Exploring the Impact of Patient Navigation on Colorectal Cancer Screening Rates among Clinics in Washington State

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Abstract

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Introduction: The Centers for Disease Control and Prevention (CDC) created the Colorectal Cancer Control Program (CRCCP) to increase colorectal cancer (CRC) screening uptake. The CRCCP partners with primary care clinics to increase the implementation of evidence-based interventions (EBIs) and supporting activities (SAs) such as patient navigation (PN) in clinics. This thesis assesses the impact of newly implementing PN compared to continuing or enhancing PN on the change in CRC screening rate.

Methods: Data from clinics participating in Washington state's CRCCP from July 2022 to June 2024 was used to determine clinic characteristics and change in screening rate from program year (PY) 3 to PY4. Clinics were stratified into two groups: those that had newly implemented PN vs those that had continued or enhanced PN. I calculated descriptive statistics for clinic

characteristics such as clinic size and percentage of uninsured patients stratified for each PN groups. Then I calculated the mean, median, range, and interquartile range for the change in CRC screening rate for each group and used a Mann-Whitney u-test to determine whether the distribution of the change in CRC screening rate was significantly different between the two groups.

Results: The PN new and PN continuing/enhancing groups differed greatly in clinic characteristics such as clinic size (72.73% large clinics vs. 20.00% large clinics, respectively) and percentage of uninsured patients (45.45% with ≤5% uninsured vs. 100.00% with ≤5% uninsured). The PN new in PY4 group had a much lower median change in CRC screening rate (-0.17%) compared to the PN continuing in PY4 group (14.30%). The difference in the distribution between these groups was statistically significant (p-value = 0.00795).

Discussion: Clinics that continued to implement or enhanced PN for more than one year experienced higher changes in CRC screening rate compared to those clinics that newly implemented PN.

Conclusion: PN is a promising intervention that can increase CRC screening rates over time. My analysis found that continuing or enhancing PN can lead to a greater increase in screening rates than newly implementing PN among CRCCP participating clinics in Washington state. Future research should focus on understanding how these clinics are enhancing PN and how possible confounders impact the relationship between PN and CRC screening rates.

Introduction

Colorectal cancer (CRC) is the fourth most diagnosed cancer and the second leading cause of cancer death in the United States (US).[1] CRC screening methods such as fecal immunochemical tests, fecal occult blood tests, and colonoscopies have been shown to detect cancer at early stages when cancer is more treatable.[2] These screening methods have also been found to reduce CRC incidence and mortality.[3] In response to the high prevalence of CRC, the Centers for Disease Control and Prevention (CDC) created the Colorectal Cancer Control Program (CRCCP) in 2009 to increase CRC screening rates in primary care clinics through the implementation of evidence-based interventions (EBIs).[4] These EBIs are based on recommendations from the Guide to Community Preventive Services (the Community Guide), although not all Community Guide recommendations are part of CRCCP.[5] The Community Guide is a list of evidence-based recommendations and findings from the Community Preventive Services Task Force that is reviewed and updated periodically based on existing research.[6]

The current CRCCP grant cycle (CRCCP DP20-2002; 2020-2025) requires participants to implement at least two out of four program recommended EBIs including patient reminders, provider reminders, reducing structural barriers, and provider assessment and feedback.[7] In addition to these required EBIs, the current CRCCP also encourages, but does not require, the implementation of other interventions recommended by the Community Guide. CRCCP calls these interventions supporting activities (SAs) which include patient navigation (PN) and small media.[7]

The Community Guide categorizes its recommendations into three categories: recommended, recommended against, and insufficient evidence.[8] Recommended interventions can be categorized as either “recommended with strong evidence”, meaning that this intervention has

been well-researched and found to be effective, or “recommended with sufficient evidence”, meaning that there is enough evidence that this intervention works, but there is still room for more research to be done.[8] Meanwhile, recommended against interventions are those that may cause greater harm than benefits.[8] Similar to the recommended interventions, the recommended against interventions are then categorized by “with strong evidence” and “with sufficient evidence” which indicates the strength of evidence that this recommendation is based on.[8] Recommendations with insufficient evidence are interventions that require more research before a recommendation decision can be made.[8]

