

IMPACT OF A LOW-COST, MULTICOMPONENT INTERVENTION
TO IMPROVE COLORECTAL CANCER SCREENING RATES
IN TWO PRIMARY CARE CLINICS IN RURAL KANAS

By

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2019

Submitted to the School of Nursing and The Graduate Faculty of the University of Kansas in
partial fulfillment of the requirements for the degree of Doctor of Nursing Practice.

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March 11, 2019
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Impact of a Low-Cost, Multicomponent Intervention to Improve Colorectal Cancer Screening
Rates in Two Primary Care Clinics in Rural Kansas

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Abstract

Problem Statement: Residents in rural Kansas have lower colorectal cancer screening rates and therefore are more likely to experience poorer outcomes from colorectal cancer.

Purpose: Determine the effectiveness of a low-cost multicomponent intervention on improving colorectal cancer screening rates on patients seen in two primary care clinics in rural Kansas.

Methods: A quality improvement pre-post intervention study design was used to determine if colorectal cancer screening rates increase within 3 months of the implementation of a multicomponent intervention. The intervention consisted of two components: 1) postcard educational mailers and electronic educational mailers and 2) medical assistant and registered nurse education on colorectal cancer screening and in-clinic order process.

Inclusion Criteria: Male and female patients aged 50-75 seen at the Family Care Center in Garnett, Kansas and the Family Care Center South in Colony, Kansas from July 2018 to September 2018 who were overdue for colorectal cancer screening received a postcard mailer or an electronic mailer about colorectal cancer screening. Male and female patients aged 50-75 who visited the Clinics from October 2018 to December 2018 were assessed for colorectal cancer screening adherence and a colorectal cancer screening order was placed, if applicable.

Analysis: Post-intervention colorectal cancer screening rates from Quarter 4 (October 1, 2018 to December 31, 2018) were compared to colorectal cancer screening rates pre-intervention during Quarter 3 (July 1, 2018 to September 30, 2018).

Results: The Clinics had an increase in post-intervention colorectal cancer screening rate when compared to pre-intervention screening rate. The colorectal cancer screening rate had the largest increase in the two months following the intervention implementation.

Significance: Improving colorectal cancer screening rates using low-cost interventions may improve the health of residents in rural Kansas. The multicomponent intervention may offer an inexpensive way to improve colorectal cancer screening adherence in rural areas of the United States where healthcare resources may be scarce.

Key Words: colorectal cancer, screening, rural health, preventative health

Acknowledgements

I would like to sincerely thank my Committee Chair and Co-Chair, Dr. JoAnn Peterson and Dr. Heather Nelson-Brantley, for their unwavering support throughout my DNP project. Without your guidance this project would not have been possible. Your expertise, mentorship and support throughout my DNP project has cultivated academic and professional enrichment in my DNP journey.

I would also like to thank the Medical Director of Family Care Center, Dr. Mackenzie Peterson, the Marketing Manager of St. Luke's Health System, Kristin Dittmar and the entire staff of Family Care Center and Family Care Center South for embarking on this journey with me and for your encouraging enthusiasm and support of this project.

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Impact of a Low-Cost, Multicomponent Intervention to Improve Colorectal Cancer Screening Rates in Two Primary Care Clinics in Rural Kansas

The purpose of this paper is to describe the need, current literature, methodology, results and practice implications for a Doctorate of Nursing Practice (DNP) project to improve colorectal cancer (CRC) screening rates in two primary health care clinics in rural Kansas. CRC screening rates continue to fall below nationally set guidelines. Rural populations in the United States have significantly lower CRC screening rates than urban populations and experience higher rates of mortality from colorectal cancer. The research on this topic focuses on ways to increase CRC screening in underserved, safety net clinics and rural areas. Research highlights the need to increase community demand, decrease access barriers and increase provider delivery of screening services. However, there is no research on combining low cost interventions in primary health care clinics in rural Kansas. Therefore, a project in rural Kansas which aims to combine two low-cost interventions to increase CRC screening adds to the current body of literature on this topic, discovering new ideas on how to improve CRC screening rates in this vulnerable population.

The paper will argue that the DNP project can influence healthcare for residents of rural Kansas. The structure of the paper is divided into four parts: the topic rationale, a literature review, the methodology used to complete the project and the results of the DNP project.

Topic Rationale

Background

Colorectal cancer is the third most common cancer in both men and women in the United States (American Cancer Society, 2017). Additionally, for men it is the second most common

cause of cancer death; for women, it is the third (American Cancer Society, 2017). In Kansas, there were 1,268 new cases of colon and rectum cancer in 2015 and for every 100,000 people, 15 died of colon and rectum cancer (CDC, 2017). In the early stages, CRC does not typically have symptoms, which is why experts emphasize the importance of detecting CRC early through screening. In fact, it is estimated that 50-80% of colorectal cancers are preventable or treatable if caught early (Levy, Xu, Daly & Ely, 2013). Fortunately, CRC incidence rates have been declining in the United States due in large part to an uptake of screening efforts (American Cancer Society, 2017). However, while CRC screening rates have increased over the last decade, it is estimated that approximately one quarter of the United States population has never been screened for colorectal cancer (CDC, 2016). This CRC screening rate falls below the target screening rate set by the National Colorectal Cancer Roundtable “80% by 2018” initiative (NCCRT, 2018) and below the HealthyPeople 2020 target of 70.5% (healthypeople.gov, 2018).

Unfortunately, there are consistent disparities in CRC screening rates in rural areas of the United States. Experts agree that rural areas may have screening rates 15-30% lower than non-rural populations (Davis et al., 2018). While the incidence of CRC for rural populations is similar to non-rural populations, rural populations are more likely to die from colorectal cancer (Cole, Jackson & Doescher, 2012). This disparity in CRC mortality can be attributed in part to lower screening rates in rural areas, which leads to poorer outcomes. Healthcare leaders must focus on effective ways to increase CRC screening rates among vulnerable populations, such as rural areas of the United States.

In rural populations, expensive or complex interventions to increase CRC screening are likely not feasible due to a higher proportion of uninsured individuals and lack of access to healthcare resources. Additionally, individuals living in rural areas may be more greatly exposed

to poverty, lack of health insurance and lower educational attainment (Cole et al., 2012). One of the recommended screening options, a colonoscopy, requires access to a specialist physician. Therefore, it is recommended that low-cost interventions available in primary care offices be utilized to improve CRC screening rates in rural populations (Hendren et al., 2013).

Problem Statement

While CRC screening rates continue to increase in the United States, a health disparity exists among rural populations. Residents in rural areas of the United States have lower CRC screening rates and therefore are more likely to experience poorer outcomes and death from colorectal cancer. This represents a significant health disparity among rural populations, where financial and healthcare resources may be low. Healthcare leaders must find effective ways to increase CRC screening rates among rural populations in the United States. These interventions should focus on low-cost and easily accessible interventions available in primary care offices. Additionally, interventions that are tailored to specific population and community characteristics should be investigated to determine the most effective means to improve CRC screening in rural Kansas.

PICO(T) Question

What is the effect of a low-cost, multicomponent intervention (I) on colorectal cancer screening rates (O) among adults aged 50-75 in two rural Midwest primary care clinics (P) compared to current practice (C) within a 3-month timeframe (T)?

Organizational Analysis

Anderson County is located in east central Kansas and is considered a rural county in Kansas, with an estimated population of 7,833 (U.S. Census Bureau, 2018). Anderson County is

ranked 52 of 102 counties in Kansas for health outcomes, based on length and quality of life and 72 of 102 counties in Kansas for health factors, based on health behaviors, social and economic factors and the physical environment (County Health Rankings, 2017). Approximately 10% of the population does not have health insurance, 10% of the population under 65 years old lives with a disability and the poverty rate is approximately 13% (United States Census Bureau, 2018).

