Original Article

A Statewide Program Providing Colorectal Cancer Screening to the Uninsured of South Carolina

Jan M. Eberth, PhD [1,2,3,4]; Annie Thibault, MSc[4]; Renay Caldwell[4]; Michele J. Josey, MS[1]; Beidi Qiang, PhD[5,6]; Edsel Peña, PhD[5]; Delecia LaFrance, MD[7]; and Franklin G. Berger, PhD[4,8]

BACKGROUND: Cancer screening rates are lowest in those without insurance or a regular provider. Since 2008, the Colorectal Cancer Prevention Network (CCPN) has provided open access colonoscopy to uninsured residents of South Carolina through established, statewide partnerships and patient navigation. Herein, we describe the structure, implementation, and clinical outcomes of this program. **METHODS:** The CCPN provides access to colonoscopy screening at no cost to uninsured, asymptomatic patients aged 50-64 years (African Americans age 45-64 years are eligible) who live at or below 150% of the poverty line and seek medical care in free medical clinics, federally qualified health centers, or hospital-based indigent practices in South Carolina. Screening is performed by board-certified gastroenterologists. Descriptive statistics and regression analysis are used to describe the population screened, and to assess compliance rates and colonoscopy quality metrics. **RESULTS:** Out of >4000 patients referred to the program, 1854 were deemed eligible, 1144 attended an in-person navigation visit, and 1030 completed a colonoscopy; 909 were included in the final sample. Nearly 90% of participants exhibited good-to-excellent bowel preparation. An overall cecal intubation rate of 99% was measured. The polyp detection rate and adenoma detection rate were 63% and 36%, respectively, with male sex and urban residence positively associated with adenoma detection. Over 13% of participants had an advanced polyp, and 1% had a cancer diagnosis or surgical intervention. **CONCLUSION:** The CCPN program is characterized by strong collaboration with clinicians statewide, low no-show rates, and high colonoscopy quality. Future work will assess the effectiveness of the navigation approach and will explore the mechanisms driving higher adenoma detection in urban participants. ***Cancer*** **2018;000:000-000**. © *2018 American Cancer Society.*

KEYWORDS: colonoscopy, colorectal neoplasms, early detection of cancer, patient navigation, South Carolina.

INTRODUCTION

Colorectal cancer (CRC) is the fourth most common form of cancer and the second leading cause of cancer death in men and women combined in the United States and in South Carolina. It is most prevalent in individuals over 50 years of age.[1] South Carolina experiences approximately 2300 cases of CRC each year and over 800 deaths. Racial disparities in CRC are profound both across the United States and in South Carolina.[2-5] Incidence rates for African Americans are higher in the United States (46.7 per 100,000) and South Carolina (44.3 per 100,000) than for whites (38.9 per 100,000 nationally, 36.9 per 100,000 in South Carolina); mortalities among African Americans are also higher than for other races.[6] These disparities may be due to lower socioeconomic status and a relative lack of insurance among African American populations.[7-9] Timely screening allows identification and removal of precancerous colorectal lesions before they progress to cancer and is associated with reduced disease incidence and mortality.[10,11]

In the general US population, about 65% of average-risk adults follow US Preventive Services Task Force guidelines for CRC screening.[12] However, screening rates are particularly low in medically underserved populations,[12,13] resulting in elevated numbers of late-stage cancers, exacerbated health care costs, and increased deaths.[14-16] Poverty, poor access to health care, and lack of insurance coverage contribute to reduced engagement in screening or diagnostic testing within these populations.[17,18] Community-based health systems, such as federally qualified health centers (FQHCs) and free medical clinics (FMCs), provide primary care services to a large proportion of underinsured and uninsured individuals. In South Carolina, 90.8% of FQHC patients live at or below 200% of the federal poverty line, 29.2% are uninsured, and

Corresponding author: Franklin G. Berger, PhD, Director, Center for Colon Cancer Research, Department of Biology, University of South Carolina, Columbia, SC; fgberger@mailbox.sc.edu

[1]Department of Epidemiology and Biostatistics, University of South Carolina, Columbia, South Carolina; [2]Cancer Prevention and Control Program, University of South Carolina, Columbia, South Carolina; [3]South Carolina Rural Health Research Center, University of South Carolina, Columbia, South Carolina; [4]Center for Colon Cancer Research, University of South Carolina, Columbia, South Carolina; [5]Department of Statistics, University of South Carolina, Columbia, South Carolina; [6]Department of Mathematics and Statistics, Southern Illinois University, Edwardsville, Illinois; [7]EviCore Healthcare, Melbourne, Florida; [8]Department of Biological Sciences, University of South Carolina, Columbia, South Carolina

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Beidi Qiang's current address: Department of Mathematics and Statistics, Southern Illinois University, Edwardsville, Illinois.

