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The Difference in Barriers to Colorectal Cancer Screening Between Men and Women in the 45-55-Year Age Group

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The Difference in Barriers to Colorectal Cancer Screening Between Men and Women in the 45-55-Year Age Group

By

Maren Christina Davis

A Thesis Submitted in Partial Fulfillment of the

Requirements for the Degree of

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In

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Maren C. Davis

This thesis has been examined and approved by the following members of the student's committee.

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Dr. Joseph Visker, Committee Chair

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Dr. Mary Kramer, Advisor

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Dr. Kelly Krumwiede

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"The miracle is not that I finished. The miracle is that I had the courage to start."

~ John Bingham

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THE DIFFERENCE IN BARRIERS TO COLORECTAL CANCER SCREENING BETWEEN MEN AND WOMEN IN THE 45-55-YEAR AGE GROUP

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ABSTRACT

Statement of the Problem: Adults, 50 years or older, should have a screening colonoscopy every ten years and fecal immunochemical test (FIT) every year. However, close to 22 million adults between the ages of 50-75 in the U.S. have never been screened for colorectal cancer, which delays treatment and can be fatal if the cancer is not found in time.

Procedure: This study used a descriptive, cross-sectional, survey-based design and a convenience sample of men and women between 45 and 55 years old to assess colorectal screening practices, barriers to screening, and knowledge levels about colorectal cancer screening.

Findings: A total of 161 survey participants, mostly non-Hispanic Caucasian/white females, met the eligibility criteria. Just over half have had a colonoscopy and some before age 50 but sigmoidoscopies and use of home stool blood tests were few. The greatest barriers were no doctor's order and not being told to get screened and the least were lack of provider and other types of colon exams. Almost half complained that the prep was too painful, unpleasant, or embarrassing. Overall, the barriers were perceived as greater for women than for men. More participants knew about what starting age CRCS is recommended for but there was a significant knowledge deficit related to how often screening should occur, which presents an important opportunity for education.

Conclusions and Recommendations: Colorectal cancer should not be treated any differently than prostate or breast cancer and more public health campaigns are needed to assure patients that screening equals prevention. Automatic reminders to EMRs can serve both, the patient, and the provider. Adding health coaches to the healthcare team permanently will empower patients to take responsibility in their own healthcare and can positively impact health behavior change, including screening adherence.

Chapter I

Introduction

Colorectal cancer (CRC) is projected to claim over 50,000 lives in the United States in 2019 and more than 145,000 new colon and rectal cancer diagnoses are anticipated (American Cancer Society [ACS], 2019). The risk for developing colorectal cancer in a person's lifetime is "about 1 in 22 (4.49%) for men and 1 in 24 (4.15%) for women" (ACS, 2019, para. 2). However, timely compliance with screening recommendations can prevent most colorectal cancer occurrence and over half of colorectal cancer deaths (Cossu, Saba, Minerba, & Mascalchi, 2018).

DiPietro, DeLoia, and Barbiero (2019) related that cancer happens because of uninhibited cell growth and, in the case of colorectal cancer, those cells typically form in the inner lining of the colon or rectum. The authors likewise stated that cancer typically originates in neoplastic polyps, which can be benign, precancerous, or malignant. Since colon and rectal cancers are so closely related in their location, appearance, and presentation, they are often referred to collectively as colorectal cancer, but they can be separated for research and treatment purposes (Van der Sijp et al., 2016). Rectal tumors can be found in the rectum, which extends about six inches from the anal opening and grow to extend past the rectal wall to surrounding organs (Paschke et al., 2018). Paschke et al. (2018) expand by proposing that, even though the colon and rectum are connected as part of the large bowel, colon cancer and rectal cancer should be separated as two different diseases because of location within the body, potential complications, rate at which a cure is possible, and difference in surgical approaches.

Colorectal cancer screening (CRCS) can be accomplished by structural exams or via stool-based tests (Issa & Noureddine, 2017). As noted by the ACS (2019), CRCS tools include direct visualization of the length of the colon wall via colonoscope during a colonoscopy. A shorter version of the colonoscopy, the flexible sigmoidoscopy, only provides visualization of the lower third of the colon. The shorter version is not done as frequently because much of the colon is skipped, which means that polyps and possible cancer can be missed. The ACS (2019) furthermore mentioned that a virtual colonoscopy via computed tomography (CT) scan can be done but it requires a full bowel prep, there is radiation exposure, and if polyps are found, they cannot be removed during this procedure and the patient must undergo colonoscopy after all. Lastly, there are three different types of at-home stool sampling methods that all have the potential to miss polyps and if positive, must be followed up with a colonoscopy (ACS, 2019).

Statement of the Problem

The recommendations for CRCS are that patients at 50 years of age start having a screening colonoscopy every ten years and fecal immunochemical test (FIT) every year (Rex et al., 2017). The ACS (2019) recommends screening at age 45 for people who are of average risk. Changes to those recommendations by the ACS are based on personal or family history of colon polyps and/or colon cancer, personal history of inflammatory bowel disease, and the findings of above-mentioned tests. ACS recommendations also state that a positive fecal immunochemical test triggers a follow-up colonoscopy and that certain types of polyps, when found during colonoscopy or flexible sigmoidoscopy, indicate the need for a three-year follow-up colonoscopy, rather than ten (ACS, 2019). Colonoscopies are, therefore, not just preventative but also diagnostic procedures. However, in the United States, “21.7 million adults aged 50 to 75 years […] have never been screened for CRC [colorectal cancer]” (Centers for Disease Control and Prevention [CDC], 2019, para. 2), which delays treatment and can be fatal if the cancer is not found in time.

Factors Contributing to the Problem

Cossu, Saba, Minerba, and Mascalchi (2018) conveyed several elements contributing to the delay of CRCS, including family, cultural, and socioeconomic background; being male; not being able to get an appointment in a timely manner; mental health concerns; level of education; and being obese. Additionally, the authors pointed out that a knowledge deficit regarding the process of screening could create fear of and anxiety over what the results may be or if there is any pain, and embarrassment and helplessness could lead to low screening participation. Honein-AbouHaidar et al. (2016) similarly reported little awareness, understanding, and knowledge of colorectal cancer and the purpose of CRCS; fear of cancer, screening results, and possible outcomes related to a cancer diagnosis; poor attitudes and shame toward CRCS; questionable efficacy of CRCS; no sense of urgency to get screened because of life responsibilities, scheduling conflicts, transportation issues, being unable to find a person to accompany the patient, and a perception that other cancers might be more important to screen for; insufficient health literacy; language barriers; and a threat to masculinity among men as barriers to receive CRCS. Hasan et al. (2017) added questionable safety, high cost, and low education levels to a list akin to the two mentioned above. However, other reasons for delaying CRCS may exist and need to be explored.

Significance of the Problem

Colorectal cancer is the third most frequently diagnosed cancer in men and women in the U.S. and the second leading cause of cancer death in men and women combined (ACS, 2019). Cossu et al. (2018) noted that, although there is a downward trend, colorectal cancer is still one of the most prevalent reasons for cancer death and illness globally. This type of cancer is preventable with timely screening at regular intervals and chances for treatment and survival increase if the cancer is found and diagnosed early (Wang et al., 2012). Nevertheless, about one third of adults aged 50 to 75 are not up to date with screening and more than 25% have never had a colonoscopy screening (CDC, 2016). Overall survival and health-related quality of life in colorectal cancer patients are influenced by race, marital status, level of education, age, income, and alcohol use (Reyes et al., 2017). Insurance and socioeconomic status as well as the number of comorbidities an individual has been diagnosed with have some bearing on survival (Tannenbaum, Hernandez, Zheng, Sussman, & Lee, 2014). Additionally, survival is greatly dependent on what stage the cancer was diagnosed at and if it has metastasized (Haggar & Boushey, 2009). Colorectal cancer related mortality is also influenced by the location of the primary tumor because cancer in the right colon is less prevalent but has worse outcomes (Peeters et al., 2018).

The age at which people get diagnosed with colon cancer is dropping and the prevalence of colorectal cancer in adults under 40 years of age is growing (Campos, 2017). Imperiale, Kahi, and Rex (2018) pointed out a 22% rise in colorectal cancer diagnoses in individuals less than 50 years of age in the years between 2000 and 2013. Therefore, the recommended screening age was lowered to age 45 in 2018. However, if more than a quarter of screening-eligible adults are not having their colonoscopies, then the number of missed colon cancer cases and, ultimately death, also increases (CDC, 2016). The U.S. government set goals to reach 70.5% of adults to receive colorectal cancer screening as part of the Healthy People 2020 initiative, which is a science-based 10-year agenda for the betterment of the health of all Americans (Department of Health and Human Services [DHHS], 2019).

Purpose of the Study

The purpose of this study is to assess the extent to which participants received their primary CRCS by the recommended age and barriers that prevented timely CRCS. Furthermore, this study will evaluate the difference in barriers for timely initial CRSC for men compared to women. The information obtained from this study is of critical importance for public health campaigns to increase the number of people who have timely initial CRCS. It will also be useful for healthcare providers to help remove the barriers for individuals to receive screening.

Research Questions

1. What are the colorectal cancer screening practices among males and females, aged 45-55?
2. What potential barriers exist that prevent individuals from undergoing timely colorectal cancer screening?
3. What are the knowledge levels of colorectal cancer screening among those who have and have not received screening?

Limitations

1. The time (three weeks on social media and two weeks of GI clinic distribution) in which the study was conducted limited responses.
2. The geographical area of distribution was limited due to the size of the study.
3. The study only focused on a limited age group.
4. Males as well as ethnic and racial groups were underrepresented.
5. Socioeconomic status and education level was not addressed.
6. Reasons for early CRCS were not included.
7. Other CRCS methods were left out.

