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Assessing Levels and Correlates of Implementation of Evidence-Based Approaches for Colorectal Cancer Screening: A Cross-Sectional Study with Federally Qualified Health Centers

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Abstract

Multiple evidence-based approaches (EBAs) exist to improve colorectal cancer screening in health clinics. The success of these approaches is tied to effective implementation. Therefore, the purpose of this study was to assess the implementation of EBAs for colorectal cancer screening and clinic-level correlates of implementation in Federally Qualified Health Centers (FQHCs). We conducted descriptive and cross-sectional analyses using data collected from FQHC clinics across seven

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states (n=51). A clinic representative completed electronic surveys about clinic characteristics (e.g., size, patient characteristics, and medical record system characteristics) and the implementation of Community Guide recommended EBAs (e.g., client reminders, small media, and provider assessment and feedback). We used bivariate Spearman correlations to assess clinic-level correlates with implementation outcomes. Most clinics were planning to implement, in the early implementation stages, or inconsistently implementing EBAs. No EBA was fully implemented by more than nine (17.6%) clinics. Clinic size variables were inversely related to implementation levels of one-on-one education; medical record variables were directly related to implementation levels of client and provider reminders as well as provider assessment and feedback; and rapid and timely feedback from clinic leaders was directly associated with implementation levels of four out of six EBAs. Given the varying levels of implementation, clinics need to assess current use of implementation strategies and improve effective program delivery to increase colorectal cancer screening among their patients. In addition, clinics should also consider how their characteristics may support or serve as a barrier to implementation in their respective settings.

Keywords

Implementation and Dissemination; Cancer Prevention & Screening; Community Health Centers; Evidence-Based-Approaches; Colorectal Cancer

INTRODUCTION

Colorectal cancer (CRC) screening reduces CRC incidence and mortality through early detection and prevention (Kronborg, Fenger, Olsen, Jørgensen, & Søndergaard, 1996; Mandel et al., 2000; Shaukat et al., 2013). The US Preventive Services Task Force recommends CRC screening using fecal occult blood testing, sigmoidoscopy, or colonoscopy in adults 50-75 years old (US Preventive Services Task Force, 2016). Despite recent increases in CRC screening, estimates reveal US rates fall below the National Colorectal Cancer Roundtable goal of 80% by 2018 (Meester et al., 2015). More specifically, 2015 estimates from the American Cancer Society indicate 63% of eligible people in the US were up-to-date with CRC screening recommendations with some states reporting rates as low as 58% (American Cancer Society, 2017).

To help improve CRC screening rates, the Guide to Community Preventive Services Task Force conducted systematic reviews to determine effective evidence-based approaches (EBAs) to increase colorectal cancer screening (Sabatino et al., 2012). Based on findings, the Task Force identified a menu of four client- and two provider-oriented EBAs for clinics to consider implementing (Table 1) (The Community Guide, 2017). Client-oriented approaches include client reminders, small media, one-on-one education, and reducing structural barriers. Provider-oriented approaches include provider assessment & feedback and provider reminder & recall systems.

Despite a growing number of resources (Cancer Control P.L.A.N.E.T., Research-tested Intervention Programs (RTIPS), The Community Guide, 2017), knowledge of EBAs alone is not sufficient for achieving outcomes (Wandersman, Alia, Cook, Hsu, & Ramaswamy,

2016). EBAs need to be implemented effectively, which can be a difficult task given intervention and setting characteristics. In the clinic setting, reducing structural barriers, provider reminders, and provider assessment and feedback have been rated more challenging to implement and less frequently used than small media and client reminders (Hannon et al., 2013). As a result, clinics may be missing an opportunity to improve screening rates due to implementation-related challenges that influence program adoption and implementation.

Gaining a better understanding of EBA implementation is especially critical for federally-qualified health centers (FQHCs). FQHCs provide critical primary care services to underserved and underinsured communities (Daly, Levy, Moss, & Bay, 2015; Health Resources & Services Administration, 2017). In 2016, the Health Resources and Services Administration reported CRC screening (CRCS) rates in FQHCs to be 39.9%, which is less than screening rates of the general population. (Health Resources & Services Administration, 2018). As a result, there is an increased emphasis on reporting and improving CRCS rates among FQHCs (Allen et al., 2014). Despite increased interest, little research has been conducted assessing implementation of CRCS EBAs in FQHCs. Describing the implementation level of EBAs for improving CRCS rates in FQHCs is important in understanding progress toward reducing disparities observed in colorectal cancer incidence and mortality, since these safety net providers reach the most vulnerable patient populations including those served at migrant, homeless, public housing, and other community-based clinics.

