al., 2015; TBCCN et al., 2013). The open-ended question regarding FIT barriers not only provided reasons for the lack of motivation to complete FITs but documented barriers not originally incorporated into the study. Patients contributed barriers like

family history, remission of CRC symptoms, and disgust of the test as main reasons for failure to return the FIT. In addition, patients expressed a busy schedule and simply losing the FIT as additional barriers.

Uninsured patients are least likely to receive CRC screening due to their lack of access and utilization of the healthcare system (Jackson, Oman, Patel, & Vega, 2016; (May, Almario, Ponce, & Spiegel, 2015; Tammana, 2014). Community health clinics (CHCs) typically perform visit-based screenings whereby patients who annually visit their healthcare provider are recommended CRC screening tests (Goldman et al., 2015; Reuland et al., 2017). Uninsured patients are thus more likely to miss screening opportunities. The WFHC patients may differ from studied underserved patient populations due to self-payers being afforded access to care through the "Good Health Card," "County Cards," and regional grant funding. Thus, self-payers can regularly visit their primary care provider at the WFHC and receive FIT kits at subsidized costs. Consequently, reported barriers did not present statistically significant differences between private, public, and self-payer insurance groups.

Racial and ethnic minorities are least likely to be screened for CRC (National Center for Health Statistics, 2015; Siegel et al., 2017). Specifically, Hispanic or Latino and Spanish-speaking patients have demonstrated low CRC screening adherence but for different reasons than insurance status (Wang, Moehring, Stuhr, & Krug, 2013). Researchers suggest that Hispanic or Latino patients do not have low screening participation rates due to lack of access to care (higher cervical and breast cancer screening rates) but distinct factors like health literacy, social group influence, and lower confidence levels in healthcare providers (Wang, Moehring, Stuhr, & Krug, 2013). The

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cultural barriers were evident in the study. Test instructions, fear of embarrassment, lack of motivation, and forgetfulness were reported predominantly by Hispanic or Latino and Spanish-speaking patients (all reported with statistically significant differences between race/ethnicity and language). FIT test instructions were in English only and Spanish-speaking patients relied on healthcare providers to translate the instructions in person.

FIT Facilitators

Facilitators were adapted from previous randomized-controlled trials to enhance CRC screening via FITs (Brown et al., 2015; Davis et al., 2012; TBCCN et al., 2015; TBCCN et al., 2013). Usual care (UC) consisted of visit-based screening recommendations (the common process of CRC screening in FQHCs) (Coronado et al., 2017; Gupta et al., 2013; Reuland et al., 2017; Singal et al., 2013). UC was compared to outreach. Outreach involves several ways to increase FIT return, such as live call reminders, text reminders, email reminders, mailed reminders, detailed instruction kits, patient navigators, educational videos, and materials. Other facilitators were clinic-specific (prepaid postage, drop-off sites). The patient responses reinforced the literature, as live call reminders (72.73%) have shown to increase FIT return rates (Coronado et al., 2017; Goldman et al., 2015; Jean-Jacques et al., 2012; Singal et al., 2017; Reuland et al., 2017). Prepaid postage with return address on the FIT (76.86%) was the top facilitator overall. Facilitators did vary by insurance groups, race/ethnicity, and language.

Many self-payers (76.67%) and privately insured (80.00%) patients reported live call reminders compared to Medicare and Medicaid patients (50.00%) (p=0.03). Although publicly insured patients reported forgetfulness as the primary barrier, the finding stands apart from the literature. When comparing reported facilitators by

race/ethnicity, statistically significant differences exist between pre-paid postage (p=0.05), more drop-off sites (p=0.02), better test instructions (p=0.001), more educational materials (p=0.001), and more time with the clinician (p=0.001). Hispanic or Latino FIT non-returners largely reported better test instructions, educational materials, and more time with clinician when compared to Non-Hispanic black and white non-returners. Spanish-speakers reported pre-paid postage, more drop-off sites, live call reminders, better test instructions, more educational materials, and more time with the clinician when compared to English-speakers (p=0.001). The findings strengthen the cultural barriers witnessed in the literature as low health literacy provides desire for educational materials and more time with the clinician (Tammana et al., 2014; Tu et al., 2006; Wang, Moehring, Stuhr, & Krug, 2013). Better test instructions are necessary for Spanish-speakers due to no translated instructions available on the FIT.