Delimitations

1. The study was limited to men and women between the ages of 45 and 55 years old, which is the recommended age at which to start CRCS.

2. Data collection was limited to a portion of the spring semester 2020.
3. Participants were limited to those who can read and understand English.

Assumptions

1. Participants can understand the survey questions and follow the directions provided to them.
2. Participants are honest in answering the survey questions.

Definitions

- Adenoma: a benign tumor that originates in the epithelial tissue of a gland or gland-like structure (National Cancer Institute [NCI], n.d.)
- Benign: non-cancerous (NCI, n.d.)
- Bowel prep: elimination of all solid matter from the intestines by elimination of solid food intake for the duration of the prep and use of laxative medications (American Gastroenterological Association [AGA], 2020)
- Colonoscopy: visual inspection of the inside lining of the colon from cecum to anus by use of colonoscope, a flexible tube with a light, camera, and hole to insert instruments for polyp removal at the tip (NCI, n.d.)
- Colorectal cancer screening: is used to try to find cancer before any signs or symptoms appear but is referring to colonoscopies for the purpose of conducting this study (American Society of Clinical Oncology [ASCO], 2019)
- Epithelial tissue: the thin lining of all body surfaces, hollow organs, and body cavities and the major tissue found in glands (NCI, n.d.)

- Flexible sigmoidoscopy: visual inspection of the inside lining of the last third of the colon by use of colonoscope (ACSO, 2019)
- Home stool blood test: a test that detects hidden blood in the stool which could be an indicator for some type of bleeding in the digestive tract and warrants further investigation if results are positive (ACSO, 2019)
- Malignant: cancerous with the potential to extend and invade other areas of the body (NCI, n.d.)
- Neoplastic: a new and abnormal formation of tissue, may be cancerous or non-cancerous (NCI, n.d.)
- Polyp: a flat, or finger-like projection on the inside lining of the colon wall (NCI, n.d.)
- Polypectomy: the surgical removal of a polyp (NCI, n.d.)
- Precancerous: a growth that is not yet but likely will become cancerous (NCI, n.d.)

Chapter 2

Review of Literature

Introduction

The purpose of this study was to assess the extent to which participants received their primary CRCS by the recommended age and barriers that prevented timely CRCS. Furthermore, this study evaluated the difference in barriers for timely initial CRSC for men compared to women. This chapter provides relevant literature concerning colorectal cancer epidemiology, risk factors, screening practices, barriers to screening, and the importance of screening and prevention.

Colorectal Cancer Biology and Epidemiology

Colorectal cancer develops gradually. It begins with a growth, typically referred to as a polyp, and can, in time, become cancerous (Ünal & Ozturk, 2015). Ahmed, Johnson, Ahmed, and Iqbal (2014) stated that all colorectal cancers originate from small polyps. Winawer et al. (1997) added that cancer typically does not develop in the absence of adenomas. Growth patterns apart from adenomatous polyps are called serrated polyps and occur less often but present similar risk for cancer development, although only a fraction of all colorectal polyps will change into colorectal cancer (Øines, Helsingen, Bretthauer, & Emilsson, 2017). Winawer et al. (1997) described the progression from adenomatous polyps to colorectal cancer as slow and happening over the span of many years. Once cancer has developed, it is categorized by the extent of growth from the original site in the inside lining of the colon wall to the outside lining, nearby lymph nodes, and other structures or organs in the body (Winawer et al., 1997).

Colorectal cancer was found to be one of the primary reasons for cancer-related illness and death (Kolligs, 2016) and the third most frequently diagnosed as well as the third deadliest cancer in the United States (Kolligs, 2016). Marley and Nan (2016) reported that approximately 135,430 new cases were diagnosed in 2017 and approximately 50,260 deaths occurred in the same year. Brenner, Kloor, and Pox (2014) observed similar statistics on a global scale, describing colorectal cancer as the fourth most common oncological cause of death. Aran, Victorino, Thuler, and Ferreira (2016) suggested there are an estimated 753,000 worldwide colorectal cancer deaths per year and about 814,000 new cases for men and 664,000 for women in 2015. Favoriti et al. (2016) remarked that mortality rates were significantly different by gender as well as by race, with the latter likely due to socioeconomic diversity. The incidence rates account for 9.7% of all cancer incidents worldwide (Aran, Victorino, Thuler, & Ferreira, 2016).

The above-mentioned findings substantiate that colorectal cancer constitutes the third deadliest cancer in men and women, only following prostate and lung cancer and breast and lung cancer in the United States respectively. However, even though estimations accounted for 1,177,556 of U.S. residents to have lived with a colorectal cancer diagnosis in 2013, those numbers were noted to be dwindling (Marley & Nan, 2016). Rawla, Sunkara, and Barsouk (2019) said that incidence and death rates in persons over 50 years of age were decreasing in the United States and that death rates have fallen significantly from 1975 to 2015. A study by Siegel et al. (2017) revealed similar results, where the authors elaborated on the difference being due to an increase in general acceptance of colorectal cancer screening. Siegel et al. (2017) also noticed a change where "receipt of a colonoscopy in the past 10 years increased from 14% in 2000 to 41% in 2013 among individuals ages 50 to 54 years, from 16% to 52% in those ages 55 to 59 years, and from 25% to 63% in those ages 65 years and older" (p. 189). Other reasons for a fall in incidence and mortality rates were said to be declining use of tobacco products, especially cigarettes, and high consumption of red and processed meat, as well as increasing use of aspirin (Siegel et al., 2017). Brenner, et al. (2014) attributed the change in direction to the fact that more individuals had polyps removed during sigmoidoscopy and colonoscopy.

Another noteworthy characteristic of colorectal cancer is to consider that the age at first diagnosis is dropping (Rawla, Sunkara, & Barsouk, 2019). Aran et al. (2016) predicted that there will be a rise in new colorectal cancer diagnoses in the 20-49-year age group by 2030. Additionally, it was noted that there seems to be a disparity in incidence rates by geographical location, with the higher numbers in more developed area as well as in certain ethnicities. Over half of the global incidence of colorectal cancer was prevalent in developed countries (Kolligs, 2016). Favoriti et al. (2016) credited the reasoning behind that to varying exposures of diet and environment to those who are genetically more susceptible, while Siegel et al. (2017) attributed lifestyle changes, such as unhealthy dietary patterns, overweight and obesity, and being physically inactive, to the finding.

The five-year survival rate of colorectal cancer has been noted to be near 66% in high-income countries around the world, while lower-income countries have survival rates that are more than 16% lower (Brenner, Kloor, & Pox, 2014). Race, ethnicity, age, and progression of disease at time of diagnosis all play a role in survival, because colorectal cancer is detected in a timelier fashion and the treatment for it has been more developed (Favoriti et al., 2016). Furthermore, mortality reduction was due to advance in treatment, variations in risk factors, and increasing participation in screening procedures (Siegel et al., 2017).

Colorectal Cancer Staging

The staging of colorectal cancer encompasses how deep into the colon wall the cancer has grown (T stage), whether there is lymph node involvement (N stage), and any metastases (M stage) (Park, Kim, Lee, Lee, & Han, 2017). Appropriate treatment of colorectal cancer is determined by the staging of the disease through use of radiologic imaging like computed tomography (CT) scans, magnetic resonance imaging (MRI), transrectal ultrasound, or positron emission tomography (PET) scans (Lee & Lee, 2016). Vega, Valentín, and Cubiella (2015) suggested that whether the outcome is positive or negative as treatment is started is also dependent on the stage of the tumor. Correct staging of colorectal cancer is, therefore, crucial for correct and appropriate treatment.

Risk Factors for Colorectal Cancer

Colorectal cancer does not have one single specific cause but rather, there are multiple elements involved in the development of the disease (Aran et al, 2016). Among the most commonly named risk factors for colorectal cancer, which can accumulate during the lifespan of any individual, are environmental influences, specifically sedentary lifestyle, overweight and obesity, smoking, excessive alcohol use, and a diet rich in processed meat and cholesterol and lacking fiber, folic acid, and vitamin B6, as well as low socioeconomic status and living in countries with limited healthcare resources (López, Albero, & Rodríguez-Montes, 2014). Winawer et al. (1997) cited having one or more relative with a history of colorectal cancer as one element that could increase the risk of also getting the disease. Kolligs (2016) estimated that 30%-50% of the risk for colorectal cancer development can be associated with certain lifestyle factors. However, it was noted by Brenner et al. (2014) that no one of the risk factors is solely responsible for the majority of colorectal cancer diagnoses.

There are modifiable and non-modifiable risk factors that can contribute to the development of colorectal cancer (Rawla, Sunkara, & Barsouk, 2019). Non-modifiable factors, such as age, gender, race, personal health history of inflammatory bowel disease, and heredity, are nothing any individual can change. Modifiable risk factors, however, are the behavioral and lifestyle factors which can be adjusted to reduce the risk of developing colon cancer and increase the chance of survival (Lee, Keum, & Giovannucci, 2016).

Risk increases with age and gender influences the probability of diagnosis. Kolligs (2016) indicated that more than half of initial cancer diagnoses are made after age 70 and that men develop advanced cancer at twice the rate as and sooner in their lives than women while Favoriti et al. (2016) proposed that colorectal cancer prevalence increases considerably between the ages of 40 - 50 and in each 10-year period thereafter. Although age increases the risk of colorectal cancer, more individuals under 45 years of age are receiving a colorectal cancer diagnosis and the incidence in this age group grew by 22% between the years 2000 and 2013 (Weinberg, Marshall, & Salem, 2017). Kolligs (2016) pointed out that being male and having a close family member with colorectal cancer carries the same risk whereas Aran et al. (2016) suggested that the incidence in men is close to double than that in women.

