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Evaluating Adherence to Colorectal Cancer Screening

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DNP Final Project Report

Evaluating Adherence to Colorectal Cancer Screening

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Acknowledgements

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Abstract

Purpose: The purpose of this project and literature review was to determine provider documentation practices of colorectal cancer (CRC) screening, identify the percent of clinic patients who need to be screened, and develop a set of recommendations and targeted interventions which will increase CRC screening rates.

Methods: A retrospective chart review including males and females of all ethnicities between the ages of 45 and 80 was performed in one primary care practice. A randomized sample of 360 office visits between February and November of 2015 were selected, of which 281 met the inclusion and exclusion criteria. Patient demographics and characteristics were recorded in Excel. Data were exported to SPSS for analysis.

Results: At the time of the chart review, 37% (n=105) of patients were determined to be either not up-to-date with screening or the screening status was not documented. A t-test assuming equal variances was used and determined that those who were offered screening tended to be younger, with a mean age of 60. This is in comparison to those who were not offered screening who demonstrated a mean age of 67 (p=0.001). Provider documentation practices demonstrated use of the electronic medical record health maintenance tracking module 63% of the time. A Chi-Square test confirmed that use of the health maintenance module increases the likelihood of patients being up-to-date with screening (p = 0.000).

Conclusion: The findings of this project indicate that interventions such as a tracking tool similar to the health maintenance module are effective at improving cancer screening rates. Recommended interventions include provider and patient education, the implementation of a screening navigator, and timely software updates which impact automated features of the electronic medical record.

Evaluating Adherence to Colorectal Cancer Screening

Introduction

Colorectal cancer ranks as the third leading cause of cancer related deaths in the United States. In 2016, the American Cancer Society estimates there will be 134,500 new cases of colon or rectal cancer and 49,000 related deaths in the United States. Predictions for the state of Kentucky include approximately 2,200 new colon or rectal cancer diagnoses and an estimated 830 related deaths.

Adherence to the recommended screening practices assists in cancer prevention through the removal of polyps and early detection in stages which are potentially curable (American Cancer Society [ACS], 2016). The relative five-year survival rate for individuals diagnosed early with localized disease is approximately 90%. When diagnosed after the cancer has invaded surrounding tissue and/or lymph node(s), known as regional metastasis, the relative five-year survival rate decreases to an estimated 71%. In individuals diagnosed after the cancer has spread to distant sites within the body, the five-year survival rate decreases dramatically to approximately 14% (Howlader et al., 2016).

The financial impact of prevention and early detection was demonstrated in a study using data from the SEER- Medicare database. Costs for an individual diagnosed with localized colorectal cancer (CRC) were estimated to be $27,099 for year one and $2,665 for each subsequent year for surveillance. The cost for CRC diagnosed in later stages with distant metastasis increases to an estimated $41,562 for year one and $20,582 for each subsequent year for surveillance and treatment (Lang et al., 2009). According to one Kentucky hospital system cancer registry 33% of new colon cancers treated in 2014 were diagnosed as stage IV. Table 1

categorizes the number of colon cancer patients treated at according to stage at the time of diagnosis and year diagnosed (M. J. Mahoney, personal communication, July 6, 2016).

Outcome Measures

Colorectal cancer screening plays an important role in improving patient outcomes and decreasing healthcare related costs. The objectives of this practice inquiry project included:

- determining provider documentation practices of CRC screening,

- identifying the percent of clinic patients who need to be screened, and

- developing a set of recommendations and targeted interventions which will increase CRC screening rates.

Interventions of interest included the establishment of community outreach programs, nurse navigators, and mechanisms to track and report screening due dates assisting in prompt scheduling of appointments. According to the Oncology Nursing Society:

An oncology nurse navigator (ONN) is a professional registered nurse with oncology-specific clinical knowledge who offers individualized assistance to patients, families, and caregivers to help overcome healthcare system barriers. Using the nursing process, an ONN provides education and resources to facilitate informed decision making and timely access to quality health and psychosocial care throughout all phases of the cancer continuum (*Navigator Competencies*, 2013, p. 6)".

