



Use of Evidence-Based Interventions and Implementation Strategies to Increase Colorectal Cancer Screening in Federally Qualified Health Centers

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Abstract

While colorectal cancer (CRC) screening rates have been increasing in the general population, rates are considerably lower in Federally Qualified Health Centers (FQHCs), which serve a large proportion of uninsured and medically vulnerable patients. Efforts to screen eligible patients must be accelerated if we are to reach the national screening goal of 80% by 2018 and beyond. To inform this work, we conducted a survey of key informants at FQHCs in eight states to determine which evidence-based *interventions* (EBIs) to promote CRC screening are currently being used, and which *implementation strategies* are being employed to ensure that the interventions are executed as intended. One hundred and forty-eight FQHCs were invited to participate in the study, and 56 completed surveys were received for a response rate of 38%. Results demonstrated that provider reminder and recall systems were the most commonly used EBIs (44.6%) while the most commonly used implementation strategy was the identification of barriers (84.0%). The mean number of EBIs that were fully implemented at the centers was 2.4 (range 0–7) out of seven. Almost one-quarter of respondents indicated that their FQHCs were not using any EBIs to increase CRC screening. Full implementation of EBIs was correlated with higher CRC screening rates. These findings identify gaps as well as the preferences and needs of FQHCs in selecting and implementing EBIs for CRC screening.

Keywords Community health center · Colorectal cancer · Screening · Evidence-based interventions

Introduction

Colorectal cancer (CRC) screening in the United States is on the rise. According to results from the 2015 National Health Interview Survey, 62.4% of adults age 50–75 years have been screened for CRC with one of the US Preventive Services Task Force recommended tests [1]. While we are making good progress toward the national goal of 80% of adults age 50–75 years screened by 2018 and beyond [2], rates for racial and ethnic minorities, the uninsured, and low socioeconomic status populations lag behind the general population [1, 3, 4]. Notably, in Federally Qualified Health Centers (FQHCs), where many uninsured and underinsured

patients receive health care, only 39.9% of adults age 50–75 have been screened for CRC [5].

One factor that may be influencing this lag is that CRC screening can be more complex than other types of cancer screening. Presently, there are several approved screening methods available including colonoscopy, sigmoidoscopy, fecal occult blood testing (FOBT), and fecal immunochemical testing (FIT), as well as newer screening technologies such as DNA stool testing and virtual colonoscopy. Patients' preference and use of screening methods may differ based on access, burden, accuracy, cost, and physician recommendation [4, 6, 7].

Application of evidence-based *interventions* (EBIs), such as those recommended as effective by the Community Preventive Services Task Force (aka, Community Guide Task Force) [8] can improve CRC screening rates. Multi-level approaches in which patient, provider, organizational, and environmental interventions are combined in an intentional, systematic way have been encouraged as a means of

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improving adherence to cancer screening recommendations [9, 10]. For CRC screening, The Community Guide recommends multi-component interventions that increase community demand (e.g. client reminders), community access (e.g. reducing structural barriers), and provider delivery (e.g. provider assessment and feedback) [8]. For example, the Centers for Disease Control and Prevention (CDC)'s Colorectal Cancer Control Program (CRCCP) grantees in Alaska and Washington State successfully combined patient and provider reminders with patient navigation to improve the percentage of adults up-to-date with CRC screening by 7.5 and 24%, respectively [11].

EBIs are integrated into clinical practice by applying *implementation strategies* to select, adapt, implement, and sustain the interventions over time [12]. Implementation strategies can be defined as “methods or techniques used to enhance the adoption, implementation, and sustainability of a clinical program or practice” [13]. In several systematic reviews, authors have identified implementation strategies that are effective in improving adoption of different types of EBIs at the levels of patients, providers, and systems [14–16]. Examples include conducting educational meetings with providers, creating new clinical teams, and developing incentive or penalty systems at the organizational level [17, 18]. However, there is still much to learn in terms of which CRC screening interventions or combination of interventions are feasible and how they can be implemented in settings such as FQHCs that care for underserved populations.

One of the main goals of the Cancer Prevention and Control Research Network (CPCRN) is to conduct dissemination and implementation (D&I) research that will facilitate cancer screening. CPCRN is a network of eight research sites across the U.S. funded by the CDC and the National Cancer Institute (NCI) (<http://www.cpcrn.org>). A cross-CPCRN workgroup conducted this study to: (1) identify CRC screening EBIs that FQHCs are using, (2) explore implementation strategies that FQHCs are using to integrate those EBIs, (3) examine the relationship between EBIs, implementation strategies, and CRC screening rates, and (4) learn about the implementation supports (i.e. training and technical assistance) that FQHCs are accessing.