Located in Anderson County, The Family Care Center Clinic and its satellite clinic, The Family Care Center South (the Clinics), is a service of Anderson County Hospital, which is a hospital within the Saint Luke's Health System. The Clinics have provided primary care to residents of Anderson County and surrounding communities for over 17 years. The practice consists of four family medicine Medical Doctors, two family practice Advanced Practice Registered Nurses and one Physician Assistant. The practice treats both acute and chronic health conditions and provides routine wellness and preventative services to their patients. The Clinics have focused on improving preventative health services to their patients, including CRC screening. For the first quarter of 2018, 57% of eligible patients seen at The Clinics were documented as up-to-date on colorectal cancer screening (M.P., personal communication, 6/14/2018). The Clinics see approximately 4,000 patients in a 3-month timeframe (M.P., personal communication, 9/4/2018). Patients seen at the Clinics receive CRC screening primarily by colonoscopy or fecal occult blood testing. However, with just over half of the patients compliant with recommended CRC screening guidelines, Clinic leaders are interested in discovering ways in which this rate can be increased to meet national standards.

Goal, Objective and Expected Outcome

The goal of this DNP Project is to increase the CRC screening rate for adults aged 50-75 seen at The Family Care Center and The Family Care Center South to 70.5%, which would meet the HealthyPeople 2020 goal for CRC screening rates.

The objective for this DNP project is to determine the effectiveness of a low-cost, multicomponent intervention on increasing CRC screening rates among adults aged 50-75 seen at a rural family practice setting when compared to current practice within 3 months.

The expected outcome is for CRC screening rates among adults aged 50-75 seen at the Family Care Center and the Family Care Center South to increase within 3 months of the multicomponent intervention implementation.

Definition of Terms and Concepts

The outcome measure for this project is CRC screening rates in adults aged 50-75 seen at the Family Care Center or the Family Care Center South. A multicomponent intervention consists of two low-cost interventions: 1) postcard community mailers and electronic educational mailers and 2) Medical Assistant (MA) and Registered Nurse (RN) CRC education and education on in-clinic process for ordering CRC screening. The multicomponent intervention will be determined as improving CRC screening compliance if an increase in screening occurs within adults aged 50-75 with the implementation of the proposed intervention. This intervention will be compared to current practice, which includes opportunistic CRC screening during routine healthcare visits.

Review of the Literature

The databases PubMed and CINAHL were used to search for current literature on this topic. The literature search included relevant studies from 2000 to July 2018. Search terms used to complete this literature review include “colorectal cancer”, “colorectal cancer screening”, “rural” and “preventative health”. The operator “AND” was used to locate relevant studies including “colorectal cancer” AND “screening” AND “rural”. The studies were not limited by study design or language of publication. The reference lists of studies selected for inclusion were scanned for relevant studies. Other sources included the websites of American Cancer Society, Center for Disease Control, U.S. Department of Health, the National Colorectal Cancer Roundtable and the U.S. Preventative Services Task Force. Eighteen studies were selected for inclusion in this review of the literature.

Colorectal Cancer Screening: Clinically Preventable Burden

Colorectal cancer is one of the leading causes of cancer death in the United States (Davis et al., 2018). Unfortunately for victims of CRC, signs and symptoms of the cancer do not appear until late stages of cancer progression, putting the individual at greater risk for mortality due to the severity of the disease in the later stages. Additionally, most cases of CRC occur in individuals without family history or a predisposing past medical history (Whitlock, Lin, Liles, Beil & Fu, 2008). To decrease the mortality of CRC, the U.S. Preventative Services Task Force (USPSTF, 2008) has recommended CRC screening for more than 20 years. It recommends screening all adults aged 50-75 for CRC using fecal occult blood testing, sigmoidoscopy or colonoscopy. In addition, it recommends the following three screening regimens: 1) fecal occult blood testing completed annually, 2) sigmoidoscopy completed every 5 years with fecal occult blood testing every 3 years, and 3) screening colonoscopy every 10 years (Appendix A).

Screening for CRC using one of the recommended screening tests reduces the mortality of CRC because the tests can detect cancer in the early stages and give the opportunity for cancerous polyps to be removed (USPSTF, 2008).

Colorectal cancer screening is both highly effective and cost-effective at reducing CRC in adults aged 50-75 (Maciosek, Solberg, Coffield, Edwards & Goodman, 2006). It is estimated that with the United States current screening practices, there would be approximately 90,800 deaths from CRC in adults 50 years or older (Maciosek et al., 2006). Additionally, without screening it is estimated that 99,700 deaths would occur from CRC and about 32% of these deaths could be prevented if there was 100% adherence to screening guidelines (Maciosek et al., 2006).

Experts agree that approximately \$11,900 per life year is saved with current CRC screening recommendations (Maciosek et al., 2006). This data reveals evidence for the highly impactful and cost effective screening recommendations for CRC. However, screening for CRC in the United States remains well below targeted goals and should be considered a missed opportunity for improving the health of adults aged 50-75 at a reasonable cost (Maciosek et al., 2006).

Colorectal Cancer: Rural Health Disparity

Rural areas of the United States have reportedly lower CRC screening rates than urban areas, revealing a consistent health disparity among this population (Davis et al., 2018). While overall CRC screening rates are increasing in the United States, a cross sectional analysis of CRC screening adherence from 1998-2005 revealed that rural residents had significantly lower CRC screening rates than urban populations (48% vs. 54%, $P < 0.01$) (Cole et al., 2012, pg. 352). Further, while the incidence of CRC in rural areas is similar to urban areas, residents of rural

populations are more likely to die of CRC than urban populations (Rabeneck, Paszat, Saskin & Stukel, 2010). Experts agree that the increase in CRC mortality in rural areas is due to lower screening rates in these areas (Cole et al., 2012).

It is important to consider what factors may put rural residents in the United States at increased risk for this health disparity, including poverty, reduced access to preventative health care and lack of health insurance (Cole et al., 2012). Additionally, residents of rural areas have distance barriers and a lower proportion of health care providers than urban areas, which may limit access to primary health care. A lack of access to primary care is one of the strongest predictors of CRC screening adherence (Seeff et al., 2004). Additionally, one of the screening modalities, a colonoscopy, requires access to specialty services, such as a gastroenterologist. Access to these specialty services is lower in rural areas of the United States than urban areas, further adding to the health disparity of CRC screening in rural America (Seeff et al., 2004).

Medicare extended its coverage to include screening colonoscopies in 2000, which experts agree was a driving force behind an increase in CRC screening in the United States over the past two decades (Meissner, Breen, Klabunde & Vernon, 2006). However, widespread adoption to screening colonoscopies is difficult in rural areas where access to specialty care is limited. Researchers found that there was a 14-17% reduction in late stage CRC in non-metropolitan areas than areas with a higher density of primary care physicians and gastroenterologists (Ananthakrishnan, Hoffmann & Saeian, 2010, p. 1164).

Colorectal Cancer Screening Interventions In Rural Areas

Several studies have demonstrated increased CRC screening rates in rural and underserved areas when low-cost interventions are implemented, such as community educational mailers, mailed FIT kits, patient reminders and provider ordered in-clinic distribution of CRC

screening tools. Further, a review of the literature reveals the importance of combining low-cost interventions to improve screening rates in rural populations (Davis et al., 2018).

