**Research Article** 

### The Cancer Prevention and Control Research Network: An Interactive Systems Approach to Advancing Cancer Control Implementation Research and Practice

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Abstract

**Background:** Although cancer research has advanced at a rapid pace, a gap remains between what is known about how to improve cancer prevention and control (CPC) and what is implemented as best practices within health care systems and communities. The Cancer Prevention and Control Research Network (CPCRN), with more than 10 years of dissemination and implementation research experience, aims to accelerate the uptake and use of evidence-based CPC interventions.

**Methods:** The collective work of the CPCRN has facilitated the analysis and categorization of research and implementation efforts according to the Interactive Systems Framework for Dissemination and Implementation (ISF), providing a useful heuristic for bridging the gap between prevention research and practice. The ISF authors have called for examples of its application as input to help refine the model.

**Results:** We provide examples of how the collaborative activities supported by the CPCRN, using community-engaged processes, accelerated the synthesis and translation of evidence, built both general and innovation-specific capacity, and worked with delivery systems to advance cancer control research and practice.

**Conclusions:** The work of the CPCRN has provided real-world examples of the application of the ISF and demonstrated that synthesizing and translating evidence can increase the potential that evidence-based CPC programs will be used and that capacity building for both the support system and the delivery system is crucial for the successful implementation and maintenance of evidence-based cancer control.

**Impact:** Adoption and implementation of CPC can be enhanced by better understanding ISF systems and intervening to improve them. *Cancer Epidemiol Biomarkers Prev;* 23(11); 2512–21. ©2014 AACR.

Introduction

Over the last decade, prevention research has advanced at a rapid pace. However, gaps still exist between what is known about how to improve health and what is implemented as best practice within health care systems and communities (1–3). In the cancer prevention and control (CPC) field, these gaps will continue to widen if we do not improve our understanding of how and why evidence-based interventions (EBI) are adopted and implemented. Dissemination and implementation (D&I) science, which seeks to identify the best means of translating effective interventions into practice, is critical to closing the research-to-practice gap (4).

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The Interactive Systems Framework for Dissemination and Implementation (ISF; Fig. 1) provides a useful heuristic to guide the growing field of D&I research and practice (5). Three systems comprise the ISF and must work together to effectively move research to practice. The first system, Prevention Synthesis and Translation, summarizes existing evidence and customizes evidence-based products to be more easily accessible and usable by end users. The second system, Prevention Support, provides general and intervention-specific training, technical assistance, and tools to build practitioner and organizational capacity to implement EBIs. The third system, Prevention Delivery, executes activities to implement and deliver EBIs (5).

Using the ISF to better understand and intervene to accelerate the adoption, implementation and maintenance of CPC EBIs could result in improved means for translating the evidence, providing supportive structures for implementation, and building capacity for delivery. The synthesis and translation system (5) generates 2 different types of products—systematic review findings (e.g., Guide to Community Preventive Services; ref. 6) and intervention programs (e.g., Research Tested Intervention Programs; ref. 7). The challenge for practitioners is one of interpreting and applying research findings for use in community and practice settings (8). Much is needed to improve research synthesis and translation to accelerate the uptake and use of effective cancer control EBIs (9).

Within the framework of the ISF, the Rapid Synthesis and Translation Process (RSTP) supports the work of organizations that are tasked with presenting the best available science that can be easily and quickly understood (10). The RSTP provides guiding questions, action steps, and process components that can accelerate the work of organizations that are strategically positioned to bridge the gap between the research and practice realms (10). Noonan and colleagues have suggested a new focus on marketing and communications to ensure that research innovations being "pushed" to the public correspond to the needs of end users and that there is sufficient "pull" from end users to justify the provision of these specific innovations (11).

The support and delivery systems also require specific interventions to increase general and innovation-specific capacity to carry out prevention efforts (5, 9, 12). Following the development of the ISF, Wandersman and colleagues proposed an evidence-based system for innovation support (EBSIS) to increase the effectiveness and efficiency of support activities (13). The EBSIS model is conceptualized as a bridge between the ISF Prevention Support and Delivery Systems and is intended to build capacity for implementation (14, 15). EBSIS includes 4 components for innovation-specific and general capacity-building: tools, training, technical assistance, and quality assurance/ quality improvement (16).

#### **Materials and Methods**

Researchers, health care leaders, and other stakeholders can use the ISF framework (10, 13, 16) to better understand system resources and challenges and to identify opportunities to accelerate EBI use. However, there are few examples of its application, particularly in the area of cancer control. ISF developers note that learning from stakeholders' experience of processes described in the ISF is essential to further refine and expand the ISF and better understand interactions between systems (5). This article describes how the Cancer Prevention and Control Research Network

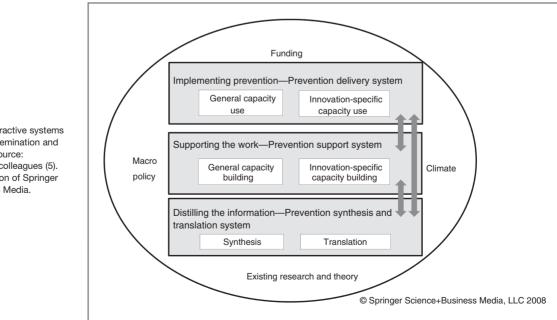


Figure 1. The interactive systems framework for dissemination and implementation. Source: Wandersman and colleagues (5). With kind permission of Springer Science+Business Media.

