A Framework for Integration of Community and Clinical Care to Improve the Delivery of Clinical Preventive Services Among Older Adults

A Report prepared for the National Association of Chronic Disease Directors and the Michigan Public Health Institute, with funding provided by the Healthy Aging Program, Division of Population Health, Centers for Disease Control and Prevention

July 2012

Prepared by:

Alex Krist MD MPH [1]
Douglas Shenson MD MPH [2]
Steven Woolf MD MPH [3]
Cathy Bradley PhD [4]
Winston Liaw MD [5]
Stephen Rothemich MD MS [1]

1 – Virginia Commonwealth University, Department of Family Medicine
2 – Yale University, School of Medicine
3 – Virginia Commonwealth University, Department of Family Medicine, Center on Human Needs
4 – Virginia Commonwealth University, Department of Healthcare Policy and Research
5 – Fairfax Family Practice Residency

Note – The findings and conclusions in this document are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Clinical preventive services (CPS) – screening tests, immunizations, health behavior counseling, and preventive medications – can save lives and promote wellbeing. Yet Americans report receiving only half of recommended care and the gap is even greater for low-income Americans, racial and ethnic minorities, and older adults. Multiple initiatives including health care reform, the creation of the National Prevention Strategy, and programs through federal, state, and community agencies have all sought to increase the delivery of preventive services. While no single intervention will overcome the gaps in care, shifting the delivery of services from purely clinical settings to include the community is particularly promising.

Currently, clinicians and healthcare practices and systems are primarily charged with delivering CPS. Yet clinicians lack resources to reach every individual in need of services. Extending CPS access to community settings makes sense. Merely creating a parallel community CPS delivery system will not succeed in closing the existing gaps and disparities. Integrating clinicians and the communities they are imbedded can extend both delivery systems, enhance the efficiency of CPS delivery, and promote true population health.

This report proposes an overarching framework – based on the principles of current evidence-based models – to integrate community and clinical care for the delivery of a core set of preventive services. These services are selected because they have high economic value, produce some of the greatest health benefits for the dollars spent, and are broadly applicable to the general population. The services are also universally covered for older adults by health insurance plans, including Medicare. Once developed, community-clinical integration could readily be extended to other preventive services, and to the care of chronic diseases, and even acute conditions.

Within this framework, increasing CPS access and delivery is defined as a three-part activity: engagement of individuals in need of services, actual delivery of the service, and appropriate clinical follow-up. The community-clinical integration involves six important stakeholders – community organizations, clinicians, national and state leadership, local delivery leadership, payers, and personnel and support that span settings. The community-clinical integration focuses on enhancing access to needed CPS, promoting acceptability among participants and recipients, and providing continuity of care across settings.

INTRODUCTION

Despite clear benefits and recent broad public support to promote the delivery of CPS, Americans report receiving only 50% of recommended care.[1] Many individuals receive no preventive care or are overdue on recommended services for which they are eligible. For example, according to the Centers for Disease Control and Prevention (CDC) 2010 Behavioral Risk Factor Surveillance Survey, 22% of women over the age of 50 report not having undergone a mammogram in the past two years. Among adults aged 50 years and older, 47% report never having had a colonoscopy, sigmoidoscopy, or home blood stool test. Among adults aged 65 and older, 36% report never having had a pneumococcal vaccination, and 31% have not received an influenza vaccine in the past year.[2,3] Overall, only 25% of adults aged 50 to 64 are up-to-date on the full set of high-priority CPS.[4]The NCPP estimates that if 20 key recommended preventive services were more widely delivered, more than two million additional Americans would have been alive in 2006.[5]

The gap in health and CPS delivery is even more pronounced among low-income Americans, racial and ethnic minorities, and older adults.[6] For example, among adults aged 65 and older, 44% of Blacks and 39% of Hispanics report not having received the influenza vaccine, compared with 29% of Whites; and adults with less than a high school education are 10% less likely to report having an influenza vaccination than are college graduates.[7] Similar patterns are consistently observed for other immunizations, screening tests, and health behavior counseling.[7]

Decades of interventions focused on increasing delivery in the clinical setting have had modest success at ensuring that all Americans receive CPS. These efforts have included reminder systems, removal of copayments as financial barriers, marketing of messages to promote screening and immunizations, and continuing education of providers to encourage implementation of guidelines for preventive care. However, the increases in uptake of preventive services that have been achieved by these efforts are still falling short of national goals.[8] A host of barriers limit delivery of CPS in the clinical setting.[9-11] The public may lack knowledge about needed services, have limited motivation to receive services, or face logistical challenges. Clinicians may fail to address needed services because of oversight, lack of time, and competing demands. Much of our healthcare system is fragmented, with little support for CPS delivery. Fundamentally, clinical settings lack the capacity to deliver the recommended CPS to everyone.[12] Work continues to address these barriers, but overlooked solutions to the problem may exist outside the walls of the clinical setting.

