Virtual Care Navigation To Reduce Disparities And Improve Quality: A Pilot Program For Colorectal Cancer Screening

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Virtual Care Navigation to Reduce Disparities and Improve Quality: A Pilot Program for Colorectal Cancer Screening

A Project Submitted to the Doctor of Nursing Practice Faculty of Yale University School of Nursing

In Partial Fulfillment of the Requirements for the Degree Doctor of Nursing Practice

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May 12th, 2024
This DNP Project is accepted in partial fulfillment of the requirements for the degree Doctor of Nursing Practice.

Mary Ann Camilleri, JD, RN, FACHE

5/12/2024
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Signed:________________________

May 12th, 2024
Acknowledgements

To my father,

Your battle with cancer had a profound impact on our family and inspired this work. Your enduring values of integrity, compassion, and exceptional work ethic have guided my academic and professional journey. Even in your absence, your spirit has continued to be a source of strength and inspiration during the most challenging times. It’s in your memory that I have committed to advancing colon cancer screening to save lives and reduce suffering.

To my family and friends,

I’m forever thankful for your encouragement and sacrifice throughout the program. This would not have been possible without my husband, mom, and incredible support from friends and family.

To my advisor,

Your guidance has been invaluable throughout my doctoral journey. I’m thankful for the expertise and wisdom you have shared generously along the way.

To my colleagues and mentors,

This would not be possible without the incredible mentors and colleagues that have supported me along my profession and academic endeavors.
Abstract

Title: Virtual Care Navigation to Reduce Disparities and Improve Quality: A Pilot Program for Colorectal Cancer Screening

Purpose: This DNP project piloted a virtual care navigation program for primary care patients in an urban population, aimed at improving compliance with colorectal screening and reducing disparities in access to care.

Background: Despite the high prevalence and mortality, colorectal cancer screening remains low in the United States. This is especially true for patients who are uninsured, who are younger and for racial minorities. Colorectal Cancer can be largely prevented when appropriate screening is done. Digital navigation tools have demonstrated effectiveness in helping patients complete preventative health measures like cancer screening.

Methods: This quality improvement project implemented a virtual navigation program for colorectal cancer screening within an urban primary care setting. Participants were identified based on institutional colorectal screening guidelines. The technology department supported the development of the virtual program using the enterprise patient engagement portal. Descriptive and bivariate statistics were used to evaluate outcomes of the 11-week pilot period. Recommendations were made to the organization for scaling and sustaining the program.

Results: A total of 948 patients had an annual primary care visit at the pilot locations during the 11-week pilot period. Out of all patients, 78 met the inclusion criteria and were enrolled in the virtual navigation program. An overall increase of 5.94% was observed in the colorectal screening rate compared to the same period one year prior. The baseline and pilot period screening rates were compared using Pearson Chi-squared and a statistically significant difference was measured ($p = 0.016$). No differences in screening rates by race were observed.
Conclusion: The virtual navigation program was successful at improving colorectal screening rates within an urban primary care population. Due to limitations in participant size, no differences in screening rates by race were observed.
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DISCUSSION

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PART 1. INTRODUCTION

Digital care navigation has the potential to transform the health of populations and bring us closer to the Institute for Healthcare Innovation (IHI) triple aim (IHI, 2007). This project examines digital navigation through the lens of the healthcare triple aim by improving the quality and experience of care, reducing cost, and improving the health of populations (Institute for Healthcare Improvement). For example, studies have shown that digital engagement increases the likelihood of a patient receiving an annual influenza vaccination (Huang et al., 2019; Wijesundara et al., 2020). Additionally, patients who engage electronically to book appointments report a greater degree of satisfaction compared to those who use an analog approach (Volk et al., 2020).

This DNP project piloted a virtual care navigation program for primary care patients in an urban population, aimed at improving compliance with colorectal screening and reducing disparities in access to care. The virtual care program includes annual screening reminders and facilitate in-person and virtual visits. This pilot is an adaption of the MyPennMedicine program, which showed that patients who digitally engage have a statistically significant increase in positive health behaviors such as completing cholesterol screening, monitoring blood pressure, and screening for colorectal cancer - when compared to similar patients not using the portal (Huang et al., 2019).

Problem Statement

The Covid-19 pandemic has accelerated the use of digital tools and many consumers were introduced to virtual care encounters during the pandemic (Ramsetty & Adams, 2020). As the adoption of digital health tools increases, we can expect them to become an important part of improving health behaviors. These tools require less resources and human capital and will enable healthcare delivery systems to deliver high value, evidence-based care while reducing
overall costs (Wijesundara, 2020). The pandemic also highlighted the digital divide that exists in communities. Low socio-economic status individuals can be challenged by a lack of broadband and varying degrees of literacy with digital tools; additionally, economic instability can be a barrier to purchase or afford devices and upgrades. These challenges disproportionately impact minorities and communities of color (Ramsetty & Adams, 2020).

Colorectal Cancer can be largely prevented when appropriate screening is done (Walsh et al., 2002). The literature tells us that digital access and navigation tools can improve compliance with annual colorectal screening requirements. A study by Huang (2019) of users of the MyPennMedicine patient portal showed that patients who engaged with the portal were more likely to demonstrate health behaviors such as annual influenza vaccination, checking cholesterol, regular blood pressure monitoring, and complying with colorectal screening guidelines. Digital navigation tools have also been shown to improve access to care and the experience of patients scheduling appointments (Sulieman et al., 2020). This DNP project adapted a virtual screening program for primarily low socio-economic status primary care patients in a large urban healthcare system.