Clinician Perspectives

WFHC physicians, physician assistants, and nurse practitioners were surveyed to measure perceptions on CRC recommendations, barriers, facilitators, and the FIT. Most clinicians (96.77%) preferred colonoscopy for insured patients as means for screening. Colonoscopies are considered the gold standard in CRC screening and have been the most commonly preferred screening test for patients (Brown et al., 2015). When patients are uninsured, over two-thirds of providers recommended stool-based testing (gFOBT/FIT). The finding is significant due to the prevalence of CRC screening by FIT for WFHC patients (over 50%). However, several clinicians (42.00%) either thought or did not know if the WFHC provides FITs. The confusion in terminology may affect clinician recommendations as FITs are more sensitive and specific to CRC than guaiac

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FOBTs (Brown et al., 2015; Davis et al., 2012; TBCCN et al., 2015; TBCCN et al., 2013). Disseminating accurate information and distinction about the stool-based tests to clinicians should be a priority for FQHC's striving to increase CRC screening participation rates via FITs.

The barriers and facilitators reported by clinicians mirrored many of the patient reported barriers and facilitators as expected. Most clinicians (80.00%) perceived lack of motivation as the primary barrier to return of FIT. Pre-paid postage and return address on FIT was the most common facilitator (70.97%). Automatic messaging by EPIC, a clinician-specific facilitator, was not commonly reported (12.90%) and supports literature on screening reminders by Epic in CHCs (Cole et al., 2015).

Gaps in Current Practice

The WFHC experienced educational and implementation gaps with CRC screening that may have affected results in the study. Several patients (n=61), noncompliant with USPSTF recommendations, were designated by Epic as having received a FIT but never received the test. Therefore, the patients were unable to answer survey questions. Interviewers discovered that healthcare providers described the FIT process (completion and return) but forgot to physically hand the test to patients. The number may be over reported as patients may falsely report that they never received the test to avoid survey response.

In a large staff meeting, some clinicians were unaware that patients could return the FIT via mail. The segment of the clinic telling patients to return the FIT in person may be creating barriers such as transportation to the clinics (19.01%), limited return

sites (10.74%), or hours of operation (2.48%). The miscommunication may impact provider recommendations and patient knowledge of CRC screening.

The Spanish-speaking patients were at greatest disadvantages due to the FITs English instructions and reliance on a Spanish-speaking healthcare provider. The study reflects the disproportionate burden experienced by Spanish-speaking, Hispanic or Latino patients.

Limitations

The study acknowledges that selection bias may have occurred during convenience sampling. Among surveyed and non-surveyed FIT non-returners, race and ethnicity demonstrated statistically significant differences. Non-Hispanic black patients were less likely to be surveyed and may differ from the total FIT non-returner population (p=0.04). The survey responses may underreport barriers and facilitators for the Non-Hispanic black patients, a largely at-risk patient population. The thesis contributes to the mounting body of literature on CRC screening in FQHC's for underserved patient populations.

APPENDICES

APPENDIX A

Verbal Informed Consent for English-Speaking FIT Non-Returners

"Hello, my name is _____ and I am conducting a telephone survey

for the Waco Family Health Center and Baylor University about colon cancer screening,

specifically fecal immunochemical tests. You have to be at least 18 years old to

participate in the survey and it will take about 10 minutes of your time. Participation is

voluntary and you may stop participating at any time. Your answers will remain

confidential. There are minimal risks associated with taking the survey, and you can help

improve colon cancer screening processes for patients at the Family Health Center.

Would you like to participate?"

APPENDIX B

Verbal Informed Consent for Spanish-Speaking FIT Non-Returners

"Estoy trabajando con el Family Health Center de Waco. Estamos tratando de mejorar el proceso de detección del cáncer de colon. Mis preguntas se refieren a la prueba de sangre oculta en heces. Nuestros registros muestran que no pudo devolver la prueba. Nos gustaría conocer su experiencia con el proceso. La entrevista demorará aproximadamente 10 minutos. Sus respuestas son confidenciales y la entrevista es voluntaria, lo que significa que puede dejarlo en cualquier momento. ¿Podrías responder preguntas para ayudarnos a servirte mejor?"

APPENDIX C

Script for English-Speaking FIT Non-Returners

*If not available: Call once more. If unsuccessful, try later in data collection timeframe.

Good morning/Good afternoon, may I please speak to Mr./Ms. _____?

*RESPONDS: If responds or gives phone to patient:

Hello, my name is _____ and I am conducting a telephone survey

for the Waco Family Health Center and Baylor University about colon cancer screening,

specifically fecal immunochemical tests. You have to be at least 18 years old to

participate in the survey and it will take about 10 minutes of your time. Participation is

voluntary and you may stop participating at any time. Your answers will remain

confidential. There are minimal risks associated with taking the survey, and you can help

improve colon cancer screening processes for patients at the Family Health Center.

Would you like to participate?