A literature review was conducted to evaluate the effect of patient navigation on increasing access to and performance of colorectal cancer screenings.

Review of the Literature

The research articles reviewed focused on the impact of patient outreach and patient navigation programs on cancer screening rates. Interventions provided by such programs included: reminder telephone calls; educational mailings/brochures; resolution of anxiety through counseling and education; scheduling appointments for the patient; and the removal of any barriers to screening, i.e. travel, child care, and financial concerns. Review of the literature demonstrated patient outreach and navigation programs were successful at increasing cancer screening rates, decreasing lost to follow-up and missed appointment rates, decreasing time intervals between testing, and improving continuity of care (Braun et al., 2015; Green et al., 2013; Horne et al., 2015; Laser et al., 2011; Luckett, Pena, Vitonis, Bernstein, & Feldman, 2015; & Percac-Lima et al., 2013).

The evidence also demonstrated as patient navigation successfully decreased lost to follow-up and missed appointment rates, cytology and pathology of lesions tended to be less severe (Luckett et al., 2011 & Percac-Lima et al., 2013). This indicates patient outreach and navigation programs improved patient outcomes by assisting in earlier detection of cancer. These types of programs should begin with tracking health maintenance due dates and continue through completion of the screening procedure, required follow up, and treatment if indicated (see Appendix for literature review).

Methods

Setting

This study was conducted at a patient centered medical home consisting of eight providers located in Kentucky. Prior to beginning research activities, approval for this non-experimental univariate descriptive study was obtained from both the affiliated hospital system's

Office of Research Administration and the University of Kentucky's Institutional Review Board.

Colon cancer screening guidelines published by the American College of Gastroenterology

(ACG) were used to determine elements of data collection. According to the ACG, for

individuals without familial adenomatous polyposis (FAP), heredity nonpolyposis colorectal

cancer (HNPCC), or a family history of CRC, screening begins at age 45 for African Americans

and age 50 for all other ethnic groups (Rex et al., 2009).

Participants

A sample of 360 patients, both male and female and of all ethnicities were randomized

and selected using http://www.randomizer.org/. All patients met the inclusion criteria of being

between the ages of 45 to 80 and had an office visit with a physician or nurse practitioner

between the dates of February 1, 2015 to November 30, 2015. Patients who presented for an

acute illness, were determined to be undergoing treatment for cancer, were identified as duplicate

patient, were following up after a hospital stay, or were reported as deceased were excluded.

After review of the data, 281 patients were determined to be eligible for the study. Table 2

describes the demographic characteristics of the study population. The mean age was 63.52,

over half of the population was female, 90% were Caucasian, and approximately 50% had

commercial insurance.

Study Design

A retrospective comprehensive chart review was performed to collect demographic

information, family history, prior screening dates, screening due dates, and provider

documentation practices. Status of colorectal cancer screening, if ordered, was also recorded as:

completed, canceled, insurance/financial barrier, unable to contact patient, not scheduled,

declined, or not a candidate. The data were analyzed to determine provider compliance rates for addressing CRC screening, overall screening rates, provider use of the health maintenance module, and demographic trends within the population. No identifiable provider information was collected to in order to protect their privacy.

The health maintenance tracking module is available within the electronic medical record (EMR) and contains the completion and/or due dates of individualized disease prevention activities such as: cancer screening, vaccinations, osteoporosis screening, routine diabetic care, etc. The health maintenance module then alerts patients and providers when an activity is due to be ordered and scheduled. Many disease prevention activities are intuitively added to the module by the software and based on guidelines provided by the United States Preventive Services Task Force (USPSTF) and other elements such as gender, age, and diagnosis (Roszell, 2015).