PN is defined by the Community Guide as services that “help patients overcome barriers to accessing colorectal cancer screening”.[9] These services include client reminders, efforts to reduce structural barriers to care such as assisting with scheduling, transportation, or translation, and patient education.[9] Services can be delivered through community health workers, healthcare professionals, patient navigators, or social workers, and are often designed to be culturally appropriate for the specific population being served.[9]

For years PN was seen by the public health and healthcare community as an effective outreach and health education intervention, but until recently the Community Guide had not strongly recommended PN. Over the years studies have found PN to be an effective method to increase CRC screening particularly among low-income populations.[10] Furthermore, recent research has found PN to be a cost-effective method to increase CRC screening.[10–12] Thus, in 2022, the Community Guide changed their recommendation of PN from recommended with sufficient evidence to recommended with strong evidence.[9] In response, the CDC has promoted PN to an EBI in the next grant cycle, which makes PN very timely to research.[13] PN was also supported on a state level during program year (PY) 4 when the Washington State Department of Health

(WA DOH) provided funding to participating CRCCP clinics to implement PN in the form of community health workers.[14] This demonstrates that PN implementation in primary clinic settings to increase CRC screening is endorsed and encouraged on both a national and state level.

Since 2009, the CDC has conducted three 5-year grant cycles for CRCCP. WA DOH has been a CRCCP grant recipient since its inception. With the current grant cycle coming to an end, and possible renewal on the horizon, it is important to identify factors that impact CRC screening to inform future program activities.

Previous evaluations have found the CRCCP program increases CRC screening rates,[15] especially among the most vulnerable populations, including racial minorities and women.[16] However, few articles have been published using data from the current grant cycle and using state-level data. Given the recent promotion of PN to strongly recommended EBI status, WA DOH's financial support for PN, and the gap in knowledge about the impact of PN among Washington state (WA) clinics, this thesis aims to explore the impact of long-term (i.e. a year or more) PN implementation and new PN implementation on CRC screening rates among clinics participating in WA's CRCCP. Understanding how sustained PN implementation impacts CRC screening rates on a clinic-level throughout WA will help inform future WA CRCCP PN usage.

Methods

Sample and Data Source

This analysis is a longitudinal, retrospective cohort study that utilized a sample of clinics participating in WA's CRCCP from July 2022 to June 2024. Data was limited to PY3 (July 2022-June 2023) and PY4 (July 2023-June 2024). The first two PYs of the current grant cycle were excluded due to concern over disruptions to program and screening activities caused by the

COVID-19 pandemic. Clinics that did not participate in CRCCP during both PY3 and PY4, or that did not provide validated screening rates were excluded from the analysis. Ultimately, 21 clinics from four health systems were included in the sample. I used data collected annually from participating clinics including clinic and patient characteristics, screening rate data (number of patients screened and number of patients eligible for screening), and EBI and SA implementation data. These variables were defined by the CDC's CRCCP Evaluation Team to ensure standardized measurement across all program participants. All WA clinic-level data were reported by health system staff to the University of Washington team who then cleaned and validated the data. Clinic characteristics, patient characteristics, and overall screening rate are recorded per the calendar year (January to December) and collected in March. EBI and SA implementation data are recorded per the PY (July to June) and collected in September.

Descriptive Analysis

Using R Statistical Software (v4.5.0; R Core Team 2021),[17,18] I conducted a descriptive analysis to characterize the clinics included in the sample and assess the proportion of clinics implementing each of the EBIs and SAs during the analysis period. These variables included: clinic size (based on the total number of patients), health system size (based on the number of clinics in the health system), the number of providers at each clinic, the percentage of uninsured patients at each clinic, and the number of years each clinic has participated in CRCCP. By PY4, all the clinics included in the sample were implementing PN. Therefore, the two comparison groups used in this analysis are clinics newly implementing PN (i.e. clinics that did not implement PN during PY3 and implemented PN during PY4) and clinics continuing PN (i.e. clinics that implemented PN for at least one year during PY3). It is worth noting that the continuing PN group also includes clinics enhancing PN (i.e. clinics that have implemented PN

for at least one year and made improvements to their implementation over the last year). The mean, standard deviation, range, count, and frequencies for the clinic characteristics and EBI/SA implementation were calculated and stratified by PN implementation group (PN new vs. PN continuing/enhancing).