**Significance**

The Center for Disease Controls (CDC) estimates that the annual medical costs of colorectal cancer exceed $14 billion dollars per year (Centers for Disease Control and Prevention, 2021). This does not include the annual loss in productivity and wages for survivors who may not be able to return to work. Colorectal cancer carries a lifetime risk of 4% and an estimated 150,000 new cases arise each year. Older adults have seen a decline in colorectal cancer, but overall rates have not decreased, a finding attributed to rising rates in younger adults aged 55 and under where the rate has increased over the past two decades from 11 to 12 deaths per 100,000 individuals (Centers for Disease Control and Prevention, 2021).
Colon Cancer screening has been identified as an area that can benefit greatly from a virtual care navigation program (Huang et al., 2019). Colon cancer ranks number two of the most common cancers in the United States for both women and men, and it carries the second highest cancer mortality rate (Walsh et al., 2002). For patients who are seen in the primary care setting, the rates of colorectal cancer screening remain low. This is especially true for patients who are uninsured, younger, and racial minorities (Walsh et al., 2002). These screening rates have remained low despite a recommendation from the United States Preventive Services Taskforce (USPST) that all Americans aged 45 and up complete regular screening (United States Preventive Services Taskforce, Taskforce, 2021). Applying an evidence-based approach to use digital tools to improve access and compliance with cancer screening can have an immense impact on healthcare organizations and society at large. This work can save lives, improve access, and bring us closer to realizing the healthcare triple aim.

**Review of Literature**

**Search Strategy**

The search strategy included a query of the PubMed and Ovid Medline databases. The search was centered around the concepts of the digital patient portal, outcomes, and quality. For the theme of digital patient portal, the keywords of ‘Digital patient portal’ and ‘Patient portal’ were used along with “Patient access to records”. For the theme of outcomes, the keywords “Health behaviors”, “Patient outcomes” and “Patient safety” were used. For the theme of quality, the keywords “Quality of care”, “Healthcare quality” and “Quality improvement” were used. To improve the search result, the Boolean operator OR was used to group the keywords listed above using the themes of patient portal, outcomes, and quality. The following inclusion criteria were used: studies published after 2016, full text studies, and studies written in the English language. Studies were excluded if they were not empirical studies, or were editorials or letters to the editor. The PRISMA flow diagram illustrates the search process. A total of 427 studies
were yielded from the initial search. Duplicate removal yielded 214 articles, followed by abstract and title review for relevancy which yielded 150 abstracts. Non-English publications, those with full text not available, and non-research articles were excluded leaving 78 full-text articles to assess for relevance. After assessing for relevance, 53 additional articles were excluded. A total of 25 articles were included in the Review of Literature, 8 exemplars were included in the Evidence table.

**Synthesis of Literature**

Study designs included retrospective analysis, observational studies, and randomized control trials. Levels of evidence ranged from Joanna Briggs Institute (JBI) level 3e to level 1c. The review of literature uncovered the themes of digital navigation programs improving health behaviors, quality outcomes and the patient experience. Patients who engage with digital navigation programs have measurable improvements in quality outcomes as compared to patients who do not digitally engage (Daly et al., 2020; Holte et al., 2021; Huang et al., 2019; Volk et al., 2020; Wijesundara et al., 2020). Patients who participate in digital navigation programs are more likely to comply with colorectal screening guidelines (Huang et al., 2019).

The literature suggests the digital patient portal is an efficient way to improve quality outcomes in a resource efficient manner. The digital portal also appears to play an important role in expanding access and reducing health disparities. The limited number of randomized control trials limits the ability to generalize findings for many of the studies and demonstrate the effectiveness of the interventions noted.

**Literature Findings**

*Digital Navigation Programs Improve Health Behaviors*

There is an increasing body of evidence to support using digital navigation programs to drive measurable improvements in health behaviors and quality outcomes (Daly et al., 2020; Holte et al., 2021; Huang et al., 2019; Volk et al., 2020; Wijesundara et al., 2020). These
improvements include improving health behaviors for colorectal cancer screening, influenza vaccination, along with cholesterol and blood pressure monitoring. This theme was highlighted in a large retrospective study conducted at the University of Pennsylvania, a team of researchers looked to quantify the impact of patients using the MyPennMedicine digital portal and its influence on preventative health behaviors and chronic health outcomes (Huang et al., 2019). The study looked at a cohort of ten thousand patients and used cardinality matching to compare active portal users to a control group of non-users. The authors compared the two groups’ compliance with four health behaviors: completion of flu shot, annual cholesterol screening, annual blood pressure check, and colorectal screening compliance. The study also looked at four health outcomes: systolic blood pressure control, LDL levels, diabetes status, and hypertension status. Results of the study showed a statistically significant impact on health behaviors including improved compliance for annual flu shot, cholesterol screening, annual blood pressure check, and colorectal screening compliance for users versus non-users (Huang et al., 2019). There was no significant difference between users versus non-users for chronic health outcomes. Chronic health conditions generally develop over a long-time horizon and since the digital portal for patients is relatively new, it will likely take many years of observational study to understand if there is an impact on health outcomes.