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Results and Statistical Analysis

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Screening Rates

Data were analyzed using SPSS software and Excel. At the time of the chart review 105 patients, or 37%, were determined to be either not up-to-date with screening or their screening status was not documented. According to the documentation in the electronic chart, screening was offered to 39 of the 105 patients. Nineteen unscreened patients who were offered screening declined while 20 agreed to be screened (Figure 1). Only 50% (n=10) of those who agreed to be screened actually completed the screening process; five canceled and never rescheduled, the office was unable to contact three of the patients, no attempt to schedule the appointment was made with one of the patients, and one individual declined the appointment once offered. A t-test assuming equal variances was used and determined that those offered screening tended to be

younger, with a mean age of 60 compared to those not offered screening who demonstrated a mean age of 67 (p=0.001). Notably, cancer screening was no longer tracked in the health maintenance module on 31 patients, all of whom were age 75 and older. The 75 and older population in this study consisted of 35 patients total. Utilizing Chi-Square and Fisher's Exact tests, no significant differences were found among gender, race, or family history.

Provider Documentation Practices

Provider documentation practices demonstrated use of the health maintenance module 63% of the time (Table 3). When the module was used correctly, 89% of the patients were found to be up-to-date with colorectal cancer screening practices compared with 18% when the module was not used or used incorrectly. A Chi-Square test confirmed that use of the health maintenance module increases the likelihood of patients being up-to-date with screening (p = 0.000). Documentation practices per provider yielded similar results. Providers with a high usage rate of the health maintenance module tended to have a higher percentage of patients up-to-date with screening.

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Discussion

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Recommended Interventions

In this study, 63% of patients were successfully screened for colorectal cancer. According to the Healthy People 2020 initiative, the goal is to have 70.5 percent of the population up-to-date with CRC screening by the year 2020 (Healthy People 2020, 2016). Based on the findings of this project and the literature review, several targeted interventions have been created and are recommended to assist in meeting this goal. Recommended interventions are

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specifically aimed toward increasing correct use of the health maintenance module, patient

education, and removal of barriers to care.

According to the results of this project, use of a tool such as the health maintenance

tracking module is successful in increasing CRC screening rates. The accuracy and success of

the module is dependent upon provider use and correct data entry by the end user. During

review of patient records multiple documentation errors were encountered. Frequent errors

occurred due to defaults set in the EMR which were not modified or overridden by the provider.

These errors resulted in the due date for the patient's next CRC screening being incorrect,

sometimes by as much as 10 years. The impact of such errors could result in negative patient

outcomes. Based on these findings, a recommended intervention includes provider education to

increase use and reinforce correct use of the health maintenance module.

During data collection it was observed that a majority of individuals 75 and older no

longer had colon cancer screening information included in the health maintenance module.

Guidelines published by the USPSTF drive the automated management of the tracking module

(Roszell, 2015). An updated version of the CRC screening guidelines was published by the

USPSTF in June 2016, the new recommendation includes screening for individuals ages 76 to 85

continue to be tracked based on the patient's current health status and the provider's clinical

judgement (United States Preventive Services Task Force [USPSTF], 2016). Based on this

information, a recommendation is indicated to ensure the EMR's software is using the most up-

to-date guidelines. Furthermore, the removal of screening due dates should be at the discretion

of the provider and patient and not an automated function controlled by software.

The results of the literature review and project also support a targeted intervention such as the implementation of a cancer screening patient navigator. The creation of a report extrapolating the data from the health maintenance module would aid in tracking cancer screening. The navigator could be responsible for contacting those individuals due for screening or who declined screening in the office to provide in depth education, reassurance, and assist in the removal of barriers. Given the results of this study, which demonstrated that individuals not offered screening during provider office visits tended to be older with a mean age of 67, the use of a navigator could be especially advantageous among this age group. Analysis of the data also showed only 50% of patients who agreed to screening actually completed screening. In light of this information, a navigator would begin following a patient when a need for screening has been established and continue through procedure completion and coordinating future referrals as indicated by the results. The literature demonstrated navigation programs were successful at increasing cancer screening rates and improving patient outcomes (Braun et al., 2015; Green et al., 2013; Horne et al., 2015; Laser et al., 2011; Luckett et al., 2015; Percac-Lima et al., 2013). Therefore, one could presume a compound effect with the concomitant use of a health maintenance module. Further research is necessary in this area.