Indeed, there are a number of inherent limitations in the ability of the clinical setting to deliver the full spectrum of preventive services to all persons who would benefit. First, not all persons who would benefit are in the clinical setting; many of the people who would have the most to gain from preventive services eschew clinicians or visit only occasionally when acutely ill. Second, the full dimensions of what patients require cannot be delivered by clinicians. Successful delivery of CPS requires more than giving a shot or filling out a referral slip for a mammogram. It requires efforts to inform people about the need for services, reaching out to all members of the public who would benefit, encouraging and motivating people to overcome barriers and reservations about obtaining services, following up of abnormal results to ensure completion of workups, and reminding people who are due for retesting or new immunizations. The notion that all of this can be done by busy clinicians is unrealistic. Nor is the clinician's office necessarily the best place to accomplish all of these tasks.

Because preventive care is often an ongoing process of change, reevaluation, motivation, and adjustment of activities, it makes sense to expand on the model of addressing prevention in a discrete place (the clinician's office) and a prearranged time (an office visit) and adopt a new paradigm that offers the community as a setting for preventive services integrated into care in the clinical setting. This report examines the various ways in which communities can help deliver preventive services; the potential benefits of integrating the work of clinicians, community organizations, and public health in delivering preventive services; and recommendations on how clinical and community integration may overcome challenges and taking advantage of existing opportunities.

RETHINKING THE CPS DELIVERY SYSTEM

The inherent nature of "clinical" preventive services requires the involvement of the healthcare system for delivery. Some services can only be delivered by a clinician (e.g., a Pap test or a colonoscopy), other services require a clinician's interpretation (e.g., a mammogram), and other services are less useful unless linked to clinical follow-up of abnormal findings (e.g., blood pressure, cholesterol screening).

Yet, efforts to deliver "preventive" services can be greatly enhanced through the involvement of communities and the public health system for delivery. Preventive services are broadly applicable to entire populations, the traditional focus of public health. The target population for CPS includes healthy individuals, who are less likely to visit healthcare settings and might be more easily engaged at work or in the community. Engaging individuals where they are (in the community setting) is more proactive than waiting to engage individuals in clinical settings and allows for ongoing reinforcement over time by multiple parties – which research has shown to be the most effective strategy for promoting behavior change.[13,14] What clinicians can accomplish by offering advice at an office visit is far more constrained. Meaningful progress in helping Americans improve diet, increase physical activity, stop smoking, and make other lifestyle changes also involves a range of environmental, cultural, and socioeconomic factors, all of which fall under the purview of public health and the community.[15]

The medical and public health communities have historically shared a commitment to population-based strategies, at least through the 19th century. The advent of medical specialization in the 1920s drove a wedge between medicine and public health that lingers today, but efforts beginning with the Medicine-Public Health Initiative of the 1980s have worked to bridge the schism. Growing recognition of the need for clinicians and the public health community to "join hands" in the delivery of CPS has prompted increasing discussion at the national, state and local level on how best to forge collaborations between clinicians and the community and has spawned a growing list of success stories where collaboration has proven effective.[11, 16] Successful collaborations have resulted in both entities rethinking their role in CPS delivery, breaking down silos of care to integrate activities, and more effectively using and sharing limited resources across settings. The resulting partnerships frequently become greater than the sum of their parts.[17-19]

Despite various examples of successful collaborations to deliver CPS, fundamental limitations have hindered the broad national dissemination of community-clinical collaborations for CPS

delivery. Clinicians are accustomed to viewing the office visit as the beginning and end of CPS delivery rather than one component of a larger process. The collaborations that are often pursued by clinicians typically focus more on how to use community resources to fill gaps in care delivery as opposed to creating true partnerships. The prevailing models for financing healthcare in the U.S. lack a robust mechanism for paying community organizations for playing a larger role. Community organizations, and even public health departments that rely on categorical funding for their sustenance, do not always view delivery of CPS to individuals as part of their core mission. Some community-based efforts to deliver CPS are disconnected from the clinical delivery system, which duplicates care and gives advice and treatments that compete with clinicians. Neither the clinical nor public health system is very good at identifying all members of the public who need CPS. In sum, the delivery of CPS in the United States is often fragmented and incomplete.