The impact of digital portal use on health behaviors shown in the MyPennMedicine study has broad reaching implications for improving the health of populations; however, there are several limitations. This study did not have a randomized control so we cannot say with certainty that the use of the digital portal caused the improvements in health behaviors. Users of the portal were more likely to be white (73% versus 53%), have a higher annual income (74k versus 63k), and have commercial insurance (61% versus 40%) than non-users. It was unclear from the statistical analysis description if the authors controlled for race and race proxies like insurance type when matching cases and controls. We cannot eliminate the possibility of
selection bias and race having an impact on the results since portal users are more likely to be white and have commercial insurance. A follow-up study with a randomized control trial design would be beneficial and could bring additional validation to these important findings.

Improving health behaviors with digital navigation for colorectal screening was demonstrated in a large randomized control trial done at the University of Chicago. In this study, Solonowicz (2022) explored the use of SMS based digital navigation to improve the quality of bowel prep prior to a screening colonoscopy and the impact on keeping the appointment for the scheduled procedure. The program consists of sending several SMS-based messages to patients starting the day the procedure is scheduled up to the day of the procedure, the messages include education on bowel prep, information on the cancelation policy and costs, reminders for bowel prep and instructions for wayfinding and transportation to the clinic. The authors found that patients enrolled in the program had a lower no-show rate and same-day cancellation rate (10% versus 16%; P = 0.0003) as compared to the control group (Solonowicz, 2021). This study included a demographically diverse population and highlights ways that digital navigation can improve access to care for patients undergoing colorectal screening. A relatively simple intervention consisting of sending digital SMS messages showed substantial benefit on changing patient behavior and improving the likelihood that they would complete the colorectal screening. This has broad implications for use across colorectal screening programs.

The Veterans Health Administration (VA) sponsored a large randomized clinical trial that explored the role of a digital navigation program in improving the rates of influenza vaccination (Wijesundara et al., 2020). In this randomized control study, the intervention arm received a digital patient portal message that prompted patients to schedule their annual influenza vaccine while the control arm received standard care. Approximately 20,000 patients were enrolled in the trial, making this the largest cohort study in this review of literature. Study results showed a statistically significant increase in influenza vaccine rates for the population in the intervention
arm as compared to the control group. The study was one of the few randomized control trials that met the parameters of the search criteria. The VA sponsored study provides strong evidence for the effectiveness of digital navigation programs to improve health behaviors such as compliance with influenza vaccination (Wijesundara et al., 2020). This study did have some limitations. For example, since the authors did not have access to data from pharmacies and other healthcare providers outside the VA system, it is possible that patients in the control group received an influenza vaccination at another care provider.

In the MyPennMedicine, University of Chicago, and VA studies, digital navigation was shown to be an effective means for improving health behaviors. These were large studies with 10,000 patients included in the Penn study and 20,000 patients enrolled in the VA program. The Chicago and VA studies were randomized controlled trials with a strong level of evidence. These programs have broad implications for the impact of using virtual navigation for improving health behaviors.

**Virtual Navigation Programs Improve Quality Outcomes**

Virtual navigation programs not only can improve health behaviors, the literature demonstrates ways these programs can also improve quality outcomes. In a large observational study of patients undergoing total hip and knee arthroplasty, a virtual navigation program was introduced with the goal of improving patient reported outcomes (Holte et al., 2021). Patients enrolled in the study received digital patient information that could be accessed through a web-based and mobile platform. The information included pre-operative visit education along with postoperative recovery and rehabilitation information. Patients who opted not to utilize the virtual program received the same information from an in-person educator. A retrospective observational study design compared patients enrolled in the virtual navigation program with those who were not enrolled. A multi-variate analysis controlled for variables including socioeconomic status, gender, and level of education. The patients who underwent total knee
arthroplasty and participated in the virtual program reported significant improvements in physical function and in joint-specific function when compared to the patients not digitally engaged.

In the digital navigation program for colorectal screening at University of Chicago, Solonwicz (2022) performed a randomized controlled trial to measure the impact of digital navigation on the quality of bowel prep. The program consisted of education and reminders for bowel prep, assistance with filling prescriptions for prep solution, and prompts for when to start and complete the prep processes. The authors found that patients enrolled in the digital navigation program were significantly more likely to achieve adequate bowel prep (93% vs. 88%; P = 0.04) compared to those in the control group (Solonowicz, 2021).

A team from Wake Forrest University School of Medicine implemented a randomized control trial for digital navigation of colorectal screening across six primary care sites (Denizard-Thompson, 2020). In the study, patients were randomized to standard of care or to the mPATH-CRC a digital navigation program that allowed patients to self-screen and order either a stool based or colonoscopy screening using an interactive application on an iPad. Participants in the study were at risk individuals including 38% African American and 63% unemployed. Of these, 37% had low health literacy, and 53% had an annual income below $20,000 a year. The authors found that participants in the intervention group were twice as likely to complete colorectal screening within 24 weeks compared to the control group; additionally, the increase in screening was seen in both stool-based testing (36% vs. 11%) and colonoscopies (32% vs. 21%) (Denizard-Thompson, 2020). The study focused on at risk individuals and demonstrated the value of a digital navigation intervention improving quality outcomes for at risk populations.