Multicomponent interventions to improve CRC screening in rural populations have been recommended by the Community Preventative Services Task Force since 2016. The Community Preventative Services Task Force (2016) defines multicomponent interventions as a combination of two of the following interventions:

- Interventions to increase community demand: client reminders, client incentives, small media, mass media, group education, one on one education
- Interventions to increase community access: reducing structural barriers, reducing client out-of-pocket costs
- Interventions to increase provider delivery of screening services: provider assessment and feedback, provider incentives and provider reminders

When conducting a systematic review on the topic, Davis et al. (2018) found the most effective interventions used to increase CRC screening in rural populations involved mailing fecal occult blood testing kits directly to patients, client reminders and provider ordered in-clinic distribution. The researchers emphasized the importance of not just finding which interventions work to improve CRC screening rates, but which interventions work best in the targeted setting among the specific population and community characteristics (Davis et al., 2018). Interventions, such as client reminders, were consistently seen as highly effective and therefore should be considered as an important tool to increase CRC screening in targeted rural areas (Davis et al., 2018). Research revealed a significant increase in screening adherence when patients received a multicomponent intervention, including a mailed reminder letter with a fecal occult blood testing kit, when compared to usual care (Baker et al., 2014).

In a systematic review, researchers found that low cost interventions such as client reminders using small media, provider reminders and auditing increased screening for breast, cervical and colorectal cancer (Brouwers et al., 2011). Specifically, in two studies looking at CRC screening, client reminders significantly increased screening adherence (Beach et al., 2007; Dietrich et al., 2006). In a randomized controlled trial, researchers found that mailed outreach interventions significantly increased CRC screening rates in a safety-net clinic (Singal et al., 2016). Further, the researchers argue that population-based interventions, such as community mailers, are an effective means to improve screening rates in health systems or clinics with a fixed budget.

Similar to Singal et al. (2016), Hendren et al. (2013) found that a multimodal intervention that included mailing letters significantly increased CRC screening rates in patients seen at a safety-net primary care clinic. The authors emphasize that expensive interventions, such as patient navigator programs, likely are not feasible in under resourced areas (Hendren et al., 2013). In contrast, low cost interventions such as mailed patient reminders increase CRC screening rates modestly, with the most significant increase in screening rates seen when several low-cost interventions are combined. The additive effect of combining low cost interventions to improve CRC screening rates is further supported by Stone, et al. (2002), Kempe, Shetterly, France & Levin (2012) and Ahmed, Haber, Semanya, Hargreaves (2010).

Mailed education was also found to be an effective means to improve CRC screening rates in rural clinics in a randomized controlled trial (Levy, Yinghui, Daly, & Ely, 2013). In 16 rural family practices in Iowa, subjects randomized to receive mailed education were significantly more likely to complete CRC screening than subjects who received usual care (Levy et al., 2013). In this study, mailed education included an American Cancer Society

monograph and DVD, the Centers for Disease Control Screen for Life Brochure and a magnet which was developed by the principal investigator with the intention of informing the recipient about CRC screening (Levy et al., 2013). Of note, the investigators also researched whether chart reminders using post-it notes would improve screening rates among their target population. The researchers found that there was not a significant difference in patients randomized to receive provider chart reminders and usual care (Levy et al., 2013). The researchers found that follow-up telephone calls had no significant impact on the study outcomes. Of note, the mailed education included a FIT kit, which the researchers believe greatly improved their CRC screening rates. However, it was found that study participants also had an increase in colonoscopy, indicating that mailed education without FIT kits can also improve CRC screening rates.

Similar to Levy et al. (2013), researchers in Texas found that mailed outreach invitations markedly improved CRC screening rates when compared with usual care (Gupta et al., 2013). Study participants that received mailed outreach, which included a FIT kit, were more likely than the study participant group that received mailed outreach without an FIT kit to receive CRC screening. However, both groups which received outreach mailers had significantly improved CRC screening rates compared to those who received usual care, which consisted of opportunistic based screening in a primary care office (Gupta et al., 2013).

Most CRC screening efforts take place in physicians' offices. This constitutes a barrier for a rural and underserved populations (Gupta et al., 2014). These individuals may have limited access to primary care and even with access to primary care, rural residents may have limited access to one of the screening modalities – a colonoscopy. Therefore, healthcare leaders must

address efforts that are specifically targeted for improving CRC screening rates among rural populations.

One way to improve CRC screening in rural areas, where barriers to receiving screening offers are present, is to develop organized strategies for CRC screening (Gupta et al., 2014). Community outreach programs should be considered as a target for organized strategies. An example is community mailer invitations to complete CRC screening (Gupta et al., 2014). In their systematic review, Gupta et al. (2014) found that effective strategies to increase CRC screening in underserved and rural areas included mailed invitations to complete screening. Research findings indicate that an increase in CRC screening can be seen without the use of telephone reminders or patient navigators. This is especially important when considering implementation of this type of intervention in a rural clinic where resources may be scarce.

Methodology

Theoretical Framework: The Iowa Model of Evidence-Based Practice to Promote Quality Care

The 1998 Iowa Model of Evidence-Based Practice to Promote Quality Care (Titler et al., 2001) is used as a theoretical framework to organize efforts for the proposed quality improvement project (see Appendix B). The Iowa Model provides a guideline for clinicians to make decisions about implementing evidence-based clinical practices, which are intended to affect clinical outcomes. This model includes an overview of change process and is designed to include many feedback loops in order to best address the process to implement evidence-based practice changes (Melnyk & Fineout-Overholt, 2015). Phases of the Iowa Model include (a) identify triggers, (b) clinical applications, (c) organizational priorities, (d) forming a team, (e)

piloting a practice change, (f) evaluating the pilot and (g) evaluating practice changes and dissemination of results. For the purpose of this proposal, the methods of the project will be outlined using the Iowa Model. Due to time constraints, not all phases of the Iowa Model will be feasible in the context of this DNP project, but intentions of how each phase will be utilized will be addressed in this paper.

Identify triggers. The Iowa Model begins with the clinician identifying practice questions through identification of a clinical problem—problem focused triggers—or from new knowledge—knowledge focused triggers. In this project, a problem-focused trigger was utilized to formulate the overall purpose of the project. A problem-focused trigger was identified when the project manager met with The Clinic’s Medical Director to assess the Clinic’s current CRC screening rate. For the first quarter of 2018, the Clinic’s CRC screening rate was 57%; HealthyPeople 2020 aims for the United States population to be screened for CRC at a rate of 70.5%. This information represents a problem-focused trigger because it identifies an area where the Clinics are falling below national goals. Several studies identify the need to organize interventions to improve CRC screening rates in underserved or rural populations. However, the question remained unclear if this national goal can be met in two rural Kansas clinics using a low-cost multicomponent intervention. Thus, this problem-focused trigger guided the purpose of the project, which was to determine the effectiveness of a multicomponent intervention on increasing the CRC screening rates among adults seen in two rural primary care clinics in rural Kansas.

In order to develop the specific project question, a problem-focused trigger was used, as defined by the Iowa Model. Specifically, the problem-focused trigger in this project was to determine if a low-cost multicomponent intervention can be used to effectively increase CRC

screening rates in two primary care clinics in rural Kansas. Through a review of the literature, the project manager determined that multicomponent interventions that combine several low-cost interventions are a reliable way to increase CRC screening rates in rural populations.

Additionally, community mailed education was identified as an effective and reliable method to improve CRC screening rates in rural populations. The project manager used this information as a guide to develop a low-cost multicomponent intervention to improve CRC screening in the identified clinics.

Clinical Applications. An important step in the Iowa Model is to determine if the project is aligned with clinically relevant practice questions. The Iowa Model urges healthcare and nursing leaders to create a culture of inquiry where evidence-based practice questions can guide care delivery (Melnyk & Fineout-Overholt, 2015). In this project, the project manager met with nursing and medical clinicians to determine what areas of preventative health could be improved. It was determined that patients seen at the Clinics had CRC screening rates that were lower than nationally set guidelines. Thus, a clinically relevant practice question was developed to determine if a low-cost multicomponent intervention could improve CRC screening rates in two primary care clinics in rural Kansas.