INTEGRATING CLINICAL AND COMMUNITY CARE TO DELIVER CPS

Merely supporting collaboration between community and clinical organizations to deliver CPS is insufficient. Collaboration requires energy to bring two separate entities together and to pursue common goals. Instead of settling for regional or local ad hoc collaborations, the nation needs to create a generalizable model of community-clinical integration that can sustainably deliver CPS. This idea is consistent with the Chronic Care Model and the application of the chronic care model to prevention in general.[20-22] Programs such as the Sickness Prevention Achieved through Regional Collaboration (SPARC) program and Vermont's Blueprint for Health serve as examples of effective regional community-clinical integrations.[21, 23, 24] Now, however, is an optimal time to nationally support community-clinical integrations, because both current economic forces and recent advances in informatics can support change. Rising healthcare costs demand that we optimize the value (health benefit per dollar) of healthcare expenditures through prevention and the minimization of treatment costs. Integration may offer a more effective model for financing delivery of CPS. The Patient Protection and Affordable Care Act (ACA) has both required the coverage of CPS and empowered Medicare to test and support innovative models of care.[25] Many private payers are following suit.[26,27] Furthermore, a national informatics platform is being built and adopted that could facilitate seamless communication and access to clinical information across settings.[28]

In order to design an integrated delivery system, it is important to define which services should first be addressed, the components of service delivery, the participating entities, the roles each entity will play, who will pay for services, and how success will be monitored and rewarded. Additionally, catalysts are needed to bring community and clinical entities together, and spanning personnel and support are needed to mold them into an integrated system.

Core services to address. It makes sense for CPS to serve as an initial focal point for the development of community-clinical care integration, because CPS can have high economic value, receive universal coverage by insurers, and have broad applicability to the general population.

TABLE 1. High Value CPS: Focus for Community-Clinical Integration
Influenza immunization Pneumococcal immunization
Colorectal cancer screening Breast cancer screening Cervical cancer screening Hypertension screening Hypercholesterolemia screening
Smoking cessation counseling
Aspirin chemoprophylaxis

It also makes sense to focus on a core set of nine services – the services with the greatest health benefit and economic value and a record of underutilization (Table 1).[5,29] These services span all four categories of CPS – immunizations, screenings, counseling, and preventive medications.

Additionally, the delivery of multiple services should be bundled whenever possible, given that a substantial proportion of the population requires more than one service.[4] Bundling can increase the efficiency of CPS delivery and can have a synergistic effect on health. Once successful frameworks have been developed for integrating the delivery of this core set of CPS, these integrations can serve as a platform for integrating delivery for additional important services including other types of CPS, preparedness efforts, as well as treatment of chronic diseases and potentially even acute conditions.

Defining CPS delivery. The overall process of "delivering" CPS is complex. It is more than simply administering an immunization, ordering a test, counseling a patient, or prescribing a medication. It includes three equally important steps: engagement, delivery, and follow-up.[30.]

Engagement includes all of the necessary steps before actual CPS delivery (Table 2). While often overlooked and undervalued, engagement may be the most critical step to closing the gap in CPS delivery and ensuring that the right individuals receive the right services.

Delivery includes different tasks depending on the nature of the clinical preventive service (Table 2). Immunizations and screening tests are often distinct events, potentially repeated at intervals. Counseling and supporting the adoption of healthy behaviors are the most intensive CPS, requiring significant contact time over prolonged periods and potentially involving the individual, family, and social supports in order to achieve and sustain success.[31.] Prescribing chemoprevention must be preceded by individualized assessment of existing contraindications and the tradeoff between the medication's benefits and risks.

Follow-up is an essential, yet underappreciated, element of CPS delivery. Follow-up includes (a) immediate actions such as documenting delivery of a CPS in the patient's records, referring individuals with abnormal results for appropriate evaluation and management, and ensuring that they follow through with recommended management; (b) long-term support for maintenance of healthy behaviors and medication adherence; and (c) continued reassessment to identify and re-engage individuals who become due for repeat delivery of services (Table 2).