In a study that was reviewed by Connell, Mota, Braghiroli, and Hoff (2017), it was found that race or ethnicity influenced colorectal cancer incidence and that those who are white had lower rates than those who are black. Favoriti et al. (2016) suggested higher screening practices in those who are white because of differences in socioeconomic status. Correspondingly, biological differences include higher genetic predisposition at a younger age in those who are black and cancer occurrence mostly in the right and proximal transverse colon (Favoriti et al., 2016). This is significant to consider because cancers in that region of the colon are typically bigger in size (Baran et al., 2018). Siegel et al. (2017) claimed that the highest incidence and mortality rates were in non-Hispanic blacks and noted that the lowest rates could be found in Asian Americans/Pacific Islanders.

Individuals with inflammatory bowel diseases, such as Crohn's disease or ulcerative colitis are also at increased risk for colorectal cancer due to chronic inflammation of the bowel (Barsouk, Rawla, Barsouk, & Thandra, 2019). Relatedly, Marley and Nan (2016) revealed that there is a correlation between inflammation associated with an ulcerative colitis diagnosis and time spent in active flare-ups and the development of colorectal cancer. In the same article, it was also noted that Crohn's disease, although also an inflammatory condition, increases the risk but at a lower rate than ulcerative colitis. This was corroborated by Aran et al. (2016), who added that colorectal cancer develops via numerous interactive molecular pathways, which makes this type of cancer multifaceted and difficult to manage. Lastly, celiac disease, which is an auto-immune disorder that reacts with inflammation to the exposure of gluten in the gastrointestinal tract, can also increase the risk for development of colorectal cancer (Barsouk et al., 2019).

A family history of colon cancer or even colon polyps represents another notable risk factor and makes up about one third of the risk, which increases as the number of biological relatives with a history increases and with the degree of the relative (Kolligs, 2016). That means that a mother's or father's history or diagnosis increases the risk far more than an uncle's or a cousin's. Another crucial aspect to consider here is how old the relative was when he or she was first diagnosed because the risk for colon cancer increased if the first-degree family member received their diagnosis at less than 50 years of age (Connell, Mota, Braghiroli, & Hoff, 2017). This will guide the age of first screening for the individual in question. Brenner et al. (2014) noted that genetic syndromes can also pose a risk but only make up less than 5% of colorectal cancer incidences and related details to that effect remain unclear.

A correlation exists between the increased risk of developing colorectal cancer and a Westernized lifestyle, which entails certain dietary habits, diabetes, excessive alcohol and tobacco use, lack of weight management, and physical inactivity (Connell et al., 2017). The dietary habits include eating a high-fat, meat-based diet, insufficient amounts of dietary fiber intake from fruits, vegetables, and legumes (Turner & Lloyd, 2017). In a study conducted by Young et al. (2019), the authors concluded that lifestyle factors alone as well as combined with inherited genetics increased colorectal cancer risk, and that genetics alone carried an equal amount of risk as lifestyle.

Findings about how dietary practices increase the risk of colorectal cancer development vary between studies. Particular attention is paid to red and processed meat consumption (Turner & Lloyd, 2017). Santarelli, Pierre, and Corpet (2008) pointed out that consuming processed meat might be more detrimental than the consumption of red meat. Wilkins, McMechan, and Talukder (2018) noted that, although high fat consumption has also been found to increase the risk, there was not enough evidence in previous studies that adherence to a low-fat diet was cancer protective. Siegel et al. (2017) suggested that folic acid may have a contradictory influence on colorectal cancer development in that it can be preventative of new growths, but also stimulate further advance of existing ones. Øines, Helsingen, Bretthauer, and Emilsson (2017) found a correlation between the presence of adenomas and unfavorable cholesterol levels at the time of the screening.

Like dietary habits, body mass index (BMI) is a factor and important to consider. Øines et al. (2017) wrote that there is a small link between BMI and development of colorectal cancer. The authors noted that extra weight, as in overweight and obesity, can cause persistent low-grade inflammation, which can compound the risk for colon cancer. Behaviors consistent with a high-fat and high-meat diet, coupled with sedentary lifestyle, result in rising numbers of overweight and obesity and influence cardiac health, blood sugar levels, metabolism, hormone balance, and immune system function (Young et al., 2019).

Numerous studies connect an increased risk for cancer development with smoking habits. Aran et al. (2016) described tobacco smoke as containing over 7000 chemicals, including known carcinogens. They also related colorectal cancer incidence and decreased survival with smoking. Øines et al. (2017) named smoking the number one modifiable risk factor for the development of polyps and colorectal cancer due to carcinogens which can cause permanent cigarette-specific genetic mutations inside of the colon. Cigarette smoke also causes inflammation (Young et al., 2019), which was mentioned earlier as one of the relatable causes for increase in risk. Bailie, Laughrey, and Coleman (2017) alluded to molecular mutations in smokers that constitute a 2.5 to

3.4-fold amplified risk for serrated or adenomatous polyps respectively. Hoffmeister, Jansen, Stock, Chang-Claude, and Brenner (2014) described the risk for colorectal cancer as being overcome by regular CRCS and polypectomy in those who were former smokers, but for those that continue to smoke into older age, the risk increases.

Not unlike the increased risk presented by smoking, excessive alcohol consumption can escalate the danger for colorectal cancer development. Walter et al. (2016) cited the potentially fatal carcinogenic outcomes of alcohol metabolites and alcohol-related nutritional deficiencies and malabsorption. Wang, Duan, Yang, and Lin (2015) found that the more alcohol an individual consumes, the higher the risk for development of colorectal cancer becomes. Furthermore, the authors pointed out that alcohol consumption influences cancer death in general. Alcohol is also said to pose an enhanced risk in individuals with a first-line relative with a history of colorectal cancer (Rossi, Jahanzaib Anwar, Usman, Keshavarzian, & Bishehsari, 2018).

Physical activity is a critical factor for the prevention of colorectal cancer, however not often mentioned separately in the literature. Rather, it is included in the list of risk factors and lifestyle behaviors such as diet and smoking but elaborated on more with prevention in mind. However, Santos Silva et al. (2018) reviewed a global longitudinal study and found a correlation between physical inactivity and disability-adjusted life-years related to colorectal cancer in Brazil.

Colorectal Cancer Screening Practices

Colorectal cancer screening practices vary according to recommendations from assorted organizations like the American Academy of Family Physicians, the American Cancer Society, and U.S. Preventive Services Task Force but all have the following in common: for those of average risk, screening via colonoscopy should begin at 50 and end at 75 years of age unless risk factors, symptoms, personal or family history, or previous screening results determine otherwise and repeated every ten years while stool-based tests and flexible sigmoidoscopy are advised to be done more often (Wilkins, McMechan, & Talukder, 2018). In addition, Wilkins et al. (2018) documented that the recommended screening age decreases to 45 in African Americans per the American College of Gastroenterology and the U.S. Multi-Society Task Force on Colorectal Cancer, which was substantiated by Short, Layton, Teer, and Domagalsky (2015), who added that screening in African Americans should begin at age 45 since the colorectal cancer incidence in this population increases earlier. Colorectal cancer is a slow-growing cancer which can be prevented by regular screening and straightforward treatment if found early (Sorra, 2006). Screening and early intervention can, therefore, decrease mortality and cost. According to Short et al. (2015), 50-75 years of age is when routine screening should be performed on an individual of average risk, which is also noted by Wilkins et al. (2018), who listed various organizations and their screening recommendations.

Various options are available for screening. These options include both, stool-based tests as well as structural exams. The stool-based exams are guaiac fecal occult blood tests (gFOBT) or fecal immunochemical tests (FIT), which uses antibodies to test for the presence of microscopic blood in the stool sample (Ahlquist, 2019). The benefits to these tests are that they can be done at home and are relatively easy and quick to perform. Ahlquist (2019) noted that screening with FIT every year not as helpful in the detection of colorectal cancer as multitarget DNA stool-based tests or colonoscopies. However, the author also interjected that FITs are more sensitive in detecting advanced adenomas and cancer than gFOBTs (Ahlquist, 2019).

Structural exams, such as sigmoidoscopy and colonoscopy, are done by use of flexible tubes equipped with a camera on the end, which allows direct visualization of the inside of the colon wall; partially in a sigmoidoscopy, and completely during a colonoscopy. Abdel-Rahman and Cheung (2019) advised that sigmoidoscopies should be performed every 10 years, just like regular screening colonoscopies can be done every 10 years. During either procedure, polyps can be identified, removed, and tested.

In a study conducted by Hol et al. (2010), the authors found that flexible sigmoidoscopy and colonoscopy were the preferred methods over stool-based approaches for CRCS in patients who had previous screening, as well as those who had never been screened before. Hoffman, Teubner, and Kiesslich (2014) called colonoscopy the definite gold standard screening method for colorectal cancer. Ahlquist acknowledged that the inside colon wall can be fully visualized and any polyps removed at the same time. It was also noted that the precision in adenoma detection during a colonoscopy relies on the expertise and awareness of the proceduralist (Ahlquist, 2019).

Other screening tests are available. Among those are double-contrast barium enemas, computed tomographic (CT) colonography or virtual colonoscopy, and capsule colonoscopy, which are not as frequently used (Wilkins et al., 2018).