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(CPCRN) has conducted dissemination and implementation research and practice across the 3 systems of the ISF. We apply the ISF retrospectively, providing specific examples of activities within these systems. We also identify challenges and opportunities to work both within and across these systems to enhance dissemination and implementation of EBIs for cancer control.

#### **Description of the CPCRN**

The CPCRN is a national network funded by the National Center for Chronic Disease Prevention and Health Promotion at the Centers for Disease Control and Prevention (CDC) and the Division of Cancer Control & Population Sciences of the National Cancer Institute (NCI). The mission of CPCRN is to accelerate the use of EBIs in communities and to fill the evidence gaps about "what works" in CPC (17). The CPCRN is a unique "network of networks" composed of 10 centers in 9 states, each with their own local network of partners. CPCRN history is described elsewhere (17, 18). Table 1 highlights the activities of CPCRN's 5 workgroups and how they address different ISF components.

#### **Results**

#### Prevention synthesis and translation system

CPCRN's role in synthesizing evidence. CPCRN members update and synthesize existing evidence and conduct environmental scans of implementation efforts to add practice-based perspectives to existing evidence. For example, faculty from 6 CPCRN centers joined experts from the CDC, NCI, academic institutions, and the U.S. Preventive Services Task Force to review evidence on effective interventions to increase breast, cervical, and colorectal cancer screening and to update recommendations in the Guide to Community Preventive Services (Community Guide; ref. 19). The multidisciplinary team ensured that the final product was scientifically accurate and relevant to end users. Currently, another cross-site CPCRN team [University of Texas Health Science Center at Houston (UTH), Houston, TX; Emory University, Atlanta, GA; University of California at Los Angeles (UCLA), Los Angeles, CA; University of South Carolina (USC), Columbia, SC; and University of Washington (UW), Seattle, WA] is helping to reexamine the evidence and update Community Guide recommendations for multicomponent cancer screening interventions.

Special events (e.g., health fairs, screening events) are a common CPC activity (20); however, evidence is lacking on whether they increase cancer screening rates (21). Led by Emory, the CPCRN synthesized practice and researchbased evidence on the effectiveness of special events via a systematic review of peer-reviewed and gray literature (20). Emory is conducting a prospective study with UTH and CBOs across the country on the effectiveness and costeffectiveness of health fairs to promote breast, cervical, and colorectal cancer screening. University of Colorado (UC; Denver, CO), Texas A&M (College Station, TX), UW, and Harvard University (Cambridge, MA) CPCRNs conducted an environmental scan of health promotion activities for cancer survivors to better understand the extent to which research about recommended lifestyle behaviors and pyschosocial support is translated into practice. The results of this pragmatic synthesis showing that few programs provided comprehensive health promotion services will be used to inform future program planning and evaluations and help providers and survivors locate different types of health promotion programs (22)

CPCRN's role in translating existing evidence. CPCRN's role in translating evidence has included activities and products that make the findings from evidence syntheses easier to adopt and implement (23). For example, Washington University (St. Louis, MO) CPCRN partnered with CDC's Colorectal Cancer Control Program (CRCCP) to assess and increase use of 2 evidence-based interventions-small media and client reminders-for promoting CRC screening among CRCCP grantees and partners in 25 states and 4 tribal organizations (24). Researchers developed an online tool (MIYO or Make It Your Own; www. MIYOworks.org) to help users customize these Community Guide-recommended interventions for the specific populations they serve (25, 26). Registered users from 370 state and local health organizations in 47 states have created more than 4,300 versions of EBIs through MIYO, with a particular focus on vulnerable populations (27). The use of MIYO for promoting colorectal cancer screening has led CDC to invest in developing new MIYO modules promoting breast and cervical cancer screening.

The UCLA and Texas A&M CPCRNs successfully translated the evidence-based Stanford Chronic Disease Self-Management Program for use among cancer survivors by taking a generic chronic disease self-management program and adding components that are especially relevant to cancer survivors' increased attention to symptom management, making informed treatment decisions, and improving lifestyle behaviors (28). More than 25 workshops were provided to 244 participants. More than 80% of participants attended >3 of the 6 sessions, 95% of the participants were satisfied and would recommend the program (28, 29).

#### **Prevention support system**

The CPCRN conducts both the general and innovationspecific capacity-building functions of the prevention support system (PSS). Several examples of these CPCRN activities also fit into the 4 EBSIS components: tools, training, technical assistance, and quality assurance/ quality improvement, as described by Wandersman and colleagues. EBSIS uses the Getting to Outcomes (GTO) framework, a 10-step approach to aid the identification and synthesis of concepts, tools, and evidence (13). These include assessment, planning, addressing capacity issues, implementing, evaluation, continuous quality improvement, and addressing sustainability issues.