The new guidelines published by the USPSTF recognize there are several CRC screening modalities however, due to lack of evidence the guidelines do not recognize one screening modality as being more superior. The USPSTF undoubtedly acknowledges that CRC screening and an ongoing screening plan reduces the associated mortality rate (USPSTF, 2016). Patients should be actively involved in the selection of a screening modality that is right for them. To assist in the informed decision making process and creation of an individualized screening plan

patient education should include procedure details, risks, benefits, and frequency of each screening modality.

This project was limited to colonoscopy screening. More research is needed to determine differences in provider practices and screening rates using all CRC screening modalities. A future study of specific interest includes the use of a tracking report which extrapolates data from the health maintenance module to identify patients of Medicare age who are due for screening or declined screening in the provider office. A patient navigator would then contact each patient in the report to provide education regarding the varying screening modalities and offer to make procedure arrangements through the primary care provider. This study could evaluate the effect that a screening navigator and in depth patient education on all screening modalities has on increasing CRC screening rates.

Limitations

Multiple limitations were identified during the course of this study which may limit generalizability. First, the population was 90% Caucasian with insurance and limited to one primary care office. In addition, some screening completion dates were based on patient report if performed at an outside facility. Another limitation included a change made to the EMR during the study period which added a screening notification alert to the provider under the heading of Best Practice Advisories. A future study comparing data before and after implementation of this new feature is warranted to determine the effectiveness of increasing screening rates.

The USPSTF finalized new guidelines for CRC screening in June of 2016 with two significant updates which impacted this study. The first update recognized the decision for CRC screening among individuals between the ages of 76 and 80 should be at the provider's and

patient's discretion based on health status. The second update acknowledged the benefits and risks of several screening modalities, however does not recognize one screening modality as superior to the others (USPSTF, 2016).

Conclusion

The findings of this study and the literature review indicate interventions such as a patient navigator and a tracking tool similar to the health maintenance module are effective at improving cancer screening rates. It remains to be seen if one is better than the other or if the combination is the best practice. Recommended interventions based on this project include provider education, the implementation of a screening navigator, and ensuring automated features of the EMR are based on current evidence based guidelines. Future research will be necessary to evaluate the effectiveness of these interventions and to determine the impact a screening navigator has on decreasing time from screening to diagnosis and treatment if indicated.

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Table 1

Number of new colon cancer diagnosis treated at one Kentucky hospital system according to stage

Year	Stage 0	Stage I	Stage II	Stage III	Stage IV	Stage unknown	Total cases
2010	10	45	46	51	56	6	214
2011	7	33	35	43	46	7	171
2012	23	30	47	54	59	5	218
2013	10	34	55	56	41	10	206
2014	21	26	44	50	66	12	219
Total	71	168	227	254	268	40	1028

Table 2

Demographic Characteristics of the Study Population n = 281

Variable	Mean	Standard Deviation	Actual Range
Age	63.52	8.495	45-80

Variable	Frequency	Percent (%)
Gender		
Male	122	43.4
Female	159	56.6
Insurance Type		
Commercial	143	50.9
Medicare	113	40.2
Other Insurance	25	8.9
Race		
Caucasian	255	90.7
Other Race	26	9.3
Family History for Colorectal Cancer		
Yes	28	10.0
No	253	90.0