TABLE 2. Component Steps of CPS		
Engagement • Identify those needing CPS • Raise public awareness • Educate about condition and CPS • Encourage receipt of CPS • Assist in making service decisions • Coordinate logistics • Transport to receive service	**Delivery** • Administer an immunization • Administer and interpret a screening test • Counsel and support adoption of a healthy behavior • Prescribe medication after risk and benefit assessment	**Follow-up** • Document CPS delivery and results • Refer those with abnormal findings for further management • Ensure that those referred follow through • Support maintenance of healthy behaviors • Monitor and support medication adherence • Issue reminders when services due again

A MODEL FOR UNDERSTANDING DELIVERY PARTICIPANTS AND ROLES

There are six general participants in an effective community-clinical integration to deliver CPS as identified in the proposed framework: the community, clinicians, national and state leadership, local delivery leadership, payers, and personnel and support that span settings. Their roles and how they might collectively function as an integrated unit to deliver CPS is depicted in Figure 1 below. This model more broadly extends the Chronic Care Model to all six participants needed for an effective community-clinical integration to increase the uptake of CPS.[20-22]

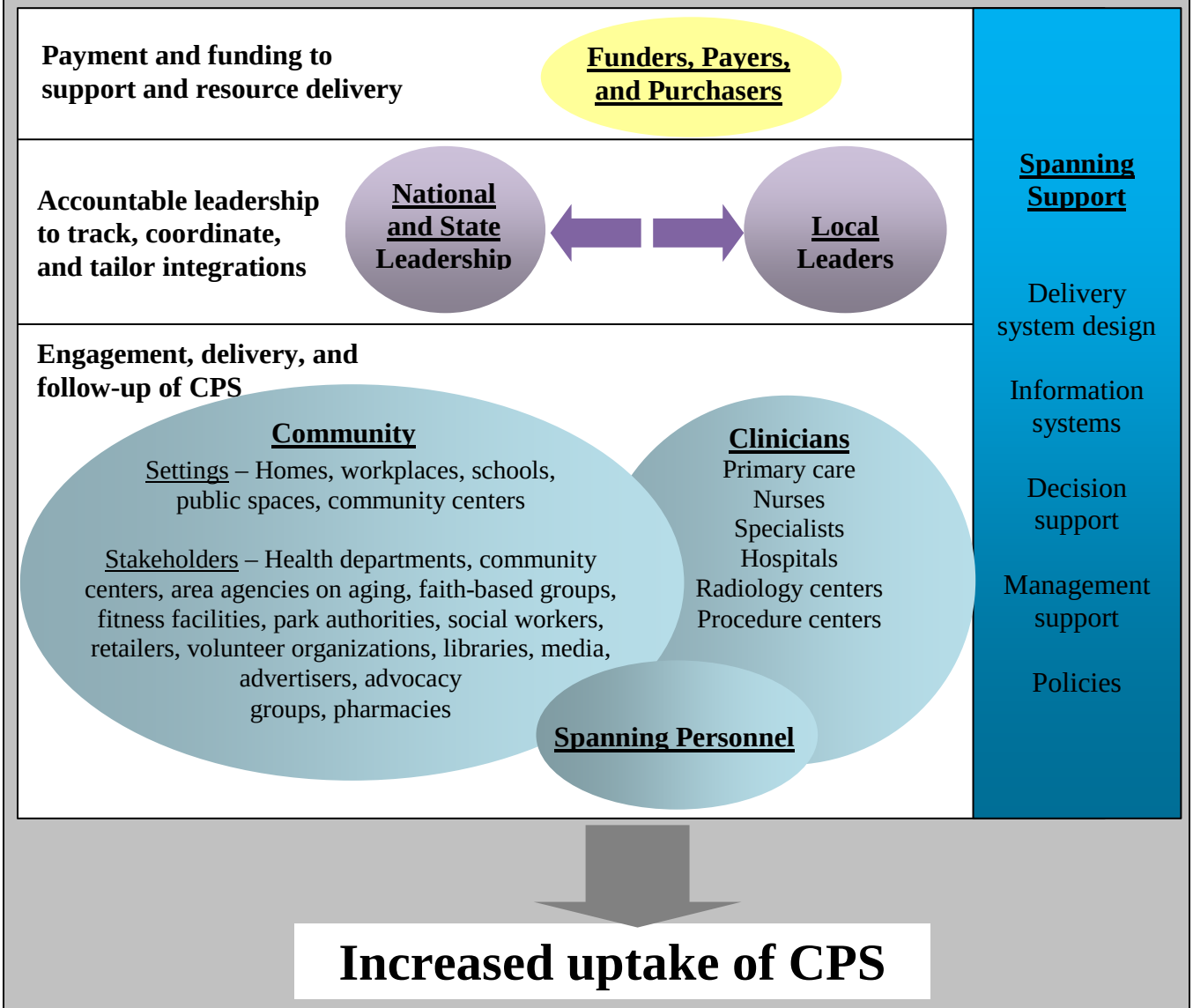
We broadly define the *community* to include the settings where individuals live and work and the organizations that serve those settings. *Clinicians* include all entities required for CPS delivery, with an emphasis on ambulatory care.

