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Using Evidence-based Interventions to Improve Cancer Screening in the National Breast and Cervical Cancer Early Detection Program

A DeGross, Ph.D., M.P.H.,

Senior Health Scientist, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control, Program Services Branch, Atlanta, Georgia

A Carter, M.S.,

Evaluation Fellow, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control, Program Services Branch, Atlanta, Georgia

K Kenney, M.P.H.,

Health Scientist, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control, Program Services Branch, Atlanta, Georgia

Z Myles, M.P.H.,

Epidemiologist, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control, Program Services Branch, Atlanta, Georgia

S Melillo, M.P.H.,

Health Scientist, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control, Program Services Branch, Atlanta, Georgia

J Royalty, M.S.,

Public Health Advisor, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control, Program Services Branch, Atlanta, Georgia

K Rice, Ph.D., M.S.,

Prevention Effectiveness Fellow, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control, Program Services Branch, Atlanta, Georgia

Corresponding Author: Amy DeGross, 4770 Buford Hwy, NE, MS K-76, Atlanta, GA, 30341, 770-488-2415, adegrosso@cdc.gov.

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L Gressard, M.Ed., M.P.H., and

Presidential Management Fellow, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control, Program Services Branch, Atlanta, Georgia

JW Miller, M.D.

Medical Director, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Cancer Prevention and Control, Program Services Branch, Atlanta, Georgia

Abstract

Context—The National Breast and Cervical Cancer Early Detection Program (NBCCEDP) provides cancer screening to low income, un- and underinsured women through over 11,000 primary care clinics. The program is well-positioned to work with health systems to implement evidence-based interventions (EBIs) to increase screening among all women.

Objective—To collect baseline data on EBI use, evaluation of EBIs, and related training needs among NBCCEDP grantees.

Design—CDC conducted a web-based survey in late 2013 among NBCCEDP grantees for the period July 2012-June 2013. This was the first systematic assessment of EBIs among NBCCEDP grantees.

Setting—CDC’s National Breast and Cervical Cancer Early Detection Program

Participants—Primarily program directors/coordinators for all 67 NBCCEDP grantees.

Main Outcome Measures—Data captured were used to assess implementation of five EBIs, their evaluation, and related training needs. Frequencies and proportions were determined. Cluster analysis identified grantees with similar patterns of EBI use for NBCCEDP clients and providers.

Results—On average, 4.1 of 5 EBIs were implemented per grantee for NBCCEDP clients and providers. Four clusters were identified including “high overall EBI users,” “high provider EBI users,” “high EBI users with no provider assessment and feedback,” and “high client EBI users.” Only 1.8 EBIs were implemented, on average, with non-NBCCEDP clients and providers. Fewer than half (n= 32, 47.8%) of grantees conducted process or outcome evaluation of one or more EBIs. Overall, 47.6% of grantees reported high or medium training needs for client-oriented EBIs and 54.3% for provider-oriented EBIs.

Conclusions—NBCCEDP grantees are implementing EBIs extensively with clients and providers. Increased EBI use among non-NBCCEDP clients/providers is needed to extend the NBCCEDP’s reach and impact. Grantee training and technical assistance is necessary across EBIs. Additionally, grantees’ use of process and outcome evaluation of EBI implementation must be increased to inform effective program implementation.

Keywords

Early detection of cancer; public health; program evaluation; evidence-based practice; healthcare systems

INTRODUCTION

The Centers for Disease Control and Prevention (CDC) National Breast and Cervical Cancer Early Detection Program (NBCCEDP) has a long history of providing high quality screening for the medically underserved.^{1–3} However, recent health care reforms offer new opportunities for the program to expand its reach beyond those women screened through the program⁴ and promote implementation of organized screening programs more broadly.⁵ In particular, the Affordable Care Act (ACA) is expected to expand insurance coverage to an estimated 25 million Americans by 2016⁶ while also requiring many plans to cover without cost-sharing clinical preventive services recommended by the U.S. Preventive Services Task Force, including breast and cervical cancer screening.⁷ Expanded insurance coverage and elimination of cost-sharing remove two significant barriers to cancer screening.⁸ However, research suggests that even for women with insurance, non-financial barriers related to knowledge, language, health literacy, geography, culture, and social support impede screening.^{8–9} Indeed, data from the 2013 National Health Interview Survey (NHIS) show that only 77% and 85% of insured women were up-to-date with breast and cervical cancer screening, respectively.¹⁰