Table 3

Screening Documentation Practices n = 281

	Frequency	Percent	Up-To-Date with Screening	Not Up-To-Date or Screening Status Unknown	Percent Up-To-Date with Screening
Correct Utilization of the Health Maintenance Module	176	63%	157	19	89%
Health Maintenance Module Incorrect or Lack of usage	105	37%	19	86	18%
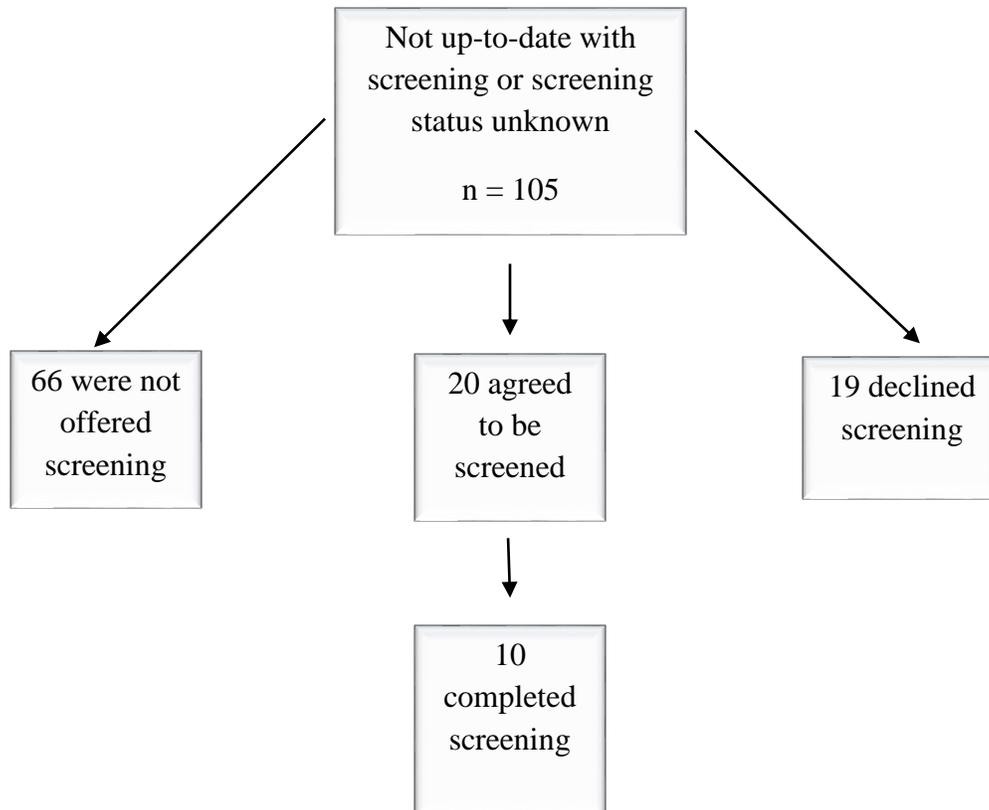
Figure 1. Colorectal cancer screening status