In a 2020 study conducted at Memorial Sloan Kettering Cancer Center (MSKCC) researchers implemented a digital navigation tool with the goal of reducing preventable acute care episodes (Daly et al., 2020). The digital navigation tool called InSight was used to send questionnaires to 100 patients asking about symptoms that would prompt alerts to the care team
for any concerning symptoms. The study found that patients enrolled in the digital navigation program were less likely to use acute care services when compared to patients who were not enrolled (Daly et al., 2020). This study contributes to our understanding of ways digital navigation programs can improve outcomes aimed at reducing avoidable acute care encounters.

**Virtual Navigation Improves Patient Experience**

In addition to improving quality outcomes, virtual care navigation programs have been shown to have an impact on patients' experience of care (Sulieman et al., 2020; Volk et al., 2020). Digital patient portals and navigation programs can deliver streamlined workflows that can save patient’s time. One example is the appointment scheduling process, which historically would require a manual phone call to a practice or call center. Volk (2019) explored the use of a digital portal to improve patient access and ease of scheduling for an academic children’s hospital. The program which was implemented at Texas Children’s Hospital demonstrated that the digital portal scheduling led to a 44% increase in patient appointments which equated to over 53,120 additional children appointments completed annually. In the same study, Volk (2019) looked at the patient satisfaction survey results for the domain of ‘ease-of-scheduling’ pre and post implementation. The ease of scheduling patient experience survey improved in a positive direction with results of 72% post-implementation as compared to 57% pre-implementation.

The outcome of patient experience was measured as part of the University of Chicago’s digital navigation for colonoscopy study. In the randomized control study, Solonowicz (2022) noted that the mean patient satisfaction score in the intervention and control group was similar (4.56/5 vs. 4.95/5); however, in the intervention group there was a higher percentage of patients who reported they “strongly agreed” with understanding the instructions and feeling prepared for
their colonoscopy (77.8% vs. 74.4%; p = 0.00023). This study highlights how a digital navigation program can have a measurable impact on improving the patient experience.

In addition to the Volk (2019) and Solonowicz (2022) studies which demonstrated how a digital tool can improve the patient experience, a novel study at Vanderbilt University Medical Center by Sulieman (2020) explored the employee experience of using their digital patient portal. The descriptive analysis explored whether employees would view their personal health information using the hospital’s digital portal or by looking them up on the Electronic Health Record (EHR). A retrospective review of 35,172 unique employees showed that 79% accessed health information using either the portal or the EHR. Additionally, 46.5% of employees accessed their personal health information using the EHR only. The authors found that hospital employees would use the EHR to retrieve information not available in the patient portal. This study suggests that digital patient portals would benefit from including an expanded set of patient health information.

**Project Model**

The project model selected for this DNP project is Plan Do Study Act (PDSA). This framework comes from the IHI Model for Improvement (IHI, 2007). The larger IHI framework addresses three macro questions: what the goal is to be accomplished, how it will be determined that an improvement has occurred, and what changes must be made to make that improvement. This model takes an iterative approach and lends itself well to the agile development process for digital product development. The IHI model delineates the PDSA cycle of plan, do, study, and act to make continuous improvements while checking for progress at each step. The iterative approach with checks at each step reduces the risk of the project going off course throughout the project lifecycle.
During the Plan stage, the project plan was developed along with the training, communication, and stakeholder management approach for the initial virtual navigation program. There was an emphasis in the planning phase on the change management techniques needed to increase the likelihood of success. In the Do stage, the virtual navigation program went live at pilot locations, including monitoring of technical and operational performance as part of the go-live support. In the Study phase, key performance indicators were measured to assess the impact of the program. In the Act stage, a recommendation was made based on data to expand, improve, or abandon the project after a review of the key project metrics.

Organizational Assessment

The sponsor organization has a strong commitment to addressing the Social Determinants of Health and reducing health disparities from senior leadership and a dedicated department within the School of Medicine with faculty members dedicated to researching health disparities. The strong support from senior leadership has created a culture where efforts to address health disparities are embraced and encouraged.

The sponsor organization is undergoing a digital transformation that includes building the infrastructure to enable digital experiences for patients to improve access to care. This infrastructure will enable the colorectal screening program to offer an omni-channel experience that enables patient engagements over phone, email, text message, web, and in-person across our network of ambulatory practices. The combination of a culture that embraces reducing health disparities and digital transformation makes the organization an ideal health system to pilot the digital colorectal screening program.

Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis

An assessment of the organization’s strengths, weaknesses, opportunities, and threats as it articulates with this project was completed. The strengths include the health system’s commitment to reducing health disparities and support from senior leadership to embrace digital
transformation. The Cancer service line has a focus on increasing screening and referrals which is aligned with the goals for the organization to attract more patients, increase revenue, and further develop its brand and reputation. Increasing market share for the Cancer service line is a strategic priority for the organization. Additionally, there are downstream financial revenue implications of increased procedure volumes for colonoscopy and cancer treatments. The weaknesses include organization and department resource constraints which require that work for this initiative will be performed by the existing team and there will be no additional personnel hired to support this program.