The NBCCEDP, with a network of over 11,000 primary care clinics, is uniquely positioned to work with health systems to implement initiatives that increase screening among both the newly insured and those who remain un- and under-insured. Consequently, when CDC established a new, five-year grant cycle for the NBCCEDP in 2012 (DP12–1205), grantees were encouraged to expand their reach and increase impact by implementing and evaluating evidence-based interventions (EBIs) in health systems and organizations while continuing to provide breast and cervical cancer screening consistent with the law establishing the program (Breast and Cervical Cancer Mortality Prevention Act of 1990). CDC encourages NBCCEDP grantees to adopt some combination of five EBIs identified in the Guide to Community Preventive Services [Community Guide] (<http://www.thecommunityguide.org/index.html>) as effective in increasing breast and cervical cancer screening. These include two provider-oriented EBIs: messages to providers to remind them to make a screening recommendation (provider reminders) and assessment and feedback to providers about their performance in meeting specific benchmarks (provider assessment and feedback, e.g., cancer screening rates among their client population). The EBIs also include three client-oriented strategies: small media to increase awareness about screening, written or telephone reminders to clients due for screening, and efforts to reduce structural barriers that impede screening (e.g., expanding clinic hours).

Understanding NBCCEDP grantees' implementation of EBIs can inform public health efforts to increase cancer screening through health systems changes and improved community-clinical linkages. This study provides baseline data on EBI use among NBCCEDP's 67 grantees in July 2012–June 2013, their first program year under the current grant cycle. Although the NBCCEDP has a robust data monitoring system in place for clinical service delivery,¹¹ this is the first time CDC has systematically assessed the implementation of EBIs that increase cancer screening. We also examine grantees' evaluation of EBIs and identify their training and technical assistance (TA) needs for EBI implementation.

METHODS

Survey Development and Administration

Evaluators at CDC developed a survey comprised of seven sections: non-screening program activities, clinical service delivery, evaluation, non-screening partnerships, data use, training and TA, and program management. The purpose of the survey was to assess program implementation efforts, particularly those related to the use of EBIs. Survey items explored EBI use with two distinct populations: NBCCEDP clients and providers in NBCCEDP-funded clinics (women receiving clinical services through the program and providers delivering those services) and non-NBCCEDP clients and providers (women or providers outside of NBCCEDP-funded clinic sites who receive an intervention through the program). The 67-item instrument included both dichotomous and multiple response questions. In regard to EBI use, grantees were asked if their program used a particular EBI as a dichotomous question with the response options of yes or no. The instrument was piloted with eight NBCCEDP grantees to assess clarity and further tested with three public health professionals to assess the estimated time (30 minutes) required to complete the data collection.

CDC's data contractor, Information Management Services, Inc. created a web-based survey which they administered. An introductory email was sent to all NBCCEDP program directors in November 2013 providing a unique link to the survey. Grantees were encouraged to have the person most familiar with the day-to-day operations of the program complete the survey. Participation was voluntary and the instrument was determined exempt from human subjects review. Survey administration was approved by the Office of Management and Budget (OMB #0920-0879). Grantees completed the survey in November-December 2013.

Several methods were instituted for data validation. Within the survey software, response inconsistencies were flagged for resolution by the respondent. Questions left blank or responses outside a defined range required correction before submission. Once submitted, a report with all survey questions and responses was provided to grantees, CDC program consultants, and a CDC evaluation team member for review. Inconsistencies and potential inaccuracies were discussed with grantees and data were revised when necessary. Data validation was completed in January 2014.

Descriptive Analysis

Data captured in the program activities, training and TA, and evaluation sections of the survey were included in analyses. The selected survey items assessed implementation of all five EBIs, evaluation of EBIs, and training needs per EBI. Each EBI was examined by (1) population (NBCCEDP clients/providers, non-NBCCEDP clients/providers), (2) evaluation type (process evaluation, outcome evaluation, both, not evaluated), and (3) level of training and TA need (low, medium, high). Frequencies and proportions were determined.

Cluster analysis

Cluster analysis is an exploratory technique used to recognize patterns in a given data set and identify naturally related groups or clusters.¹² In this study, cluster analysis was used to identify grantees with similar patterns of EBI use for NBCCEDP clients and providers. The cluster analysis did not examine EBI use for non-NBCCEDP audiences, given limited implementation of these activities. Four EBIs were included in the analysis: provider reminders, provider assessment and feedback, client reminders, and reducing structural barriers. Small media was excluded given a lack of variation; all but one grantee implemented small media.