Screening Barriers

Not everyone eligible for colorectal cancer screening participates when they reach the recommended age. Bromley, May, Federer, Spiegel, and Van Oijen (2015) remarked that while African Americans constitute the ethnic group with the greatest number of colorectal cancer diagnoses and death rates, they are also the group least likely to present for an exam. The authors cited fear, lack of knowledge about the risks, benefits, and screening procedure itself, lack of physician recommendation, and financial difficulties among the top barriers for this subgroup to undergo colorectal cancer screening. Barriers not only exist based on race or ethnicity but also because of level of education, income, and insurance status (Redmond Knight, et al., 2015). Attitudes and beliefs are barriers for more affluent and educated white adults, while cost was the most predominant barrier in less educated, low-income black adults (Redmond Knight et al., 2015).

Sahin, Aker, and Arslan (2017) noted fear of bad test results as the number one barrier to receive colorectal cancer screening, followed by being embarrassed of the test, and the screening potentially being painful and uncomfortable as the main reasons not to get screened. Cossu, Saba, Minerba, and Mascalchi (2018) pointed out that a lack of knowledge concerning the screening process could lead to fear and anxiety about what screening results would show and whether there would be discomfort or unease during the procedure. Other barriers that were described included readiness, being too busy, fear about the test, lack of conversation about screening with healthcare provider, lack of insurance, insufficient time, no intentions to get screened, and a general distaste towards screening (Ely, Levy, Daly, & Xu, 2016).

Similar findings come up in other articles. However, Katz, Young, Zimmermann, Tatum, and Paskett (2018) noted that their results showed the test as not being a priority or even an inconvenience as the most frequent answer, closely followed by the belief that there is no family history of colorectal cancer, and therefore no need for screening. Hasan et al. (2017) discovered that the majority of study participants would have a colonoscopy screening if their doctor told them to and that they just don’t know enough about colorectal cancer to make an informed decision.

Importance of Screening and Prevention

Early screening and prevention will reduce colorectal cancer related morbidity, mortality, and healthcare cost. Using findings from current research and following the best practices available can avert a cancer diagnosis for those with one or more risk factors (Short et al., 2015). Apart from regular and timely screening and lifestyle modifications, prevention measures include assessment of personal risk related to genetics and heredity (Kolligs, 2016), consumption of fish and fish oil, a high intake of fiber, calcium, and vitamin D, and regular exercise (Marley & Nan, 2016). Of particular interest was the fact that there can be a 20%-25% reduction in colorectal cancer risk with physical activity (Santos Silva, et al., 2018). Conflicting information is found about the daily use of aspirin as a preventive measure due to the danger of developing bleeding in the gastrointestinal system (Gravitz, 2015). Since the risks outweigh the benefits, aspirin is worth mentioning, but deserves caution.

Gender-specific Differences in Attitudes Toward Colorectal Cancer

McKinney and Palmer (2014) discussed how gender affects knowledge of and worry about colorectal cancer, perceived risk of being diagnosed with the disease, and CRCS intention. The findings suggested that there is no difference in how much men worried about CRCS versus the level of worry in women and they also did not find a difference in intention to receive CRCS. There was, however, a discrepancy in knowledge, perceived risk, and understanding of colorectal cancer but this study was only focused on African Americans in Florida. (McKinney & Palmer, 2014). In a study conducted by White et al. (2018), it was observed that women had higher CRCS rates than men although those results only included answers from participants aged 60-74. Ritvo et al. (2013) learned that women were uncomfortable with the thought of how a colonoscopy is performed, embarrassed about CRCS, and had a fear of colonic perforation, while men displayed an avoidant attitude of procrastination, thought that CRCS was unnecessary healthcare, and felt vulnerable. Other points mentioned were a better relationship between providers and women, more knowledge about colorectal cancer in women, and greater emotional distance in regards to choosing CRCS in men.

Summary

Colorectal cancer, or cancer of the colon or rectum, is the third most common and deadly cancer in the United States and ranks in the top five for leading cause of cancer death around the world. Lifestyle choices, specifically modification of risk factors, such as smoking, eating an unhealthy diet full of meat and fat and devoid of fruits, vegetables, and dietary fiber, physical inactivity, and excessive alcohol consumption can influence the risk for development of colorectal cancer. Treatment options depend on staging. Colorectal cancer can be screened for by various methods, but the most common are stool-based and direct visualization tests. Barriers to screening are abundant. The most frequently named are fear of the test or what the results could be, attitudes regarding perceived susceptibility, and cost. Timely and individualized screening as well as a number of preventive measures can lead to early detection and easier treatment as well as better health outcomes and decreased mortality. Limited information is available about specifics regarding gender-related differences in attitudes toward CRCS.

Chapter 3

Methodology

Introduction

The purpose of this study was to assess the extent to which participants received their primary CRCS by the recommended age and barriers that prevented timely CRCS. Furthermore, this study was conducted to evaluate the difference in the specific barriers to timely initial CRSC for men compared to women. This chapter describes the research design, sample selection and technique, data collection procedures, instrumentation, validity and reliability of the instrument, and data analysis.

Research Questions

This study addressed the following research questions:

1. What are the colorectal cancer screening practices among males and females ages 45-55?
2. What potential barriers exist that prevent individuals from undergoing timely colorectal cancer screening?
3. What are the knowledge levels of colorectal cancer screening among those who have an have not received screening?

Research Design

A descriptive, cross-sectional, survey-based design was used for this study. Descriptive data was used explain what happened in the sample by summarizing it using measures of central tendency and dispersion (Thompson, 2009). A descriptive research design uses observation of a behavior or situation as it occurs naturally, without the researcher's interference or manipulation of variables (Kim, Sefcik, & Bradway, 2017). It is helpful to use a descriptive design when an experiment is not practical, for instance with limitations of time and budget to conduct the study, as was the case for the current study. The cross-sectional study design was used because it assesses the variables at one point in time and is largely used for population-based surveys (Setia, 2016). A cross-sectional design is intended to provide estimates of the pervasiveness of a certain illness, including attitudes and behaviors (Kesmodel, 2018). The time to conduct this study was limited to three weeks and a cross-sectional design was therefore more appropriate than a design that would require more time. Surveys make it possible to sample a sizeable number of participants from a chosen population (Safdar, Abbo, Knobloch, & Seo, 2016).

Sample Selection

This study was comprised of a convenience sample of men and women between the ages of 45 and 55 years old, which is the newest recommended age at which to start CRCS (American Cancer Society, 2020). Data collection took place during the spring semester of 2020.

Convenience sampling was the sampling technique chosen for this study. Convenience or opportunity sampling is the most customary when no other conditions need to be met apart from the convenience of the person or persons conducting the research (Farrokhi & Mahmoudi-Hamidabad, 2012). Using this type of sampling allows the researcher to utilize the part of a population that is close at hand and requires very little resources (Hedt & Pagano, 2011). Convenience or opportunity sampling is used most often because it saves time and money. The current study was limited in time to only a small portion of the spring semester 2020 and there was a limited budget. A geographical area from which participants are selected was not defined for this study and no identification of geographical location was requested in the demographics.

Data Collection Procedures

The researcher contacted various individuals from organizations like Lifetime Fitness Corporate, Minnesota Public Health Association, Sons of the American Legion, and Minnesota Society for Public Health Education by email to inquire about them being able and willing to distribute via email an introduction, purpose of the study, and the survey link within their respective organizations. These individuals agreed and distributed the online survey link along with the above-mentioned information to their specific email lists with the request for the survey to be completed at the participants' convenience. Additionally, postcards with the same information as noted above were printed and left at the front desk of two locations of a local gastroenterology clinic. Permission for this distribution was extended verbally as well as in writing to the researcher. The cards were left at the two clinic sites with a request for them to be distributed to those patients who met the inclusion criteria. Lastly, the link and accompanying information were shared on social media by persons known to the researcher as well as on city-specific social media sites, along with requests to also share the link to recruit further participants. The survey was conducted only by means of the Qualtrics® web-based survey software and no paper copies were distributed.

Krejcie and Morgan (1970) developed a formula and a corresponding table for determining research sample size needed to be representative of a given population. According to that table, an estimated number of 384 participants were necessary to ascertain the data needed for this survey to be representative of the study population and to establish statistically meaningful and significant results. Having statistically significant and meaningful results suggests that those results did not happen by chance.

Inclusion criteria for this study consisted of being male or female, 45 to 55 years old, and having had or planning to have an initial colonoscopy for the purpose of colorectal cancer screening. Exclusion criteria were being of an age that is outside of the given age range and not answering any questions.

Instrumentation

Select items and questions from the National Cancer Institute's Health Information National Trends Survey 2003 (HINTS, 2003) were used to assess screening practices, barriers to receiving CRCS, and knowledge about colorectal cancer (National Cancer Institute, 2018). The HINTS 2003 survey instrument is available online in its entirety and permission to use items was granted via personal email from the National Institute of Health to the researcher. The items for the current study were used to create a survey utilizing the Qualtrics® web-based software, which will collect survey results.

The year 2003 was the first year during which the HINTS was conducted by the National Cancer Institute (NCI) to research “the American public’s knowledge of, attitudes toward, and use of cancer- and health-related information” (National Cancer Institute, 2018, para. 1). The instrument is a survey originally designed to be delivered via telephone and comprised of 14 separate sections to include household details, health communication, cancer history and knowledge, specific cancers like colon, breast, cervical, and prostate, and health-related behaviors like tobacco use, fruit and vegetable intake, and exercise, overweight and obesity, general health status, and, lastly, demographics. Each section has varying numbers of questions, ranging from 2 to 33. The types of questions in the HINTS 2003 vary. Some questions are multiple choice/pick all that apply, some yes or no, and some are Likert-type.