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32.2% have undergone CRC screening.[19] The majority of FQHC patients (62.3% nationally and 64.9% in South Carolina in 2016) represent racial and/or ethnic minorities.[20] The interplay between race/ethnicity, socioeconomic vulnerability, and inadequate insurance coverage has been shown to affect observed disparities in CRC burden,[21-25] making FQHCs and FMCs uniquely positioned to benefit from programs aimed at increasing CRC screening rates.

In recent years, efforts have focused on improving CRC screening awareness and participation through evidence-based practices, such as reminder letters, patient navigation, elimination of financial barriers, among others.[26-29] Navigation in the clinical and community setting has been successful in increasing cancer screening participation, and has great potential in reducing cancer disparities.[30-36]

In the current study, we describe the programmatic structure, implementation, and outcomes of an open access colonoscopy screening program for uninsured patients in South Carolina. Patient navigation and organized linkages to board-certified gastroenterologists are central features of the program, which has the overarching goal of increased participation in high-quality CRC screening among the uninsured.

METHODS

Programmatic Structure of the Colon Cancer Screening Program

In 2008, to address disparities in care for uninsured individuals in South Carolina, the Center for Colon Cancer Research at the University of South Carolina established the Colorectal Cancer Prevention Network (CCPN), which provides CRC education, awareness, and high-quality screening services statewide. Comprehensive patient navigation and organized linkages among referring clinics, board-certified gastroenterologists, pathologists, and cancer treatment specialists are used in the program.

Eligibility

The CCPN provides colonoscopy screening at no cost to individuals aged 50-64 years (African Americans are eligible at age 45 years) who are under the care of safety net practices, live at or below 150% of the federal poverty line, and are uninsured. Patient eligibility is determined through chart reviews and phone interviews managed by patient navigators, who are employed by the CCPN but work remotely within the communities they serve. Exclusion criteria for the program include: a colonoscopy within the past 10 years, a history of colorectal neoplasia, recent onset of symptoms associated with CRC (ie, significant rectal bleeding, iron deficiency anemia, unintended weight loss >10%, diarrhea or constipation, abdominal distention, pain or cramps, nausea or vomiting), a diagnosis of an inherited CRC disorder, a known history of inflammatory bowel disease, or a personal history of cancer other than a nonmelanoma skin cancer. Although very rare, participating gastroenterologists may also decline to provide services based on additional medical factors (eg, allowable body mass index range) that vary across practices.

Clinical Partnerships

The CCPN recruits patients from 36 counties throughout South Carolina (Fig. 1). A network of health system partners—including 112 FMCs, FQHCs, and hospital-based indigent practices—provide patient referrals to CCPN navigators, who assess medical eligibility, and as appropriate, coordinate navigation appointments, educate patients on CRC and screening, conduct reminder calls, schedule colonoscopies, and provide follow-up information as needed. Procedures are performed by 86 board-certified gastroenterologists representing 19 endoscopy facilities and 5 hospital-based practices, all of whom donate their time to the CCPN. In addition, 12 pathology organizations and 13 anesthesiology practices provide services to the program.

Implementation of the Program

Patient navigation

A comprehensive patient navigation approach is used to recruit, educate, and screen patients that are referred to the program (Fig. 2). Once a clinic makes a referral, a navigator conducts a medical chart review to ensure the patient's eligibility. Upon being declared tentatively eligible, the patient is contacted and interviewed via telephone, a step that is particularly important given that a complete health history is not always available in the medical records. Following confirmation of eligibility, the navigator sends patient files to an endoscopy center and receives the colonoscopy appointment once approved. An in-person navigation visit is scheduled 5-10 days before the procedure, during which time the patient is educated on CRC and the importance of screening, procedure details and instructions are given, and the patient has an opportunity to ask questions (Supporting Figures 1 and 2 [see online supporting information] for select navigation materials used). After the in-person visit, the navigator follows up with the patient as needed the day before and the day of the procedure. The navigator is available to the patient via telephone at any time 24 hours a day, 7 days a week, which helps reduce no-shows and any other barriers that arise (eg, assistance with transportation to the