Workgroup	Description	<b>CPCRN</b> members	ISF system(s) addresse
FQHC	• To develop and implement a quantitative and qualitative survey of FQHCs that belong to their state primary health care association. The survey addresses organizational factors that influence implementation of evidence-based cancer screening interventions in health center settings.	Emory, Texas A&M, UC, UCLA, UNC, USC, UTH, UW, Wash U	Prevention support: general capacity- building; prevention delivery
Capacity building: technical assistance and training	<ul> <li>To build the capacity of cancer control planners and public health professionals to locate, select, adopt, adapt, implement, and evaluate evidence- based cancer prevention programs, policies, and practices through face-to-face training and technical assistance.</li> <li>To develop a training curriculum on using cancer evidence with slides, interactive exercises, and resources for cancer planners, which has been delivered at national conferences and to local community partners.</li> <li>To research capacity-building models and evaluate training or technical assistance initiatives to translate evidence-based approaches into communities.</li> </ul>	Emory, Texas A&M, UC, Harvard, UCLA, UNC, USC, UTH, UW, Wash U	Prevention synthesis and translation; Prevention support: intervention- specific and general capacity building; prevention delivery
2-1-1	<ul> <li>To form research delivery partnerships with 2-1-1 call centers nationwide to conduct cancer screening, vaccination, and smoking interventions.</li> <li>2-1-1 is a nationally designated 3-digit telephone exchange that links underserved callers to health and social services in their community.</li> </ul>	Emory, Texas A&M, UCLA, UNC, USC, Wash U	Prevention support; prevention delivery
Survivorship	<ul> <li>To investigate factors affecting cancer survivorship and strategies for improving long-term health outcomes of patients with cancer.</li> <li>To examine the best way to translate recently issued guidelines on elements that should be included in cancer survivorship care planning activities into action. To assess the effectiveness and dissemination of these efforts.</li> </ul>	Emory, Texas A&M, UC, UCLA, UNC, USC, UTH, UW	Prevention synthesis and translation; prevention support
CRCCP EBI use	<ul> <li>The CDC funded 29 states and tribes to increase colorectal cancer screening rates to 80% of age-eligible patients by 2014. This workgroup measures CRCCP grantees' adoption and implementation of the Community Guide's recommended strategies to increase colorectal cancer screening. These strategies include client reminders, small media, reducing structural barriers, provider assessment and feedback, and provider reminders and recall.</li> <li>To create survey measures adaptable to other studies and settings attempting to study the implementation process.</li> </ul>	Emory, Harvard, UC, UCLA, UNC, USC, UTH, Wash U, UW	Prevention synthesis and translation; prevention delivery

*General capacity building.* CPCRN researchers assess delivery system capacity, as in GTO Step 1, and then design and provide training and technical assistance to

address gaps. For example, the CPCRN conducted a survey of 282 cancer control planners from 7 states to understand their knowledge, attitudes, behaviors, and

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training needs for translating research evidence into practice (9, 13). Fewer than half of respondents (48%) representing government agencies, health care providers, and community-based organizations had ever used online resources to locate EBIs for CPC (9). Most expressed a need for training on how to locate and secure funding and technical assistance and how to adapt EBIs for different populations (75.8% and 64.2%, respectively; ref. 9). Results of this assessment led to 2 major CPCRN-wide initiatives to provide guidance to partners on finding, adapting, and implementing EBIs.

Consistent with the training component of EBSIS, the Capacity Building and Technical Assistance Training (CBTAT) Workgroup produced a uniform set of training materials to increase community capacity to use EBIs (26). The training familiarizes clinical and community partners with credible sources of EBIs (e.g., Community Guide, Cancer Control P.L.A.N.E.T.) that describe evidence about what works in CPC practice. The CBTAT group conducted multiple trainings at national conferences and for partners such as state health departments, the National Breast and Cervical Cancer Early Detection Program, and the National Association of Chronic Disease Directors. Feedback from our partners made it clear that simply telling them where to find EBIs was insufficient to prompt use (9, 26, 30). They wanted to learn how to choose from among recommended strategies, adapt EBIs to fit specific settings and audiences, and estimate the costs of implementation and maintenance (30). An evaluation of 3 revised trainings conducted in Georgia that addressed these needs found that competencies related to locating evidence-based resources and defining steps in the adaptation process, along with specific guidance on adaptation and implementation, increased capacity among community practitioners who attended the trainings (30).

With funds from an NCI R01 (CA163526-01), CPCRNs (led by UTH and Emory) are developing and evaluating Tailored Aid for Communities Adapting Tested Interventions for Cancer Control (TACTICC; ref. 31), an online tool to walk users through the steps of finding and adapting EBIs for CPC, an example of the *tools* component of EBSIS.

The CPCRN has also studied what factors influence adoption and implementation of CPC in Community Health Centers (CHC) conducting a survey of CHCs in seven states. This study resulted in the development and validation of measures of inner-setting constructs as defined by the Consolidated Framework for Implementation Research (CFIR) that can be used to identify areas in need of general capacity building (32). Another study based on these data demonstrated that clinic Practice Adaptive Reserve was significantly associated with implementation of colorectal cancer screening programs at CHCs (33). Adaptive reserve includes relationships, leadership, time for group reflection and consideration about changes, and attention to the environment (34). The CPCRN Federally Qualified Health Center (FQHC) workgroup also conducted in-depth interviews with 59 leaders and staff from more than 25 FQHCs across the country to better understand factors that influence implementation of EBIs in FQHCs or similar settings (35). Collectively, these studies identify factors influencing implementation that can be targeted to accelerate and maintain CPC EBI use.

Intervention-specific capacity building. CPCRN teams also provide training and other support to build capacity to adapt and implement specific EBIs or guidelines while maintaining fidelity to a program's core elements. Specific EBIs include Pool Cool, Body & Soul, Treatwell 5-a-Day programs, Friend to Friend, and the Community Guide breast cancer screening recommendations (Emory and Wash U, Wash U, UW, Texas A&M, and UNC respectively; refs. 36-39). These initiatives have increased EBI adoption and implementation. UNC, for example, found that CBOs increased their adoption of Community Guide EBIs following training and technical assistance, with close to twice as many applicants proposing to do one-to-one education and/or client reminders (13). UTH worked with community organizations in both Houston and Puerto Rico to adapt and implement Cultivando la Salud, an evidencebased breast and cervical cancer screening program. In Houston, the adapted program increased both mammography and Pap test screening. Preliminary results indicate that 35.0% and 37% of women in the intervention group received mammography and Pap test screening, respectively, representing a level two a half times greater than women in the comparison group (40). In Puerto Rico, the adapted CLS program similarly increased Pap test screening [OR, 2.34; 95% confidence interval (CI), 1.13-4.87] but not mammography (41).