As there are sections in the HINTS 2003 that were not applicable to this study, particularly those related to other types of cancer and health-related behavior, only those items associated with colorectal cancer were chosen to be included. Necessary demographic items in the present study were limited to age, gender, race, and ethnicity. Other demographic items were omitted. Items that were included from HINTS 2003 originated from the colon cancer section and included three Likert-type questions related to perceived personal risk, 23 items related to screening knowledge and behaviors in various formats and addressing colonoscopies as well as stool-based screening tests, and two questions about detection and curability of colon cancer. Items

CC-9, CC-11, CC-12 were omitted because they did not address any of the current study variables.

Since the following questions were not addressed in the HINTS 2003 survey, they were added to address research questions and variables to be measured. Apart from question #1, they will be given a Likert-type response:

1. At what age did you have your first screening colonoscopy?
2. Did the colonoscopy prep bother you?
3. Were you fearful of the results?
4. Were you fearful of the test itself?
5. How easy was it to take off from work to have screening done?

All questions in the current study were numbered consecutively.

Descriptive information was gathered from the survey, which explored the participants' CRCS practices, the age at which screening first occurred, and any reasons for the delay of screening. Moreover, the potential barriers to receiving timely CRCS were established and the difference in these barriers between men and women were uncovered.

Validity and Reliability

Minimal information was available regarding validity and reliability of this national survey instrument, even though survey items were used in numerous articles (National Cancer Institute, n.d.). Nelson et al. (2004) noted that "scientific validity criteria emphasized including items that have been demonstrated to measure population-based constructs in reliable ways” (p. 447). The validity elements mentioned by Nelson et al. (2004) included that self-reported information can provide valid assessments for the adult population, and well-established measures of cancer-related information or knowledge. Schnittker and Bacak (2014) remarked that the validity of a self-reported health assessment such as HINTS 2003 is also greatly influenced by knowledge levels of health-related issues and an increased use of technology to obtain such knowledge. Ok, Marks, and Allegrante (2008) pointed out that the HINTS 2003 survey was created by “using constructs from established health communication and behavior change models” (p. 640).

Reliability was only mentioned regarding the five communication item responses in the study done by Ok, Marks, and Allegrante (2008), indicating that the results for all of them were similar. Finney Rutten et al. (2019) reported that data quality was assured by first conducting cognitive testing of new survey items in each HINTS instrument. This was noted to grant valid measures of the constructs in question as well as minimal inaccuracy in responses. Furthermore, Finney Rutten et al. (2019) related that, in comparison with validated multi-item scales, “single-item measures can have similar test–retest reliability and construct validity” (p. 8).

Data Analysis

Data analysis was conducted using the IBM Statistical Package for Social Sciences (IBM SPSS® Statistics 26). Descriptive statistics, including frequencies, percentages, and means, were calculated to describe data, a Mann-Whitney test was performed and an alpha level of .05 selected to assess differences in CRCS between males and females (Table 1).

Table 1

Table of Specifications

Research Question (RQ)	Survey items or scales used to assess RQ'S	Level of data (Nominal, Ordinal, Interval/Ratio)*	Analysis needed to assess RQ
1. What are the colorectal cancer screening practices among males and females ages 45-55?	1 2 3 4 5 6	Nominal and Ordinal	Descriptive statistics including frequencies, percentages, and measures of central tendency Mann-Whitney Test
2. What potential barriers exist that prevent individuals from undergoing timely colorectal cancer screening?	7	Nominal and Ordinal	Descriptive Statistics including frequencies, percentages, and measures of central tendency
3. What are the knowledge levels of colorectal cancer screening among those who have an have not received screening?	8 9 10 11 12 13	Nominal and Ordinal	Descriptive statistics including frequencies, percentages, and measures of central tendency

Note. *Indicates level of data for survey items, not RQ's

Summary

Data will be collected from items from the National Cancer Institute's HINTS 2003 survey instrument in addition to several added questions, addressing the study variables and research questions. Sampling will be conducted using cluster and snowball sampling and data will be collected via mixed methods. Data analysis will be performed using IBM SPSS® and descriptive statistics as well as independent samples t-test used to analyze and describe study findings.

Chapter IV

Results

Introduction

The purpose of this study was to assess the extent to which participants received their primary colorectal cancer screening by the recommended age and any barriers that prevented participants from receiving timely colorectal cancer screening. Furthermore, the researcher sought to evaluate differences in barriers to timely initial colorectal cancer screening for men compared to women. This chapter gives an overview of the results of the study.

A total of 316 surveys were collected via Qualtrics® web-based survey software from potential participants and 161 surveys (51%) were used for data analysis. The remainder of the surveys (49%, n = 155) were rejected due to incomplete/missing data (more than 5%) or the participants' age outside of the required range of 45-55 years.

Demographics of the Sample

The sample consisted of 161 adults between the age of 45-55 years of age. Participants were primarily female (82%), non-Hispanic (96.9%), and Caucasian/White (94.4%). The mean age of participants was 50.07 years (SD = 3.153) (Table 2).

Table 2

Participant Demographics

Item		n(%)	Item		n(%)
Sex*			Age		
	Male	28(17.4)		45 Years	12(7.5)
	Female	132(82)		46 Years	11(6.8)
Race*				47 Years	15(9.3)
	Caucasian/White	152(94.4)		48 Years	24(14.9)
	African American/Black	1(0.6)		49 Years	13(8.1)
	Asian	2(1.2)		50 Years	18(11.2)
	Other	2(1.2)		51 Years	12(7.5)
	Two or more races	3(1.9)		52 Years	11(6.8)
Ethnicity*				53 Years	12(7.5)
	Hispanic	3(1.9)		54 Years	13(8.1)
	Non-Hispanic	156(96.9)		55 Years	20(12.4)

Note. *Totals not equaling 100% indicates missing data.

Assessment of Research Questions

What are the colorectal cancer screening practices among males and females ages 45-55?

Out of the sample of 161 participants, 151 (93.8%) have never had a sigmoidoscopy, 73 (45.3%) have never had a colonoscopy, 71 (44.1%) have not had either, and 144 (89.4%) have never done a home stool blood test. Seventeen participants (10.6%) have used a home stool blood test kit. Among those who have used a home stool blood test kit, seven (4.3%) used a home stool blood test kit less than a year ago, four (2.5%) used a home stool blood test kit more than a year but no more than two years ago, one (0.6%) used a home stool blood test kit more than two years but not more than five years ago, and five (3.1%) used a home blood test kit more than five years ago. For reasons that were not specified in the study, 33 (20.5%) participants had their first screening colonoscopy before the age of 45. A total of 22 (13.7%) participants were screened between 45 and 49 years of age, 26 (16.1%) had their first screening when they were 50 or 51 years old, seven (4.3%) at age 52 or 53, and one participant (0.6%) could not remember when she had her first screening. Ninety participants (55.9%) have received CRCS via sigmoidoscopy or colonoscopy. Among those participants, 32 (19.9%) Received CRCS within the past year, 44 (27.3%) more than a year but not more than five years ago, 10 (6.2%) more than five but less than 10 years ago, and four (2.5%) had their last screening more than 10 years ago. Fifty-two participants (32.3%) have only had one CRCS, while 37 participants (23%) have had more than one. Out of those 37 participants, five (3.1%) reported having had CRCS within the past year, 17 (10.6%) between one and five years, 11 (6.8%) between five and 10 years, and four (2.5%) more than 10 years between CRCS (Table 3).

Table 3

Participants' Screening Practices

Item	n(%)
1. Have you ever had a sigmoidoscopy?	
Yes	10(6.2)
No	151(93.8)

Table 3 continued

Item	n(%)
2. Have you ever had a colonoscopy?	
Yes	88(54.7)
No	73(45.3)
3. Age at first CRCS	
Not yet	72(44.7)
Before 45	33(20.5)
45-49	22(13.7)
50-51	26(16.1)
52-53	7(4.3)
Can't remember	1(0.6)
4. Most recent stool blood test	
Never	144(89.4)
A year ago or less	7(4.5)
Between 1 and 2 years ago	4(2.6)
Between 2 and 5 years ago	1(0.6)
More than 5 years ago	5(3.1)
5. Most recent sigmoidoscopy/colonoscopy	
A year ago or less	32(19.9)
More than 1 but no more than 5 years ago	44(27.3)
More than 5 but no more than 10 years ago	10(6.2)
Over 10 years	4(2.5)
I have never had either	71(44.1)
6. how many years since previous CRCS?*	
A year ago or less	5(3.1)
More than 1 but no more than 5 years ago	17(10.6)
More than 5 but no more than 10 years ago	11(6.8)
Over 10 years	4(2.5)
I have only had one CRCS	52(32.3)
I have never had a sigmoidoscopy/colonoscopy	71(44.1)

Note. *Totals not equaling n = 161(100%) indicates missing data

[a] Survey items/Questions were adapted from National Cancer Institute (2003)

What potential barriers exist that prevent individuals from undergoing timely colorectal cancer screening?

Not every participant answered items in this portion of the survey, which left anywhere from 26.1% to 71.4% of missing data (Table 4). Of those that did answer, 12 participants (7.5%) said that ‘didn’t know I needed this test’ was a major barrier and 10 (6.2%) called it a moderate barrier. CRCS being too expensive or the participant not having insurance was a major barrier to 11 (6.8%) and a moderate barrier to nine (5.6%) participants. Close to a quarter of participants (n = 38, 23.6%) also said that they put it off or didn’t get around to it, with 11 (6.8%), 14 (8.7%), and 13 (8.1%) choosing this respectively for major, moderate, or minimal barrier.