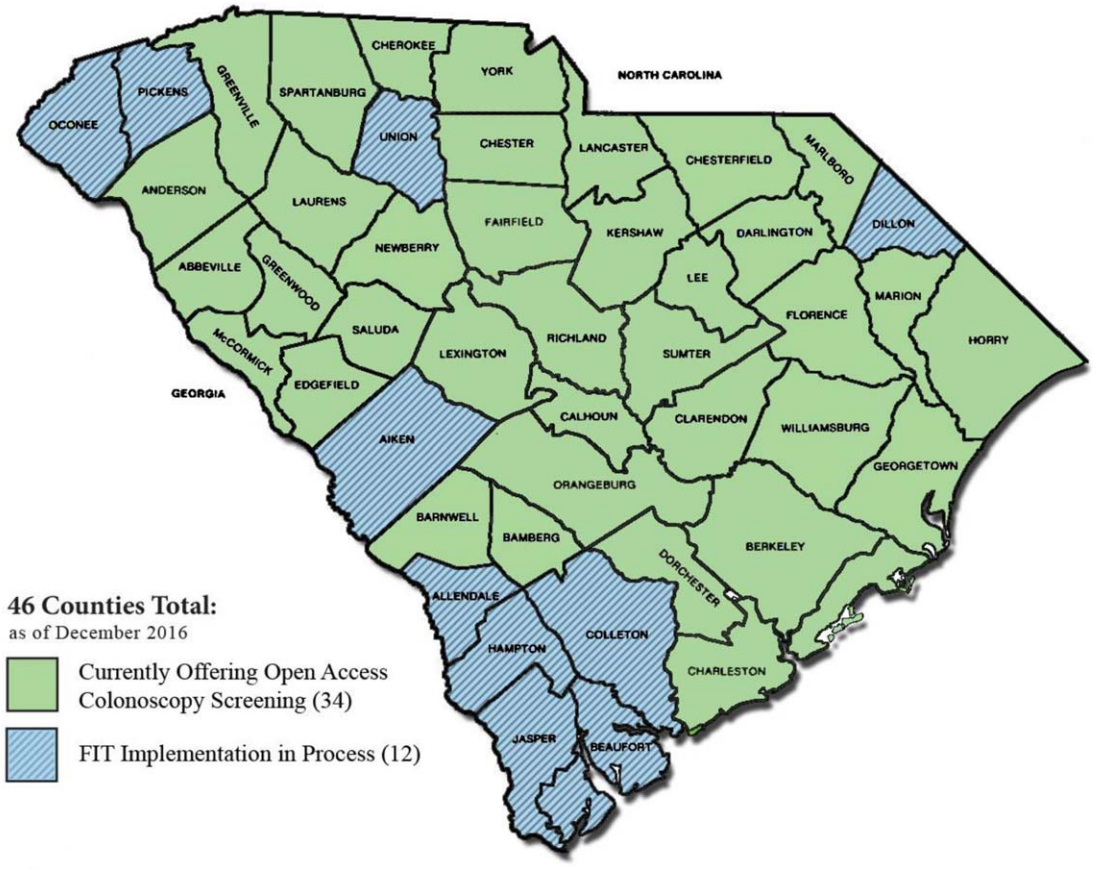

Figure 1. Map of South Carolina counties served by the Colorectal Cancer Prevention Network Screening Program.

colonoscopy by church congregations, neighbors, or other community organizations).

Data collection and analysis

During each step of the patient navigation process, data are collected in real time, managed by CCPN navigators, and housed in the Data Coordinating Center. The Data Coordinating Center is supported by a web-based database that is compliant with the Health Insurance Portability and Accountability Act (Dacima Software, Inc).[37] In addition to patient contact information and eligibility criteria, the database captures over 1000 variables, including details about health behaviors, personal/ family medical history, endoscopy details, pathology findings, and other specialized care reports.