Additionally, there is also little information available about potential clinic characteristics associated with levels of implementation of CRCS EBAs. Filling this research gap will help determine the need for implementation support as well as provide information about what clinic characteristics should be considered when implementing or evaluating the implementation of EBAs in FQHCs. Therefore, the aims of this study are to report the extent to which CRCS EBAs are implemented across a national sample of FQHCs, and to assess what clinic characteristics are correlated with CRCS EBA implementation.

METHODS

Study Design and Setting

This cross-sectional study was part of the work conducted by the Cancer Prevention and Control Research Network (CPCRN), which is a collaborative group of academic and public health community partners, and part of the Centers for Disease Control (CDC) and Prevention Research Center program (Fernandez et al., 2014; Ribisl et al., 2017). The CPCRN is funded by the CDC and the National Cancer Institute to reduce the burden of cancer. The CPCRN leveraged existing partnerships with FQHCs to establish a working group to advance the dissemination and implementation of cancer control programs in health clinics. CPCRN Network Centers (from seven states: CA, CO, GA, MO, SC, TX, and WA) recruited FQHCs by partnering with Primary Care Associations and inviting FQHCs through email, telephone calls, or in-person meetings. On agreeing to participate, the FQHCs designated an employee to serve as the main contact for the project. The CPCRN worked with the designated contact to help distribute two surveys at his/her clinic: 1) a clinic-level survey and 2) an individual-level survey. This study uses data from the clinic-level survey

only. The Institutional review Boards of the CPRN Coordinating Center at University of North Carolina at Chapel Hill, the Centers for Disease Control and Prevention, and each participating Network Center approved study procedures.

Participants

The project contact or a designated employee at each respective FQHC completed the clinic-level survey where they responded to questions about their clinic's characteristics and how well their clinics were implementing various Community Guide EBAs. Clinic representatives could ask other employees at their respective clinic if they were unsure how best to respond to a survey question(s). One clinic per FQHC system was asked to complete the survey except for clinic systems in three states (CA, WA and CO). Each state was allowed to recruit individual clinics or FQHCs. Some states opted to include multiple clinics per system based on the number of FQHCs in a given state, the geographic distribution of FQHCs and clinics, and the variability of clinics within FQHCs. As a result, there were 6 clinics from 5 different FQHCs in CA, 6 clinics from 3 different FQHCs in CO, and 16 clinics from 7 different FQHCs in WA. A total of 59 different clinics completed the survey across the seven states. Surveys were administered from January-May, 2013 using Qualtrics, an online survey tool. Individuals who completed the survey received a \$25 gift card as an incentive unless clinics opted to receive a clinic-wide incentive for their overall participation in the CPRN's research efforts. For these clinics, incentives were provided as a single payment to the clinic based on the number of surveys completed during the entire project (both clinic- and individual-level surveys were included in this incentive).

Measures

Respondents provided general information about the state in which their clinic was located and their job title. However, no other individual demographic information (e.g. gender, age, etc.) was collected from respondents since they were answering on behalf of clinics. Implementation levels of each CRCS EBA were measured using six different questions (Table 2) (Hannon et al., 2013). The survey also included 12 questions related to clinic characteristics used in analyses (Table 2). Respondents answered questions about clinic size (number of employees and patient encounters), characteristics of the patient population, accuracy and ease of retrieving information from the medical record system (Table 2), and the clinic's use of quality improvement incentives and leadership feedback. The number of providers and patient encounters values were used to create an additional variable representing the ratio of patient encounters to providers. The survey also included a series of four questions about the ease of generating information from the medical record system. Responses from the medical record system questions were added together to create one index variable with values ranging from 0-12. As a result, ten clinic characteristics variables were included in the analysis.