PY4 Screening Rate Adjustment

In 2021, the United States Preventive Services Task Force (USPSTF) reviewed and changed the recommended age for CRC screening from ages 50-75 to ages 45-75.[19] This guideline was implemented in CRCCP participating clinics. Consequently, screening rate data in PY3 were collected for patients aged 50-75, while PY4 screening rate data were collected for patients aged 45-75 and 45-49. Therefore, before starting the inferential analysis, I needed to adjust the PY4 screening rate to make the age range the same for PY3 and PY4. I did this by subtracting the number of patients aged 45-49 who were screened for CRC from the number of patients aged 45-75 who were screened for CRC and subtracting the number of patients aged 45-49 who were eligible for screening from the number of patients aged 45-75 who were eligible for screening. This resulted in the adjusted numerator and denominator for the PY4 screening rate among patients aged 50-75.

Inferential Analysis

In order to quantify the difference in screening rate between the PN new and PN continuing/enhancing groups, I used R Statistical Software to calculate the change in screening rate from PY3 to PY4 by subtracting the PY3 screening rate from the PY4 screening rate. The changes in screening rates were then stratified by PN implementation group. The mean, standard

deviation, median, range, and interquartile range for each PN implementation group were calculated in R or in Excel.

Finally, I used R Statistical Software to run a Shapiro-Wilk normalcy test to assess whether the distribution of the data was normal. The normalcy test found a p-value of 0.0365, indicating that the difference in the distribution of the data and a normal distribution was statistically significant. Therefore, I could not use a parametric test (such as a t-test) to evaluate association. Instead, I ran a Mann-Whitney u-test, a non-parametric test used to determine if there is a significant difference in the change in screening rate and the distribution of the change in screening rates between two groups.

Results

Descriptive Statistics

The sample included 21 clinics from four health systems. 11 clinics were newly implementing PN in PY4 and 10 clinics were continuing/enhancing PN in PY4.

Clinics that newly implemented PN were mostly large clinics that served more than 1900 patients (72.73%) (Table 1). They were often part of small- (36.36%) or medium-sized (63.64%) health systems (Table 1). Clinics newly implementing PN served relatively high proportions of uninsured patients, with 54.54% of them having greater than 5% uninsured patients at their clinics. Also, most clinics (54.54%) had five or fewer providers.

Meanwhile, clinics that continued/enhanced PN implementation were primarily small clinics serving less than 900 patients (30.00%) or medium clinics serving between 900 and 1900 patients (50.00%) (Table 1). These clinics were mostly from large health systems (90.00%). All

the clinics that continued/enhanced PN implementation served populations with less than 5% uninsured patients (100.00%). Finally, most clinics (70.00%) had more than five providers.

Overall, almost all the clinics (n=20 clinics) have participated in CRCCP for five or more years (Table 1). Clinics in the PN new group have participated in CRCCP for seven years (63.64%) or five years (36.36%). Meanwhile, 80% of clinics in the PN continuing/enhancing group have participated in CRCCP for eight years, 10% have participated for five years, and 10% have participated for three years.