Outcome assessment

An analysis of program outcomes was conducted for patients screened between May 2014 and May 2016. The following quality metrics and clinical outcomes were evaluated: colonic preparation quality (% excellent/good preparation), cecal intubation rate (% of patients where cecum was reached during screening), polyp detection rate (PDR) (ie, % of colonoscopies in which $\geq$1 polyps were removed during the procedure), and adenoma detection rate (ADR) (ie, % of colonoscopies in which $\geq$1 adenomas were identified via pathological examination). Patients were further classified based upon the most advanced polyp biopsied during colonoscopy or procedure outcome, as follows: 1) cancer, carcinoid, or lesion requiring surgical intervention; 2) advanced polyps, classified as any polyp $\geq$1 cm in diameter, including hyperplastic, traditional serrated or sessile serrated, and any polyp with villous components and/or high-grade dysplasia[38-41]; 3) nonadvanced adenoma $<$1 cm in diameter; (4) hyperplastic polyps $<$1 cm in diameter; (5) biopsied polyps with nonsignificant pathology; or (6) no biopsies performed. Patients who had a colonoscopy with polypectomy but no associated pathology report were excluded from the analysis.

Descriptive statistical analyses were performed for the overall quality metrics and clinical outcomes and by patient characteristics (sex, age, race/ethnicity, urban/

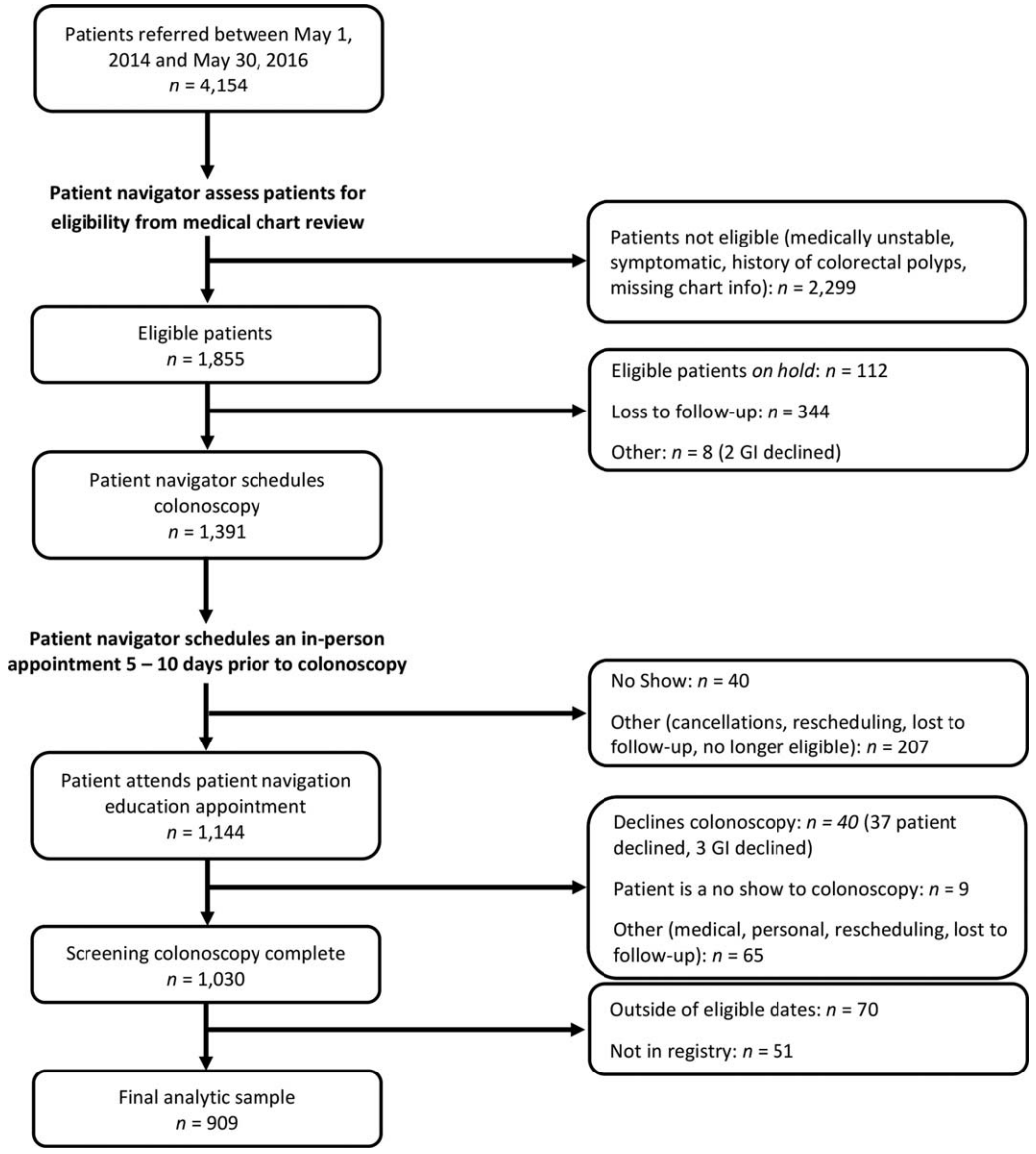

Figure 2. Flow diagram for referral, patient navigation, and open access colonoscopy for the Colorectal Cancer Prevention Network Screening Program.