Organizational Priorities. The Iowa Model explains that not all clinical questions can be addressed. Using this model, clinicians are encouraged to identify practice questions that are a priority for the organization. In order to determine if the clinical question was a priority for organizational leaders, the project manager met with the Medical Director of the Clinics to create an early opportunity for stakeholder buy-in and to determine if the project aligned with organizational priorities. When discussing the project with the Clinic Leadership, emphasis was placed on discussing the national goal set by HealthyPeople 2020 and the Colorectal Cancer

Roundtable discussion. Additionally, stakeholders were educated on current evidence indicating that multicomponent interventions have increased CRC screening rates in both rural and underserved populations. Within the Iowa Model, the interaction between the project manager and the stakeholders represented a feedback loop to determine if the project was an organizational priority. The project manager was given an opportunity to refine the question to best align with organizational priorities. Leadership at the Clinics agreed that the project aligned with organizational goals to provide evidence-based practice to promote quality care of their patients. Additionally, leadership at the Clinics agreed to partner with the project manager as a stakeholder in this project.

Forming a Team. Forming a team to develop, implement and evaluate the practice change is a crucial step in the Iowa Model. In this project, the identified stakeholders included the project manager, the Medical Director of the Clinics and a Marketing Manager at Anderson County Hospital. It was important to include multidisciplinary team members for this project because the intervention affected a variety of departments. The project manager was primarily responsible for reviewing, critiquing and synthesizing available research on this topic. The Marketing Manager at Anderson County Hospital was utilized to approve and oversee the community mailers. The Medical Director of the Clinics was utilized to oversee and approve the project proposal and implementation.

Piloting a Practice Change. After forming the team, the next step in the Iowa Model is to pilot the project in a controlled environment. This is an essential step in the process because the outcomes in a controlled environment may be different than the outcomes in an environment with fewer controls, such as a natural clinical setting (Melnik & Fineout-Overholt, 2015). Further, by using a pilot environment, issues and effectiveness can be determined prior to rolling

an intervention out in a large-scale setting (Melnyk & Fineout-Overholt, 2015). The low-cost multicomponent intervention to improve colorectal cancer screening was piloted on patients who were seen at the Clinics during the months of July through December 2018 who were not up to date with CRC screening, per the USPSTF guidelines. The multicomponent intervention included a postcard mailer or electronic educational mailer sent via email, which served as a patient reminder, and Medical Assistant and Registered Nurse CRC education and in-clinic process for ordering CRC screening, which served as a provider reminder. The postcard mailer or electronic educational mailer was sent to patients seen during Quarter 3 (July, August and September 2018) who were deemed as overdue for CRC screening. A list of these individuals is easily accessible in the Electronic Health Record used at the Clinics, EPIC. The second portion of the multicomponent intervention, the MA and RN education, aimed to increase provider delivery of CRC screening and included MA and RN CRC education and in-clinic process for ordering CRC screening education. This portion took place during a 1-hour meeting with the MA and RN team at the Clinics. The focus of this meeting was on CRC education, including CRC definition, risks specific to rural populations, USPSTF screening guidelines as well as education on the clinic process for CRC screening order entry. The details of the CRC screening ordering process are explained in the Project Intervention section of this paper.

Evaluating the Pilot. Following the implementation of the multicomponent intervention to improve colorectal cancer screening, the project manager determined if the outcome data supported adopting the pilot for CRC screening on a larger scale, such as sending community mailers to all patients seen at the Clinics who are overdue for CRC screening, due within 3 months or adopting the CRC screening process to be used as standard practice year round. This was facilitated with the support of the Clinic Medical Director and the Marketing

Manager of Anderson County Hospital. Details describing data collection tools and methods for data analysis are described below.

Evaluating Practice Change and Dissemination of Results. The final step in the Iowa Model is to have ongoing evaluation of the evidence-based practice implementation as well as to incorporate the quality improvement program into standard patient care. In order for the evidence-based practice change to be sustainable, it is important for ongoing evaluation of processes, barriers and outcome measures to take place (Melnik & Fineout-Overholt, 2015). While this step of the Iowa Model is not feasible within the scope of a DNP capstone project due to timeline constraints, it is important for the project manager to implement processes and resources for stakeholders to incorporate this final step of the practice change into practice. In order to do so, the project manager disseminated the results of the project during a monthly staff meeting to employees of the Clinics. Additionally, the project manager will publish the results of this project in ProQUEST and present the information at the Graduate Research Summit in Topeka, Kansas and at the Midwest Nursing Research Conference.

Project Design

This DNP project used a quality improvement design to examine the effect of a low cost, multicomponent intervention on CRC screening rates of eligible adults aged 50-75 who were seen at the Family Care Center in Garnett, Kansas and the Family Care Center South in Colony, Kansas during July through December 2018. A quality improvement design is often used in DNP projects where it is not helpful or feasible to have a control group (Moran, Burson & Conrad, 2017). This type of design can measure change in a health-related outcome, such as CRC screening compliance, when a true experiment is not feasible (Polit & Beck, 2012). In this

case, it was unethical to deny an eligible patient the intervention as the patient could be unnecessarily exposed to a missed opportunity of the health screening.

CRC screening rates for Quarter 3 (July, August and September 2018) served as baseline data and screening rates for Quarter 4 (October, November and December 2018) served as post-intervention data. Additionally, the project manager tracked the number of postcard mailers and electronic educational mailers sent to patients seen at the Clinics. This information was facilitated through communication with the Marketing Manager of Anderson County Hospital. In order to further identify the impact of the intervention, the Clinic scheduler was asked to determine if patients calling to schedule CRC screening were prompted by the postcard or electronic mailer. However, due to limited staffing and resources, this was not possible for the Clinic staff to maintain during the project implementation period. In order to identify the impact of the intervention, the percentage of eligible patients seen during Quarter 4 who are up to date with CRC screening was compared to the percentage of eligible patients seen during Quarter 3 who were up to date for CRC screening. This information was readily available in the Clinic's Electronic Health Record, EPIC.

Project Site and Population.

Project Site. The Family Care Center and its satellite location, the Family Care Center South, are primary care clinics located in Anderson County. The Family Care Center is located in Garnett, Kansas and the Family Care Center South is located in Colony, Kansas. Both clinics are affiliated with Anderson County Hospital, which is a part of the Saint Luke's Health System. The Clinics, which have been providing primary care to residents of Anderson County and the surrounding communities, have been in operation for 17 years. Patients at both clinics receive health care from one of the four family medicine Medical Doctors, two family practice

Advanced Practice Registered Nurses or a Physician Assistant. The clinics treat both acute and chronic health conditions and provide routine wellness and preventative services to their patients. The Family Care Center and the Family Care Center South have focused on improving preventative health services to their patients, including CRC screening.

Project Sample Population. The sample population to receive the provider reminder portion of the intervention included male and female patients aged 50-75 years old who were seen during Quarter 4 (October, November, December 2018) and who were overdue for CRC screening per the USPSTF CRC screening guidelines. This information was captured within the EPIC medical record and was available within the patient's chart on the provider's home screen. The sample population who received the postcard or electronic educational mailers included male and female patients aged 50-75 seen at the Clinics during Quarter 3 (July, August and September 2018) who were deemed as overdue for CRC screening, per the USPSTF guidelines. The list of these patients was also available within the Electronic Health Record, EPIC.