The greatest reported major barrier to receiving CRCS among the participants was that the they did not have a doctor’s order or they were not told by their doctor that they needed it (n = 23, 14.3%), while 12 participants (7.5%) called it a moderate barrier. This is equally followed by the test being too painful, unpleasant, or embarrassing as a major (n = 17, 10.6%) or moderate (n = 19, 11.8%) barrier and not having had any problems or symptoms as a major (n = 17, 10.6%) or moderate (n = 10, 6.2%) barrier. Within the eligible age range, 15 participants (9.3%) ranked their age or thought that they were too young as a major and 10 (6.2%) as a moderate barrier.

One notable finding was that a total of 63 participants (54.8%) reported the prep for CRCS presented some type of barrier with 15 (9.3%)saying it was a major, 27 (16.8%) saying it was moderate, and 21 (13%) saying it was a minimal barrier. Fifty-six participants (47.9%), found the test too painful, unpleasant, or embarrassing, rating it a major (n = 17, 10.6%), moderate (n = 19, 11.8%), barrier (Table 4). Lastly, fear also generated obstacles for CRCS. Ten participants each (6.2%) conveyed major fear of the test as well as the results while 13 participants (8.1%) were moderately fearful of the test versus eight (5%) who were moderately fearful of the result. Specific comments in this section included that arranging a driver meant that another person had to take off work, the negative side of undergoing the prep, and a general dislike for doctors.

Table 4

Potential Barriers for CRCS

	Major Barrier n(%)	Moderate Barrier n(%)	Minimal Barrier n(%)	No Barrier at All n(%)	Total* n(%)
1. No reason	3(1.9)	2(1.2)	9(5.6)	105(65.2)	119(73.9)
2. Didn't need it	9(5.6)	6(3.7)	11(6.8)	91(56.5)	117(72.7)
3. Didn't know I needed this test	12(7.5)	10(6.2)	8(5)	87(54)	117(72.7)
4. Doctor didn't order it/didn't say I needed it	23(14.3)	12(7.5)	12(7.5)	71(44.1)	118(73.3)
5. Haven't had any problems/no symptoms	17(10.6)	10(6.2)	16(9.9)	72(44.7)	115(71.4)
6. Put it off/didn't get around to it	11(6.8)	14(8.7)	13(8.1)	79(49.1)	117(72.7)
7. Too expensive/no insurance	11(6.8)	9(5.6)	15(9.3)	83(51.6)	118(73.3)
8. Too painful, unpleasant, or embarrassing	17(10.6)	19(11.8)	20(12.4)	61(37.9)	117(72.7)
9. Had another type of colon exam	1(0.6)	2(1.2)	4(2.5)	106(65.8)	113(70.2)

Table 4 continued

	Major Barrier n(%)	Moderate Barrier n(%)	Minimal Barrier n(%)	No Barrier at All n(%)	Total* n(%)
10. Don't have doctor	3(1.9)	4(2.5)	7(4.3)	99(61.5)	113(70.2)
11. Never heard of it/never thought about it	3(1.9)	3(1.9)	8(5)	95(59)	109(67.7)
12. Age/thought they were too young	15(9.3)	10(6.2)	13(8.1)	76(47.2)	114(70.8)
13. Preparing for the colonoscopy bothers me	15(9.3)	27(16.8)	21(13)	52(32.3)	115(71.4)
14. I am fearful of the test	10(6.2)	13(8.1)	20(12.4)	71(44.1)	114(70.8)
15. I am fearful of the results	10(6.2)	8(5)	17(10.6)	78(48.4)	113(70.2)
16. Could not get time off from work	3(1.9)	6(3.7)	13(8.1)	92(57.1)	114(70.8)
17. Other	3(1.9)	1(0.6)	0(0)	42(26.1)	46(26.6)

Note. *Totals not equaling n = 161(100%) indicates missing data
[a] Survey items/Questions were adapted from National Cancer Institute (2003)

The results of the Mann-Whitney tests showed that males considered the following attitudes as a lesser barrier than women or women saw greater obstacles in the following: 'no specific reason' (U = 1013.5, z = -2.181, p = .029); 'didn't need it' (U = 834, z = -3.097, p = 0.002); 'didn't know I needed this test' (U = 888, z = -2.459, p = 0.014); 'too expensive/no insurance' (U = 921, z = -2.147, p = 0.032); 'had another type of colon exam' (U = 985, z = -2.185, p = 0.029); 'never heard of it/never thought about it'

(U = 816, z = -2.078, p = 0.038) ‘I am fearful of the results’ (U = 816, z = -2.566, p = 0.010) (Table 5).

Table 5

Mann-Whitney Test Results

Barrier	Sex	n	Mean Rank	Mann-Whitney U	Z	p-value
No specific reason	Male	26	52.48	1013.50	-2.181	p<.05
	Female	92	61.48			
Didn't need it	Male	26	45.58	834.00	-3.097	p<.05
	Female	90	62.23			
Didn't know I needed this test	Male	26	47.65	888.00	-2.459	p<.05
	Female	90	61.63			
Doctor didn’t order it/didn’t say I needed it	Male	25	49.38	909.50	-1.825	p>.05
	Female	92	61.61			
Haven’t had any problems/no symptoms	Male	26	53.88	1050.00	-.737	p>.05
	Female	88	58.57			
Put it off/didn’t get around to it	Male	26	55.27	1086.00	-.674	p>.05
	Female	90	59.43			
Too expensive/no insurance	Male	26	48.92	921.00	-2.147	p<.05
	Female	91	61.88			
Too painful, unpleasant, or embarrassing	Male	25	67.12	922.00	-1.576	p>.05
	Female	91	56.13			
Had another type of colon exam	Male	26	51.38	985.00	-2.185	p<.05
	Female	86	58.05			
Don’t have doctor	Male	26	52.33	1009.50	-1.345	p>.05
	Female	86	57.76			
Never heard of it/never thought about it	Male	23	47.48	816.00	-2.078	p<.05
	Female	85	56.40			
Age/thought they were too young	Male	26	51.48	987.5	-1.177	p>.05
	Female	87	58.65			
Preparing for the colonoscopy bothers me	Male	26	57.56	1142.50	-.011	p>.05
	Female	88	57.48			
I am fearful of the test	Male	26	55.00	1079.00	-.441	p>.05
	Female	87	57.60			

Table 5 continued

Barrier	Sex	n	Mean Rank	Mann-Whitney U	Z	p-value
I am fearful of the results	Male	26	44.88	816.00	-2.566	p<.05
	Female	86	60.01			
Could not get time off from work	Male	26	52.81	1022.00	-1.098	p>.05
	Female	87	58.25			
Other	Male	9	25.50			
	Female	37	23.01			

Note. *Totals not equaling n = 161 indicates missing data.

[a] Survey items/Questions were adapted from National Cancer Institute (2003)

What are the knowledge levels of colorectal cancer screening among those who have and have not received screening?

The results revealed a mean knowledge score of 2.37 (SD = 1.12) with possible scores ranging from 0-6. When asked what participants knew about colorectal cancer screening, roughly half (n = 80, 49.7%) were able to correctly identify the tests used for detection of colorectal cancer. Ninety-two participants (57.1%) knew at what age people are supposed to perform home stool blood tests, but only 54 participants (33.5%) knew the frequency at which the stool blood test should be performed. Just over 75% (n = 122) of participants identified the age at which people are supposed to have sigmoidoscopy or colonoscopy exams correctly. Yet, only 10 participants (6.2%) knew at which frequency these exams generally should be performed (Table 6).

Table 6

Colorectal Cancer Screening Knowledge Levels

Item	Correct n(%)	Incorrect n(%)
Which of the following tests can detect colorectal cancer?	80(49.7)	81(50.3)
At what age are people supposed to start doing home stool blood tests?	92(57.1)	69(42.9)
In general, once people start doing home stool blood tests, about how often should they do them?	54(33.5)	107(66.5)
At what age are people supposed to start having sigmoidoscopy or colonoscopy exams?	122(75.8)	39(24.2)
In general, once people start having sigmoidoscopy exams, about how often should they have them?	24(14.9)	137(85.1)
In general, once people start having colonoscopy exams, about how often should they have them?	10(6.2)	151(93.8)

[a] Survey items/Questions were adapted from National Cancer Institute (2003)

Summary

A total of 161 usable surveys were utilized for analysis. The sample was made up of mostly non-Hispanic Caucasian/white females, evenly distributed across the age range in question. The greater part of participants has never had a sigmoidoscopy or performed a home stool blood test and just over half of them reported having had a colonoscopy. A significant number of participants started CRCS before the generally recommended age of 50. More than half of the participants reported not having any other barriers to CRCS than those listed in the survey. Lack of an order from a healthcare provider or being told that CRCS was needed was cited as the greatest barrier to receiving CRCS among the participants while not having a doctor and having had another colon exam was cited as the least. Close to half of the participants established that the prep was a barrier and too painful, unpleasant, or embarrassing. Overall, the results showed that all the mentioned barriers were greater for women than they were for men. Approximately half of participants were knowledgeable about which test would identify colorectal cancer, slightly more were aware of the age at which home stool blood testing starts, and about three quarters of participants knew when to start endoscopic CRCS. Knowledge of frequency of either stool-based tests or CRCS via sigmoidoscopy/colonoscopy was minimal.