rural location based on 2010 ZIP Rural-Urban Commuting Area codes, language spoken, and educational attainment). A multilevel logistic regression analysis (level 1: patients, level 2: physicians), with a physician-level random intercept was performed for PDR and ADR as a function of patient characteristics, with significance defined at the $\alpha = 0.05$ level.

RESULTS

Among 1855 patients referred to the program and deemed eligible, 1391 were scheduled for colonoscopy, 1144 attended an in-person navigation visit, and 1030 completed the procedures. Of the completed procedures, 909 patients with complete records (colonoscopy and pathology) were included in the analytic sample (Fig. 2). No-shows for the scheduled patient navigation visit and for the colonoscopy were exceptionally low (40/1391 [2.9%] and 9/1144 [0.8%], respectively). The colonoscopy participation rate, which is defined as the proportion of eligible, navigated individuals who completed their scheduled colonoscopy, was 90% (1030/1144). The majority of patients screened were women (62%), non-Hispanic black (53%), and high school graduates or less (68%). Fewer than 3% of patients spoke a language other than English. Mirroring the South Carolina population, 32% of the patients screened resided in a rural area (Table 1).

TABLE 1. Colorectal Cancer Prevention Network (CCPN) Screening Program Participant Characteristics and Screening Metrics, May 2014 to May 2016

Characteristics	n (%)	Excellent/Good Preparation, n (%)	Cecum Intubation Rate, n (%)	Polyp Detection Rate, n (%)	Adenoma Detection Rate, n (%)[a]
No. of participants	909 (100)	812 (89.32)	905 (99.556)	570 (62.71)	291 (35.62)
Sex		*P* = .2997	*P* = .985	***P* = .0453**	***P* = .0123**
Women	564 (62.05)	509 (90.25)	561 (99.47)	339 (60.11)	167 (32.36)
Men	345 (37.95)	303 (87.83)	344 (99.71)	231 (66.96)	124 (41.33)
Age, y[b]		***P* = .0330**	*P* = .1473	*P* = .3231	*P* = .0899
45-49[c]	47 (5.17)	43 (91.49)	46 (97.87)	29 (61.70)	9 (22.50)
50-54	405 (44.55)	358 (88.40)	405 (100)	241 (59.51)	123 (33.70)
55-59	288 (31.68)	268 (93.06)	286 (99.31)	189 (65.62)	105 (40.70)
60-64	169 (18.59)	143 (84.62)	168 (99.41)	111 (65.68)	54 (35.29)
Race/ethnicity		*P* = .6211	*P* = .1707	*P* = .2763	*P* = .0924
Non-Hispanic white	335 (36.89)	297 (88.66)	335 (100)	221 (65.97)	120 (39.47)
Non-Hispanic black	483 (53.19)	431 (89.23)	479 (99.17)	292 (60.46)	139 (32.25)
Other	90 (9.91)	83 (92.22)	90 (100)	56 (62.22)	32 (40.00)
Location		*P* = .4883	*P* = 1	***P* = .0043**	***P* = . 0031**
Urban	614 (67.55)	552 (89.90)	611 (99.66)	405 (65.96)	218 (39.14)
Rural	295 (32.45)	260 (88.14)	294 (99.51)	165 (55.93)	73 (28.19)
Language		*P* = .3821	*P* = 1	*P* = .5633	*P* = .6839
English	882 (97.03)	786 (89.12)	878 (99.55)	555 (62.93)	281 (35.48)
Non-English	27 (2.97)	26 (96.30)	27 (100)	15 (55.56)	10 (41.67)
Education		*P* = .6103	*P* = .4610	*P* = .7124	*P* = .6287
Less than high school	249 (27.42)	216 (86.75)	249 (100)	161 (64.66)	83 (37.05)
High school diploma	366 (40.31)	333 (90.98)	363 (99.18)	227 (62.02)	108 (33.44)
Some college or associate's degree	230 (25.33)	205 (89.13)	229 (99.57)	146 (63.48)	80 (38.46)
Bachelor's or higher	63 (6.94)	57 (90.48)	63 (100)	36 (57.14)	20 (33.33)

P values were calculated using a chi-square or Fisher's exact test (for small cell sizes); values in boldface are statistically significant at $\alpha = 0.05$.
[a] Adenoma detection rate based on 816 patients for which both colonoscopy and pathology data (if applicable) were available.
[b] Age at inclusion.
[c] Includes African Americans only.