Methods

The study design was a cross-sectional, self-administered, web-based survey of FQHC staff in eight states (AR, FL, IA, KY, NC, OH, PA, SC). To develop the survey, we reviewed the literature to identify multi-level CRC screening EBIs and implementation strategies that might be applied in the FQHC setting. The search for EBIs was based on information from systematic reviews published between 2007 and 2015. A total of 12 reviews of CRC screening interventions,

plus those included in The Community Guide, were identified [19–31]. The review articles evaluated 11 EBIs that targeted the individual, organization, community, or policy levels of influence. Examples include one-on-one education, provider reminder and recall systems, mass media, and reducing client out-of-pocket costs. To specify implementation strategies, we reviewed and consolidated two taxonomies [17, 18] and searched the Cochrane Library (<http://www.cochranelibrary.com>) for reviews of evidence in support of specific implementation strategies. The study team removed strategies that were redundant with those included in the list of CRC screening EBIs (e.g., assessment and feedback). We consolidated the ones that remained into a matrix of 22 strategies organized within four stages of the overall process of planning and implementing an intervention (i.e. assess barriers and context, activate and engage key stakeholders, integrate the intervention within existing systems, make changes to broader context). The goal was to identify a parsimonious list of strategies most central to implementing CRC interventions in FQHCs.

A draft survey instrument was pilot-tested with four FQHCs, and feedback was incorporated into the final version. The survey included questions about current use of seven effective CRC screening EBIs (out of the eleven from the scoping review) with six response options: fully and systematically implemented, partially implemented, early stages of implementation, planning to implement, considering implementation, or not planning to implement. We also inquired about current use of 22 distinct implementation strategies (yes/no). Finally, we asked about areas where additional training and technical assistance was desired to strengthen EBI implementation, and preferred mode of delivery. To compare variables to CRC screening rates, we chose to use the 2016 Uniform Data Systems (UDS) rates collected by the Health Services & Resource Administration (HRSA) in our statistical analyses rather than the self-reported rates from the survey due to the large proportion of missing responses for this survey item (36%). It should be noted that the 12-month timeframe for our survey questions started in July 2015, while the UDS rates are for calendar year 2016. The survey was programmed using Qualtrics software (Qualtrics©, Provo, UT) and all collaborating CPCRN sites received study protocol approval from their own Institutional Review Boards.

Survey administration was centralized by the CPCRN Coordinating Center, which distributed the survey links to the contact at each FQHC between August and September 2016. At each CPCRN-affiliated research site in the eight states, potential respondents were identified using a master list of FQHCs. Five of the eight sites distributed surveys to all FQHCs in their respective states. Two affiliate sites surveyed only those centers with whom they had working relationships. One site excluded FQHCs that were participating

in another study on the same topic. The survey was designed to be completed by only one representative from each participating FQHC, preferably the Medical Director or Chief Executive Officer (CEO). Primary contacts could identify another designee to respond to the survey. After the invitation to participate was sent, non-responders received two additional reminders to complete the questionnaire. Respondents received a \$100 gift card for completing the 30–45-min self-administered survey.

Statistical Analysis

Data were exported from Qualtrics into a SAS© data file for analysis. Data cleaning involved review of the distribution of responses and assessment of missing values. Implausible or inconsistent values from open-ended items were investigated and resolved. The response sets for use of CRC screening EBIs were collapsed from six into four categories for analysis: *fully implementing* (defined as “the evidenced-based approach is implemented across the center following a specified protocol or guideline”); *partially implementing* (defined as “part but not all of the center is implementing” and “evidenced based approach is just starting to be implemented in the center or pilot-tested”); *planning or open to implementing* (defined as “planning to implement the evidence-based approach” or “no plan, but we are considering it”); and *not implementing* (defined as “no plan”). Survey responses were summarized using descriptive statistics such as means with standard deviations and percentages as appropriate. A correlation analysis was conducted to assess the association between each center’s 2016 UDS CRC screening rates and the number of EBIs which were *fully implemented* at the center. An alpha level of 0.05 was used to assess for statistical significance. Correlations were also performed between UDS screening rates for each center and number of implementation strategies used. All analyses were conducted using SAS software Version 9.4 (SAS Institute, Cary, NC).

Results

A total of 148 invitations were emailed, and 56 respondents completed a survey for a response rate of 37.8%. The majority of respondents were CEOs (46%) or Medical Directors (31%). As shown in Table 1, almost three-quarters of FQHCs (74%) were designated as patient-centered medical homes and most provided services in other languages such as Spanish. The average CRC screening rate for participating FQHCs was 37.5% (± 17.2). Among stool-based testing modalities, the most commonly used screening test was FIT (68%).