CPCRN researchers from Emory, UTH, Texas A&M, UCLA, and USC have instituted minigrant programs (ranging from \$3,500–\$12,000/participating organization) as another approach to supporting CBOs' implementation of specific EBIs that have proven to be effective at changing diet, physical activity, and screening behaviors (37, 39, 42, 43). The training and technical assistance offered typically focused on several of the GTO steps, including goal setting, addressing capacity, planning, implementing, and evaluating. Consequently, the training and technical assistance enabled funded sites to adapt EBIs to better suit their setting and audience, overcome systems barriers to implementation, evaluate their programs, and apply for additional funding (39).

The capacity to adopt and implement specific guidelines such as the use of patient-reported measures in primary care is another area recently advanced by the CPCRN. The UCLA CPCRN piloted a tool using a set of validated patient-reported measures of health behaviors and psychosocial issues (44, 45) in 5 FQHCs serving primarily Latino and Asian patients. They found that it was feasible to implement the tool in clinic settings and showed high levels of patient, staff, and physician acceptance and perceived use for facilitating patient–physician discussions.

Following this, a national multisite pragmatic trial was launched, using a publicly available tool for electronic capture and interpretation of the measures (www. myownhealthreport.org), to assess the feasibility and use of incorporating the measures into routine primary care practice. Four CPCRN sites (UCLA, UNC, UTH, Texas A&M) participated in the trial, which confirmed findings of the pilot study. Preliminary findings indicate that intervention patients reported significantly more positive changes in diet, physical activity, and other areas (45, 46). This example incorporates all EBSIS components: tools, training, technical assistance, and quality improvement.

These experiences helped the CPCRN better understand the types of adaptations practitioners make to EBIs (39), the challenges of finding and adapting EBIs, and the types and intensity of technical assistance needed at various stages in the process of moving EBIs into community and clinical settings.

#### **Prevention delivery system**

Understanding the delivery systems' current use of *EBIs*. All CPCRN sites engage local delivery systems in research–practice partnerships to improve CPC. For example, the CPCRN is collaborating with the CDC to evaluate CRCCP grantees' implementation of 5 Community Guide EBIs and patient navigation (47). The CPCRN surveys CRCCP grantees annually to assess EBI use. Survey data show that grantees are more likely to implement small media and client reminders than provider-oriented EBIs (48) and are more likely to implement all of the Community Guide EBIs than states and tribal groups that do not have CRCCP funding (48, 49).

*Partnering with delivery systems to improve CPC.* The CPCRN builds partnerships with organizations to expand traditional prevention delivery settings and extend the reach of effective interventions (50, 51) in varied settings, including workplaces, faith-based organizations, housing developments, the 2-1-1 Helpline, and community health centers.

Workplaces are an important delivery system given that 63% of U.S. adults are employed (52). UW's CPCRN partnered with the American Cancer Society to develop Workplace Solutions, a package of Community Guide EBIs that offers employers free, on-site consultation to help them select, adapt, and implement EBIs (53, 54). ACS delivered Workplace Solutions to more than 1,700 employers across the United States (55). Harvard's CPCRN is developing a tailored, telephone-delivered intervention promoting smoking cessation and weight management among blue-collar workers through health and welfare funds (56). UCLA is disseminating an organizational change physical activity and healthy nutrition intervention in worksites throughout Los Angeles County. Texas A&M is working with academic, health care, and business workplaces to promote successful application of the CEO Cancer Gold Standard. USC offers members of African-American communities of faith diet, physical activity, and stress reduction interventions along the lines of a randomized trial conducted in African-American churches in central South Carolina. This work, which has been shown to be effective at modulating C-reactive protein, an important marker of systemic inflammation, is moving to D&I phase with funding from the NHLBI (R01-HL122285; ref. 57). It also complements USC's pilot project—creating a farmers' market at an FQHC (58–60), which has since formed the basis of the interinstitutional collaborative effort in 3 states—Ohio, South Carolina, and Texas (61).

Several CPCRNs (Wash U, UTH, UNC, Emory, UCLA) are partnering with local 2-1-1 Helplines, a national 3-digit telephone information and referral service connecting people to local health and social services (62). 2-1-1 callers are often racial or ethnic minorities with lower levels of income and education than the general population and higher rates of unemployment or job insecurity (63). The CPCRN formed a 2-1-1 Workgroup to address research questions posed by 2-1-1 and participated in a nationwide research consortium with academics and 2-1-1 partners. Progress and contributions are highlighted in a Supplement to the *American Journal of Preventive Medicine* (64).

The CPCRN found that 2-1-1 callers were willing to complete a brief cancer risk assessment after receiving standard 2-1-1 service and would accept cancer control referrals when offered (63). CPCRN researchers also (65-68) demonstrated that 2-1-1 callers had significantly higher rates of smoking and lower rates of screening for breast, cervical, and colorectal cancers than U.S. adults. WU's CPCRN conducted a randomized controlled trial that demonstrated the efficacy of using proactive referrals and navigators for preventive services to motivate callers to follow-up with cancer control needs (69). UTH's CPCRN is currently implementing and evaluating navigation services and referrals for preventive services for 2-1-1 Texas callers (67). In collaboration with 3 other CPCRNs (WU, UTH, UNC), Emory received NCI funding (S713745/ U101CA154282) to test an intervention to promote smoke-free homes with an efficacy trial followed by 2 effectiveness trials in which the intervention will be delivered by 2-1-1 North Carolina and Houston. Results from a pilot study of the intervention showed that more than 30% of households had established a smoke-free home at follow-up (70). The intervention, if effective, will be disseminated to 2-1-1s nationally through a grants program.