Looking externally, the opportunities and threats to the organization were assessed to determine alignment with this initiative. The opportunities included the enhancing the image and reputation of the sponsor organization within its community as being an innovative system willing to invest in new care delivery models to service the community. The impact of this project on saving lives and demonstrating the value of virtual navigation to reduce health disparities and improve access is an opportunity to enhance the sponsor organizations standing. Through this program, there is an opportunity for the sponsor organization to position itself as a leader nationally with a program that is both extendable and repeatable, particularly given the national call by the United States Preventive Services Taskforce (USPST) that all Americans age 45 and up complete regular screening (2021). There is an opportunity for the program to influence the broad adoption of digital tools that improve quality, safety, and experience of care by showing the impact of this program. Lastly, there are external threats from disruptors in the market that could implement a program before it is implemented. Similarly, there are threats from competing healthcare systems which may develop this program before we do. Lastly, there is a threat that new regulations could be introduced in the future to govern the use of digital products, or the use of digital in healthcare organizations, slowing the sponsor organizations realization of its strategic priority of digital transformation and adding complexity to this project.
Project Goals and Aims:

This DNP project piloted a virtual care navigation program for primary care patients in an urban population, aimed at improving compliance with colorectal screening and reducing disparities in access to care.

The aims of this project are to:

1. To adapt the MyPennMedicine and University of Chicago programs with a focus on digital navigation for colorectal screening with primarily low socio-economic status patients.
2. To implement and evaluate the digital navigation program.
3. To make recommendations for scaling and sustaining the program.
PART 2. METHODS

Overview of Methods

This process improvement pilot is an adaption of the MyPennMedicine and University of Chicago programs, which showed that patients who digitally engage have a statistically significant increase in positive health behaviors including screening for colorectal cancer - when compared to similar patients not using the portal (Huang et al., 2019). Primary care patients in a large urban healthcare system were enrolled in a virtual care navigation program. Outcomes examined included the impact on colorectal screening rates post-implementation along with the leadership and clinician perception of program effectiveness. Additionally, process measures captured patient interactions with the virtual navigation program.

Goal and Aims of the Project:

This DNP project piloted a virtual care navigation program for primary care patients in an urban population, aimed at improving compliance with colorectal screening and reducing disparities in access to care. The Aims of the project are to:

1. To adapt the MyPennMedicine and University of Chicago programs with a focus on digital navigation for colorectal screening with primarily low socio-economic status patients.
2. To implement and evaluate the digital navigation program.
3. To make a recommendation for scaling and sustaining the program.

Aims and Associated Methods

Aim 1: To adapt the MyPennMedicine and University of Chicago programs with a focus on digital navigation for colorectal screening with primarily low socio-economic status patients.

Leadership Formation

○ Steering Committee
- An interdisciplinary steering committee was assembled by the Project Manager (PM) to advise on the project and to serve as the overarching governing body. The committee was responsible to monitor progress and key performance indicators, provide feedback on implementation matters, allocate necessary resources, and remove any barriers that arise.
- The steering committee met monthly in a hybrid format of in-person and virtual participation.

  - Implementation team
    - An implementation team was assembled and chaired by the Project Manager to lead the program development and deployment
    - The role of the implementation team was to develop the workflows, and make recommendation for training, education, and the implementation plan that can be presented to the steering committee.
    - This team met bi-weekly and on an ad hoc bases based on the overall project needs.

Review of current-state workflow

  - The current state workflow was captured by the PM on a process map based on direct observation and interviews with the clinical team.
  - Feedback on the process map was solicited from the clinical team by the PM and patient feedback will be retrieved from patient experience surveys.
  - The feedback was used to inform the future-state workflow which uses the Patient Portal to assist with scheduling, education, and to answer commonly asked questions.
The future state workflow was designed on a process map by the PM and feedback was solicited from the implementation team in a working group meeting.

The future state process was presented to the committee by the PM.

Development of Training Materials

The pre-implementation planning process consisted of developing training materials, along with a communication and change management plan developed and reviewed by the PM and implementation team.

- The communication plan consisted of key communications that were delivered via email to the frontline team, management, and senior leadership by the PM. Each message was tailored to the right level of detail for the intended audience.
- The risk management plan identified project risks and the associated mitigation strategies.

Participant Identification

- Patients were identified based on the practice location and the EMR to automatically enroll in them in the program.
- Patient's communication preference for phone, email, or SMS outreach were used to determine communication method, this information is stored in the EMR and patient portal.
- Patients could opt out of communication and can change communication preferences at any time.
- Patients with a preferred language of English and/or Spanish were included.
- Patients aged 45 and older were included (per institutional guidelines).
- The pilot locations average 4,000 patient visits per month.
Identification of Pre and Post Implementation Measurements

- The following metrics were included:
  - The primary success metric is the colorectal screening rates pre and post implementation. This metric is defined as the total number of patients screened (numerator) out of the population of eligible patients (denominator).
  - Process metrics were tracked, including: the total number of patients who engage with the program (numerator) out of total patient outreaches (denominator).
  - Evaluation was facilitated by an encrypted data reporting portal. This reporting portal followed organization policies for the handling of confidential and Protected Health Information (PHI).

- The Data Collection Plan was developed. The pilot data was refreshed weekly from the EMR data warehouse and retrieved weekly from the Ambulatory Quality dashboard, accessible through a reporting portal by the PM.

Development of Program Evaluation

- A program evaluation survey was administered to qualitatively understand the perception of program effectiveness. The survey consisted of three questions using a five-point Likert scale and three open-ended questions. The survey was delivered electronically, and the PM configured automated reminders to be sent every three days for a period of two weeks for those surveys not completed. Two versions of the survey were used, each applicable to one of two groups, one to direct care providers, and one to members of the steering committee.