Table 1. Clinic Descriptive Statistics for PY3

Clinic Variables	Patient Navigation New in PY4		Patient Navigation Continuing/Enhancing in PY4	
	Count (n)	Percentage (%)	Count (n)	Percentage (%)
Total Clinics	11	100.00	10	100.00
Clinic Size				
≤900 patients	0	0.00	3	30.00
>900 patients- 1900 patients	3	27.27	5	50.00
>1900 patients	8	72.73	2	20.00
Health System Size (4 health systems)				
≤5 clinics	4	36.36	1	10.00
>5-8 clinics	7	63.64	0	0.00
>8 clinics	0	0.00	9	90.00
Percent of Uninsured Patients				
≤5%	5	45.45	10	100.00
>5-10%	2	18.18	0	0.00
>10%	4	36.36	0	0.00
Number of Providers				
≤5 providers	6	54.54	3	30.00
<5-10 providers	2	18.18	3	30.00
>10 providers	3	27.27	4	40.00
Years with CRCCP				
3	0	0.00	1	10.00
4	0	0.00	0	0.00
5	0	0.00	1	10.00
6	4	36.36	0	0.00
7	7	63.64	8	80.00

EBI and SA Implementation

Clinics participating in CRCCP can choose to implement any combination of the EBIs and SAs. Consequently, it is important to consider the other interventions that may have been implemented concurrently with PN during this time in participating clinics. Table 2 contains the frequency of EBI and SA implementation in participating clinics by PN implementation group for PY3. Table 3 also reports the frequency of EBI and SA implementation but for PY4.

In PY3 (Table 2), all clinics in the PN continuing/enhancing group implemented all four priority EBIs (patient reminders, provider reminders, reducing structural barriers, and provider assessment and feedback). Meanwhile, only 63.64% of clinics in the PN new group implemented all four EBIs in PY3. Additionally, in PY3, 90% of clinics in the PN continuing/enhancing group were continuing and enhancing PN implementation, which may have an impact on changes in the screening rate.

All clinics in both PN implementation groups (n=21) had implemented all four EBIs and small media in PY4. However, these clinics were in varying stages of implementation of these interventions (Table 2). For example, the PN new group had four clinics (36.36%) that were newly implementing reducing structural barriers in PY4 while seven of the clinics in the PN continuing/enhancing group (70.00%) were continuing and enhancing the reducing structural barriers intervention. For a full list of EBIs and SA frequencies during PY3, see Table 2. For a full list of these interventions during PY4, see Table 3.

Table 2. Evidence-Based Interventions and Supporting Activities for PY3

Clinic Activity	Patient Navigation New in PY4		Patient Navigation Continuing/Enhancing in PY4	
	Count (n)	Percentage (%)	Count (n)	Percentage (%)
Total Clinics	11	100.00	10	100.00
Patient Navigation in Place				
Yes, continuing, enhanced	0	0.00	9	90.00
Yes, continuing	0	0.00	1	10.00
Yes, newly in place	0	0.00	0	0.00
No	11	100.00	0	0.00
Patient Reminders in Place				
Yes, continuing, enhanced	4	36.36	9	90.00
Yes, continuing	7	63.64	1	10.00
Yes, newly in place	0	0.00	0	0.00
No	0	0.00	0	0.00
Reducing Structural Barriers in Place				
Yes, continuing, enhanced	0	0.00	10	100.00
Yes, continuing	7	63.64	0	0.00
Yes, newly in place	0	0.00	0	0.00
No	4	36.36	0	0.00
Provider Reminders in Place				
Yes, continuing, enhanced	0	0.00	9	90.00
Yes, continuing	8	72.73	1	10.00
Yes, newly in place	0	0.00	0	0.00
No	3	27.27	0	0.00
Provider Assessment and Feedback in Place				
Yes, continuing, enhanced	0	0.00	9	90.00
Yes, continuing	7	63.64	1	10.00
Yes, newly in place	0	0.00	0	0.00
No	4	36.36	0	0.00
Number of EBIs in Place				
4	7	63.64	10	100.00
3	0	0.00	0	0.00
2	1	9.09	0	0.00
1	3	27.27	0	0.00
Small Media in Place				
Yes, continuing, enhanced	0	0.00	0	0.00
Yes, continuing	7	63.64	0	0.00
Yes, newly in place	0	0.00	0	0.00
No	4	36.36	10	100.00