#### Discussion

The research described in this article advances the field of implementation science in several ways. First, it operationalizes definitions and descriptions of the ISF and validates its usefulness as a way of categorizing activities and studies that contribute to enhancing research translation. Second, it demonstrates the strength of national collaborative efforts focused on a common theme and informed by experiences with local partnerships. Finally, the framework allowed CPCRN researchers to better conceptualize key systems, functions, and relationships affecting the movement of research into practice. The CPCRN works in and across all 3 ISF systems and provides insight into an understudied element of the ISF: the potential of bidirectional communication across

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systems (see Fig. 1) and their respective stakeholders (e.g., funders, researchers, practitioners, consumers; ref. 13). Each CPCRN engaged partners to develop local CPC delivery systems and have worked in cross-site collaborative partnerships to develop national partnerships. These partnerships helped CPCRN researchers identify delivery system needs, which in turn, led to the creation of tools and other supports, such as the MIYO system that delivery systems could use to accelerate appropriate EBI use. Interactions with the delivery system also led to new syntheses of evidence that are then translated into recommendations for practice. For example, CPCRN's evaluation of CDC's NBCCEDP led to a research project to evaluate the effectiveness of health fairs and other special events, a common strategy used by grantees yet not supported by research findings. By working closely with members of the Delivery System, the CPCRN reshaped its research agenda to produce evidence to support current CPC efforts as well as foster more effective use of special events across settings.

The exchange across ISF systems is bidirectional (see Fig. 1) in that CPCRN researchers not only learn from the delivery system but also provide trainings and technical assistance to build delivery system capacity to select and implement EBIs. The network's community-engaged partnerships and resulting exchanges such as those with partners, including community health centers, the CRCCP, and others, allowed the CPCRN to consider a variety of perspectives when synthesizing and translating evidence and creating tools, trainings, and other strategies to support the use of evidence in CPC practice. In addition, the success of the CPCRN can also be attributed to funder engagement that supported collaborative efforts and provided resources for network infrastructure. Rhoades and colleagues have proposed the need to actively engage funders in the process of dissemination and implementation and to support the transfer of bidirectional knowledge between each of the systems (Fig. 1; ref. 71).

The TACTICC project enhances interactions between the Prevention Support and Delivery Systems. It makes the steps of finding and adapting EBIs explicit and guides CBOs through the process of mapping the needs of the community and using that information to systematically adapt the EBI. Members of the Delivery System receive concrete guidance and materials to use during implementation and to increase the likelihood that the adapted EBI will appropriate for the community and setting.

The need to advance D&I science and to use what we learn to effectively move CPC evidence into real-world settings is particularly relevant in the current practice and policy environment. Provisions within the Affordable Care Act (ACA) provide the opportunity to investigate new approaches for disseminating information and implementing CPC practices that will benefit traditionally underserved populations (72). The ACA will change the types of actors and design of delivery systems, and practitioners will require ongoing support to adapt to these changes (73). Networks such as the CPCRN can play a central role by synthesizing and translating evidence and building the new types of capacity the delivery system will need to provide and evaluate CPC care within an evolving context (74).

The CPCRN experience shows that the ISF Systems are relevant and useful and confirms that developing researchpractitioner-funder-consumer partnerships (13) leads to an acceleration of knowledge creation around the Prevention Support System. In addition, while resources exist that synthesize evidence on CPC and describe effective programs, they may be of little use to community partners without training and technical assistance by researchers, academic partners, program developers, and others. As exemplified by CPCRN activities, strengthening ties between translation, synthesis, and support activities can help practitioners benefit from these resources and ultimately be better equipped to adopt and implement evidence-based approaches for cancer control. Future prospective investigations of the ISF as part of real-world program planning, implementation, and evaluation efforts would add to our understanding of how to apply the ISF to maximize EBP use. Nevertheless, the CPCRN's experience is a testament to how concepts proposed in the ISF can lead to increased use of EBIs to address health disparities around chronic diseases such as cancer.

#### Conclusion

The CPCRN is a dynamic network bringing together stakeholders from the ISF Systems to advance CPC innovations and evidence. The CPCRN takes a community-centered approach to ensure that its efforts to bridge the research-to-practice gap around CPC are grounded in the needs of community partners to build the evidence base and enhance their capacity to adopt, implement, and maintain effective interventions over time. We recognize that researchers, practitioners, and community members interested in advancing CPC cannot function in separate silos; instead, researchers must invite practitioners and community members to become intimately involved in the entire research process from program development to dissemination if they are to develop relevant and usable products.

#### **Disclosure of Potential Conflicts of Interest**

No potential conflicts of interest were disclosed.

#### Disclaimer

The findings and conclusions presented here are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention or the National Cancer Institute.