Statistical Analysis

We carried out descriptive statistics to characterize respondent job types, clinics, and implementation levels for the Community Guide CRCS EBAs. Because implementation outcomes and some clinic characteristics were measured on an ordinal scale, we used bivariate Spearman correlations to assess associations between clinic characteristics and

implementation levels of EBAs. Results are reported in terms of effect sizes rather than p values given the exploratory nature of this study. A correlation greater or equal to 0.30 was selected as a meaningful relation given it corresponds with a moderate effect size. The analysis was conducted using Stata version 13.0.

RESULTS

A total of 256 clinics were approached to be part of the study. Seventy-nine clinics indicated interest in participating, 59 clinics responded to the clinic-characteristics survey, and 51 clinics provided complete data for implementation outcomes. About 17.6% of clinics were from a single-clinic FQHC, 54.9% were from an FQHC that had 2-4 clinic sites, and 27.5% were from an FQHC with 5-21 sites. The most common job types for respondents were Quality Director (11), Chief Medical Officer (8), and Chief Executive Officer (6). There was a range of other job types in the sample, which included other leadership positions (e.g. Chief Nursing Officer, Chief Operations Officer) as well as operational and administrative positions (e.g. Clinic Managers, Director of Programs, Outreach Program Administrator).

The states with the most clinics that responded were Texas (14) and Washington (16), whereas Missouri (1) and South Carolina (3) had the fewest number of clinics respond. Clinics employed an average of 37 full time employees, and had an average of 33,631 patient encounters in the previous calendar year (Table 3). Almost 50% of patients were uninsured, just over 50% of patients were at or below the federal poverty level, and about 30% of patients had limited English proficiency. In general, clinics were planning to implement or were already implementing many of the EBAs (Table 4). Provider assessment and feedback, one-on-one education, and provider reminders were the most commonly implemented approaches as indicated by having the most clinics in the early implementation stages or higher. No EBA was reported as being fully implemented by more than nine (17.6%) clinics.

Assessing trends across clinics indicated 31 (61%) were inconsistently implementing at least one evidence-based approach, 29 (57%) were in the early stages of implementing at least one approach, and 38 (74%) were planning to implement at least one approach. Overall, clinics reported implementing (in early stages or higher) an average of 3.47 (± 1.63) out of the six EBAs. Only one clinic reported fully implementing all EBAs whereas two clinics reported no plans to implement any of the EBAs under study.

Results from bivariate Spearman correlations are presented in Table 5. Number of full time employees and patient encounters were inversely associated with implementation levels of one-on-one education ($\rho = -0.30$ and $\rho = -0.32$, respectively). EMR accuracy was directly associated with implementation levels of provider assessment and feedback ($\rho = 0.31$). Ease of retrieving medical record information was directly associated with implementation levels of client reminders ($\rho = 0.37$) and provider reminders ($\rho = 0.30$). Last, rapid and timely feedback from clinic leaders was directly associated with implementation levels of four EBAs: one-on-one education ($\rho = 0.36$), client reminders ($\rho = 0.33$), provider assessment and feedback ($\rho = 0.39$), and provider reminders ($\rho = 0.31$). Notably, the ratio of patient encounters to providers, offering incentives aligned with quality improvement, and the

patient characteristics variables had only three correlations greater than or equal to 0.20, which translates to weak or no associations with the implementation levels of any EBAs.

DISCUSSION

This study set out to describe implementation levels of CRCS EBAs across FQHCs and determine what clinic characteristics were correlated with reported implementation levels. The descriptive trends suggest clinics are implementing multiple EBAs. However, across all approaches, most clinics were either planning to implement, in the early implementation stages, or inconsistently implementing. Given the variability in implementation levels, these trends suggest a need for implementation strategies to improve program delivery and in-turn effectiveness. In addition, correlation results revealed several substantive associations between clinic characteristics and implementation levels of EBAs. Notably, clinic size variables were inversely related to implementation levels of one-on-one education; medical record variables were directly related to implementation levels of client and provider reminders as well as provider assessment and feedback; and rapid and timely feedback from clinic leaders was directly associated with implementation levels of four out of six EBAs.

One-on-one education consists of communicating information with the goal of informing, encouraging, or motivating people to get screened (The Community Guide, 2017). Therefore, having to train a large staff or reach a larger number of clients may be a barrier when trying to provide individual education about screening, and the clinic may be faced with seeing a higher number of patients with fewer staff, resulting in less time available for EBA implementation with each patient. This may be particularly challenging in clinics experiencing staff shortages and/or high employee turnover. Patient encounters were also inversely related to implementation levels of other EBAs, although most effect sizes were in the weak-moderate range (>0.20 but <0.30). Overall, more patient encounters represents larger and busier clinics, which may introduce an added challenge when implementing EBAs for CRCS as the data suggest.