Aim 2: To implement and evaluate the digital navigation program.
Preliminary work

- The PM and implementation team developed the future state workflow in the technology platform and test environment. The final flow and experience were brought to the working group for a demonstration and feedback before being moved into the production environment. This occurred between weeks 5 and 6.

Implement the education and training program for clinical staff

Recruitment of Clinical Staff

- The PM disseminated materials through email and with in-person huddles at the hospital clinics.

Implementation of virtual care navigation program

- The technology team brought the program live by moving it into the production environment after the completion of training during week 10.

- The PM, with assistance from the technology department Product Owner, ensured the virtual navigation program was functioning as anticipated and the data was valid and reliable. The Product Owner for virtual navigation is a technology department team member responsible for supporting the end-to-end experience and the roadmap of new features.

- Once the program was live, there were automated interactions with patients based on the designed future state workflow. The communication channel was based on patient preferences and included: email, SMS notifications (text messages), and patient portal messages. The communication preferences are stored in the EMR and modifiable by both patients and employees. For security requirements, patients need to confirm their identity. For patient portal interactions, a password or biometric verification is required (for example, using FaceID on an Apple device).
The technology platform supporting the virtual navigation program is capable of communication in English and Spanish, scheduling appointments, delivering education, and answering frequently asked questions. If the platform is unable to assist a patient there is an option to connect to a health system employee by phone or though sending a secure message.

A go-live communication was emailed by the PM to the steering and implementation committee members.

The PM facilitated a weekly post go-live fidelity meeting and support call with the implementation team for the first four weeks.

The PM coordinated additional go-live support discussions on an as needed basis.

Program Evaluation

The overall program evaluation was accomplished using two surveys to measure stakeholder perception of the project impact.

- The PM distributed a survey through email using a Microsoft electronic survey tool to leadership and members of the oversight committee. This occurred between weeks 22 and 24.
- The PM distributed an additional survey through email using a Microsoft electronic survey tool to frontline clinicians who have direct interaction with the program and patients. This occurred between weeks 22 and 24.

Evaluation

Descriptive and bivariate statistics were used to evaluate outcomes.

- Key performance metrics included:
  - Total number of patients who interacted at least once with the virtual navigation program.
  - The percentage of patients contacted who connect to follow-up screening.
The percentage of patients contacted who require additional assistance at least one time.

- The baseline pre-program colorectal screening rates were compared to the post-implementation rates using Pearson’s chi-squared test.
  - The statistical analysis was completed with support from a member of the department of biostatistics.
  - The data was stratified by race, gender, payer, and socio-economic status.
  - For baseline rate, the same period one year prior was used.
  - Evaluation was facilitated by an encrypted, HIPAA protected data reporting portal. The PM and biostatistician working on the project had access to the database.

- Program evaluations were analyzed descriptively.

**Aim 3:** To make recommendations for scaling and sustaining the program.

**Sustainability**

The Key Performance Indicators and project outcomes were presented to project stakeholders. The presentation included the feedback from stakeholder surveys, an overall assessment of the program and opportunities for improvement. A formal recommendation was made for the ongoing sustainability of the program.

A sustainability plan was provided to support the ongoing technical and operational needs to support the program in the post-evaluation phase. This plan included the resources required to support the program, the ongoing optimization requests, and end-user support requirements. The plan included the ongoing data and analytics to keep stakeholders updated with the program performance and monitor for any compliance changes over time.

**Scaling**
The program was proposed for scaling to project stakeholders. A timeline and budget were developed to support a system-wide implementation.

**Statement related to human subjects**

This DNP project has been deemed a Quality Improvement project by the Yale University IRB. It poses minimal risk to participants.
PART 3. SYSTEMS, POLICY, AND BUSINESS IMPLICATIONS

Systems Overview: Leadership, Business, Policy

This proposal aligns with the sponsor organizations mission, vision, and values by promoting equitable access to high-quality healthcare services, particularly colorectal cancer screening, through virtual care navigation. The program is aligned with the organization's strategic plan and goals of enhancing patient engagement, reducing health disparities, and improving clinical outcomes. Additionally, it aligns with the organizational strategy to expand the use of digital and virtual care to improve outcomes and strengthen financial performance.

The health system is frequently restructuring departments and processes to improve efficiencies, patient outcomes, and improve financial performance. The post pandemic landscape has led to an increased focus on digital transformation to improve the patient experience, and to remove non-value-added activities from the workforce. Despite recent changes, the organization remains stable and committed to its core mission and values. Thus, there is no anticipated impact on the proposal. The organization’s senior leadership was supportive of the project’s goals and provided resources necessary for its successful implementation.

The healthcare industry across the country has seen a surge in telehealth and virtual care services, with new market entrants and competitors vying for market share. Recent examples include the Amazon acquisition of One Medical and concierge primary care company and CVS launching a virtual primary care offering in early 2023. This presented both challenges and opportunities for the pilot program. While competition inevitably leads to an improved consumer experience, it can be a catalyst to ensure our organization invests in digital capabilities and can stay relevant in a changing market.
The Business Case and Leadership Engagement

The change model used for this project is leading change (Kotter, 2012) developed by John Kotter. This change model includes creating a climate for change, engaging and enabling the organization, followed by implementing and sustaining the change. Important leadership skills to ensure project success included frequent and effective communication, leveraging networks, and building trust with formal and informal project stakeholders. As an academic medical center, peer-reviewed publications are supported and encouraged; this culture of supporting academic work was highlighted to build support for the project and is aligned with the values of the organization. Communication for this project was delivered in a way that is respectful and inclusive of different cultures.