Project Intervention

The intervention for this DNP Project was a low cost, multicomponent intervention aimed at increasing CRC screening rates for patients seen at the Family Care Center in Garnett, Kansas and the satellite clinic, Family Care Center South, in Colony, Kansas. The low-cost, multicomponent intervention included two parts: 1) postcard educational mailers and electronic educational mailers sent via email aimed to increase in community demand and 2) Medical Assistant and Registered Nurse CRC education and CRC screening order process education aimed to increase in provider delivery of screening services. Details of the multicomponent intervention are described below:

- a. Postcard educational mailers (Appendix C) or electronic educational mailers (Appendix D) were mailed to male and female patients aged 50-75 seen in the Quarter 3 (July, August and September 2018) at the Family Care Center and the Family Care Center South who were not up to date with CRC screening, per the USPSTF guidelines. The educational mailers highlighted the at home fecal occult blood testing option for CRC screening and invited the recipient to call the Clinic to schedule their CRC screening. The project manager and the Marketing Manager developed the educational mailers collaboratively. The Clinic Medical Director approved the mailer prior to it being sent to recipients.
- b. Medical Assistants and Registered Nurses employed at the Family Care Center and the Family Care Center South engaged in a one-hour meeting regarding CRC screening. The meeting provided education on CRC, screening barriers specific to rural communities, screening guidelines set forth by the USPSTF as well as an in-clinic CRC screening order process for eligible patients seen at the Clinic during the project implementation (October, November and December 2018). The MAs and RNs were educated on their ability to place an order for CRC screening. The specific order entry process is detailed below:
 - a. At the time the patient was roomed, the MA or RN reviewed the patient's CRC screening status, which was available on the provider's home page within EPIC. If the patient was overdue for CRC screening, the MA or RN informed the patient of the need for CRC screening and placed an order for CRC screening.
 - b. The provider reviewed the order for CRC screening while reviewing all orders for the patient visit.

- c. Fecal occult blood testing kits were made available in the patient rooms for the MA or RN to distribute prior to checkout, when applicable.

Implementation Plan

Postcard and electronic educational mailers were developed collaboratively between the project manager, the Marketing Manager of Anderson County Hospital and the Marketing Department of the Saint Luke's Health System. The postcard and electronic educational mailers were sent to 1,516 patients in October 2018 who were seen at the Clinics during Quarter 3 (July, August and September 2018) and who were overdue for CRC screening. The mailers were paid for by the Marketing Department of Saint Luke's Health System. The educational mailer's call to action was for the recipient to call the Family Care Center or Family Care Center South Clinic to schedule a CRC screening.

Providing education to MAs and RNs employed at the Clinics was performed in October 2018. During this meeting, the MAs and RNs were educated on CRC, CRC screening and in-clinic CRC screening order process.

Measurement Instruments. The Electronic Health Record System, EPIC, was used to determine the percentage of patients who were compliant with CRC screening, as per the USPSTF guidelines.

Data Collection Procedure. The Medical Director of the Family Care Center determined the rates of CRC screening on eligible patients seen at the Clinic pre- and post-intervention and sent these rates to the project manager via electronic communication. This information was available within the EPIC Electronic Health System Record and was accessed by the Medical Director.

Data Analysis. Numerical methods including the percentage of eligible patients who were deemed as up to date on CRC screening, as per the USPSTF guidelines described the data. Microsoft Excel was used to track the data.

Cost-Benefit Analysis

The cost to implement this project was minimal, which was important to consider in rural health clinics where there may be a lack of financial resources. The project manager spent time implementing the project that was not billable. The Marketing Department agreed to spend salary dollars to develop the educational mailers. The exact salary dollars spent by the Marketing Department was not made available to the project manager, however, this mailer can be used from year to year so this was a one-time cost to the Marketing Department. An additional cost was salary paid during the educational meeting with the Medical Assistants and Registered Nurses. However, this cost was negligible because the educational program occurred during a regularly scheduled monthly Medical Assistant and Registered Nurse meeting.

Timeline

The pre-intervention screening rate was collected in October 2018. This data was compared to the Clinic's screening rate three months post project implementation in December 2018. Details of the project timeline are included in Appendix E.

Ethical Considerations

According to the Human Subjects Committee, consent was not needed to be included in the data collection of this project because the data collection was a retrospective chart review. An "Exempt Initial Study Research Form" form was submitted to the Human Subjects Committee for review. The Human Subjects Committee issued IRB approval on October 8,

2018 in order to ensure the rights, safety and welfare of all subjects who are included in the project were maintained (Appendix F).

Results

Data Analysis

The pre- and post-intervention CRC screening rates were obtained by the Medical Director of the Clinics and sent to the project manager via electronic communication on January 31, 2019. The CRC screening rate was 57% in Quarter 1, 60% in Quarter 2, 61% in Quarter 3 and 66% in Quarter 4 (Figure 1). A 5% increase in the CRC screening rate was seen following the intervention implementation (61% to 66% from Quarter 3 to Quarter 4). Monthly screening rates for Quarter 3 and Quarter 4 are as follows: July – 65%, August – 69%, September – 62%, October – 66%, November – 70% and December – 66% (Figure 2).

The largest increase in CRC screening rate was in the two months following the intervention implementation. The October 2018 CRC screening rate increased by 4% from the previous month and the November CRC screening rate increased by 4% from the previous month. However, a 4% decline in CRC screening rate was seen in the month of December, which may indicate that ongoing staff education and community outreach may be needed to sustain results. Additionally, it is possible the data collection timeline restricted actualizing the full impact of the intervention, specifically in December. The percentage of patients who were CRC screening compliant in December may continue to rise as it can take several weeks to months to schedule a colonoscopy, especially in areas where resources may be scarce such as rural Kansas. Therefore, continued assessment of the CRC screening rate beyond 3 months may reveal continued increase in CRC screening compliance in December 2018.

The clinic scheduler was not able to reliably track the reason why patients were calling to schedule their CRC screening. Therefore, despite successfully increasing the CRC screening rate by 5%, there are challenges to directly correlating the data to the intervention. Further research is needed to determine how to reliably track outcome data in a setting with limited resources, such as rural Kansas.

The results of this project did not meet the goal of the project, which was to increase the CRC screening rate to the nationally set goal of 70.5%, indicating that continued effort to improve the CRC screening rate in this population is needed to meet nationally set guidelines. However, the project did successfully meet the objective of increasing the CRC screening rate in two primary care clinics in rural Kansas.

Figure 1

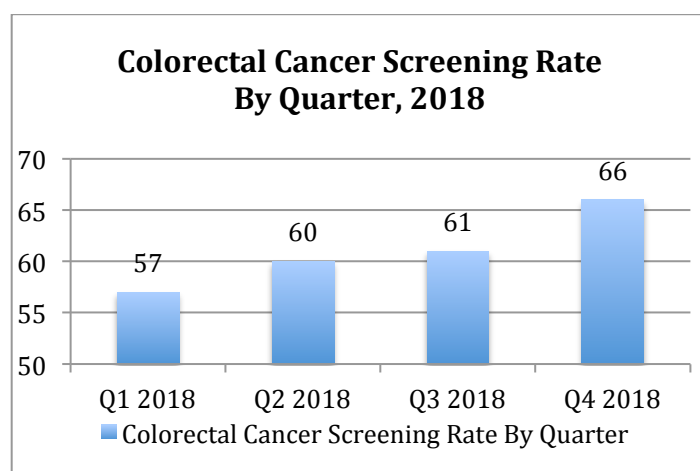
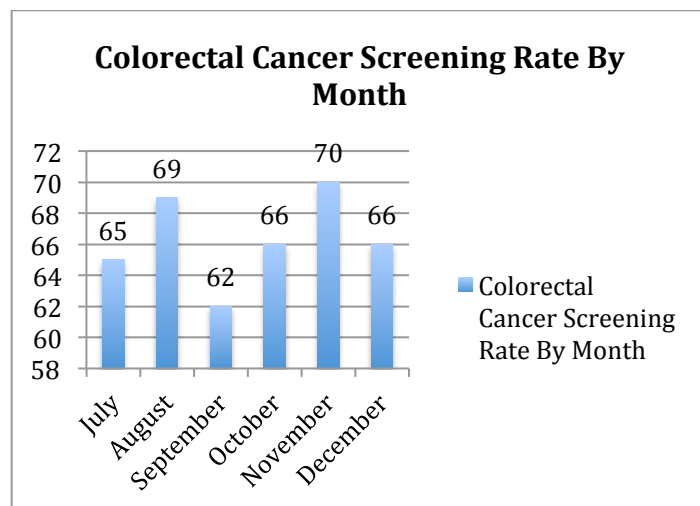