While the goal of integration is to create one system, the community and clinical settings may be geographically separated, individuals receiving CPS may access the settings at different times, and both entities often retain responsibility for non-overlapping missions that consume more energy than does CPS delivery. These factors require spanning support and personnel.

Spanning support consists of the management, delivery systems, arrangements, processes, tools, resources, information systems, and surveillance data and policies required for community-clinical integrations. This support is needed not only by the community and clinicians, but also by the local delivery leadership, national and state leadership, and funders/payers.
Spanning personnel primarily serve the community and clinicians in the CPS delivery process, connecting the two entities into one delivery system.

Collectively, spanning supports and personnel have five key roles: (1) assist in the delivery of CPS, (2) help individuals who seek services navigate between the community and clinicians, (3) support communication and the flow of clinical information between the community and clinicians, (4) serve as a shared resource for all participants, and (5) provide information and data to inform and guide actions.

FIGURE 1. An Integrated Community-Clinical Model to Increase CPS Uptake



LEGEND. Funders, payers, and purchasers collectively pay for integration infrastructure and preventive care. National and state leadership is an organization selected and empowered with the authority and resources to foster integrations across regions nationally. Local leaders are selected regional organizations charged with directing local tailoring and integration activities. Local leaders will vary from region to region but include public health and clinical entities. The community is where individuals live and the stakeholders serving those settings. Clinicians include all clinical entities participating in preventive care. Spanning personnel are staff that help patients in both the clinical and community settings. Spanning support is the infrastructure to support all of the participants in an integrated care model.

Replacing the existing community and clinical silos with fully integrated systems will not likely happen without coordinating entities. National and state leadership is needed to ensure and support broad nationwide efforts to build the ties. Currently, there are many national agencies and organizations that support clinical care, public health, specific conditions and community services. Representative of these types of organizations and agencies are: Centers for Disease Control and Prevention; Health Resources and Services Administration; Centers for Medicare and Medicaid Services; Agency for Healthcare Research and Quality; National Prevention,

Health Promotion, and Public Health Council; National Association of Area Agencies on Aging; Association of State and Territorial Health Officials; National Association of county and City Health Officials; American Heart Association; and American Cancer Society.

Many of these entities are ardent and longstanding advocates of community-clinical collaborations. However, no organization is empowered with the authority or resources to make it happen. Local, state and national leaders also would serve as champions with both the energy and incentives to move integration forward. We define the role of *national and state leadership* as creating and implementing the guiding principles to model community-clinical integrations and providing the authority and resource streams to ensure that such integrations can be sustained across states and communities. We define *local delivery leadership* as the coordinating entity for CPS delivery within each community. Local delivery leadership is necessary because the needs and resources of each community vary and buy-in from local change agents is often essential to move the needle. A one-size-fits-all model for integration cannot be implemented everywhere; integrations need to be locally-tailored around guiding principles. Local delivery leadership is familiar with and can leverage extant community and clinical activities and resources, convene stakeholders to coordinate activities and define roles, and track and monitor care delivery.

Finally, collaboration and support from *funders and payers* are needed to ensure that all participants are appropriately resourced to provide CPS delivery activities. By integrating and combining existing resources, avoiding duplication of services, and creating a more efficient delivery system, current funding might be used more wisely and spread further to support this integration.

While the specifics of community-clinical integrations vary depending on needs, resources, and the specific CPS, there are several defining characteristics that distinguish a community-clinical integration versus the current model for delivering CPS (Figure 2). Fundamentally, both entities must meaningfully participate in at least one step of the CPS delivery process. Ideally, all activities, resources, and accountability are shared and communicated between participants.

Figure 2. The Distinctive Features of Community-Clinical Integrations

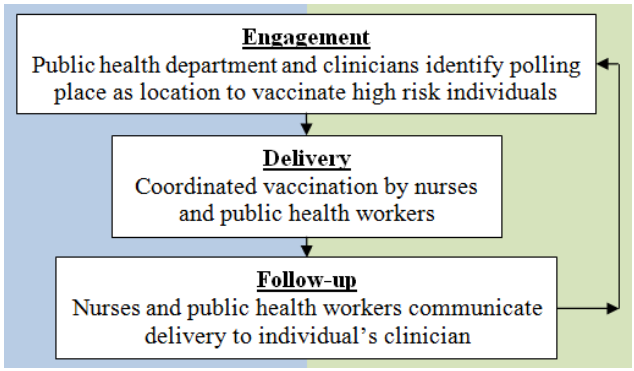
The specifics of community-clinical integrations vary depending on the setting and the service.