The sponsor organization has many initiatives focused on diversity, equity, and inclusion and the organizational commitment is highlighted as a strength in the SWOT analysis. Since the project goals were centered on reducing health disparities, it was important to socialize this project with organizational stakeholders responsible for health disparities outcomes. The membership of the steering committee and the implementation team included gender and racial diversity that reflects our patient population at large. This helped to ensure that different perspectives were captured, and that individual bias is minimized.

Business and Financial Considerations

Colon cancer screening is recommended for everyone above age 45. The actual implementation of this recommendation in the New York Metropolitan area varies significantly across ethnic and socioeconomic demographics. The business case for the program was centered on increased referrals to screening colonoscopies. The return on investment (ROI) analysis accounted for project costs, including biostatistician support and assumption of a yearly impact analysis being completed. The incremental technology costs associated with the project were included; the project ran on an established technology platform, the total cost for the
program is expected to be 70k over four years.

On the revenue side, the sponsor organizations data on colon cancer screening rates for the primary care practice in the project's scope were used. The billing and coding data were obtained from the sponsor organizations finance department and included the breakdown of payment and profit per case.

In addition to the direct financial benefits, several longer-term indirect benefits can be demonstrated by the program. There is an expected increase in compliance with quality metrics related to colorectal screening as more patients are connected with care. There is an expected improvement in the patient experience from the proactive outreach and personalized care that comes with this program.

There are limitations to the business plan. The annual volume assumptions were made using historical data and it’s possible that future volume will change due to competition in the marketplace. The projected financial impact was for facility revenue only and did not include professional services. Lastly, the business plan did not take into consideration additional revenue from referrals to medical and surgical specialists for positive colonoscopies that require advanced treatments.

**Risk Assessment and Risk Mitigation Plan**

The Project Manager developed a risk assessment and contingency plan and a risk registry updated with the actual and potential risks and remediation actions. All identified risks were logged in the registry and reviewed by the project team. A summary view and high-risk items were shared with the project sponsor. The risk plan and registry were maintained by the Project Manager and updated throughout the project. The risks identified span multiple domains including implementation, technical, business, and workforce.

The implementation risks were mitigated by ensuring appropriate resource allocation, providing comprehensive education and project communication, and by refining the workflows
based on feedback from the end-users. The technical risks were mitigated by testing and quality assurance checks of the IT systems used, and robust system performance monitoring. The business risks were mitigated by setting expectations that improvement in screening rates is not guaranteed. The workforce risks were mitigated through early and frequent engagement with the end users and project stakeholders to address any questions or concerns.
Part 4. RESULTS

A total of 948 patients had an annual Primary Care visit at the pilot locations during the 11-week pilot period. Out of all patients, 78 met the inclusion criteria and were enrolled in the virtual navigation program. Notifications were confirmed as “read” by 74 (94.5%) of the patients enrolled in the program. The program ran from November 2023 to January of 2024. An overall increase of 5.94% was observed in the colorectal screening rate compared to the same period one year prior. The screening rates were calculated, with a pilot screening rate of 77.85% and a baseline period screening rate of 71.91%. There was a statistically significant difference between the pilot and baseline rates with a Chi-Squared of 5.846, p = 0.0156.

The cohort characteristics were calculated for the pilot and baseline periods. No significant differences were observed between the baseline and pilot periods in age, race, or gender. During the pilot period, use of the patient portal was slightly higher (97.3%) compared to the baseline period (95.8%).

The screening modalities for both periods are shown in Figure P2. There was a notable shift in the modality ordered, with an increase in the use of Fecal Immunochemical DNA (FIT-DNA) based screenings like Cologuard (17.6%) compared to the baseline period (13.6%). There was a decrease in screening colonoscopies in the pilot period (78.9%) compared to the baseline period (81.4%). There was a decrease in fecal immunochemical test (FIT) based screening (3.5%) in the pilot period compared to the baseline period (5%).

Nine stakeholders completed a program evaluation. All respondents agreed (33%) or strongly agreed (67%) that the goals were clearly defined. Most stakeholders strongly agreed (89%) that the program will have a positive impact on patient care and the remaining (11%) agreed. All respondents strongly agreed (56%) or agreed (44%) that the project will improve care for underrepresented groups.
Part 5. DISCUSSION AND CONCLUSION

Discussion

Discussion of findings

The virtual care navigation program for colorectal screening was a pilot led by this DNP student while in the role of System Vice President of Digital Experience and Chief Nursing Informatics Officer. This Quality Improvement (QI) project was implemented within an academic primary care setting, aiming to enhance patient engagement and adherence to colorectal screening guidelines. The success of this program can be attributed to the collaborative efforts of various stakeholders from the sponsoring organization. Stakeholders included primary care providers, practice coordinators, members of the technology department, and members of the enterprise data reporting team.

The program's design was grounded in an evidence-based approach, drawing upon existing literature that demonstrates the effectiveness of digital tools in modifying health behaviors. The literature findings were adapted to the workflows of the sponsoring organization, using digital communications and health informatics to identify eligible patients, guide them through the screening process, and improve adherence with screening recommendations.