Chapter V

Interpretation of Findings

Introduction

The purpose of this study was to assess the extent to which participants received their primary colorectal cancer screening by the generally recommended age and any barriers that prevented participants from receiving timely colorectal cancer screening. Moreover, the researcher sought to evaluate the difference in barriers for timely initial colorectal cancer screening for men compared to women.

This research focused on establishing CRCS practices of individuals aged 45-55 years old, their potential barriers towards CRCS, and participants' knowledge levels surrounding CRCS. An interpretation and explanation of the research questions and findings, discussion, and recommendations are included in this chapter.

Overview

The findings indicate that non-Hispanic, Caucasian/White, and female participants were the most prevalent respondents to participate in the survey. Since the general population of the United States is not just made up of non-Hispanic, Caucasian/White, females but rather a much more diverse group of people, the results of this survey are skewed towards only a small portion of the general population and do not give an adequate representation of the population as a whole. Ages of participants ranged from 20 to 78 years. However, those outside of the desired age range were eliminated from the sample.

Sigmoidoscopy and home stool blood tests were the two screening modalities with which the participants had the least experience. Additionally, nearly half of participants have not had any CRCS at all. There was no option to specify possible reasons why a participant may have had CRCS before the age of 45. However, out of those participants who have had a colonoscopy, over a third of participants reported that they started screening before the generally recommended age of 50, which correlates with over two-thirds of participants having had more than one colonoscopy already. The number of those that have waited more than ten years in between colonoscopy screenings was small.

In regards to barriers, colon exams other than those focused on in the present study, like barium enemas, lower GI series, CT colonography, or capsule colonoscopy were not mentioned as much of a barrier by most participants either, because these tests are not commonly done for CRCS. Not having a doctor was only reported as a slight obstacle to receiving CRCS. Conversely, not having a doctor's order or their doctor not mentioning the need for CRCS, the test being too painful, unpleasant, or embarrassing; and not having any problems or symptoms of colon cancer were named as the leading obstacles.

More than half of the participants reported that the test prep presented some sort of barrier and comments were made that 'the prep is awful,' 'the prep is horrible,' and 'I have seen what prep does to people when I often pick them up in the early morning hours for severe dehydration, weakness and altered mental status.' Other comments suggested having to find a responsible person/driver means that another person must take time off work, presenting an imposition to more than just the patient, and a general dislike for doctors also could pose as a barrier.

When conducting comparisons between the barriers of males versus females, all statistically significant comparisons showed a greater barrier for females than for males. Those items include ‘no specific reason,’ ‘didn’t need it,’ ‘didn’t know I needed this test,’ ‘too expensive/no insurance,’ ‘had another type of colon exam,’ ‘never heard of it/never thought about it,’ and ‘I am fearful of the results.’

Knowledge levels were varied. Almost half of the participants were able to correctly identify the tests used for detection of colorectal cancer. Over half correctly identified the general age at which CRCS via home stool blood tests is supposed to start, but only a third knew at what frequency they should be performed. Similar results were seen with the identification of starting age and frequency for sigmoidoscopy/colonoscopy. Three quarters of participants knew the general recommended age but less than 10% of participants correctly named the frequency.

Discussion

This study revealed some important findings. Colonoscopies were the most frequently reported CRCS test in this sample. Sovich, Sartor, and Misra (2015) pointed out that “colonoscopy is the gold standard for CRC screening and the most common method in the United States” (p. 1) and that approximately two-thirds of adults over 50 in the United States follow CRCS recommendations from the United States Preventive

Services Task Force. The average age of participants was just over 50 years old (M = 50.07, SD = 3.153) with 93 (57.8%) of them 50 years of age and under and more than half of them (n = 83, 53.9%) reported having had at least one colonoscopy. Considering that the general recommendation is to do CRCS from 50-75 years of age, which is likely the age range Sovich, Sartor, and Misra (2015) used to report their findings since there was no age limitation noted in the article, it is encouraging to see that the present sample is ahead of the curve.

Salimzadeh, Delavari, Montazeri, and Mirzazadeh (2012) found that "four commonly cited reasons for not having CRC tests were "doctor did not recommend the test," "did not think it was needed," "never think of the test," and "no symptoms/problems" which were reported by 29%, 26%, 20%, and 17% of the participants, respectively" (p. 29). Hughes, Watanabe-Galloway, Schell, and Soliman, (2015) identified the cost of CRCS and lack of insurance, feelings of embarrassment, lack of knowledge of benefits of CRCS, and access to care as barriers to receiving CRCS. Within the sample of this study, the most prevalent barriers to receiving CRCS were found to be no physician order or discussion that the test is needed, a lack of signs or symptoms of colorectal cancer, and the test itself creating emotional and physical discomfort. Many participants also designated the prep as appalling. Therefore, the outcomes of this study are consistent with previous findings.

Another similarity this study revealed to the existing literature was that there is a general knowledge deficit of the screening process, which leads to anxiety over mental and physical discomfort during the exam as well as potentially detrimental test results. Hasan et al. (2017) reported that a general knowledge deficit about colorectal cancer prevented patients from making an informed decision whether to receive CRCS. Salimzadeh et al. (2016) also determined that there was a strong knowledge deficit in regards to both, colorectal cancer, and CRCS practices.

Overall, the current study showed that the perception of barriers was higher in women than in men. Wong et al. (2013) described the same phenomenon. Their findings stated that more women chose all of the following categories as a greater barrier than men did: preference of not knowing about a positive cancer diagnosis, fear of finding out that they have colorectal cancer, cost of the screening, potentially dangerous side effects of colonoscopies, painful tests, embarrassment of having a colonoscopy performed, and inconvenience of CRCS. These results match what the current study found when making the contrast between barriers for men compared to those for women.

A larger sample that is more representative of the general population in this country may have resulted in different outcomes, but it is encouraging to see that this sample shows screening numbers that are in line with the recommendations, especially considering that the age group chosen for this study encompasses only the lower end of the recommended screening ages. Prevention happens when people get timely screening. Therefore, the facts that such a large portion of the sample have already had multiple screenings, evidenced by reporting time between previous and most recent screening, and that one participant even specified getting screened every time the doctor recommended it, are reassuring that barriers are not keeping patients from following CRCS recommendation.

Recommendations for Healthcare Providers

A large portion of the participants viewed the lack of doctor’s order or encouragement for a colonoscopy from their primary care provider as a major barrier to receiving CRCS. Healthcare providers therefore need to add CRCS to the list of regular screening procedures, like mammograms or blood tests for prostate cancer. Education can be done during annual wellness visits or check-ups with the provider. The American College of Gastroenterology (ACG, n.d.) offers a colorectal cancer community education toolkit which includes online links where patients can explore information by themselves, slides containing pertinent information in easy-to-understand language, brochures to hand out and posters to hang on the clinic office walls, as well as podcasts and videos. These resources are ready and easy to use. Since women seem to be more hesitant in receiving CRCS, gender-specific education, which is available from the ACG, is appropriate to use when talking to one sex over the other.

However, more detailed information about the medical and clinical aspects of colorectal cancer and CRCS can always be gathered from sites like the CDC, ACS, and major healthcare facilities. It is highly important that members of the healthcare team impress upon their patients the seriousness of timely screening, regardless of presence or absence of signs and symptoms, and potential consequences that may result if timely screening does not happen. In a study done by Gupta, Brenner, Ratanawongsa, and Inadomi (2014), it was noted by the authors that a trusting relationship with a patient's primary care provider can increase adherence to CRCS recommendations. The general definition of trust is the belief that the provider is truthful, caring, compassionate, and has the best interest of the patient at heart (Chandra, Mohammadnezhad, & Ward, 2018). It is, therefore, critical that primary healthcare providers establish a trusting relationship with their patients if they want to see improved adherence with screening suggestions. According to Chandra, Mohammadnezhad, and Ward (2018), that trusting relationship can be established through effective communication, the way the provider treats the patient, and how well the provider demonstrates knowledge of the patient.

Another opportunity would be electronic health maintenance reminders sent directly to both, the primary care providers and the patients who meet eligibility criteria, like age, time since previous CRCS, family history, personal history, or risk factors. Such information would need to be added to the electronic medical/health records by someone on the healthcare team and flagged for upcoming visits. The Office of the National Coordinator for Health Information Technology (ONC, 2019) noted that public health outcomes are enhanced with improved quality of care screenings for several chronic diseases through clinical alerts and reminders in the electronic health record (EHR). Other health maintenance reminders like vaccine boosters and mammograms or pap smears already appear in EHRs, so adding CRCS should not be difficult.

Public service announcements via television commercials, radio announcements, or advertisements on social media and in printed magazines are other means to increase awareness of colorectal cancer. There are plenty of public service announcements regarding breast cancer with the Susan B. Komen Foundation and their ‘dress pink for breast cancer’ campaign as well as the designation of October being breast cancer awareness month and also tobacco cessation campaigns like ClearWay Minnesota’s QUITPLAN (2020) or the National Institute of Health’s smokefree.gov (n.d.), which includes free resources, tools, and tips for smokers who want to quit. Much less awareness is surrounded by the fact that March is colorectal cancer awareness month and the official color of the awareness ribbon is royal blue but not for the lack of availability of educational material. Public health agencies have a great opportunity to change the numbers of new colorectal cancer diagnoses and decrease deaths if they promote a campaign that appeals to all adults and helps mitigate fear of the test and similarly abate fear of the results. The ACG provides social media ready resources, some even separated to address men and women individually, that are easily accessible and can be used to promote CRCS. Having a way to focus on either sex separately makes it easier to alleviate concerns that are more insistent in women, as this study showed that women have greater barriers than men do.