Core community-clinical integration features

- One step must occur in each setting
- Activities coordinated between participants
- Activities recorded in a common health record
- Both entities reinforce and support all steps
- Resources are shared
- Accountability is shared

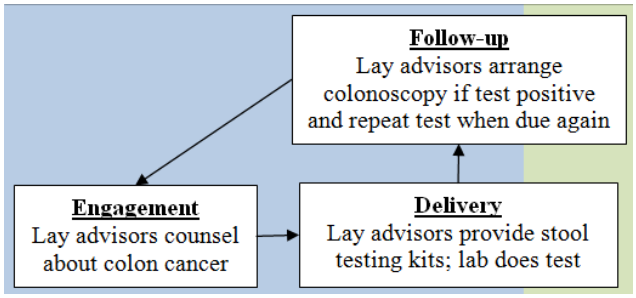
Figure 3 highlights an example of a community-clinical integration in which the community and clinical partners participate equally in each step of the CPS delivery process. While this depicts a highly shared community-clinical integration, effective integrations can also have a community or a clinical focus, as shown in Figures 4 and 5, respectively, and still be considered "integrated" as long as the integration adheres to the distinguishing characteristics outlined in Figure 2. These examples are fundamentally different than our current non-integrated "silo care system," as seen in dysfunctional examples such as pharmacies giving immunizations without notifying the customer's clinician or clinicians focusing solely on CPS for patients seen with no attention to activities that occur outside the confines of their office.

Figure 3. Example of an Equally Shared Community-Clinical Integration



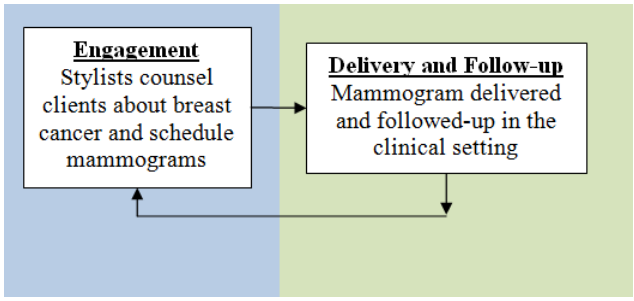
Blue (left) = community setting; Green (right) = clinical setting

Figure 4. Example of a Community Dominant Integration



Blue (left) = community setting; Green (right) = clinical setting

Figure 5. Example of a Clinically Dominant Integration



Blue (left) = community setting; Green (right) = clinical setting

EVIDENCE SUPPORTING COMMUNITY AND INTEGRATED CPS DELIVERY

Evidence supporting community CPS delivery. The concept of delivering CPS in the community is neither new nor unproven (see Table 3 for examples). For decades, media campaigns initiated by public health departments have promoted awareness about the benefits of cervical, colorectal, and breast cancer screening. State health departments have promoted the use of smoking cessation quitlines.[32] Vaccinations have been administered in pharmacies, shopping malls, churches, and polling places. Health fairs have screened participants for hypertension, anemia, blood chemistry abnormalities, hyperlipidemia, and glaucoma.[33,34]

Adding community delivery to existing clinical delivery of CPS appears to increase service uptake.[16,35] For example, the New York City Department of Health and Mental Hygiene sought to increase awareness of and access to colonoscopies. After the dissemination of public service advertisements promoting colonoscopies and the implementation of a navigator program

(community-based engagement), colonoscopy rates increased from 40% in 2003 to 60% in 2007.[36] A project in Toronto targeting women at an inner-city drop-in center who were due for mammograms demonstrated that breast cancer screening rates increased from 5% to 29% after the intervention.[37] Other communities have bundled the delivery of multiple CPS and demonstrated increases in both vaccination rates and cancer screenings.[38,39] More substantial, downstream health benefits have also been documented. The California Tobacco Control Program allocated 5 cents of a 25-cent cigarette package tax to an aggressive anti-tobacco media campaign and the promotion of clean indoor air policies. Three years after initiating the program, coronary heart disease mortality decreased by 2.93 deaths per year per 100,000 in California.[40]

The Task Force on Community Preventive Services has similarly identified numerous community interventions to promote the delivery of CPS.[41] Community interventions demonstrated to increase breast cancer screening include printed or telephone reminders, small media distributed in the community to engage people in screening (e.g., letters, brochures, leaflets, pamphlets, flyers, or newsletters), group education to role model and motivate screening, individual education by telephone or in person, reducing structural barriers (e.g., bringing mammograms to clients, modifying service hours, simplifying administrative procedures), and reducing out-of-pocket costs. Community interventions demonstrated to help smokers quit include mass media campaigns, telephone counseling, smoking bans in public places, and increasing taxes on tobacco products. Community interventions demonstrated to increase vaccinations include home visits, school and child care center vaccination programs, and reminders.