Table 1 Organizational characteristics of participating FQHCs (N=56)

Characteristic	% (n) or Mean (SD)
Location ^a	
Florida	7% (4)
Iowa	11% (6)
Kentucky	27% (15)
North Carolina	21% (12)
Ohio	18% (10)
Pennsylvania	7% (4)
South Carolina	9% (5)
Proportion of patient population current with CRC screening guidelines ^b	37.5 \pm 17.2
Designated Patient-Centered Medical Home	
Yes	75% (39)
No	25% (13)
Provide services in other languages	91% (48)
Most common language: Spanish	87% (46)
Types of FOBT offered ^c	
Guaiac-based FOBT (e.g., Hemoccult II)	24% (13)
High-sensitivity guaiac-based FOBT (e.g., Hemoccult Sensa)	19% (10)
Immunochemical tests (FIT)	68% (36)
Other, please specify	4% (2)

^aArkansas also participated but no surveys were completed

^bAs reported from the Uniform Data System (UDS) for respondent centers (2016 data)

^cCategories are not mutually exclusive so will not add to 100%

Use of CRC Screening EBIs

FQHCs’ reported use of CRC screening EBIs is presented in Table 2. The most commonly used EBI was provider-directed reminder and recall systems (e.g., flagging patient records) with 45% of centers fully implementing and another 32% partially implementing. Other frequently used and fully implemented EBIs included one-on-one education (41%) and provider assessment and feedback (41%). Only 25% of the respondents were fully implementing patient reminders, patient navigation, and small media. Group education was the least commonly reported EBI with 50% indicating that they were not implementing or had no plans to implement this intervention.

Total Number of EBIs Fully Implemented

Table 3 shows the frequency of EBIs that were fully implemented by the respondent FQHCs. Nearly a quarter of the centers were not fully implementing any CRC EBIs (23.2%). Another 35.7% of centers were fully implementing one to two CRC EBIs. The mean number of EBIs that were fully implemented across all centers was 2.4 (range 0–7; data not

Table 2 Frequency of CRC screening EBIs used by FQHCs (N=56)

Intervention	Fully implementing		Partially Implementing		Planning or open to implementing		Not implementing	
	n	%	n	%	n	%	n	%
Provider reminder and recall systems	25	44.6	18	32.1	9	16.1	4	7.1
One-on-one education	23	41.1	30	53.6	3	5.4	–	–
Provider assessment and feedback	23	41.1	23	41.1	8	14.3	2	3.6
Other approach(es)	21	37.5	31	55.4	4	7.1		
Patient reminders	14	25.0	27	48.2	10	17.8	5	8.9
Patient navigator(s)	14	25.0	14	25.0	18	32.1	10	17.9
Small media	14	25.0	21	37.5	13	23.2	8	14.3
Group education	1	1.8	7	12.5	20	35.7	28	50

Table 3 Frequency of the total number of EBIs fully implemented at FQHCs (N=56)

Number of EBIs implemented	Number of FQHCs	%
0	13	23.2
1	13	23.2
2	7	12.5
3	7	12.5
4	4	7.1
5	6	10.7
6	3	5.4
7	3	5.4

shown). The maximum number reported was seven. The correlation between the number of EBIs that an FQHC was fully implementing and their 2016 UDS CRC screening rates was significant ($\rho=0.50$, p -value <0.001 ; data not shown).

Implementation Strategies

Table 4 provides an overview of FQHCs' use of implementation strategies within each of the four stages of the planning and implementation process. To assess context, 84% of FQHCs reported that they identified barriers to implementing CRC screening EBIs. Very few solicited feedback from patients and family members or assessed community CRC screening rates. Distributing CRC screening guidelines (82.1%) was the most commonly used process to engage and activate providers and staff, with a majority of FQHCs also reporting that they sought consensus among providers (66.1%) and conducted group educational meetings (62.5%) related to CRC guidelines and EBIs. Less than half of FQHCs reported conducting the other three engagement/activation processes. Within the integrate interventions within existing systems stage, the majority of respondents reported that they monitored and modified implementation processes (82.1%),

implemented incremental changes over time (82.1%), held regular review sessions (75.0%), made changes to the electronic health record system (EHR) (75.0%), and developed a formal implementation protocol (66.1%). Only a small proportion of FQHCs reported any of the strategies included in the final category: make changes to the broader context to support implementation. Secure grant funding, the most commonly reported strategy, was pursued by 44.6% of FQHCs.