Table 3. Evidence-Based Interventions and Supporting Activities for PY4

Clinic Activity	Patient Navigation New in PY4		Patient Navigation Continuing/Enhancing in PY4	
	Count (n)	Percentage (%)	Count (n)	Percentage (%)
Total Clinics	11	100.00	10	100.00
Patient Navigation in Place				
Yes, continuing, enhanced	0	0.00	1	10.00
Yes, continuing	0	0.00	9	90.00
Yes, newly in place	11	100.00	0	0.00
No	0	0.00	0	0.00
Patient Reminders in Place				
Yes, continuing, enhanced	4	36.36	9	90.00
Yes, continuing	7	63.64	1	10.00
Yes, newly in place	0	0.00	0	0.00
No	0	0.00	0	0.00
Reducing Structural Barriers in Place				
Yes, continuing, enhanced	0	0.00	7	70.00
Yes, continuing	7	63.64	3	30.00
Yes, newly in place	4	36.36	0	0.00
No	0	0.00	0	0.00
Provider Reminders in Place				
Yes, continuing, enhanced	4	36.36	0	0.00
Yes, continuing	7	63.64	10	100.00
Yes, newly in place	0	0.00	0	0.00
No	0	0.00	0	0.00
Provider Assessment and Feedback in Place				
Yes, continuing, enhanced	0	0.00	1	10.00
Yes, continuing	7	64.65	9	90.00
Yes, newly in place	4	36.36	0	0.00
No	0	0	0	0.00
Number of EBIs in Place				
4	11	100.00	10	100.00
3	0	0.00	0	0.00
2	0	0.00	0	0.00
1	0	0.00	0	0.00
Small Media in Place				
Yes, continuing, enhanced	0	0.00	9	90.00
Yes, continuing	7	63.64	0	0.00
Yes, newly in place	4	36.36	1	10.00
No	0	0.00	0	0.00

Inferential Analysis

The change in CRC screening rate from PY3 to PY4 for each clinic can be found in Table 4 and the change in CRC screening rate distribution statistics can be found in Table 5.

Table 4. Change in CRC Screening Rate from PY3 to PY4 by PN Group

Change in CRC screening rate (%)	
PN New in PY4	PN Continuing/Enhancing in PY4
-9.00	0.27
-6.29	0.32
-1.21	9.64
-1.03	11.10
-0.72	11.78
-0.17	16.81
1.25	17.88
2.25	18.44
3.61	23.57
6.56	25.09
31.62	

Table 5. Change in Screening Rate Statistics by Group

	PN* New in PY4 (n=11)	PN* Continuing/Enhancing in PY4 (n=10)
Average change in screening rate (%)	2.44	13.49
Median change in screening rate (%)	-0.17	14.30
Range in change in screening rate (%)	[-9.00, 31.62]	[0.27, 25.09]
IQR** for change in screening rate (%)	4.05	8.29

*PN = Patient Navigation; **IQR = Interquartile Range

Among the clinics that newly implemented PN in PY4, the range of the change in CRC screening rate from PY3 to PY4 was -9.00% to 31.62% with a median of -0.17%. Meanwhile, among the clinics that continued/enhanced PN implementation, the range was 0.27% to 25.09% and the median was 14.30% (see Table 5). The difference between the median change in CRC

screening rate for the two groups was very large (14.47%). These calculations indicate a large difference in the distribution between the two PN implementation groups with the PN continuing/enhancing group having a larger increase in CRC screening rate than the PN new group.

Due to the results of the Shapiro-Wilk normalcy test, I ran a Mann-Whitney u-test to determine if the distribution of the change in screening rates between the PN new and PN continuing/enhancing groups was significantly different. This test found a p-value of 0.00795, therefore I rejected the null hypothesis and determined that the distribution of the change in screening rates for these two groups was statistically significant. I concluded from this that clinics that continued/enhanced PN have a higher increase in screening rate than those that newly implemented PN.