Overall, 89% of screened patients were rated as having good-to-excellent bowel preparations. In addition, cecal intubation rates were >99%. No significant differences were noted in bowel preparation or cecal intubation rate by race/ethnicity, gender, education, language or rurality (Table 1). Significant differences in bowel preparation were noted for age ($P = .033$), with persons aged 60-64 having the lowest prevalence of good-to-excellent bowel preparation (85%).

PDR and ADR were 63% and 36%, respectively. Both PDR and ADR were higher in males than in females ($P = .045$ and $P = .012$; see Table 1). Persons residing in rural areas were significantly less likely to have a polyp ($P = .0043$) or adenoma ($P = .0031$; Table 1). No significant differences in detection rates were noted across race/ethnicity, language spoken, or education.

Among all completed colonoscopies, 36% had no biopsy performed. Among the lesions sent for pathological assessment (n = 486), 6.6% were histologically normal, 41.6% were hyperplastic polyps, 28.0% were nonadvanced adenomas, and 22.0% were advanced adenomas/polyps (Table 2). Approximately 1% of patients were diagnosed with CRC or a carcinoid tumor and were referred for surgical resection. Men were more likely than women to have advanced polyps ($P = .029$) and cancer/carcinoid tumors ($P = .015$).

In a multilevel, adjusted logistic regression model, male sex (odds ratio [OR], 1.54; 95% confidence interval [CI], 1.13-2.11) and rural residence (OR, 0.67; 95% CI, 0.45-0.99) were significantly associated with the presence of adenomas, with rates in males and urban residents being higher than in women and rural residents, respectively (Table 3). Male sex was also significantly associated with polyp detection, albeit to a lesser extent in both unadjusted and adjusted models. After controlling for physician variability and other individual-level covariates, rural residence was no longer associated with polyp detection (OR, 0.70; 95% CI, 0.48-1.02). No differences were noted based on age, race/ethnicity, language spoken, or education in adjusted models.

DISCUSSION

Provision of high-quality CRC screening that includes comprehensive patient navigation to uninsured and medically underserved residents of South Carolina ensures that barriers to participation are addressed, that patients are

TABLE 2. Screening and Pathology Findings Among Colorectal Cancer Prevention Network (CCPN) Screening Program Participants, May 2014 to May 2016 (N = 816)

Characteristics	No Biopsies Performed	Biopsy with No Significant Pathology	Hyperplastic Polyps <1 cm	Adenoma <1 cm	Advanced Polyps[a]	Surgical Intervention, Cancer, or Carcinoid[b]
Total	330 (36.30)	32 (3.92)	202 (24.72)	136 (16.65)	107 (13.11)	9 (1.10)
Sex	***P* = .0252**	*P* = .6362	*P* = 1	*P* = 1	***P* = .0288**	***P* = .0146**
Women	221 (39.18)	22 (4.26)	128 (24.81)	86 (16.67)	57 (11.05)	2 (0.39)
Men	109 (31.59)	10 (3.33)	74 (24.58)	50 (16.61)	50 (16.67)	7 (2.33)
Race/ethnicity	*P* = .2902	*P* = .2130	*P* = .5830	*P* = .4855	*P* = .1352	*P* = .2177
Non-Hispanic white	111 (33.13)	8 (2.63)	78 (25.57)	54 (17.70)	47 (15.46)	6 (1.97)
Non-Hispanic black	186 (38.51)	22 (5.10)	107 (24.83)	66 (15.31)	47 (10.90)	3 (0.70)
Other	33 (36.67)	2 (2.50)	16 (20.00)	16 (20.00)	13 (16.25)	0

Data are presented as n (%). *P* values were calculated using a chi-square or Fisher's exact test (for small cell sizes); values in boldface are statistically significant at $\alpha = 0.05$.

[a] Advanced polyps are defined as any polyp ≥1 cm (including hyperplastic), any traditional serrated or sessile serrated adenoma/polyp, any polyp with villous components, and/or high-grade dysplasia.