Table 4 also presents implementation strategies stratified by whether the center was "fully implementing" at least one EBI. Among those FQHCs that were fully implementing EBIs, the most commonly utilized strategies were identifying barriers to implementing evidence-based approaches to increase CRC screening (83.7%), consistently monitoring the implementation process and modifying as appropriate (74.4%), distributing CRC guideline materials to providers (81.4%), implementing incremental changes over time to improve CRC (86.0%), and developing a formal implementation protocol (74.4%). Among those centers not fully implementing any EBIs, the most commonly reported strategies were developing incentive systems for the organization (92.3%), identifying barriers to implementing evidence-based approaches to increase CRC screening (84.6%), distributing CRC screening guidelines materials to providers (84.6%), and making changes to the EHR system (84.6%).

When examining the total number of implementation strategies utilized by centers, the mean number of strategies used by the respondents was 10.4 (range 2–19; data not shown). The correlation between the total number of implementation strategies used by FQHCs and 2016 UDS CRC screening rates was not significant ($\rho=0.22$, p -value = 0.10; data not shown). However, a significant correlation was noted between the number of fully implemented EBIs and the number of implementation strategies used ($\rho=0.43$, p -value = 0.001; data not shown).

Table 4 FQHCs use of implementation strategies (N=56) overall and stratified by degree of implementation

Strategy grouped by stage	All centers (N=56) Yes n (%)	Stratified	
		Centers fully implementing EBIs (N=43) Yes n (%)	Centers not fully imple- menting (N=13) Yes n (%)
Stage 1: Assess Barriers and Context			
Identify barriers to implementing EBIs to increase CRC screening	47 (83.9%)	36 (83.7%)	11 (84.6%)
Collect feedback data from patients and family members	22 (39.3%)	17 (39.5%)	5 (38.5%)
Conduct community assessment of CRC screening rates in your service area	16 (28.6%)	13 (30.2%)	3 (23.1%)
Stage 2: Activate and Engage People to Support and Execute Implementation			
Implement incremental changes over time to improve CRC screening	46 (82.1%)	37 (86.0%)	9 (69.2%)
Distribute CRC screening guideline materials to providers	46 (82.1%)	35 (81.4%)	11 (84.6%)
Consistently monitor the implementation process and modify as appropriate	46 (82.1%)	36 (83.7%)	10 (76.9%)
Have regular review sessions to learn from past experiences and improve future implementation efforts	42 (75.0%)	32 (74.4%)	10 (76.9%)
Seek consensus about chosen CRC EBIs among providers	37 (66.1%)	29 (67.4%)	8 (61.5%)
Conduct group educational meetings for providers about intent and benefit of complying with CRC screening guidelines	35 (62.5%)	29 (67.4%)	6 (46.2%)
Identify and prepare CRC screening champions (who actively promote the screening practice at the center)	26 (46.4%)	21 (48.8%)	5 (38.5%)
Create a CRC screening implementation staff team	23 (41.1%)	19 (44.2%)	4 (30.8%)
Obtain formal commitments from providers to recommend CRC screening to eligible patients	18 (32.1%)	15 (34.9%)	3 (23.1%)
Stage 3: Integrate Intervention Within Existing Systems			
Make changes to the electronic health record system	42 (75.0%)	31 (72.1%)	11 (84.6%)
Develop a formal implementation protocol	37 (66.1%)	32 (74.4%)	5 (38.5%)
Provide clinical supervision to improve providers' compliance with CRC screening guidelines	29 (52.8%)	24 (55.8%)	5 (38.5%)
Change physical structures, facilities or equipment	12 (21.4%)	11 (25.6%)	1 (7.7%)
Stage 4: Make Changes to Broader Context to Support Implementation			
Secure grant funding	25 (44.6%)	21 (48.8%)	4 (20.8%)
Develop incentive systems for the organization	20 (35.7%)	8 (18.6%)	12 (92.3%)
Build a coalition	13 (23.2%)	12 (27.9%)	1 (7.7%)
Develop incentive systems for providers	11 (19.6%)	9 (20.9%)	2 (15.4%)
Develop penalty systems for providers	1 (1.8%)	1 (2.3%)	0 (0%)
Develop penalty systems for the organization	1 (1.8%)	1 (2.3%)	0 (0%)

Needs and Preferences for Implementation Support

The majority of respondents reported that their center would like additional training in patient navigation (62%), use of small media (55%), and patient reminders (53%). Additionally, many respondents preferred on-site training and workshops (53%). Other common preferences for training included real time webinars (40%) and self-directed print learning (36%).