1. What was the primary reason for not returning the FIT test?

2. Please answer yes or no to the following, were you unable to return the FIT due
   to:
   Cost
   Unclear Test Instructions
   Transportation Issues
   Time to Complete Test
   Limited Drop-off Sites
   Limited Hours of Operation
   Fear of Abnormal Findings
   Fear of Embarrassment
   Lack of Motivation
   Forgetfulness

3. Please select any of the following that would improve your ability to return the FIT kit [yes or no]:

  A pre-paid postage and return address on FIT
  More drop-off sites than the Family Health Center and nearby clinics
  Reminders by phone
  Reminders by email
  Reminders by text
  Reminders by mail
  Better instructions
  More educational materials
  More time spent with your clinician

4. Any recommendations to improve your CRC screening experience?

Thank you for taking time to help us and have a great rest of your day.

APPENDIX D

Script for Spanish-Speaking FIT Non-Returners

*If not available: Call once more. If unsuccessful, try later in data collection timeframe.

Buenos días / Buenas tardes, puedo hablar con el Sr./ La señora. _____?

*RESPONDS: If responds or gives phone to patient:

Estoy trabajando con el Family Health Center de Waco. Estamos tratando de mejorar el proceso de detección del cáncer de colon. Mis preguntas se refieren a la prueba de sangre oculta en heces. Nuestros registros muestran que no pudo devolver la prueba. Nos gustaría conocer su experiencia con el proceso. La entrevista demorará aproximadamente 10 minutos. Sus respuestas son confidenciales y la entrevista es voluntaria, lo que significa que puede dejarlo en cualquier momento. ¿Podrías responder preguntas para ayudarnos a servirte mejor?

1. ¿Cuál fue la razón principal para no devolver la prueba durante el período de dos semanas asignado?

2. Responda sí o no a lo siguiente, ¿no pudo regresar la prueba debido a?:
   Costo
   Instrucciones de prueba poco clara
   Problemas de transporte
   No tenias tiempo
   Sitios limitados de entrega
   Horas limitadas de operación
   Miedo de tener resultados anormales
   Vergüenza
   Falta de motivación
   Te olvidaste

3. ¿Por favor dígame sí o no a cuál de los siguientes lo ayudaría a regresar la prueba?

    Franqueo prepagado y dirección de devolución adecuada
    Más sitios de entrega que no son el Family Health Center
    Llamadas telefónicas para recordarme
    recordatorios por correo electrónico
    Recordatorios por texto
    Recordatorios por correo
    Mejores instrucciones
    Mas materiales educativos
    Más tiempo dedicado con su médico

4. ¿Tiene alguna recomendación para mejorar su experiencia de detección?

Gracias por tomarse el tiempo para ayudarnos y tener un gran descanso de su día

APPENDIX E

Questions from Online Clinician Survey

1) What do you believe are the primary barriers for your patients to complete the fecal occult blood test (FOBT/FIT)? [Please Check All That Apply]
    Cost
    Misunderstanding Test Instructions
    Transportation to Clinic/Drop Off Sites
    Time to Complete Test
    Limited Number of Return Sites
    Hours of Operation for Return Locations
    Fear of Abnormal Findings
    Fear of Embarrassment
    Lack of Motivation
    Forgetfulness
    Other: _____

2) What colorectal cancer screening test do you prefer to administer for your patients? [Please choose one]

IF INSURED:

    Colonoscopy
    Fecal Immunochemical Test (FIT)
    Fecal Guaiac Test (gFOBT)
    Flexible Sigmoidoscopy
    Patient Preference
    No Preference/Any of the Tests
    None of These

IF UNINSURED:

    Colonoscopy
    Fecal Immunochemical Test (FIT)
    Fecal Guaiac Test (gFOBT)
    Flexible Sigmoidoscopy
    Patient Preference
    No Preference/Any of the Tests
    None of These

3) Does the FHC offer Fecal Immunochemical Testing as a service to patients?
    Yes   No

4) Why would you choose the FOBT/FIT over flexible sigmoidoscopy or colonoscopy? [Please Check All That Apply]
    Access
    Time
    Cost
    Patient Age
    Patient Insurance Status
    Patient Sex

Patient Race/Ethnicity

Other: _____

5) What do you believe would increase FOBT/FIT participation rates for your patients? Please choose up to three responses you feel would be most helpful. [Please Check All That Apply]

A pre-paid postage and proper return address to return FIT kits via mail

More drop-off sites than the FHC and nearby clinics

Better FIT instructions to the patient

More educational materials to the patient

Reminders to patient by phone

Reminders to patient by email

Reminders to patient by text

Reminders to patient by mail

Automatic messaging by EPIC

More time talking with patient about test

Nothing will increase participation rates

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