Ease of retrieving information from the medical record system was directly correlated with client and provider reminders. Client reminders include letters, postcards, emails, or telephone calls reminding patients their screening is due whereas provider reminders inform healthcare providers that a client needs a screening test (The Community Guide, 2017.) Both types of reminders require a clinic to identify clients in need of screening. Therefore, having a medical record system that can support retrieving client screening information would further facilitate the implementation of these EBAs (Cole et al., 2015). In addition, EMR accuracy was directly correlated with provider assessment and feedback. Provider assessment and feedback approaches evaluate and present providers with information about their performance for CRC screening (The Community Guide, 2017). Therefore, having an accurate EMR likely plays an important role in the implementation of provider-oriented approaches in FQHCs and should be monitored for its role as a key strategy in increasing the uptake of CRCS in disparate populations.

Rapid and timely feedback from clinic leaders was directly associated with implementation levels of all EBAs with moderate correlations except for reducing structural barriers (where

it was a weak-moderate correlation) and small media (where it was weak). These results suggest leadership likely plays a role in the implementation process across many EBAs except for small media, which consists of using small videos or print materials to motivate individuals for screening (Kegler et al., 2018; The Community Guide, 2017.) In contrast, patient characteristics and quality improvement incentives had weak correlations with implementation levels of almost all EBAs suggesting other factors likely play a larger role in implementation.

A previous study assessing the use of Community Guide-recommended EBAs by Colorectal Cancer Control Program Grantees indicated that clinics implemented 3.15 EBAs on average (Hannon et al., 2013). In addition, small media and client reminders were the most commonly used EBAs. Results from our study which indicated that clinics were also implementing about 3 EBAs were consistent with previous findings. However, one-on-one education, provider assessment & feedback, and provider reminders were the most commonly implemented programs (early implementation stage or higher) relative to the others in this study sample. Our study extends on findings from current literature because it includes information assessing the level of implementation and not just use of EBAs. Further, our study provides descriptive evidence to support the idea that variability exists in implementation levels across clinics and that different contextual factors are related to different levels of EBA implementation. As a result, there is a need for using effective implementation strategies to further enhance program delivery and effectiveness where implementation is in the early stages or inconsistent. Additionally, the development of new approaches should consider the clinical practice work flow and be readily adaptable to further improve implementation (Neta et al., 2015; Tu et al., 2014).

The primary study limitations include a cross-sectional design with a small sample. This limited the ability to further assess causal relations by addressing confounders and establishing a temporal precedence. In addition, the recruitment and survey approach could have led to a selection bias where the sample included a disproportionate number of highly motivated health centers and clinics. Data collected for this study were from self-reported questionnaires by a clinic representative responding about both clinic characteristics and implementation levels. It is possible respondents had varying levels of understanding about the implementation of programs at their respective clinics, which may influence survey results. Further, there was no question explicitly addressing the amount of time clinics had been implementing respective EBAs, which is likely related to where clinics are in the implementation process. Because data were collected in 2012, it is possible results are not representative of clinic's current implementation levels. There are also other important factors worth assessing that were not measured by this study (e.g. prioritization of CRCS, reporting requirements, type of screening offered, and variations across states). Last, some clinics in CA, CO, and WA were part of the same FQHC systems, however, we did not account for potential clustering in the analysis due to the exploratory nature of the research.

Despite limitations, this study had several strengths. First, this study provides empirical evidence about the variability of implementation levels of EBAs among clinics, supporting the need for effective implementation strategies. The exploratory nature of the study also allowed for testing many relations to determine what variables are important to assess and

control for in future studies evaluating implementation outcomes. In addition, results provide information to clinics about factors they should consider when choosing to adopt and implement EBAs. For example, an easy to use medical record system is likely important if a clinic wants to implement client and provider reminders. Additionally, using one-on-one education may be more challenging to implement in a larger clinic setting where less time may necessarily be spent with patients. Lastly, despite using a convenience sample, there was a high level of variation in clinic characteristics. When compared to a national sample of FQHCs using available data from 2014-2016 (Health Resources and Services Administration, 2018), the national averages for number of patients and patient characteristics were either similar or within one standard deviation of our sample mean. Notably, clinics treated a similar number of patients with limited English proficiency, had a somewhat higher percentage of patients at or below the federal poverty level, and a marginally lower percentage of patients who were uninsured when compared to a national sample of FQHCs.