Figure 2



Discussion of Results

Impact on Practice

Colorectal cancer screening is crucial in detecting CRC in early stages and greatly reducing the mortality of this cancer. Unfortunately, CRC screening rates continue to fall below nationally set guidelines, particularly in rural populations. In a complex and dynamic healthcare system, it is important for healthcare leaders to determine ways in which systems and processes can be put into place to avoid missed opportunities for this life-saving cancer screening. Further, healthcare leaders are urged to consider ways in which low cost interventions can be combined to improve CRC screening rates in this vulnerable population with a lack of resources and limited access to care. This project supports the current body of literature on this topic, which reveals that combining low-cost interventions is a reliable way to improve CRC screening rates in a variety of healthcare settings, including rural Kansas. These evidence-based interventions should be considered and their implementation evaluated as a way to improve CRC screening

compliance among patients seen in primary health care clinics in rural areas of the United States where rates are below nationally set guidelines.

Strengths and Limitations

This project adds to the current body of literature supporting the use of low-cost multicomponent interventions to improve CRC screening compliance in rural areas of the United States. The project revealed that staff education, in-clinic order process and mailed education can be used as a means to increase CRC screening rates in rural areas, where resources may be scarce. While the results did not reveal a statistically significant increase in CRC screening rates post-intervention, any incremental increase in preventative screenings can impact the lives of residents of rural Kansas.

This project is limited by the ability to directly relate the CRC screening compliance rate to the intervention. The Clinic staff was unable to identify if patients who called the Clinic to schedule a CRC screening were prompted by the mailed education, therefore it is not possible to determine if the increase in CRC screening rate seen post-intervention was directly related to the intervention. Additionally, the largest increase in CRC screening rates were seen during the two months following the intervention implementation, which may indicate that ongoing education and community outreach is needed to sustain results. Finally, this project was conducted in two primary care clinics in rural Kansas and therefore, the results are not generalizable to a greater population or other settings.

Plan for Dissemination

The results of this project will be disseminated to the public at the Graduate Nurse Research Summit in Topeka, Kansas, the Midwest Nursing Research Society Conference and

during the University of Kansas School of Nursing Public Project Presentations during the Spring of 2019. The project paper will also be published to ProQUEST online database.

Future Implications for Practice

The results of this project indicate that low cost multicomponent interventions can be combined to increase CRC screening adherence in two primary care clinics in rural Kansas. However, researchers should investigate the impact of low-cost multicomponent interventions for periods longer than three months to fully realize the impact of this type of intervention. This may be especially important in rural areas where resources are scarce and CRC screening by colonoscopy can take several weeks to months to schedule. Additionally, further research is needed to more clearly connect the intervention to the outcome data in order to fully understand the implications of the intervention.

Healthy People 2020 calls on healthcare leaders to find ways to improve cancer-screening rates. This project met the this objective by evaluating an innovative way for healthcare leaders to implement low cost interventions to improve CRC screening rates in rural Kansas. The improvement in CRC screening compliance in two primary care clinics in rural Kansas demonstrates the ability for healthcare leaders to implement low cost interventions that will have the ability to impact the colorectal health of this population.

References

- Ahmed, N., Haber, G., Semanya, K., & Hargreaves, M. (2010). Randomized controlled trial of mammography intervention to insured very low-income women. *Cancer Epidemiology Biomarkers Prevention, 19*, 1790-1798.
- American Cancer Society. *Cancer Facts & Figures 2017*. Atlanta, GA: American Cancer Society; 2017.
- Ananthkrishnan, A., Hoffmann, R. & Saeian, K. (2010). Higher physician density is associated with lower incidence of late-stage colorectal cancer. *Journal of General Internal Medicine, 25*(11), 1164-1171. doi: 10.1007/s11606-010-1457-z.
- Baker, D., Brown, T., Buchanan, D., Weil, J., Balsley, K., Ranalli, L., ... Wolf, M. (2014). Comparative effectiveness of a multifaceted intervention to improve adherence to annual colorectal cancer screening in community health centers. *The Journal of American Medical Association Internal Medicine, 174*(8), 1235-1241. doi: 10.1001/jamainternmed.2014.2352.
- Beach, M., Flood, A., Robinson, C., Cassells, A., Tobin, J., Greene, M., Dietrich, A. (2007). Can language-concordant prevention care managers improve cancer screening rates? *Cancer, Epidemiology, Biomarkers Prevention, 16*, 2058-2064.
- Brouwers, M., De Vito, C., Bahirathan, L., Carol, A., Carroll, J., Cotterchio, M., ... Wathen, N. (2011). What implementation interventions increase cancer screening rates? A systematic review. *Implementation Science, 6*(111), 1-17.
- Center for Disease Control and Prevention, *Colorectal Cancer Screening in the U.S.: Behavioral Risk Factor Surveillance System 2016*. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Retrieved from

<https://www.cdc.gov/cancer/colorectal/pdf/QuickFacts-BRFSS-2016-CRC-Screening-508.pdf>.

Cole, A., Jackson, J., Doescher, M. (2012). Urban-rural disparities in colorectal cancer screening: cross-sectional analysis of 1998-2005 data from the Centers for Disease Control's behavioral risk factor surveillance study. *Cancer Med*, 1(3), 350-356.

Community Preventative Services Task Force (2016). *Cancer screening: multicomponent interventions – colorectal cancer*. Retrieved from:
<https://www.thecommunityguide.org/findings/cancer-screening-multicomponent-interventions-colorectal-cancer>.

Davis, M., Freeman, M., Shannon, J., Coronado, G., Stange, K., Guise, J., ... Buckley, D. (2018). A systematic review of clinic and community intervention to increase fecal testing for colorectal cancer in rural and low-income populations in the United States – how, what and when? *BioMed Central Cancer*, 18(40), 1-16. doi: 10.1186/s12885-017-3813-4.

Dietrich, A., Tobin, J., Cassells, A., Robinson, C., Greene, M., Sox, C., ... Younge, R. (2006). Telephone care management to improve cancer screening among low-income women: a randomized, controlled trial. *Annals of Internal Medicine*, 144, 563-571.

Gupta, S., Sussman, C., Doubeni, C., Anderson, D., Day, L., Deshpande, A.,... Martinez, M. (2014). Challenges and possible solutions to colorectal cancer screening for the underserved. *The Journal of National Cancer Institute*, 106(4), 1-12. doi: 10.1093/jnci/dju032.

Hall, H. & Roussel, L. (2014). *Evidence-Based Practice: An Integrative Approach to Research, Administration and Practice*. Burlington, MA: Jones & Bartlett Learning.

Healthy People 2020. U.S. Department of Health and Human Services; 2018. Available at:

<https://www.healthypeople.gov/2020/topics-objectives>.

Hendren, S., Winters, P., Humiston, S., Idris, A., Li, S., Ford, P., ... Fiscella, K. (2013).

Randomized controlled trial of a multimodal intervention to improve cancer screening rates in a safety-net primary care practice. *The Journal of Internal Medicine*, 29(1), 41-49. doi: 10.1007/s11696-013-2506-1.

Kempe, K., Shetterly, S., France, E. & Levin, T. (2012). Automated phone and mail population outreach to promote colorectal cancer screening. *American Journal of Managed Care*, 18, 370-378.

Levy, B., Xu, Y., Daly, J. & Ely, J. (2013). A randomized controlled trial to improve colon cancer screening in rural family medicine: an Iowa Research Network (IRENE) study.