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References

- Brownson RC, Fielding JE, Maylahn CM. Evidence-based public health: a fundamental concept for public health practice. Annu Rev Public Health 2009;30:175–201.
- Sanchez MA, Vinson CA, Porta ML, Viswanath K, Kerner JF, Glasgow RE. Evolution of Cancer Control P.L.A.N.E.T.: moving research into practice. Cancer Causes Control 2012;23:1205–12.
- Wandersman A, Lesesne CA. If translational research is the answer, what's the question? who gets to ask it? In:Wethington E, Dunifon RE, editors. Research for the public good: applying the methods of translational research to improve human health and well-being. Washington, DC: American Psychological Association; 2012. p. 33–52.
- Brownson RC, Colditz GA, Proctor EK. Dissemination and implementation research in health: translating science to practice. New York: Oxford University Press, Inc.; 2012.
- Wandersman A, Duffy J, Flaspohler P, Noonan R, Lubell K, Stillman L, et al. Bridging the gap between prevention research and practice: the interactive systems framework for dissemination and implementation. Am J Community Psychol 2008;41:171–81.
- Centers for Disease Control and Prevention [Internet]. The Community Guide. Cancer Prevention & Control [home page] 2013 [cited 2014 May 27]. Available from http://www.thecommunityguide.org/cancer/index. html.
- National Cancer Institute [Internet]. Research-tested intervention programs (RTIPs): moving science into programs for people. 2014 [cited 2014 May 12]. Available from http://rtips.cancer.gov/rtips/ index.do.
- Lipsey MW. The challenges of interpreting research for use by practitioners: comments on the latest products from the Task Force on Community Preventive Services. Am J Prev Med 2005;28:1–3.
- Hannon PA, Fernandez ME, Williams RS, Mullen PD, Escoffery C, Kreuter MW, et al. Cancer control planners' perceptions and use of evidence-based programs. J Public Health Manag Pract 2010;16: E1–8.
- Thigpen S, Puddy RW, Singer HH, Hall DM. Moving knowledge into action: developing the rapid synthesis and translation process within the interactive systems framework. Am J Community Psychol 2012;50:285–94.
- Noonan RK, Wilson KM, Mercer SL. Navigating the road ahead: public health challenges and the interactive systems framework for dissemination and implementation. Am J Community Psychol 2012;50: 572–80.
- Leeman J, Teal R, Jernigan J, Reed JH, Farris R, Ammerman A. What evidence and support do state-level public health practitioners need to address obesity prevention. Am J Health Promot 2014;28:189–96.
- Wandersman A, Chien VH, Katz J. Toward an evidence-based system for innovation support for implementing innovations with quality: tools, training, technical assistance, and quality assurance/quality improvement. Am J Community Psychol 2012;50:445–59.
- 14. Kreuter M, Casey C. Enhancing dissemination through marketing and distribution systems: a vision for public health. In: Brownson R, Colditz G, Proctor E, editors. Dissemination and implementation research in health: translating science to practice. New York: Oxford University Press; 2012.

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- Kreuter MW, Bernhardt JM. Reframing the dissemination challenge: a marketing and distribution perspective. Am J Public Health 2009;99: 2123–7.
- 16. Ray ML, Wilson MM, Wandersman A, Meyers DC, Katz J. Using a training-of-trainers approach and proactive technical assistance to bring evidence based programs to scale: an operationalization of the interactive systems framework's support system. Am J Community Psychol 2012;50:415–27.
- Harris JR, Brown PK, Coughlin S, Fernandez ME, Hebert JR, Kerner J, et al. The cancer prevention and control research network. Prev Chronic Dis 2005;2:A21.
- Cancer Prevention and Control Research Network [Internet]. About CPCRN. 2013 [cited 2014 May 27]. Available from http://cpcrn.org/ about/.
- Sabatino SA, Lawrence B, Elder R, Mercer SL, Wilson KM, Devinney B, et al. Effectiveness of interventions to increase screening for breast, cervical, and colorectal cancers: nine updated systematic reviews for the guide to community preventive services. Am J Prev Med 2012; 43:97–118.
- Escoffery C, Rodgers KC, Kegler MC, Haardorfer R, Howard DH, Liang S, et al. A systematic review of special events to promote breast, cervical and colorectal cancer screening in the United States. BMC Public Health 2014;14:274.
- Escoffery CT, Kegler MC, Glanz K, Graham TD, Blake SC, Shapiro JA, et al. Recruitment for the national breast and cervical cancer early detection program. Am J Prev Med 2012;42:235–41.
- Risendal BC, Dwyer A, Jankowski C, Kilbourn K, Thorland W, Wood R, et al. Seizing the moment of opportunity: health promotion programs for cancer survivors. Washington, DC: Biennial Cancer Survivorship Conference; 2014.
- Leeman J, Moore A, Teal R, Barrett N, Leighton A, Steckler A. Promoting community practitioners' use of evidence-based approaches to increase breast cancer screening. Public Health Nurs 2013;30: 323–31.
- 24. Kreuter MW, Garibay LB, Pfeiffer DJ, Morgan JC, Thomas M, Wilson KM, et al. Small media and client reminders for colorectal cancer screening: current use and gap areas in CDC's Colorectal Cancer Control Program. Prev Chronic Dis 2012;9:E131.
- 25. Kreuter MW. Make it Your Own (MIYO): creating customized materials for your communities. 2014 [cited 2012 March 13]. Available from https://researchtoreality.cancer.gov/cyber-seminars/make-it-yourown-miyo-creating-customized-health-materials-your-community.
- Ekwenugo L, Benard VB, Vinson C. News from the CDC: collaborations to build capacity at the community level in cancer prevention and control. Transl Behav Med 2013;3:3–5.
- 27. Kreuter M, Hovmand P, Pfeiffer D, Fairchild M, Rath S, Golla B, et al. The "Long Tail" and public health: new thinking for addressing health disparities. Am J Public Health 2014. In press.
- 28. Risendal BC, Dwyer A, Seidel R, Lorig K, Katzenmeyer C, Kellar-Guenther Y, et al. Adaptation of the Chronic Disease Self-Management Program for cancer survivors: feasibility, acceptability, and lessons for implementation. J Cancer Educ. 2014 Jun 6. [Epub ahead of print].
- 29. Risendal B, Ory MG, Dwyer A, Katzenmeyer C, Lorig K. cancer thriving and surviving (CTS): translation of the chronic disease self-

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Cancer Epidemiol Biomarkers Prev; 23(11) November 2014 2519

#### Fernández et al.

management program. Washington, DC: Biennial Cancer Survivorship Conference; 2012.