A two-step approach to the cluster analysis was employed. First, to determine the similarity of grantees in relation to one another, each grantee was treated as an individual cluster with distances between grantees measured. Closest distances were determined using the Ward Minimum Variance Method.¹²⁻¹⁴

A dendrogram was produced to assess grouping options and identify the number of suitable clusters for interpretation. The R-square (RSQ) and semi-partial R-squared (SPRSQ) values were used in determining groupings. The RSQ value measures the heterogeneity between the clusters and the SPRSQ value measures the loss of homogeneity as clusters that are different from each other are combined.¹⁵ The number of clusters best fitting the data was determined when adding an additional cluster produced a high RSQ value while maintaining a low SPRSQ value. The number of clusters was further assessed to determine whether clusters could be described practically and sensibly interpreted.¹⁶

The second step of the cluster analysis used the K-means method to calculate the means of each factor (i.e., EBI use) by cluster. Since each factor was coded as 0 (grantee does not use the EBI) or 1 (grantee uses the EBI), the mean represents the proportion of EBI use in each cluster. Based on proportions, clusters were characterized by use of provider or client-oriented EBIs. Training and TA needs were also examined among the clusters. All analyses were performed using SAS© statistical software (SAS Institute Inc., Cary, North Carolina).

RESULTS

Respondent Characteristics

All 67 grantees (100% response rate) completed the survey with 94% of respondents representing either program directors or program managers/coordinators. Thirty-one (46.3%) respondents reported working with their NBCCEDP program for six or more years, while 9 (13.4%) respondents reported working with their program for less than one year at the time of survey administration. Grantees' first year funding, including CDC and other resources (e.g., state funding), ranged from \$238,433 to \$25,294,773 (mean= \$4,181,623, median=\$2,532,271, SD= \$4,729,651). A complete presentation of respondent characteristics is provided in Table 1.

EBI Implementation

All grantees reported implementing at least three EBIs targeting NBCCEDP clients/providers, with 30 (44.8%) grantees reporting implementation of all five. On average, 4.1 of 5 EBIs (SD=1.0, range 3–5) were implemented per grantee with small media (n=66, 98.5%) most frequently implemented, followed by client reminders (n=60, 89.6%), activities to reduce structural barriers (n=58, 86.6%), provider assessment and feedback (n=47, 70.1%) and provider reminders (n=42, 62.7%) (Fig. 1).

Fewer EBIs were implemented with non-NBCCEDP clients/providers. On average, 1.8 EBIs (SD=1.2, range=0–5) were implemented per grantee and only 32 (47.8%) grantees reported implementing at least three EBIs for this population. Small media (n=63, 94.0%) was most frequently reported as implemented for non-NBCCEDP clients/providers, followed by activities to reduce structural barriers (n=27, 40.3%), client reminders (n=19, 28.4%), provider assessment and feedback reports (n=7, 10.4%), and provider reminders (n=5, 7.5%).

Four clusters were identified accounting for 68% of the variance (RSQ=.68, SPRSQ=0.08). The means generated from the K-means method are shown in Table 3. Clusters were characterized as low EBI users if the proportion was less than 0.50 and high EBI users if greater than 0.70. Including the largest number of grantees at 40, cluster 1 is characterized as “high overall EBI users” whereby at least 75% of grantees implemented provider-oriented EBIs and 100% of grantees used client-oriented EBIs. Cluster 2 (n=7) represents “high provider EBI users.” In this cluster, more than 80% of grantees used provider-oriented EBIs and less than 50% used client-oriented EBIs. The smallest number of grantees (n=6) comprise cluster 3 which reflects “high EBI users with no provider assessment and feedback.” Cluster 4 includes 14 grantees representing “high client EBI users” where 79% of grantees implemented client-oriented EBIs and none used provider-oriented EBIs.

Evaluation of EBIs

Overall, 32 (47.8%) of the 67 grantees conducted process or outcome evaluation of one or more EBIs. Of these, 11 (34.4%) grantees conducted only process evaluation, 6 (18.8%) grantees conducted only outcome evaluation, and 15 (46.9%) grantees conducted both process and outcome evaluation. Of those grantees implementing specific EBIs, provider assessment and feedback was most frequently evaluated (22/48, 45.8%), followed by small media (21/67, 31.3%), reducing structural barriers (17/58, 29.3%), client reminders (17/61, 27.9%), and provider reminders (9/43, 20.9%) (Fig. 2).