Discussion

In this project, I assessed the impact of sustained PN implementation on the change in screening rate among clinics participating in WA's CRCCP. The focus on WA clinics allowed me to concentrate on the specific trends in CRC screening happening locally. Based on the data, I found that clinics that continue to implement or enhance PN for more than one year experience higher changes in CRC screening rate compared to those clinics that have newly implemented PN within the last year. Several large differences in the clinic characteristics between the two groups (PN new in PY4 and PN continuing/enhancing in PY4) may account for the differences in CRC screening rate change that were found in this analysis. Particularly, the clinics in the PN new group tended to be larger and have a higher percentage of uninsured patients compared to the PN continuing/enhancing group. Clinics with larger populations may have greater difficulty implementing PN because of the volume of patients they serve, which could impact overall

screening rates and the amount of time it takes to effectively implement PN. Additionally, uninsured patients face more barriers to CRC screening and therefore are less likely to be screened.[20] Thus, having higher proportions of uninsured patients may negatively impact screening rates which is why PN is so vital to implement in order to address such disparities. Also, a large proportion (90.00%) of clinics in the PN continuing/enhancing group were actively improving their PN implementation, which may account for the greater increase in CRC screening seen in this group. However, without more specific details about how this group enhanced their implementation, it is difficult to determine the impact of these enhancements on screening rates. Therefore, the findings from this analysis should be taken with caution.

This analysis was unique because it specifically compared clinics that are newly implementing PN to clinics that have been implementing PN for multiple years. There is a large body of literature that supports the use of PN in clinic settings to increase CRC screening rates.[10–12,21] The findings from this project align with other literature which finds that long-term PN programs are effective methods for increasing CRC screening rates compared to clinics that lack PN programs.[22]

Strengths

This analysis is a practice-based study of FQHC clinics participating in CRCCP. This study uses real world data with some programmatic parameters but very few controls. Therefore, this analysis could have practical national implications for other CRCCP participants. Additionally, this project focused on PN, an intervention that has recently been given EBI priority status in the next CRCCP grant cycle. Thus, this study reflects the new priorities of the next grant cycle.

Limitations

I acknowledge there are some limitations to this analysis including that it was only a univariate analysis and did not include a multivariate component. It is important to note that this analysis did not assess the impact of possible confounding variables such as duration with CRCCP, percentage of uninsured patients, and clinic size that may impact PN implementation and CRC screening rates. Therefore, future analyses should explore the impact of potential confounders on the association between newly implementing PN and screening rates. Additionally, intervention groups were not assigned, this analysis lacked a "no PN implementation" comparison group. This makes it difficult to attribute the change in CRC screening rate to the implementation of PN. The small sample size and WA-specific nature of the sample limits the generalizability of the analysis and leads to a potentially underpowered analysis. Another factor that limits the generalizability of these results is that CRCCP grantees tend to implement EBIs and PN more frequently than non-grantees.[23] Also, due to COVID-19, I excluded PY 1 and PY 2 data, which limited this analysis to only two years of data. Finally, the Mann-Whitney u-test operates on the assumption that the observations are independent from one another. However, the data from clinics within the same health system are probably not independent observations. Therefore, the Mann-Whitney u-test may not be the best test to run for this specific analysis.

Next Steps

Future studies should include multivariate analyses to take into account possible confounders such as years with CRCCP, percent of uninsured patients, and the size of the clinic. Understanding how these other factors impact the relationship between implementing PN and

CRC screening will help develop a more complete understanding of the implementation of PN. Furthermore, future analyses should account for the nonindependence of the clinic-level data that are nested within larger health systems. Additionally, since I found that continued/enhanced PN implementation increases CRC screening more than new implementation of PN, future analyses could explore how to support continued, expanded, and sustained implementation of PN and other EBIs and how the enhancement of PN impacts CRC screening rates.

Conclusion

The CRCCP is a public health program that supports the use of EBIs in primary care settings to increase CRC screening among high need populations. PN is of particular interest because of its recent change in the Community Guide to recommended with strong evidence. My results demonstrate that continuing or enhancing implementation of PN results in a larger increase in CRC screening than newly implementing PN. These findings could inform future PN implementation practices among clinics participating in WA's CRCCP.

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