The Journal of the American Board of Family Medicine, 26(5), 486-497. doi: 10.3122/jabfm.2013.05.130041.

Maciosek, M., Solberg, L., Coffield, A., Edwards, N., & Goodman, M. (2006). Colorectal cancer screening: health impact and cost effectiveness. *American Journal of Preventative Medicine*, 31(1), 80-89.

Meissner, H., Breen, N., Klabunde, C. & Vernon, S. (2006). Patterns of colorectal cancer screening update among men and women in the United States. *Cancer Epidemiology, Biomarkers and Prevention*, 15(2), 389-394.

Melnyk, B. & Fineout-Overholt. (2015). *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice (3rd ed.)*. Philadelphia, PA: Wolters Kluwer.

Moran, K., Burson, R. & Conrad, D. (2017). *The Doctor of Nursing Practice Scholarly Project: A Framework for Success (2nd Ed.)*. Burlington, MA. Jones & Bartlett Learning.

- National Colorectal Cancer Roundtable, *80% by 2018*. Atlanta: Center for Disease Control and Prevention. Available at: <http://nccrt.org/what-we-do/80-percent-by-2018/> .
- Polit, D. & Beck, C. (2012). *Nursing Research: Generating and Assessing Evidence for Nursing Practice (9th Ed.)*. Philadelphia, PA: Lippincott Williams & Wilkins.
- Rabeneck, L., Paszat, L., Saskin, R., & Stukel, T. (2010). Association between colonoscopy rates and colorectal cancer mortality. *American Journal of Gastroenterology*, *105*, 1627-1632.
- Seeff, L., Nadel, M., Klabunde, C., Thompson, T., Shapiro, J., Vernon, S., & Coates, R. (2004). Patterns and predictors of colorectal cancer test use in the adult U.S. population. *Cancer*, *100*(10), 2093-2103. doi: 10.1002/cncr.20276.
- Singal, A., Gupta S., Tiro, J., Skinner, C., McCallister, K., Sanders, J., ... Halm, E. (2016). Outreach invitations for FIT and colonoscopy improve colorectal cancer screening rates: a randomized controlled trial in a safety-net health system. *Cancer*, *122*, 456-463. doi: 10.1002/cncr.29770.
- Stone, E., Morton, S., & Hulscher, M. (2002). Interventions that increase use of adult immunization and cancer screening services: a meta-analysis. *Annals of Internal Medicine*, *136*, 641-651.
- Tilter, M., Kleiber, C., Steelman, V., Rakel, B., Budreau, G., Everett, L.,...Goode, C. (2001). The Iowa model of evidence-based practice to promote quality care. *Critical Care Nursing Clinics of North America*, *13*(4), 497-509.
- Whitlock, E., Lin, J., Liles, E., Beil, T., Fu, R. Screening for colorectal cancer: a targeted, updated systematic review for the U.S. preventative services task force. *Annals of Internal Medicine*, *149*(9), 638-658.
- University of Wisconsin Population Health Institute. *County Health Rankings 2017*. Retrieved

from:

[http://www.countyhealthrankings.org/sites/default/files/state/downloads/CHR2017_KS.pdf/](http://www.countyhealthrankings.org/sites/default/files/state/downloads/CHR2017_KS.pdf)

U.S. Census Bureau (2018). QuickFacts: Anderson County, Kansas; Kansas. Retrieved from

<https://www.census.gov/quickfacts/fact/table/andersoncountykansas,ks/PST045217>.

U.S. Preventative Task Force (2008). Screening for colorectal cancer: U.S. preventative services

task force recommendation statement. *Annals of Internal Medicine*, 149(9), 627-638.

Appendix A

U.S. Preventative Services Task Force Characteristics of Colorectal Cancer Screening Strategies
(uspreventativeservicestaskforce.gov, 2018)

Screening Method	Frequency ^b	Evidence of Efficacy	Other Considerations
Stool-Based Tests			
gFOBT	Every year	RCTs with mortality end points: High-sensitivity versions (eg, Hemoccult SENSА) have superior test performance characteristics than older tests (eg, Hemoccult II)	Does not require bowel preparation, anesthesia, or transportation to and from the screening examination (test is performed at home)
FIT ^c	Every year	Test characteristic studies: Improved accuracy compared with gFOBT Can be done with a single specimen	Does not require bowel preparation, anesthesia, or transportation to and from the screening examination (test is performed at home)
FIT-DNA	Every 1 or 3 y ^d	Test characteristic studies: Specificity is lower than for FIT, resulting in more false-positive results, more diagnostic colonoscopies, and more associated adverse events per screening test Improved sensitivity compared with FIT per single screening test	There is insufficient evidence about appropriate longitudinal follow-up of abnormal findings after a negative diagnostic colonoscopy; may potentially lead to overly intensive surveillance due to provider and patient concerns over the genetic component of the test
Direct Visualization Tests			
Colonoscopy ^e	Every 10 y	Prospective cohort study with mortality end point	Requires less frequent screening. Screening and diagnostic followup of positive results can be performed during the same examination.
CT colonography ^e	Every 5 y	Test characteristic studies	There is insufficient evidence about the potential harms of associated extracolonic findings, which are common
Flexible sigmoidoscopy	Every 5 y	RCTs with mortality end points: Modeling suggests it provides less benefit than when combined with FIT or compared with other strategies	Test availability has declined in the United States
Flexible sigmoidoscopy with FIT ^c	Flexible sigmoidoscopy every 10 y plus	RCT with mortality end point (subgroup analysis)	Test availability has declined in the United States Potentially attractive option for patients

	FIT every year		who want endoscopic screening but want to limit exposure to colonoscopy
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Abbreviations: FIT=fecal immunochemical test; FIT-DNA=multitargeted stool DNA test; gFOBT=guaiac-based fecal occult blood test; RCT=randomized clinical trial.

^a Although a serology test to detect methylated *SEPT9* DNA was included in the systematic evidence review, this screening method currently has limited evidence evaluating its use (a single published test characteristic study met inclusion criteria, which found it had a sensitivity to detect colorectal cancer of <50%).¹ It is therefore not included in this table.