Appendix
Literature Review

Complete citation	**Article 1** Percac-Lima, S., Benner, C. S., Lui, R., Aldrich, L. S., Oo, S. A., Regan, N., & Chabner, B. A. (2013, November 5). The impact of a culturally tailored patient navigator program on cervical cancer prevention in Latina women. *Journal of Women's Health*, 22, 426-431. http://dx.doi.org/10.1089/jwh.2012.3900	**Article 2** Green, B.B., Wang, C., Anderson, M.L., Chubak, J., Meenan, R.T., Vernon, S.W., & Fuller, S. (2013). An automated intervention with stepped increases in support to increase the uptake of colorectal cancer screening. *American College of Physicians, 158,* 301-310	**Article 3** Horne, H. N., Phelan-Emrick, D. F., Pollack, C. E., Markakis, D., Wenzel, J., Ahmed, S., Garza, M. A., Shapiro, G. R., Bone, L. R., Johnson, L. B., & Ford, J. G. (2015). Effect of patient navigation on colorectal cancer screening in a community-based randomized controlled trial of urban African American adults. *Cancer Causes Control*, 26, 239-246. http://dx.doi.org/10.1007/s10552-014-0505-0	**Article 4** Braun, K. L., Thomas, W. L., Domingo, J. B., Allison, A. L., Ponce, A., Kamakana, P. H., Brazzel, S. S., Aluli, N. E., Tsark, J. U. (2015). Reducing cancer screening disparities in Medicare beneficiaries through cancer patient navigation. The American Geriatrics Society, 63(2), 365-370.	**Article 5** Luckett, R., Pena, N., Vitonis, A., Bernstein, M. R., & Feldman, S. (2015). Effect of patient navigator program on no-show rates at an academic referral colposcopy clinic. *Journal of Women's Health*, 24 (7), 608-615. http://dx.doi.org/10.1089/jwh.2014.5111	**Article 6** Lasser, K. E., Murillo, J., Lisboa, S., Casimir, N., Valley-Shah, L. Emmons, K.M., Fletcher, R. H., Ayanian, J. Z. (2011). Colorectal cancer screening among ethnically diverse, low income patients: A randomized controlled trial. *American Medical Association,* 171(10), 906-912
Research purpose, question, or hypothesis	To evaluate the impact of patient navigation (PN) on cervical cancer prevention and screening among Latina women	To evaluate the effect of educational mailings, reminders, and the use of a patient navigator on increasing colorectal cancer (CRC) screening rates	To evaluate the impact of PN services on increasing CRC screening compliance among older African Americans	To evaluate the impact of lay navigators on increasing cancer screening rates among Asian and Pacific Islanders with Medicare	To evaluate the effect of PN on no show rates within a colposcopy center	To evaluate the impact of PN services on increasing CRC screening rates among ethnically diverse, low-income patients
Study design	Quantitative - Non-randomized control trial Control group: Standard of Care	RCT with 4 groups Control group #1: SOC patients received mailed educational materials and an annual reminder with immunization and	RCT Control group: CRC screening was discussed/arranged during provider office visits. Patients also	RCT Control group: CRC screening was discussed/arranged during provider office visits. Patients also	Non-randomized controlled trial Control group: SOC	RCT Control group: CRC screening was discussed/arranged during provider office visits

(SOC) no patient navigator Intervention group: assigned a patient navigator who provided education, and removed barriers to care by assisting with transportation, child care needs, financial concerns, and scheduling appointments	screening completion/ due dates. CRC screening was discussed/arranged during provider office visits Intervention group #2: In addition to SOC patients received an automated mailing when CRC screening was due with educational information. A follow up reminder letter was sent if CRC screening was not scheduled after 3 weeks Intervention group #3 SOC+ Intervention #1+ telephone/scheduling support from a medical assist Intervention group #4 SOC+ Intervention #1+ PN with a registered nurse who assessed CRC risk, procedure related risk, provided	received printed educational materials Intervention group: SOC+ printed educational materials + were assigned a patient navigator who assisted patients in the removal of healthcare barriers	received printed educational materials Intervention group: received PN services which assisted in providing education, making appointments, sending reminders, providing transportation, communicating with providers, and assisting in the completion of paperwork	Intervention group: received PN services which assisted in providing education, making appointments, providing emotional support, assisting with transportation and child care services	Invention group: Received 6 hours of PN services over 6 months. Services included encouraging CRC screening, providing education, helping them decide which screening test to complete, assisting with financial concerns, making appointments, arranging transportation services, and meeting them on the day of the procedure.