Training and TA

In total, 47.6% of grantees reported high or medium training and TA needs for client-oriented EBIs and 54.3% of grantees for provider-oriented EBIs. A high need for training and TA was most frequently reported for the implementation of provider assessment and feedback (n=21, 31.3%) and reducing structural barriers (n=13, 19.4%), respectively (Table 4). A low need for training and TA was most frequently reported for the implementation of client reminders (n=43, 64.2%), provider reminders (n=35, 52.2%), and small media (n=34, 50.7%).

No patterns were evident by cluster for level of training and TA need (table 4). High EBI users, low EBI users, and non-users all reported similar levels of training and TA need for many of the EBIs. Further, no relationship between grantees' use of an EBI and training and TA needs was identified. For example, even though all 40 grantees in cluster 1 used provider assessment and feedback, 60% reported a need for training and TA. Comparatively, while none of the 14 grantees in cluster 4 used provider assessment and feedback, 64% reported training and TA needs for this EBI.

DISCUSSION

Many initiatives and mandates promote use of evidence-based practices in government, including in public health.¹⁷ Significant funding and attention are directed to bridge the evidence-practice divide and improve dissemination of best practices.^{18–19} In cancer prevention and control, economic efficiency is imperative; implementing strategies based on strong empirical evidence can help increase lifesaving screening and reduce disparities without compromising limited resources on less effective activities. CDC promotes EBI use for all three of its cancer prevention and control programs: the NBCCEDP, the Colorectal Cancer Control Program (CRCCP), and the National Comprehensive Cancer Control Program (NCCCCP).^{20–21} ensuring that grantees invest in programs that have proven effectiveness.

In this study we found that, among NBCCEDP grantees, use of EBIs for clients screened through the program and their providers is high. Cluster analysis found nearly 60% of grantees could be categorized as high overall EBI users for program year 2012–2013. It is important to also note that there are likely diffusion effects within NBCCEDP clinics whereby patients with other payment sources for screening benefit from EBI implementation. CDC's long-standing emphasis on comprehensive, organized screening programs, including EBIs, and the NBCCEDP's maturity are likely contributors to the high EBI utilization observed among grantees' clients and providers.

In contrast, grantees were implementing only 1.8 EBIs on average for non-NBCCEDP clients and providers. This may be largely attributed to the fact that the law establishing the NBCCEDP required grantees to expend at least 60% of their CDC funds on direct clinical services, leaving limited resources to support non-screening activities among non-NBCCEDP populations. Also, program year 2012–2013 was the first time CDC encouraged grantees to expand their reach to this audience.

In the fiscal year 2015 federal budget appropriation, the 60% requirement was eliminated. This change increases grantees' flexibility to expand EBI implementation to non-NBCCEDP clients and providers while continuing to implement EBIs to recruit the hardest-to-reach women who remain uninsured. With the ACA increasing access to insurance coverage for cancer screening services, the NBCCEDP has a significant opportunity to improve screening and decrease cancer mortality by extending its reach to the millions of newly insured and their providers.

Grantees benefit from a wide range of established partnerships, including their extensive network of primary care providers, which could be leveraged to expand EBI implementation. For instance, in the 2012–2013 program year, grantees partnered with state cancer coalitions, community-based organizations, health systems, local health departments, federally qualified health centers, and their state Medicaid program.²² With these partnerships and more flexible funding, the NBCCEDP is well positioned to further improve cancer screening among all women.

For both NBCCEDP and non-NBCCEDP audiences, the top three EBIs used by grantees were client-oriented strategies: small media, client reminders, and reducing structural barriers. This tendency towards client-oriented strategies is consistent with a study of EBI implementation among CDC's CRCCP grantees.²¹ Universal use of small media may be facilitated by availability of materials through national organizations and through Make-It-Your-Own (MIYO), a web-based tool developed by communication researchers at Washington University that allows users to create customized small media materials with evidence-tested messages.²³ Extensive use of reminders for NBCCEDP clients is possible given grantees' tracking of their client population and ability to correspond directly with them, rather than depending on clinic and health systems to send reminders. High use of activities to reduce structural barriers may be explained, in part, by grantees' uptake of patient navigation (93%, data not reported); some navigation services, such as facilitating transportation, can be considered reducing structural barriers.