In addition to being effective, community delivery of CPS appears to be of economic value. A 2009 report from the Trust for America's Health contains a thorough literature review of 84 community-based prevention programs conducted across states and communities.[35] The study found that for every $1 invested in community delivery, nearly $1 is returned in the first one to two years after investment and within five years, the return on investment (ROI) rose to $5.6 for every $1 invested.[42] At the societal level, this ROI could amount to billions of dollars of savings each year if these estimates are valid. The gains were calculated for medical costs alone and exclude gains in worker productivity and enhanced quality of life, which if counted, would raise the ROI on preventive services even further. For example, studies of productivity loss suggest that the potential for savings from cancer prevention can exceed billions of dollars each year.[43-45] Furthermore, on a study-by-study basis, the evidence is highly suggestive that community CPS delivery for some services and populations is cost-effective relative to delivery in clinical settings.[46] However, a comprehensive model is needed to compare the relative cost-effectiveness of community and community-clinical integrations for the delivery of CPS relative to the traditional clinical delivery of CPS.

Evidence supporting community-clinical integration. Several programs have sought to break down the community and clinical silos of care and integrate care across settings. A key example is SPARC, a non-profit organization that convenes community organizations, leverages local knowledge of resources and preferences, and bundles the delivery of CPS through organized community-clinical collaborations. SPARC projects, such as Vote & Vax, have been implemented in 32 states and supported by a variety of regional and national funders.[47] One SPARC project to administer pneumococcal vaccines at influenza clinics demonstrated a 94% increase in the pneumococcal vaccination rate to Medicare beneficiaries within the target area.[48] Another SPARC program designed to improve access to mammograms for rural women placed

outreach workers at community influenza clinics to schedule mammograms for women overdue for screening. Mammography use following access through influenza clinics was approximately twice that of women attending influenza clinics where access to mammography was not offered.[49]

Though not directly focused on preventive services, Vermont's Blueprint for Health has invested substantial resources to create community-clinical integrations by deploying community health teams to work with patient centered medical homes. Teams assess patient and community needs, coordinate delivery of community and clinical services, and provide multidisciplinary care. This highly integrated model of community and clinical care has demonstrated decreases in hospital admissions, emergency department visits, and costs per person per month.[24] However, it remains to be seen whether this integration will be used to promote CPS delivery.

Table 3: Examples of Community Programs to Increase Uptake of CPS

Intervention	Years	Outcomes [Source]	Clinician role	Funder(s)
Breast cancer screening				
Participants randomized to community based breast cancer education with or without on-site mobile mammography[50]	1998-2000	The mobile mammogram group was more likely to undergo mammography within 3 months then education alone (55% vs. 40%) [patient report]	Clinicians assisted with providing on-site mobile mammography	State of California Breast Cancer Research Program grant
Stylists provided counseling that encouraged clients to screen for breast cancer[51]	2002-2004	Clients of salons that provided counseling reported increased intent to obtain screening [patient report]	Clinicians did mammograms on clients referred by stylists	National Cancer Institute, Edna McConnell-Clark Foundation, United Hospital Fund, Riverside Church
Colorectal cancer screening				
Lay health advisors provided telephone counseling on colon cancer screening and stool blood testing kits[52]	2005-2007	Self reported screening increased by 25% in the intervention group compared with 8% in the control group [patient report]	Patients were obtained from the panels of primary care provider	American Cancer Society, Center to Reduce Cancer Health Disparities / National Cancer Institute
Health department passed out public service announcements to promote colonoscopies and patient navigations[53]	2003-present	Colonoscopy rates increased from 40% in 2003 to 60% in 2007 [navigator report]	The navigator made appointments, provided education, and made reminder calls	National Cancer Institute, New York City Department of Health and Mental Hygiene
Cervical cancer screening				
At a church, participants received education and Pap tests. Abnormal tests were followed by same-day colposcopies[54]	1998	24% of the 98 participants overdue for cervical cancer screening received a Pap test [patient report]	Clinicians did Pap tests and followed up on abnormal results	American Cancer Society
Influenza vaccines				
SPARC: Vote & Vax –	1997,	21,434 vaccines given,	Nurses delivered the	Robert Wood Johnson