		support and education regarding procedure and prep and assisted with scheduling appointments and tracking completion of screening				
Independent and dependent variables	IV= PN interventions DV= Improving rates of compliance and time between follow-up visits. Reduction in the severity of grade upon diagnosis	IV= Reminder mailings, scheduling assistance from a medical assistant (MA) PN interventions with a nurse DV= Increase CRC screening rates	IV= PN interventions DV= Increase CRC screening rates among African Americans	IV= PN interventions DV= Increase cancer screening rates among Asian and Pacific Islanders with Medicare	IV= PN interventions DV= reduce no show appointment rates	IV= PN interventions DV= Increase CRC screening rates
Sample/ Setting	N= 786 patients: Inclusion: Women referred to the colposcopy center after having an abnormal papanicolaou (PAP) test Outpatient colposcopy clinic	N= 4675 Inclusion: Age 50-73, due for CRC screening Exclusions: prior diagnosis of cancer, IBS, or other life threatening illness Setting: 21 primary care clinics, Washington Outpatient primary care centers	N= 3536 Inclusion: ages 65-75, African American, Baltimore City resident and enrolled in Medicare parts A&B Exclusion: institutionalized, nursing home residents, enrolled in a Medicare managed care plan, unable to give informed consent, diagnosed with cancer within the last 5 years or being in remission < 5 years	N= 488 Inclusion: Medicare part A&B beneficiaries reside in Molokai, Hawaii Exclusion: enrolled in a Medicare managed care plan Molokai General Hospital on the island of Molokai, Hawaii	N= 1601 Inclusions: Missed at least one visit Tertiary care referral colposcopy center	N= 465 Inclusion: aged 52-74, not up-to-date with CRC screening according to United States Preventive Services Task Force (USPSTF) guidelines Exclusion: acute illness, end stage disease, a psychiatric diagnosis, substance abuse, or cognitive impairment

						4 community based healthcare centers and 2 hospital based clinics
Conceptual framework	Health Promotion Model	Health promotion model	Health promotion model	Social cognitive theory	Health promotion model	Stages of change model
Methods and Measures	Women were identified using colposcopy clinic schedules and billing records The control and intervention groups were compared using data collected by the patient navigator which reflected missed appointments, the amount of time between abnormal pap smear and colposcopy, and the grade according to severity of dysplasia of the cervical abnormality and pap smear abnormality	Patients were randomized to one of four study groups. The study measured the number of patients who were current with screening at the end of the study Current with screening defined as having a colonoscopy, sigmoidoscopy or fecal occult blood testing (FOBT)	Patients were randomized to either the control or intervention group An interviewer administered questionnaire was provided to assess CRC screening status at baseline, annually for 4 years, and at the exit interview Current with screening defined as having a colonoscopy, sigmoidoscopy, or FOBT	Patients were randomized to either the control or intervention group Self-reported data collected screening status of breast, cervical, and colorectal cancer via survey at baseline and at study completion Current with screening defined as having a FOBT within the last year, endoscopy within the last 5 years, PAP test within the last 2 years, mammogram within the last year, and prostate antigen test (PSA) within the last year	The number of missed appointments prior to implementation of the patient navigator program were compared to the number of missed appointment after implementation.	Patients were randomized to either the control or intervention group Current with screening was defined by the USPSTF CRC screening guidelines: • Colonoscopy within 10 years • Sigmoidoscopy within 5 years • FOBT within the last year