Provider-oriented EBIs were used to a lesser extent by NBCCEDP grantees. Results indicate training and TA needs are slightly higher for provider versus client-oriented EBIs. Grantees may have the least control over implementation of provider reminders given a dependency on provider sites and health systems to put these in place. Of interest, the highest rated training and TA need among grantees was for implementation of health systems changes suggesting grantees are challenged in this area.²² CDC has developed grantee technical assistance guides for working with health systems and facilitating use of EBIs (<http://www.cdc.gov/cancer/nbccedp/>), but more training and TA are needed. Increasing the use of provider-oriented strategies is important given their potential to increase screening. Provider recommendation is often cited by patients as the primary reason for screening.²⁴ Also, provider-oriented EBIs have been shown to have greater impact on increasing cancer screening than client-oriented ones.²⁵

Use of provider assessment and feedback was lower among NBCCEDP audiences than expected. CDC supports a rigorous process of grantee assessment and feedback and provides grantees with a software program enabling them to produce provider-level feedback reports.¹¹ Two separate studies have shown the NBCCEDP's performance management system, which includes these reports, to improve performance on priority clinical indicators.^{26–27} Only 70% of grantees are using this strategy within the NBCCEDP provider network. Of interest, grantees most frequently rated provider assessment and feedback as an area of high need for training and TA, although this may relate more to implementation in non-NBCCEDP provider settings. A greater understanding of grantees' challenges with this strategy is needed.

Cluster analysis revealed four patterns of EBI use. Cluster composition and characterization may change over time if grantees increase implementation of provider-oriented EBIs. In particular, future cluster analysis of survey data may reveal important patterns of EBI use with non-NBCCEDP clients/providers. Although analysis of EBI training and TA needs by cluster did not reveal notable differences, it is possible that each cluster has unique needs. For example, grantees already implementing an EBI may benefit from training and TA addressing challenges to sustain the EBI, whereas grantees not implementing that EBI may need training and TA highlighting resources and partners needed for start-up. CDC should explore whether a cluster-specific approach to training and TA would be beneficial. Results support the need for training and TA across all EBIs.

Finally, results showed less than half of NBCCEDP grantees evaluated EBIs in program year 2012–2013, with fewer than one third evaluating outcomes. This is in sharp contrast to the historically strong monitoring of clinical service delivery within the NBCCEDP.¹¹ Evaluation of EBIs by grantees presents several challenges including developing new performance measures, establishing benchmarks, and working with health systems to collect related data. Grantees may benefit from hiring staff with evaluation expertise or contracting with professional evaluators. CDC is currently working to develop EBI-specific logic models and performance measures for grantees' use.

Grantees often subcontract with agencies and organizations to deliver non-screening EBIs, making process evaluation critical to ensure EBIs are reaching priority populations and implemented with fidelity and quality. A recent assessment of NBCCEDP activities in three areas (health education and promotion, quality assurance/quality improvement, and case management/patient navigation) identified important deficiencies including inconsistent and partial implementation, lack of implementation fidelity, and inadequate intervention dose either because implementers were not doing enough of a given activity or trying to do too many different things.²⁸ These are process issues that can be identified and addressed through rigorous monitoring and evaluation.

Our results are subject to certain limitations. The data are self-reported, and although several methods were applied to validate data to improve reliability, there was no independent verification of responses. In addition, collection of detailed information about implementation activities was not possible given an effort to limit grantee burden. Consequently, the reach and intensity of EBI implementation was not assessed. Diversity in program structure and implementation across 67 grantees challenges the collection of standardized, detailed information. Regardless of these limitations, this is the first systematic collection of NBCCEDP EBI activity data.

Going forward, CDC will collect program implementation data annually from NBCCEDP grantees to monitor trends in use of EBIs with NBCCEDP and non-NBCCEDP clients/providers. Conducting case studies may also be beneficial in providing more detailed information about EBI implementation, including intervention reach and intensity. A better understanding of the challenges to EBI use and challenges to partnering with health systems where provider-oriented EBIs are typically launched is also needed to help shape CDC's training and TA provision. For instance, colleagues with the NCCCP found that limited

resources and the lack of skills to adapt EBIs for local use, including adapting EBIs for cultural appropriateness, were central challenges for EBI use.²⁰

CONCLUSION

NBCCEDP grantees report implementing EBIs extensively with their clients and providers, although client-oriented EBIs are more commonly used than provider-oriented ones where impact may be greatest. Grantees are implementing fewer EBIs with non-NBCCEDP clients and providers; however, a recent policy change on the use of program funds should offer flexibility for grantees to expand EBI implementation through expanded collaboration with health systems. The NBCCEDP is well positioned to leverage the partnerships in its organized screening delivery system to increase program impact through evidence-based, health systems changes that increase cancer screening among all women, including the millions of women newly insured through ACA. Evaluation of EBIs, both process and outcome, must also be increased as the NBCCEDP shifts its focus to reducing breast and cervical cancer burden among all women.