Conclusions

Overall, few participating FQHCs reported fully implementing EBAs for improving the uptake of CRCS. This suggests that strategic investments in CRC prevention and control are needed to support the ongoing implementation of EBAs at the clinic level, especially those reaching minority and underserved populations, in order to realize the promise of CRC prevention and control. In addition, study results suggest clinics have varying implementation levels of several EBAs. Therefore, clinics need to establish more effective ways to deliver EBAs by developing, using, and assessing the current use of implementation strategies. Results also showed key clinic characteristics were related to implementation such as clinic size, accuracy and ease of medical record use, and clinic leadership. Thus, clinics can prioritize EBAs by focusing on how their clinic characteristics may support or serve as a barrier to implementation in their setting. Last, the abovementioned clinic characteristics are important to control for in future research assessing factors associated with implementation. Future research should continue to focus on assessing factors that can influence implementation. Gaining a better understanding will help improve future implementation efforts and program effectiveness.

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Table 1:

Community Guide Evidence-Based Approaches for Colorectal Cancer Screening

Intervention	Definition
Client-Oriented Approaches	
Client Reminders	Written (letter, postcard, email) or telephone messages (including automated messages) advising people that they are due for screening.
Small Media	Videos and printed materials such as letters, brochures, and newsletters. These materials can be used to inform and motivate people to be screened for cancer. They can provide information tailored to specific individuals or targeted to general audiences.
One-on-one Education	Delivers information to individuals about indications for, benefits of, and ways to overcome barriers to cancer screening with the goal of informing, encouraging, and motivating them to seek recommended screening. These messages are delivered by healthcare workers or other health professionals, lay health advisors, or volunteers, and are conducted by telephone or in person in medical, community, worksite, or household settings.
Reducing Structural Barriers	Non-economic burdens or obstacles that impede access to screening. Interventions designed to reduce these barriers facilitate access by reducing time or distance between service delivery settings and target populations; modifying hours of service to meet client needs, offering services in alternative or non-clinic settings; and eliminating or simplifying administrative procedures and other obstacles.
Provider-Oriented Approaches	
Provider Reminders	Reminders inform health care providers it is time for a client's cancer screening test (called a "reminder") or that the client is overdue for screening (called a "recall"). The reminders can be provided in different ways, such as in client charts or by e-mail.
Provider Assessment and Feedback	Evaluate provider performance in delivering or offering screening to clients (assessment) and present providers with information about their performance in providing screening services (feedback). Feedback may describe the performance of a group of providers (e.g., mean performance for a practice) or an individual provider, and may be compared with a goal or standard.

Table 2:**Survey Questions for Implementation Outcomes and Clinic Characteristics**

Implementation Outcomes and Response for Community Guide EBAs		
Survey Question	Response Option	
Does the clinic use...	1-No, and have no plans to do so	
1) One-on-one education to promote colorectal cancer screening?	2-No, but planning to implement this strategy in the future	
2) Approaches that reduce structural barriers to promote colorectal cancer screening?	3-Yes, we are at an early stage of implementing this strategy	
3) Patient reminders to promote colorectal cancer screening?	4-Yes, we have implemented this strategy, but it is inconsistently implemented across the clinic	
4) Provider assessment and feedback to promote colorectal cancer screening?	5-Yes, we have implemented this strategy fully and systematically across the clinic	
5) Small media to promote colorectal cancer screening?		
6) Provider reminders to promote colorectal cancer screening?		
Clinic Characteristics Questions and Response Type		
Topic	Survey Question	Response Type
Clinic Size	1. How many Full Time Equivalents of the following personnel? (Providers, Nurses, Medical Assistants, Enabling services personnel)	Numeric
	2. Total patient encounters at the clinic in 2012?	Numeric
Characteristics of Patient Population	3. Percentage of patients who are uninsured at the clinic?	Percent
	4. Percentage of patients who are at or below 100% FPL at the clinic?	Percent
	5. Estimate the percentage of patients at the clinic who have limited English proficiency?	Percent
Medical Record System	6. How accurate is the CRCS data generated from the EMR?	1 Very accurate 2 Somewhat accurate 3 Not at all accurate
	With the patient medical record system, how easy would it be to...	
	7. Generate a list of patient panels by provider	1 Easy (<24 hours)
	8. Generate a list of patients who are due/overdue for CRCS	2 Somewhat Difficult (<1 week)
	9. Have reminder patients when they are due for CRCS	3 Difficult (>1 week)
	10. Obtain CRCS rates	4 Cannot Generate
Incentives and Feedback	11. Incentives at the clinic are aligned with quality improvement	5 point Likert scale: (Strongly disagree to Strongly Agree)
	12. Clinic Leaders provide staff with rapid and timely feedback on performance measures of CRCS	