Outcome measurement	Descriptive statistics two sided tests with a significant p value of <0.05	80% power Alpha 0.05 Significant p value <0.0083	Significant p value < 0.05	Significant p value < 0.05	Significant p value < 0.05	80% power, 2 sided significance level of 0.05, and confidence intervals of 95%
Statistical/ data analysis	Evaluation of categorical and continuous variables were performed using Chi-square and Student T-test Multivariate logistic regression identified factors independently connected with attending colposcopy appointments	Logistic regression models, predictive margins, exploratory analysis	Weighted multivariable logistic regression models, adjusting for potentially confounding variables. Weighted regression analysis was used to account for differential lost to follow up between study groups	Chi-square analysis	Chi-square analysis	X2 and Fisher exact tests for dichotomous variables
Key findings	A significant decrease in the percentage of missed colposcopy appointments were noted among the individuals who received navigation services. The control group missed appointment rate did not change. A difference trend analysis revealed a substantial improvement in follow up times among the	Intervention groups were more likely to undergo CRC screening than control group. The greater the intervention i.e. PN+ with a nurse the more likely CRC screening was complete p=<0.001 Current with screening by the end of the study: Control group 1: 26.3%	The intervention group were more likely to be up-to-date with CRC screening than the control group. 72.5% were up-to-date with screening in the intervention group compared to 58.6% in the control group (P=0.008)	57.0% of women in the intervention group had completed PAP testing within the last 24 months compared to 36.4% of the control group (P=.001) 61.7% of women in the intervention group had a mammogram within the last year compared to 42.4% of the control group (P=.003)	Appointment no show rates decreased from 49.7% to 29.5% after implementation of PN services (P=<0.0001) Individuals who miss appointment are more likely to have worse pathology results	33.6% of patient in the intervention group received CRC screening compared to 20% of the control group (p<0.001) 26.4% of the intervention group received colonoscopies compared to 13.0% of the control (P=<0.001)

	navigated individuals while the control group did not change. The severity of colposcopy findings substantially decreased while the control group slightly increased.	Intervention group 2: 50.8% Intervention group 3: 57.5% Intervention group 4: 64.7%		54.4% of men in the intervention group had PSA testing within the last year compared to 36% of the control group (P=0.008) 43% in the intervention group had an endoscopy for CRC screening within the last 5 years compared to 27.2% of the control group (p=<0.001)		
Limitations	Outcomes may not be generalizable among other communities as only one urban community was utilized in the study Variation within demographics of the treatment and control group	May not be generalizable due to small sample size, interventions were not tailored to include diverse cultures. All patient had insurance with no or low copays	Large population lost to follow up, high percentage of individuals at baseline who reported being up-to-date with screening. May not be generalizable to population without Medicare due to full coverage provided by Medicare. Interviews and result were based on self-report from patients	Not a blind randomized controlled trial Data based on self-report from patients Medicare coverage and guidelines are potentially different than other payers	Data based in patient reported information Contact with the patient was made via the telephone. No all individuals had a working telephone The high no show rates collected before implementation of PN services was prior to the availability of state fund insurance programs. Higher	Contact with 23.0% of intervention patients was unsuccessful Data not generalizable to individuals with mental illness or those with substance abuse Some individuals in the study were responding to a prior mailing sent

				Generalizability may be limited due to specific population and demographic used in the study	no show rates could have been related to no insurance	out in 2009 which was not part of this study
Results/ implications	Patent navigation improves timely follow-up by removing barriers within healthcare, assisting in the prevention of cervical cancer, and promoting screening.	Patient navigation services increase CRC screening participation. The more intervention with patients the more likely they are to have testing performed.	Patient navigation services which assist in identifying and resolving healthcare barriers are more effective in increasing compliance with CRC screening than providing educational materials alone.	Patient navigation services which assisted in providing education, making appointments, sending reminders, providing transportation, communicating with providers, and assisting in the completion of paperwork are more effective in increasing cancer screening rates then providing educational materials alone	Patient navigation services which assisted in providing education, making appointments, providing emotional support, assisting with transportation and child care services reduce no show appointment rates thereby increasing cervical cancer screening rates	Patient navigation services such as encouraging CRC screening, providing education, helping them decide which screening test to complete, assisting with financial concerns, making appointments, arranging transportation services, and meeting them on the day of the procedure were successful in increasing CRC screening rates

LEGEND

CRC= colorectal cancer; DV= dependent variable; EMR= electronic medical record; FOBT= fecal occult blood test; ID= independent variable; PAP= Papanicolaou test, PN= patient navigation; PSA= prostate-specific antigen test, RCT= randomized controlled trial, SOC= standard of care, USPSTF= United States Preventive Services Task Force