The implications of a 5.9% increase in colorectal screening rates during the pilot period cannot be understated. This increase means more patients will have their cancer detected earlier, leading to reductions in mortality, suffering, and costs associated with the treatment of advanced colorectal cancers. Furthermore, the use of technology led to this increase without adding to the workload of existing staff or requiring any additional human capital.

The rate of digital engagement in the pilot is noteworthy, with 94.5% of patients enrolled reading the outreach messages. This suggests that primary care patients in urban academic medical centers are highly engaged with digital tools and has broad implications for ways to strategically use these channels to improve quality and safety across populations.

The modality of screening changed in the pilot period with more patients using stool-based
FIT-DNA tests like Cologuard and a slight decrease in colonoscopy and FIT screening. This change is likely due to the increase in convenience, and the public’s awareness of FIT-DNA based cancer screening options.

The program evaluation demonstrated that project stakeholders felt strongly about the project having a positive impact on patient care. The evaluation also highlighted that those involved felt the goals and objective were clearly defined. All stakeholders agreed the project will improve care for underrepresented groups. The evaluation had an option for free-text feedback, one stakeholder suggested embedding an education video into the experience, another advocated for a rapid expansion across the healthcare system.

Limitations

Several limitations of this Quality Improvement (QI) pilot merit attention. Because this was not a randomized control trial, it’s difficult to know for certain if any confounding factors can be attributed to increases in screening rates achieved. This DNP student personally gave the in-service education to the clinical teams, it’s possible that some of the increase in screening is due to the ‘halo effect’ that can occur when participants know they are being monitored.

Due to the relatively small sample size of patients who met the inclusion criteria, it was not possible to measure any differences in screening rates by race. A broader program or longer time horizon is needed to know how the changes in screening rates differed by racial group. Although the digital engagement rate was high within the pilot setting, it’s not clear if these results will generalize for a large-scale implementation.

Review or Modifications for Sustainability

The virtual navigation program is well positioned for expansion and sustainability. The technology changes to include additional primary care locations can be made efficiently. During working group meetings, several enhancements were recommended which can improve the program for future phases. Suggestions included adding a brief video from a clinical expert to
explain why it’s important to complete colorectal cancer screening. Another suggestion was to embed patient education after a screening modality has been ordered, the education can be personalized and specific to the modality ordered.

A dashboard was developed within the EMR to facilitate easy monitoring of compliance over time. This dashboard can continue to be used as the program expands to more locations. Colorectal screening is a quality metric for primary care practices and is part of value-based care incentives for providers. For this reason, the rates are closely monitored and reviewed by the ambulatory quality and clinical departments.

**Recommendations for Scalability**

The recommendation to stakeholders at the sponsoring organization is to scale the programs across the network of primary care practices. An important aspect to the successful scaling of the program is to ensure all practice administrative and clinical team members are aware of the program. For this reason, the recommendation is that before each new practice is enrolled in the program, the project overview and educational materials should be reviewed with the local practice team. This is a key step to ensure all team members know the goals of the program and what the experience is for patients.

Another recommendation is to continue meeting as a working group until the program is fully implemented across the sponsor organization, to ensure that the team most familiar with the work are able to address any issues that arise while scaling. Currently, the program is accessible to patients whose preferred language is English or Spanish. To enhance inclusivity, it is recommended to expand the language options, initially incorporating the ten most spoken languages within the sponsoring organization.

**Policy and Broader Healthcare Systems Implications**

In reflecting on the implications of this QI project, it is essential to consider the broader context of healthcare delivery. The utilization of digital tools in preventive care navigation can
serve as a model for other screening programs, highlighting the potential for technology to bridge gaps in care and promote public health initiatives. The project also underscores the importance of interdisciplinary collaboration in healthcare, demonstrating how diverse expertise can contribute to the enhancement of patient outcomes. This program requires no additional human capital, making it a cost-efficient approach to closing care gaps. Healthcare delivery organizations are likely to see a positive financial return on the program by increasing referrals and improving quality metrics in their value-based care contracts.

The virtual navigation program can inform future research and practice by providing a template for implementing technology-based interventions in primary care settings. It lays the groundwork for subsequent investigation into the long-term impacts of virtual care navigation on patient health behaviors and outcomes, as well as its economic implications for healthcare systems.

Conclusion

The virtual care navigation program for colorectal screening represents a significant step forward in the integration of digital tools to enhance patient engagement and adherence to preventive care guidelines. The pilot's success, evidenced by the statistically significant increase in colorectal screening rates, underscores the potential of technology to streamline healthcare delivery and improve patient outcomes. As the program looks towards expansion and sustainability, it is imperative to consider the lessons learned from this pilot, including the importance of interdisciplinary collaboration, the strategic use of digital tools, and the need for continuous evaluation and adaptation to ensure the program's effectiveness and inclusivity across diverse patient populations. Further work is necessary to measure the full impact of this program in reducing healthcare disparities. The implications of this project extend beyond colorectal screening as there are many aspects of preventative care that can be improved with technology. As healthcare systems continue to
evolve, incorporating digital care navigation programs like this one will be essential in meeting the growing demands of preventive healthcare, reducing cost, and ensuring equitable healthcare delivery for all.
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