- 30. Escoffery C, Carvalho M, Kegler MC. Evaluation of the prevention programs that work curriculum to teach use of public health evidence to community practitioners. Health Promot Pract 2012;13:707–15.
- Kerner J. Applying new knowledge. In: Elwood JM, Sutcliffe SB, editors. Cancer control. Oxford, England: Oxford University Press; 2010.
- 32. Fernandez ME, Calo WA, Kegler MC, Carvalho M, Liang S, Weiner B, et al. Developing measures to assess constructs from the inner settings of the consolidated framework for implementation. 2014. Forthcoming.
- 33. Tu S-P, Kuniyuki A, Young V, Fernandez M, Kimura A, Williams R, et al. Practice Adaptive Reserve and Patient Centered Medical Home best practices at community health center clinics in seven states. 2014. Forthcoming.
- Nutting PA, Miller WL, Crabtree BF, Jaen CR, Stewart EE, Stange KC. Initial lessons from the first national demonstration project on practice transformation to a patient-centered medical home. Ann Fam Med 2009;7:254–60.
- 35. Fernandez ME. Factors influencing implementation of evidence-based cancer prevention and control practices in FQHCs: a qualitative study. Oral Presentation at Centers for Disease Control National Conference. Washington, DC: Centers for Disease Control; 2012.
- Rabin BA, Nehl E, Elliott T, Deshpande AD, Brownson RC, Glanz K. Individual and setting level predictors of the implementation of a skin cancer prevention program: a multilevel analysis. Implement Sci 2010;5:40.
- Honeycutt S, Carvalho M, Glanz K, Daniel SD, Kegler MC. Research to reality: a process evaluation of a mini-grants program to disseminate evidence-based nutrition programs to rural churches and worksites. J Public Health Manag Pract 2012;18:431–9.
- Slater JS, Finnegan JR, Madigan SD. Incorporation of a successful community-based mammography intervention: dissemination beyond a community trial. Health Psychol 2005;24:463–9.
- Carvalho ML, Honeycutt S, Escoffery C, Glanz K, Sabbs D, Kegler MC. Balancing fidelity and adaptation: implementing evidence-based chronic disease prevention programs. J Public Health Manag Pract 2013;19:348–56.
- 40. Savas LS. Using an evidence-based lay health worker program to increase breast and cervical cancer screening in low-income Hispanic women in Houston [grant proposal]. The University of Texas Health Science Center at Houston, School of Public Health. [PP11081, Cancer Prevention and Research Institute of Texas]. 2014.
- 41. Fernandez ME, Savas LS, Fernandez-Espada N, Calo WA, Velez C, Ayala AS, et al. A randomized controlled trial to test the effectiveness of Cultivando La Salud: a breast and cervical cancer screening promotion program for low-income Puerto Rican women. Forthcoming. 2014.
- 42. Teal R, Moore AA, Long DG, Vines AI, Leeman J. A communityacademic partnership to plan and implement an evidence-based lay health advisor program for promoting breast cancer screening. J Health Care Poor Underserved 2012;23:109–20.
- 43. McCracken JL, Friedman DB, Brandt HM, Adams SA, Xirasagar S, Ureda JR, et al. Findings from the Community Health Intervention Program in South Carolina: implications for reducing cancer-related health disparities. J Cancer Educ 2013;28:412–9.
- 44. Estabrooks PA, Boyle M, Emmons KM, Glasgow RE, Hesse BW, Kaplan RM, et al. Harmonized patient-reported data elements in the electronic health record: supporting meaningful use by primary care action on health behaviors and key psychosocial factors. J Am Med Inform Assoc 2012;19:575–82.
- 45. Krist AH, Glenn BA, Glasgow RE, Balasubramanian BA, Chambers DA, Fernandez ME, et al. Designing a valid randomized pragmatic primary care implementation trial: the my own health report (MOHR) project. Implement Sci 2013;8:73.
- 46. Glasgow RE, Kessler RS, Ory MG, Roby D, Sheinfeld-Gorin S, Krist A. Conducting rapid, relevant research: lessons learned from the My Own Health Report (MOHR) Project. Am J Prev Med 2014;47:212–9.
- Hannon PA, Maxwell AE, Escoffery C, Vu T, Kohn M, Leeman J, et al. Colorectal cancer control program grantees' use of evidence-based interventions. Am J Prev Med 2013;45:644–8.