[b] Includes patients with surgical intervention, cancer or carcinoid diagnosis.

TABLE 3. Factors Associated with Polyp and Adenoma Detection at Baseline Screening among Colorectal Cancer Prevention Network (CCPN) Screening Program Participants, May 2014-May 2016

		Polyp Detection				Adenoma Detection[a]			
		Unadjusted		Multivariable[b]		Unadjusted		Multivariable[b]	
Characteristic	n (%)	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Sex									
Women	564 (62.05)	Ref.	NA	Ref.	NA	Ref.	NA	Ref.	NA
Men	345 (37.95)	**1.34**	**1.02-1.78**	**1.45**	**1.07-1.97**	**1.47**	**1.10-1.98**	**1.54**	**1.13-2.11**
Age, y[c]									
45-49[d]	47 (5.17)	0.84	0.43-1.64	0.91	0.44-1.91	0.53	0.24-1.20	0.56	0.24-1.33
50-54	405 (44.55)	0.77	0.53-1.12	0.73	0.49-1.09	0.93	0.63-1.38	0.87	0.57-1.32
55-59	288 (31.68)	1.00	0.67-1.49	1.01	0.66 1.55	1.26	0.83-1.90	1.18	0.76-1.83
60-64	169 (18.59)	Ref.	NA	Ref.	NA	Ref.	NA	Ref.	NA
Race/ethnicity									
Non-Hispanic White	335 (36.89)	Ref.	NA	Ref.	NA	Ref.	NA	Ref.	NA
Non-Hispanic Black	483 (53.19)	0.79	0.59-1.05	0.75	0.55-1.04	**0.73**	**0.54-0.99**	0.76	0.54-1.06
Other	90 (9.91)	0.85	0.52-1.38	1.00	0.55-1.80	1.02	0.62-1.69	1.03	0.57-1.88
Location									
Urban	614 (67.55)	Ref.	NA	Ref.	NA	Ref.	NA	Ref.	NA
Rural	295 (32.45)	**0.65**	**0.49-0.87**	0.70	0.48-1.02	**0.61**	**0.44-0.84**	**0.67**	**0.45-0.99**
Language									
English	882 (97.03)	Ref.	NA	Ref.	NA	Ref.	NA	Ref.	NA
Non-English	27 (2.97)	0.74	0.34-1.59	0.65	0.25-1.71	1.30	0.57-2.96	1.13	0.42-3.08
Education									
Less than high school	249 (27.42)	Ref.	NA	Ref.	NA	Ref.	NA	Ref.	NA
High school diploma	366 (40.31)	0.89	0.64-1.25	0.84	0.59-1.21	0.85	0.60-1.22	0.86	0.59-1.25
Some college or associate's degree	230 (25.33)	0.95	0.65-1.38	0.93	0.63-1.39	1.06	0.72-1.57	1.11	0.73-1.68
Bachelor's or higher	63 (6.94)	0.73	0.42-1.28	0.59	0.32-1.08	0.85	0.47-1.55	0.72	0.38-1.36

Abbreviations: CI, confidence interval; NA, not available; OR, odds ratio; Ref., reference.

[a] Excludes participants who did not have a pathology report (n = 93).

[b] Multivariable model includes a physician-level random intercept.

[c] Age at inclusion.

[d] Includes African Americans only.

Values in boldface are statistically significant at alpha = 0.05.

knowledgeable and prepared for their procedures, and that linkages to follow-up treatment are made available. The quality of the CCPN program is evidenced by low no-show rates, favorable colonoscopy quality metrics, strong collaborations with referring clinics and board-certified gastroenterologists, and prevention of CRC through identification and removal of precancerous polyps. Its statewide reach is also a major strength, as the program works with over 110 health clinics in 36 counties to obtain patient referrals. Others have reported increased CRC

screening rates in uninsured and underserved populations in similar programs using patient navigation.[33,42-47] In a study of primarily uninsured patients from Suffolk County, New York, Lane et al[46] found that providing 800 FQHC patients with direct access to colonoscopy resulted in a 37% PDR, a 26% ADR, a 3% no-show rate, a 95%-99% cecal intubation rate, and a 92% good-to-excellent bowel preparation rate. Wolf et al[44] implemented a statewide colonoscopy screening program including 13,000 uninsured Colorado residents, and reported a 93% adequate bowel preparation rate, a 97% cecal intubation rate, and a 28% ADR.