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Biographies

Dr. Amy DeGross is a senior health scientist in the Program Services Branch (PSB), Division of Cancer Prevention and Control (DCPC), National Center for Chronic Disease Prevention and Health Promotion (NCCDPH), Centers for Disease Control and Prevention

(CDC). Dr. DeGroff leads program evaluation efforts for the National Breast and Cervical Cancer Early Detection Program and the Colorectal Cancer Control Program.

Aundrea Carter is an Evaluation Fellow in PSB/DCPC/NCCDPH/CDC and contributes to evaluation efforts for the National Breast and Cervical Cancer Early Detection Program, Colorectal Cancer Control Program, and the National Comprehensive Cancer Control Program.

Kristy Kenney is a health scientist in PSB/DCPC/NCCDPH/CDC and conducts evaluation and data management activities for the National Breast and Cervical Cancer Early Detection Program and the Colorectal Cancer Control Program.

Zachary Myles is an epidemiologist at CDC.

Stephanie Melillo is a health scientist in PSB/DCPC/NCCDPH/CDC and conducts evaluation of the National Breast and Cervical Cancer Early Detection Program and the Colorectal Cancer Control Program. Prior to her work in DCPC, she conducted systematic reviews and meta-analyses for the Office of Public Health Genomics and was a research fellow with the Guide to Community Preventive Services, both at CDC.

Janet Royalty is a public health advisor in the PSB/DCPC/NCCDPH/CDC and leads data management activities for the National Breast and Cervical Cancer Early Detection Program and the Colorectal Cancer Control Program.

Dr. Ketra Rice is a Prevention Effectiveness Fellow in the PSB/DCPC/NCCDPH/CDC where she conducts research and evaluation for the National Breast and Cervical Cancer Early Detection Program and Colorectal Cancer Control Program. Dr. Rice earned her MS in agricultural economics and PhD in public policy from The Ohio State University. She also holds a BS in Marketing and MBA from Alabama A&M University.

Lindsay Gressard is a Presidential Management Fellow in PSB/DCPC/NCCDPH/CDC and conducts evaluation of the National Breast and Cervical Cancer Early Detection Program and the Colorectal Cancer Control Program.

Dr. Jacqueline Miller is the Medical Director for the National Breast and Cervical Cancer Early Detection Program in PSB/DCPC/NCCDPH/CDC where she provides clinical policy guidance and consultation. She is a board-certified general surgeon and a Captain with the U.S. Public Health Service. Dr. Miller also provides clinical services at the Atlanta VA Medical Center and is an Assistant Clinical Professor at Emory University School of Medicine.