- 48. Maxwell AE, Hannon PA, Escoffery C, Vu T, Kohn M, Vernon SW, et al. Colorectal cancer screening promotion and provision: a comparison of Colorectal Cancer Control Program grantees and non-grantees. Prev Chronic Dis 2014. Forthcoming.
- Hannon PA, Escoffery C, Maxwell A. Evidence-based colorectal cancer screening promotion. Atlanta, GA: Centers for Disease Control and Prevention Seminar; 2013.
- Wallerstein N, Duran B. Community-based participatory research contributions to intervention research: the intersection of science and practice to improve health equity. Am J Public Health 2010;100: S40–6.
- Proctor EK, Landsverk J, Aarons G, Chambers D, Glisson C, Mittman B. Implementation research in mental health services: an emerging science with conceptual, methodological, and training challenges. Adm Policy Ment Health 2009;36:24–34.
- Hannon PA, Harris JR. Interventions to improve cancer screening: opportunities in the workplace. Am J Prev Med 2008;35:S10–3.
- Harris JR, Cross J, Hannon PA, Mahoney E, Ross-Viles S. Employer adoption of evidence-based chronic disease prevention practices: a pilot study. Prev Chronic Dis 2008;5:A92.
- Hannon PA, Harris JR, Sopher CJ, Kuniyuki A, Ghosh DL, Henderson S, et al. Improving low-wage, midsized employers' health promotion practices: a randomized controlled trial. Am J Prev Med 2012;43: 125–33.
- 55. Laing SS, Hannon PA, Talburt A, Kimpe S, Williams B, Harris JR. Increasing evidence-based workplace health promotion best practices in small and low-wage companies, Mason County, Washington, 2009. Prev Chronic Dis 2012;9:E83.
- 56. Sorensen G, Barbeau EM, Stoddard AM, Hunt MK, Goldman R, Smith A, et al. Tools for health: the efficacy of a tailored intervention targeted for construction laborers. Cancer Causes Control 2007;18:51–9.
- Hebert JR, Wirth M, Davis L, Davis B, Harmon BE, Hurley TG, et al. C-reactive protein levels in African Americans: a diet and lifestyle randomized community trial. Am J Prev Med 2013;45:430–40.
- Freedman DA, Whiteside YO, Brandt HM, Young V, Friedman DB, Hebert JR. Assessing readiness for establishing a farmers' market at a community health center. J Community Health 2012;37:80–8.
- 59. Freedman DA, Choi SK, Hurley T, Anadu E, Hebert JR. A farmers' market at a federally qualified health center improves fruit and vegetable intake among low-income diabetics. Prev Med 2013;56:288–92.
- 60. Friedman DB, Young VM, Freedman DA, Adams SA, Brandt HM, Xirasagar S, et al. Reducing cancer disparities through innovative partnerships: a collaboration of the South Carolina Cancer Prevention and Control Research Network and Federally Qualified Health Centers. J Cancer Educ 2012;27:59–61.
- Freedman DA, Pena-Purcell N, Friedman DB, Ory M, Flocke S, Barni MT, et al. Extending cancer prevention to improve fruit and vegetable consumption. J Cancer Educ. 2014 Apr 20. [Epub ahead of print].
- **62.** Daily LS. Health research and surveillance potential to partner with 2-1-1. Am J Prev Med 2012;43:S422–4.
- Eddens KS, Kreuter MW. Proactive screening for health needs in United Way's 2-1-1 information and referral service. J Soc Serv Res 2011;37:113–23.
- Linnan LA. Research collaboration with 2-1-1 to eliminate health disparities: an introduction. Am J Prev Med 2012;43:S415–9.
- Purnell JQ, Kreuter MW, Eddens KS, Ribisl KM, Hannon P, Williams RS, et al. Cancer control needs of 2-1-1 callers in Missouri, North Carolina, Texas, and Washington. J Health Care Poor Underserved 2012;23:752–67.
- Savas LS, Fernandez ME, Jobe D, Carmack CC. Human papillomavirus vaccine: 2-1-1 helplines and minority parent decision-making. Am J Prev Med 2012;43:S490–6.
- 67. Fernandez ME, Ball-Ricks KA, Vernon SW, Savas L. Advancing dissemination and implementation research and practice: a collaboration between the CPCRN and 2-1-1. Oral Presentation at the Cancer Prevention and Research Institute of Texas Annual Conference 2012: Austin, TX.
- Alcaraz KI, Arnold LD, Eddens KS, Lai C, Rath S, Greer R, et al. Exploring 2-1-1 service requests as potential markers for cancer control needs. Am J Prev Med 2012;43:S469–74.

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- Kreuter MW, Eddens KS, Alcaraz KI, Rath S, Lai C, Caito N, et al. Use of cancer control referrals by 2-1-1 callers: a randomized trial. Am J Prev Med 2012;43:S425–34.
- Kegler MC, Escoffery C, Bundy L, Berg CJ, Haardorfer R, Yembra D, et al. Pilot study results from a brief intervention to create smoke-free homes. J Environ Public Health 2012;2012:1–9.
- **71.** Rhoades BL, Bumbarger BK, Moore JE. The role of a state-level prevention support system in promoting high-quality implementation and sustainability of evidence-based programs. Am J Community Psychol 2012;50:386–401.
- 72. Chambers DA. The interactive systems framework for dissemination and implementation: enhancing the opportunity for implementation science. Am J Community Psychol 2012;50:282–4.
- 73. U.S. Preventive Services Task Force [Internet]. USPSTF A and B Recommendations. 2014 [cited 2014 Jan 13]. Available from http:// www.ahrq.gov/professionals/clinicians-providers/guidelines-recommendations/uspstf/index.html.
- 74. Kreuter MW, McBride TD, Caburnay CA, Poor T, Thompson VL, Alcaraz KI, et al. What can health communication science offer for ACA implementation? Five evidence-informed strategies for expanding Medicaid enrollment. Milbank Q 2014;92:40–62.

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