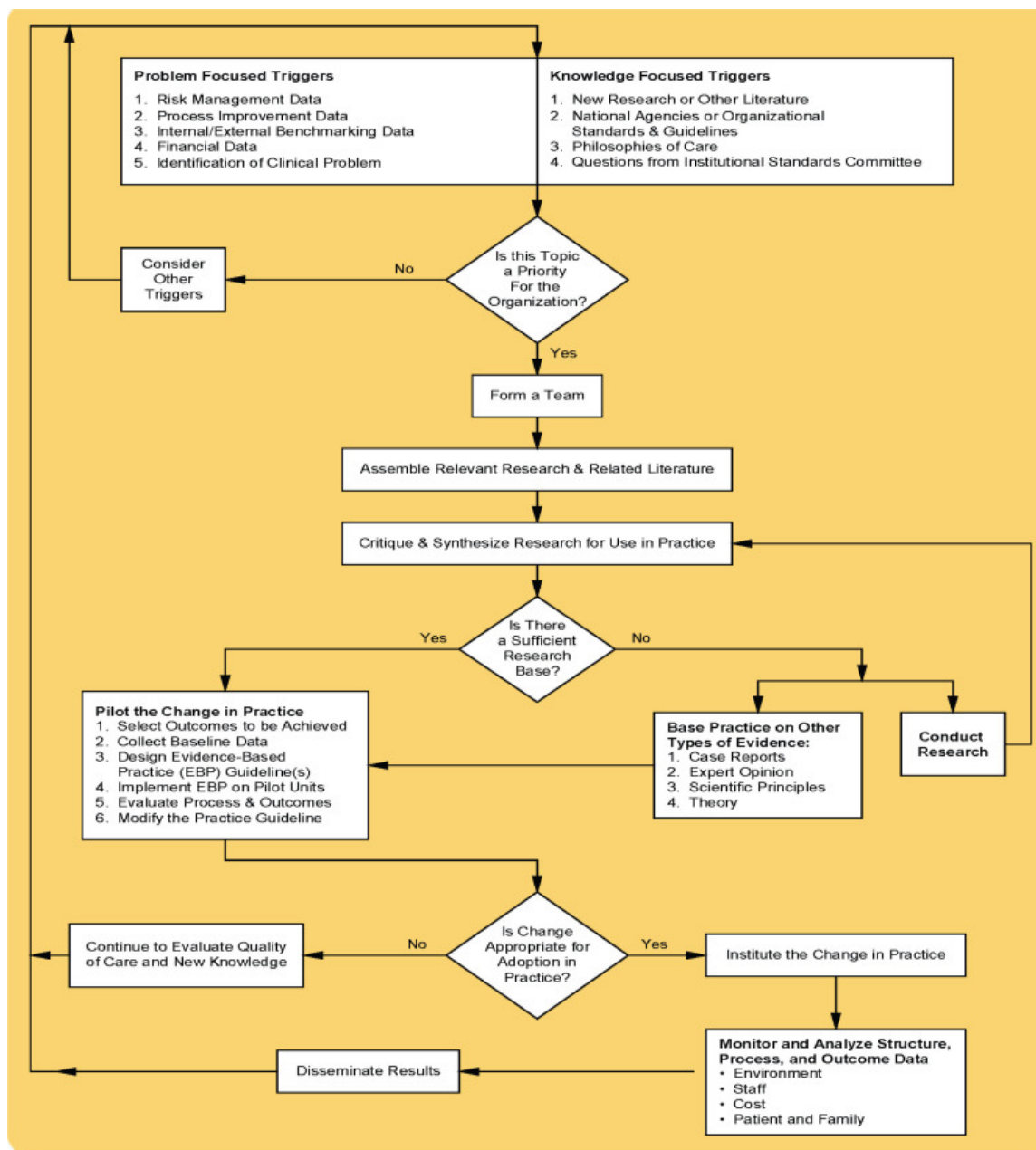
^b Applies to persons with negative findings (including hyperplastic polyps) and is not intended for persons in surveillance programs. Evidence of efficacy is not informative of screening frequency, with the exception of gFOBT and flexible sigmoidoscopy alone.

^c Strategy yields comparable life-years gained (ie, the life-years gained with the noncolonoscopy strategies were within 90% of those gained with the colonoscopy strategy) and an efficient balance of benefits and harms in CISNET modeling.²

^d Suggested by manufacturer.

^e Strategy yields comparable life-years gained (ie, the life-years gained with the noncolonoscopy strategies were within 90% of those gained with the colonoscopy strategy) and an efficient balance of benefits and harms in CISNET modeling when lifetime number of colonoscopies is used as the proxy measure for the burden of screening, but not if lifetime number of cathartic bowel preparations is used as the proxy measure.²

Appendix B



◊ = a decision point

Titler, M.G., C., Steelman, V.J., Rakel, B. A., Budreau, G., Everett, L.Q., Buckwalter, K.C., Tripp-Reimer, T., & Goode C. (2001). The Iowa Model Of Evidence-Based Practice to Promote Quality Care. *Critical Care Nursing Clinics of North America*, 13(4), 497-509.

REQUESTS TO:
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University of Iowa Hospitals and Clinics
Iowa City, IA 52242-1009

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Appendix C

Postcard Educational Mailer



Cancer You Can Prevent Through Screening

Colorectal cancer is the third most commonly diagnosed cancer, but if detected early, it has a 90% survival rate. In addition, colorectal cancer screening can help prevent colorectal cancer by detecting the polyps where cancer often grows.

Everyone 50 years and older should be screened for colorectal cancer.

The Anderson County Hospital Family Care Center offers a full range of screenings from a convenient, at-home screening option to a more comprehensive colonoscopy.

› Schedule a screening appointment today

785-448-2674

Saint Luke's Health System shall not discriminate on the basis of race, color, national origin, gender, pregnancy status, sexual orientation, age, religion, disability, veteran status, gender identity or expression. Saint Luke's Health System cumple con las leyes federales de derechos civiles aplicables y no discrimina por motivos de raza, color, nacionalidad, edad, discapacidad o sexo. Saint Luke's Health System tuân thủ luật dân quyền hiện hành của Liên bang và không phân biệt đối xử dựa trên chủng tộc, màu da, nguồn gốc quốc gia, độ tuổi, khuyết tật, hoặc giới tính. Saint Luke's Health System 遵守適用的聯邦民權法律規定，不因種族、膚色、民族血統、年齡、殘障或性別而歧視任何人。 2018-1745



Family Care Center
536 W. 4th Ave., Suite 303
Garnett, KS 66032

Appendix D

Email Educational Mailer



Schedule Your Cancer Screening Today

Colorectal cancer is the third most commonly diagnosed cancer—but if detected early, it has a 90 percent survival rate. A screening can help prevent colorectal cancer by detecting the polyps where cancer often grows.

The [Anderson County Hospital Family Care Center](#) offers a full range of colorectal cancer screenings, from a convenient at-home screening option to a more comprehensive colonoscopy.

Call the Family Care Center at 785-448-2674 to schedule your screening today.

Can't see this Email? [View it in your Browser.](#)

About this email: You are signed up for this Saint Luke's Health System email as rschneider@saint-lukes.org. Don't miss a single email from Saint Luke's Health System — add saintlukes@saintlukeskc.org to your address book.

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 **Saint Luke's**
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Appendix E

Project Timeline

Action Item	Date
Development of an educational postcard mailer	August-October 2018
Pre-intervention data collection	October 2018
Educational meeting with Medical Assistants and Registered Nurses of the Family Care Center and the Family Care Center South	October 2018
Postcard mailers sent to eligible patients	October 2018
Post-intervention data collection	January 2019
Data analysis	January-February 2019
Dissemination of results to Family Care Center Employees	March 2019

Appendix F

IRB Approval Notice

The University of Kansas Medical Center

Human Research Protection Program

APPROVAL OF SUBMISSION

October 8, 2018

JoAnn Peterson
JPETERSON2@kumc.edu

Dear JoAnn Peterson:

On 10/8/2018, the IRB reviewed the following submission:

Type of Review:	Initial Study
FWA#:	00003411
IRB#:	STUDY00143078
Title:	Impact of a Low-Cost, Multicomponent Intervention to Improve Colorectal Cancer Screening Rates in a Primary Care Clinic in Rural Kansas
Investigator:	JoAnn Peterson
IRB ID:	STUDY00143078
Exemption Category:	(2) Tests, surveys, interviews, or observation
Documents submitted for the above review:	<ul style="list-style-type: none"> • Cunningham.DNP Project Proposal • Admin Certification • Colorectal Cancer Screening Postcard • Cunningham Exempt Project Description

The IRB approved this submission as of 10/8/2018. This “exempt” approval is based upon the assurance that you will notify the HSC prior to implementing any revisions to the project. The HSC must determine whether or not the revisions impact the risks to human subjects, thus affecting the project’s “exempt” status. Projects that do not meet the “exempt” criteria must comply with all federal regulations regarding research.

For more information on Human Subjects Research Policies or using the eCompliance system, please see our website at: <http://www.kumc.edu/compliance/human-research-protection-program/institutional-review-board.html>

If you have any questions regarding the human subject protection process, please do not hesitate to contact our office at 913-588-1240 or humansubjects@kumc.edu.

Sincerely,
Kyle Stephens

Mail-Stop 1032, 3901 Rainbow Blvd., Kansas City, KS 66160
Phone: (913) 588-1240 Fax: (913) 588-5771 humansubjects@kumc.edu