Several features of the current study are noteworthy. The PDR and ADR for the CCPN program (63% and 36%, respectively) are among the highest reported to date, which may be due to the high-quality bowel preparation and cecal intubation rates, exclusive engagement of board-certified gastroenterologists, and study location (eg, high obesity rate in South Carolina). The observation of higher ADR and PDR in men compared with women is consistent with previous reports[48,49]; however, the finding of a lower ADR among rural relative to urban residents was unexpected. This may be due to any of a number of factors, including but not limited to differing characteristics of rural versus urban patients. Ad hoc analyses to determine whether the lower ADR in rural areas might be attributed to patient demographic differences revealed no statistically significant differences between the demographics of rural versus urban patients in our program (Supporting Table 1 [see online supporting information]). Further studies will be required to understand the contribution of other patient- and provider-level factors on ADR variability.

Studies of racial/ethnic differences in polyp/adenoma detection among uninsured patients have shown mixed results. In a study of uninsured individuals visiting community health clinics in New York City, Collazo et al[47] found a significant difference in polyp detection across race/ethnicity but did not find statistically significant differences in polyp type, location, or advanced pathology across groups. Similarly, Lane et al[46] did not find statistically significant differences in risk of having an adenoma between African American and white uninsured patients from Suffolk County, New York. Our study found no significant differences in either PDR or ADR across racial/ethnic groups, although further studies are needed to determine whether racial/ethnic disparities vary across geographic regions with differing population demographics, lifestyle behaviors, and health care infrastructure and insurance systems.

The finding that persons aged 60-64 years in our program were least likely to have good-to-excellent bowel preparation aligns with a recent meta-analysis showing a pooled odds ratio of 1.14 for age, indicating higher odds of poor bowel preparation with increasing age.[50] Similarly, Gandhi et al[50] reported greater likelihood of poor bowel preparation in persons with diabetes, hypertension, stoke, or dementia, all of which are more common in older populations. The lower PDR/ADR observed among individuals 60-64 years of age may be partially due to this lower rate of good-to-excellent bowel preparation, as well as the exclusion of individuals from this age group who had a colonoscopy <10 years ago or a history of polyps.

There are several limitations to the current study. By offering CRC screening only to uninsured patients, the CCPN program lacks a comparison group to a general, insured population. Additionally, only 3% of our patients were non-English speakers, limiting our generalizability to programs in regions with many non-English speaking patients. It is noteworthy, however, that bowel preparation quality and overall clinical outcomes did not differ by language spoken. Furthermore, the CCPN was unable to eliminate all selection bias, as only patients using FMCs or FQHCs as a regular source of care were referred to the program. Finally, our navigation approach requires both in-person and over-the-phone patient eligibility assessment and education, and requires significant labor and resources. Replication of the program may not be trivial. A study to examine which elements of patient navigation are most cost-effective and result in the best clinical outcomes would be a critical next step. Future research should also examine the patient characteristics associated with noncompliance and loss to follow-up before colonoscopy. Finally, a study to investigate physician-level outcomes as a function of patient case mix, practice selection criteria, and other performance factors should be performed. Despite these caveats, the current analysis provides insights into the structure, operation, and outcomes of a statewide CRC screening program that will be useful in future efforts aimed at increasing screening rates, particularly within uninsured and medically underserved communities that are vulnerable to high CRC burden.

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CONFLICT OF INTEREST DISCLOSURES

The authors made no disclosures.

AUTHOR CONTRIBUTIONS

Jan M. Eberth, Annie Thibault, Renay Caldwell, Franklin G. Berger: conceptualization of study. **Jan M. Eberth**, **Edsel Peña:** methodology design. **Michele J. Josey, Beidi Qiang:** Software coding and formal analysis. **Renay Caldwell, Annie Thibault, Delecia LaFrance:** collection of data. **Jan M. Eberth, Michele J. Josey, Beidi Qiang:** creation of data visualization. **Jan M. Eberth, Edsel Peña, Franklin G. Berger:** study supervision. **Jan M. Eberth, Franklin G. Berger:** study administration. **Jan M. Eberth:** writing (original draft). **Jan M. Eberth, Annie Thibault, Renay Caldwell, Michele J. Josey, Beidi Qiang, Edsel Peña, Delecia LaFrance, Franklin G. Berger:** writing (review and editing). **Annie Thibault, Renay Caldwell, Franklin G. Berger:** funding acquisition.

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