Unfortunately, the colon is a taboo subject for many people. Rendering CRCS a less stigmatized procedure by increasing awareness with bright and colorful ad campaigns can also decrease embarrassment, make it more acceptable, and increase adherence. The ACG has ample resources available to accomplish that task. Furthermore, health insurance providers need to revise policies and procedures that make it easier for patients to receive CRCS so that financial constraints don't end up having even more costly consequences. The ACS (2018) advocates for all patients to have access to screening established by evidence-based guidelines and regardless of insurance coverage. The current study points to not having insurance and the test being too expensive as a barrier for 35 participants, which is more than 20%, making this a significant hinderance. Unfortunately, every health insurance can determine what their own plans include and how much, if anything, the patients must pay in addition to what insurance covers. That makes it difficult to recommend specific changes since there is no uniformity, unless those changes are advocated for and effected in the political arena. Contacting local members of congress is a great option to start with.

One more way to help with CRCS behavior change would be to add health and wellness coaches or care coordinators as regular and permanent members of the healthcare team. Langley (2019) notes that health coaches effect behavior changes by inspiring motivation and helping people build up self-care skills. Coaches collaborate with patients on patient-identified health goals, improvement of general well-being, and facilitation of lifestyle changes in a growing reliance and partnership with providers (Langley, 2019). Thom et al. (2016) related the benefits of health coaches as part of the healthcare team and stressed areas like development of a trusting relationship, personal and decision-making support, coaches being a bridge between patients and their providers, and coach availability. Coaches could take over patient support of self-management in areas such as health maintenance, medication compliance, recommended preventative measures like vaccines and screenings, and making changes in physical activity and stress reduction, effectively empowering the patients to take ownership in their own health and well-being. Gastala et al. (2018) remarked that "health coaches are behavior change specialists who partner with patients to identify goals and barriers, reinforce recommendations, and coordinate care" (p. 526). Adding health coaches to any health care team is, therefore a valuable asset and can help patients stay current on preventive screenings, like CRCS.

Lastly, many see the prep and physical clearing of the colon as a barrier to getting screened. Unfortunately, having a clean colon is a prerequisite to CRCS and will remain necessary. Side effects can happen while doing a bowel prep because the body loses a lot of fluids and this can be uncomfortable and lead to dehydration, nausea, vomiting, and weakness. If that happens, proceduralists can add such information to the medical record triggering recommendations to add electrolytes and extra fluids on the fasting day to help alleviate side effects during subsequent preps and therefore making the bowel prep more tolerable.

Recommendations for Future Research

The survey was only open for three weeks on social media and distributed via postcard at two locations of a local gastroenterology clinic for two weeks, which did not yield the desired number of participants. To get a more appropriate representation of the population with much higher numbers of participants, this survey needs to be distributed in a larger geographical area and be available for a longer time. This study also only focused on patients in a limited age group. However, in light of increasing numbers of colorectal cancer diagnoses in patients younger than 50, and the majority of cases on patients older than the participants, it might yield further important information to extend a survey such as this to other age groups.

Males as well as ethnic and racial groups were underrepresented in this study. By expanding the geographic distribution of the survey, the racial distribution of participants could potentially be more consistent with that of the general American public. This survey was conducted on social media, and in middle-class suburban clinics, which likely did not get the same demographics and survey results we would see in more underprivileged areas of the country, making that another opportunity to look further into CRCS practices and barriers. In this regard, it might also be helpful to inquire about education level, income, and access to preventive care in general.

When assessing CRCS practices, it may be helpful to address reasons why participants have had their first colonoscopy before the recommended starting age of 45 or 50, which this study did not address. It would also be helpful to conduct pilot testing as one comment was made that the items that assessed attitudes did not make sense. Feedback about how the survey items are written understood can provide a valuable resource to assure higher participation by even those that are not very healthcare literate. Adding other CRCS methods that are much less prevalent will also provide added awareness of screening practices that may not adhere to the norm and a distribution across demographics.

Summary

While more women responded to the survey, men reported fewer perceived barriers. Future research needs to expand not only the time frame of the study and the geographical area to get a more diverse demographic but also include impact of socio-economic status and underlying comorbidities as barriers to timely CRCS.

This study did not yield the expected number of participants and the sample was not very diverse, yet there were some important findings that can have an impact on future healthcare practices as well as future research. Healthcare providers or other healthcare team members need to increase time spent on patient education and follow-through. Colorectal cancer should not be treated any differently than prostate or breast cancer and more public health campaigns to that effect are needed to make sure everyone knows that CRCS equals prevention.

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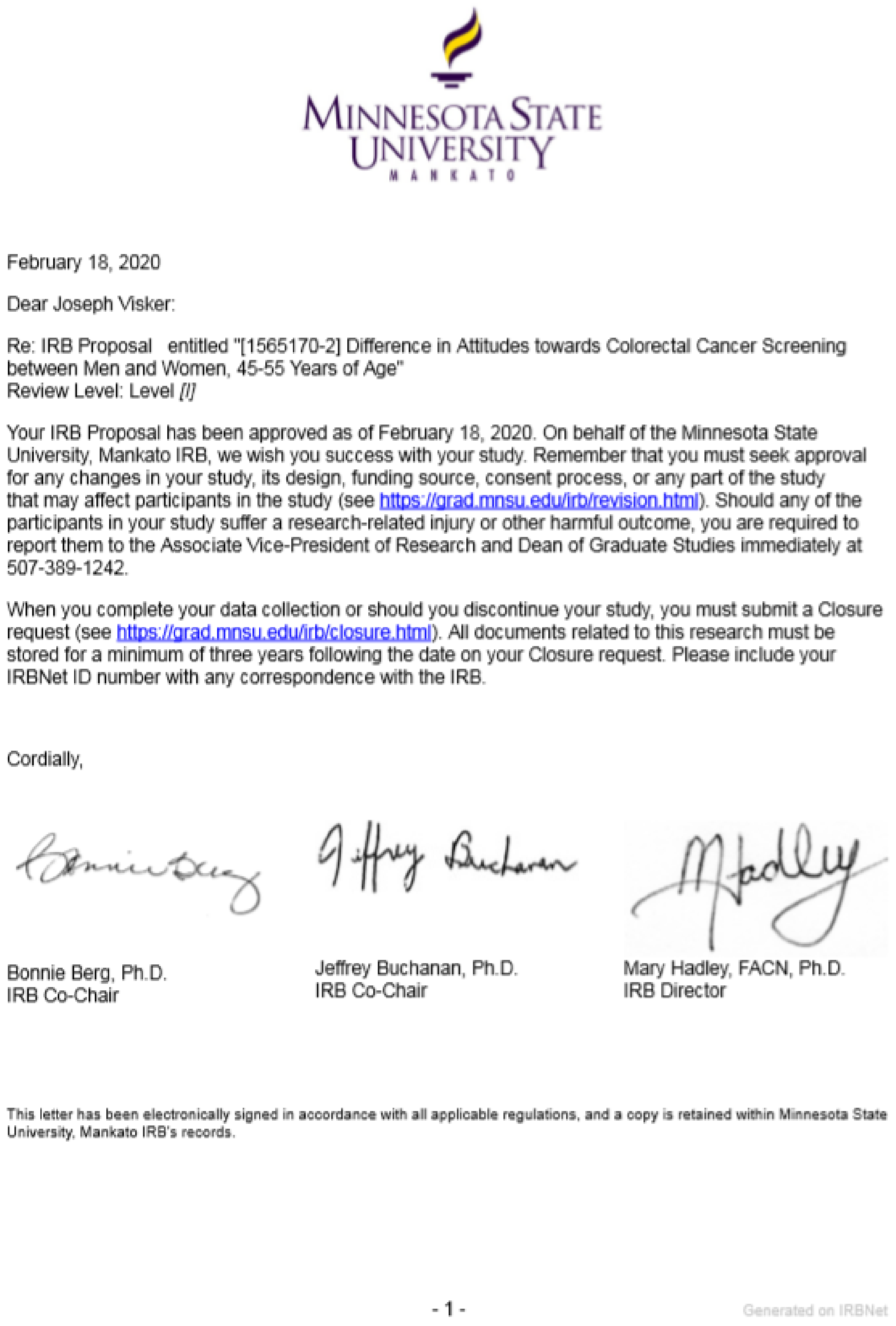
Appendices

Appendix A



MINNESOTA STATE
UNIVERSITY
MANKATO

February 18, 2020

Dear Joseph Visker:

Re: IRB Proposal entitled "[1565170-2] Difference in Attitudes towards Colorectal Cancer Screening between Men and Women, 45-55 Years of Age"
Review Level: Level *[I]*

Your IRB Proposal has been approved as of February 18, 2020. On behalf of the Minnesota State University, Mankato IRB, we wish you success with your study. Remember that you must seek approval for any changes in your study, its design, funding source, consent process, or any part of the study that may affect participants in the study (see https://grad.mnsu.edu/irb/revision.html). Should any of the participants in your study suffer a research-related injury or other harmful outcome, you are required to report them to the Associate Vice-President of Research and Dean of Graduate Studies immediately at 507-389-1242.

When you complete your data collection or should you discontinue your study, you must submit a Closure request (see https://grad.mnsu.edu/irb/closure.html). All documents related to this research must be stored for a minimum of three years following the date on your Closure request. Please include your IRBNet ID number with any correspondence with the IRB.

Cordially,

Bonnie Berg
Jeffrey Buchanan
MHadley

Bonnie Berg, Ph.D.
IRB Co-Chair

Jeffrey Buchanan, Ph.D.
IRB Co-Chair

Mary Hadley, FACN, Ph.D.
IRB Director