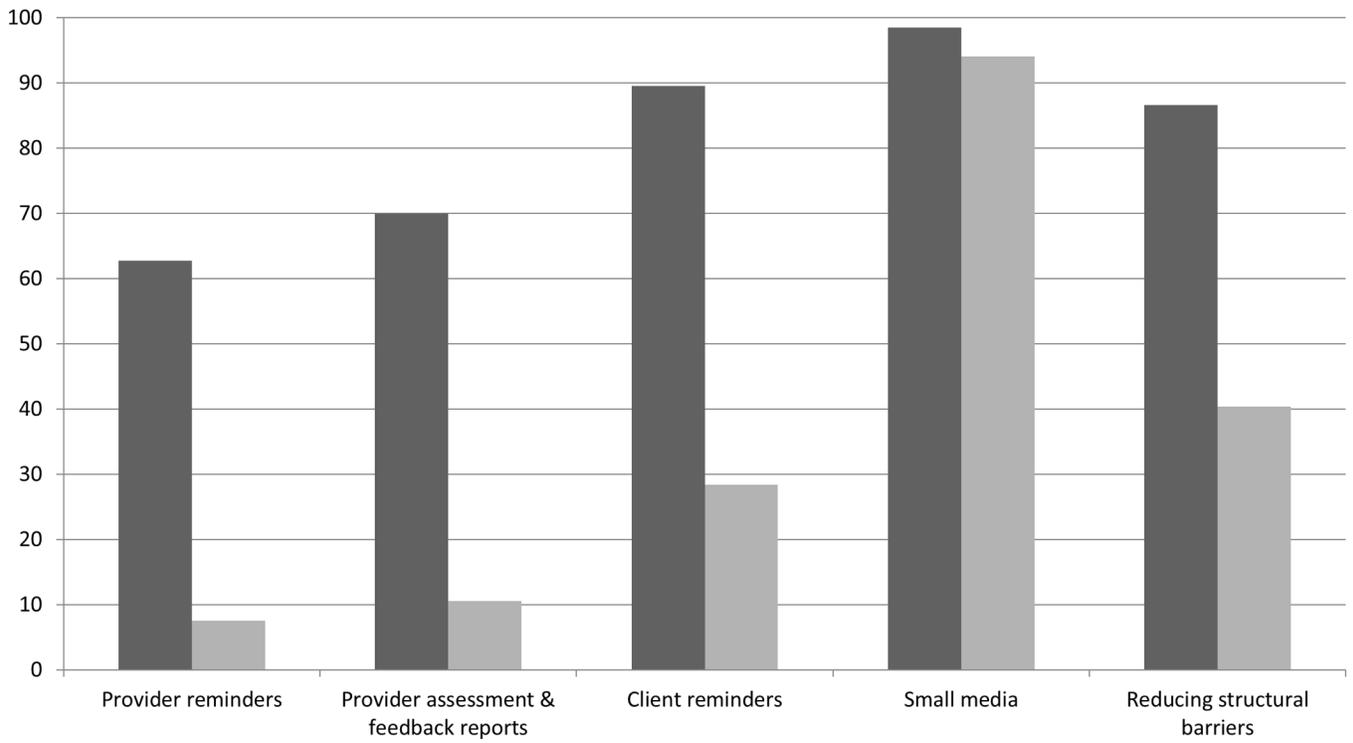


Figure 1.
Percentage of NBCCEDP Grantees Implementing EBIs by Type and Priority Population,
Program July 2012-June 2013, N=67