EBAs, Evidence-Based Approaches; FPL, Federal Poverty Level; CRCS, colorectal cancer screening; EMR, electronic medical record

Table 3:

Descriptive Characteristics of Participating Clinics

Variable (n)	Mean (range)	SD
Number of full time employees (47)	37.3 (3–209)	47.0
Patient encounters in 2012 (44)	33,631.2 (911–165,085)	37,443.2
Patient encounters / number of providers (44)	3,917 (484–14,410)	2828.4
Percentage of Patients uninsured (47)	47.6 (6–95)	23.0
Percentage of Patients at/below the federal poverty level (47)	55.4 (5–95)	22.1
Percentage patients with limited English proficiency (47)	30.6 (0–90)	27.9
Ease of EMR use (51)	8.4 (1–12)	3.3
EMR accuracy (46)	2.2 (1–3)	0.5
Incentives aligned with quality improvement (51)	2.2 (0–4)	1.2
Clinic leaders provide rapid and timely feedback (51)	1.7 (0–4)	1.1

EMR, Electronic Medical Record

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Table 4:

Implementation of Community Guide Evidence Based Approaches among Federally Qualified Health Centers, n=51, n (%)

	No Plans to Implement	Planning to Implement	Early Stages of Implementation	Inconsistently Implemented	Fully Implemented
One-on-one Education	5 (9.8)	11 (21.6)	10 (19.6)	16 (31.4)	9 (17.6)
Reduce Structural Barriers	7 (13.7)	16 (31.4)	10 (19.6)	10 (19.6)	8 (15.7)
Client Reminders	7 (13.7)	22 (43.1)	12 (23.5)	8 (15.7)	2 (3.9)
Provider Assessment & Feedback	3 (5.9)	16 (31.4)	14 (27.4)	10 (19.6)	8 (15.7)
Small Media	7 (13.7)	17 (33.3)	10 (19.6)	16 (31.4)	1 (2.0)
Provider Reminders	4 (7.8)	14 (27.5)	17 (33.3)	8 (15.7)	8 (15.7)

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Table 5:

Spearman's rho (ρ) Correlations between Clinic Characteristics and Implementation Levels of Evidence-Based Approaches

Clinic Variables	One-on-One Education	Reduce Structural Barriers	Client Reminders	Provider Assessment & Feedback	Small Media	Provider Reminders
Number of FTEs	-0.30	-0.08	-0.28	-0.05	-0.04	-0.08
Patient Encounters	-0.32	-0.24	-0.22	-0.25	-0.19	-0.04
Encounters/Providers	-0.02	-0.12	0.12	-0.21	-0.20	-0.07
% Uninsured patients	-0.05	0.12	-0.05	0.10	-0.20	0.00
% Patients FPL	-0.15	0.09	-0.12	0.02	-0.17	-0.08
% Patients limited English	-0.11	0.17	0.10	0.15	0.08	-0.14
EMR Accuracy	0.03	-0.04	0.11	0.31	0.17	0.21
Ease of retrieving information	-0.08	-0.04	0.37	-0.03	0.15	0.30
QI Incentives	-0.04	-0.07	0.11	0.00	-0.23	0.17
Rapid Feedback	0.36	0.23	0.33	0.39	0.08	0.31

FTE, Full-time equivalents; FPL, Federal poverty limit; EMR, Electronic medical record; QI, Quality improvement; Boldface indicates $\rho > 0.30$ corresponding with a moderate effect size.

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