Discussion

Overall, the majority of surveyed FQHCs were either fully or partially implementing one or more EBIs to improve adherence to CRC screening guidelines and were actively using a range of recommended implementation strategies. Group education was the EBI that FQHCs were least likely to be either partially or fully implementing. This result makes

sense given the limited physical space in many clinics and the likely challenges of getting patients to meet as a group. The most popular implementation strategies were identifying barriers and distributing guidelines to providers, as well as strategies that are inherent to the quality improvement process that most FQHCs are familiar with (e.g. monitoring the implementation process, holding regular review sessions) [32]. Provider and organizational penalty systems were generally avoided, as were activities that require additional data collection such as community assessments and gathering feedback from patients. To our knowledge, this is the first investigation in FQHCs focused on describing both evidence-based *interventions* and *implementation strategies* from an organizational perspective, grouped by stage of implementation. Previous studies have focused on either patient or provider perspectives on CRC screening strategies in FQHCs [33]. However, none have addressed the *degree of implementation* in relation to CRC screening EBIs, or specified *implementation strategies* from the literature that are used within community health centers. We found that “fully implemented” EBIs were positively correlated with higher CRC screening rates and more implementation strategies. These results parallel findings from Daly and colleague’s work in which “systems strategies” were correlated with higher CRC screening rates in their sample of FQHCs in midwestern states [34].

Previous research with FQHCs demonstrated that clinic staff felt that training and technical assistance would be beneficial to centers and increase their capacity for implementation and engagement [35, 36]. Our study results elucidate areas where centers could use additional support in achieving desired CRC screening rates. FQHCs may benefit from training on conducting community assessments and collecting feedback from patients and families. Using those data may enhance FQHCs’ capacity to target EBIs and implementation strategies to the specific barriers preventing their patient populations from getting screened. They may also benefit from training on implementation strategies such as developing a formal implementation protocol, securing grant funding, and conducting group educational meetings for providers, which were used much more often by those FQHCs that were fully implementing EBIs. Respondents reported interest in receiving training on patient navigation, use of small media, and patient reminders, preferably in the form of on-site workshops or real-time webinars. Findings from recent studies confirm a need for guidance regarding EBIs and available resources for implementation [37, 38, 39]. By collaborating with FQHCs on the most feasible and salient interventions and implementation strategies, support system resources can be targeted more effectively.

This investigation has several limitations. Our results represent information provided by FQHCs in eight states associated with CPRN sites. Not all invitations to participate

in the survey were accepted. The low response rate could potentially impact the external generalizability of our findings, as it is possible that those FQHCs that participated were more interested in CRC screening or implementation of quality improvement strategies than those that elected to not complete a survey. However, the characteristics of the participating FQHCs are similar to other FQHCs reported in the literature [40–45].

On the other hand, our study has several notable strengths. This is one of the first comprehensive investigations into CRC EBI interventions and corresponding implementation strategies at FQHCs. Additionally, we had representation from health centers across diverse states with varying degrees of urban and rural representation, racial/ethnic composition, and Medicaid expansion which has been linked to better access to cancer screening [46–48]. Finally, the survey was developed based upon an extensive and rigorous literature review to identify all possible constructs and EBIs. The instrument underwent multiple iterations after being reviewed by implementation scientists affiliated with the CPRN.

Findings from this study indicate that FQHCs are actively engaged in multiple strategies to promote CRC screening among the nation’s medically underserved populations. Given the low rates of CRC screening in this setting, focusing future efforts on assisting those FQHCs that have not implemented any EBIs and those that are not using any implementation strategies may yield the greatest improvement in CRC screening rates. Furthermore, we have a clear indication of those EBIs and implementation strategies which have not had as much uptake compared to others. For EBIs, these include patient navigation, patient reminders, and small media. For implementation strategies, these include conducting community assessments, building coalitions, collecting feedback from patients, and obtaining formal commitments from providers to recommend CRC screening to eligible patients. While the goal of reaching 80% by 2018 was ambitious and has not yet been attained among FQHCs, there is marked movement towards using the best evidence for improving CRC screening and preventing cancer among all Americans.

Funding This research was conducted by the Cancer Prevention and Control Research Network, which is funded by the Centers for Disease Control and Prevention (CDC) Prevention Research Centers and the National Cancer Institute (NCI). This research was supported by the following cooperative agreements from the CDC Prevention Research Centers and the NCI: 3 U48 DP005030-01S5, 3 U48 DP005021-01S4, 3 U48 DP005014-01S2, 3 U48 DP005053-01S1, 3 U48 DP005013-01S1A3, 3 U48 DP005000-01S2, 3 U48 DP005017-01S8.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest to report.

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