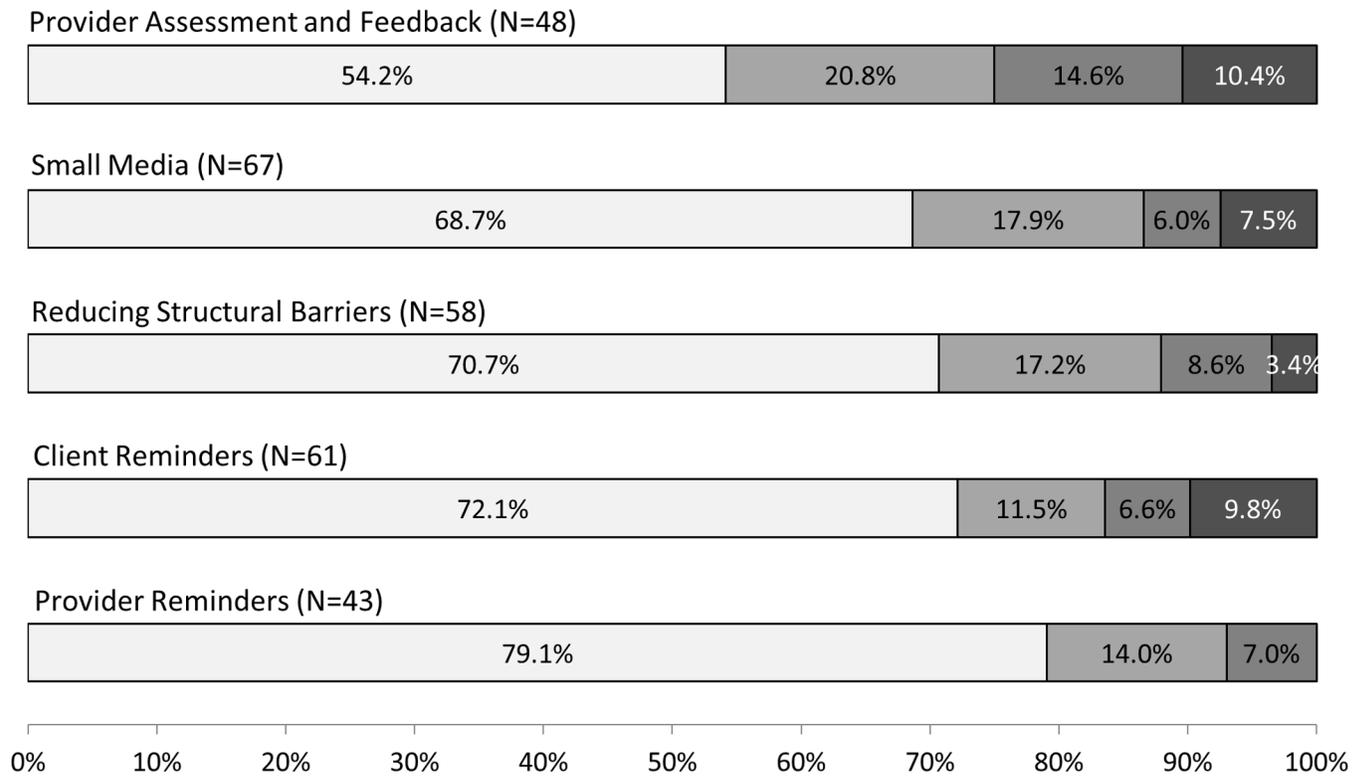


Figure 2.
Percentage of NBCEEDP Grantees Evaluating EBIs, by Type of Evaluation, July 2012-June 2013

Table 1

NBCCEDP* Grantee Respondent Characteristics and Grantee Funding, July 2012-June 2013, N=67

Characteristic	n	%
NBCCEDP Program Type		
State	51	76.1
Tribe/Territory	16	23.9
Position		
Program Director	40	59.7
Program Manager/Coordinator	23	34.3
Other	4	6
Years worked with NBCCEDP program		
<1	9	13.4
1–2	14	20.9
3–5	13	19.4
6–10	16	23.9
11+	15	22.4
Total Funding [†] Received by Grantee		
<\$2,357,718	31	46.3
\$2,357,719–\$3,766,695	12	17.9
\$3,766,696–\$6,136,473	12	17.9
\$6,136,474+	12	17.9

* NBCCEDP is the National Breast and Cervical Cancer Early Detection Program.

[†]Total funding includes CDC program award funding and additional Federal, State, non-profit, and other funding reported by the grantee respondent for program year 2012–2013.

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Table 2Proportion of NBCCEDP* Grantees' EBI Use[†] by Cluster, July 2012-June 2013

Cluster	Provider-oriented EBIs		Client-oriented EBIs	
	Provider Reminders	Provider Assessment and Feedback	Client Reminders	Reducing Structural Barriers
1. High Overall EBI users (N=40)	0.75	1.00	1.00	1.00
2. High Provider EBI users (N=7)	0.86	1.00	0.43	0.29
3. High EBI users with no Provider Assessment and Feedback (N=6)	1.00	0	1.00	0.83
4. High Client EBI Users (N=14) [‡]	0	0	0.79	0.79

* NBCCEDP is the National Breast and Cervical Cancer Early Detection Program.

[†] Small Media was excluded from this analysis given use by 98% of all grantees.

[‡] N represents the number of grantees in the cluster.

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Percentage of NBCCEDP* Grantees, Overall and by Cluster, Reporting a Medium or High Need for Training and TA, by EBI, July 2012-June 2013

Table 3

Cluster	Provider-oriented EBIs			Client-oriented EBIs		
	Provider Reminders %	Provider Assessment and Feedback %	Reducing Structural Barriers %	Client Reminders %	Small Media %	Structural Barriers %
All Grantees (N=67)	47.8	61.2	58.2	35.8	49.3	58.2
1. High Overall EBI users (N=40)	42.5	60.0	57.5	27.5	50.0	57.5
2. High Provider/Low Client EBI users (N=7)	71.4	71.4	57.1	42.9	28.6	57.1
3. High EBI users with no Provider Assessment and Feedback (N=6)	50.0	50.0	66.7	66.7	50.0	66.7
4. High Client EBI users (N=14) [†]	50.0	64.3	57.1	42.9	57.1	57.1

* NBCCEDP is the National Breast and Cervical Cancer Early Detection Program.

[†]N represents the number of grantees in the cluster.