Influenza vaccines offered at or near polling places on Election Day[55]	2004, 2006, 2008	83% were high risk and 11% uninsured [public health agency records]	vaccines	Foundation, AARP
Smoking cessation				
Quitlink – Clinicians systematically referred smokers to the state smoking cessation quitline [56]	2005-2006	Smoking cessation support increased from 28.2% to 40.7% [patient report]	Clinicians sent fax referrals to telephone counselors	Agency for Healthcare Research and Quality
California Tobacco Control Program – Creation of anti-tobacco media campaigns, education, cessation programs, and clean indoor air policies[40]	1989-2000	Coronary heart disease mortality decreased by 2.93 deaths per year per 100,000 in California [national / state statistics registries]	The program supports cessation efforts	Cigarette surtax approved by Proposition 99
Bundled services				
SPARC – Pneumonia vaccinations offered at influenza clinics after community outreach[648]	1996-1997	94% increase in the county pneumococcal vaccination rate [claims data]	Clinicians delivered the vaccines	Health Care Financing Administration, Department of Health and Human Services, Qualidigm, Improving Healthcare for the Common Good
SPARC – At community influenza clinics, outreach workers scheduled mammograms for women[57]	1997	Mammogram use nearly doubled at clinics where the service was available [patient report]	Radiology staff helped make appointments and sent results to the patient's primary care provider	Catherine and Patrick Weldon Donaghue Foundation, Health Resources and Services Administration
Patients at influenza clinics due for colon cancer screening were offered stool blood testing kits[38]	2006	Screening increased 30% compared with 4% for participants not offered kits [review of medical records]	Individuals with abnormal tests offered colonoscopies	American Cancer Society, National Cancer Institute, Asian American Network for Cancer Awareness
Lean You! – Employer provided financial incentives and support for smoking cessation, blood pressure, and cholesterol control[58]	2004-present	Increased rates of smoking cessation [review of medical records]	Offers onsite access to primary care providers and screening tests (mammogram, Pap test, and colonoscopy)	Employer funded
Vermont Blueprint for Health – Community health teams assess patient and community needs, coordinate delivery of community and clinical services, and provide multidisciplinary care[24]	2006 - present	The program has led to decreases in hospital admissions, emergency department visits, and costs per person per month [claims data]	The community health teams provide a link between primary care and community resources	Vermont's three commercial insurers, Medicaid, Medicare

Challenges with integrating CPS delivery. Despite the demonstrated benefits of delivering CPS in the community and integrating the community and clinical care delivery systems,

numerous challenges impede broad dissemination and sustainability. A primary challenge is non-sustained funding to support community-clinical integrations and inconsistent reimbursement or other payment for non-clinician delivery of CPS. Community programs and the spanning personnel necessary to link the community and clinicians together are commonly funded by episodic grants or discrete initiatives. For example, after funding for the previously referenced California Tobacco Control Program was decreased, heart disease mortality increased.[40]Additionally, many of the community interventions to deliver CPS presented in Table 3 do not represent the type of community-clinical integration supported in this manuscript – lacking personnel, support, arrangements, processes, and information systems that span and serve both the community and clinical participants. This is not only inefficient but represents a missed opportunity – integrating the community and clinical delivery systems could provide a vehicle to procedurally and financially sustain both community and clinical activities.

An added challenge is that knowledge about community-clinical integrations is inadequate to inform the design of integrated CPS delivery systems. More studies are needed to assess the acceptability, accessibility, value, and unintended consequences of integrating community and clinical delivery systems. Understanding the impact of community-clinical integrations is often complicated. Programs may be implemented without formal evaluation, confounding factors beyond implemented programs affect the overall delivery of CPS, and outcomes of implemented programs occur over long time periods. Innovative measurement metrics and evaluative methods are necessary to inform community-clinical integrations.[59]

CONCLUSIONS

The proposed framework to integrate the community and clinical settings to more comprehensively deliver CPS is a daunting undertaking. Some of the proposed strategies outlined in the model required to support this integration can be implemented now. Others will require a long-term approach. However, given the national resolve to cover CPS, existing investments to spur collaborations, the need to seek value for healthcare expenditures, and a rapidly advancing informatics infrastructure, the time is right to move forward with establishing the framework for generalizable, effective, and sustainable community-clinical integrations. As the infrastructure is assembled for CPS delivery, information on costs and outcomes need to be systematically captured and brought together in a comprehensive model that compares different programs, settings, populations, and considers how programs can be synergistic and not duplicative.

REFERENCES

1. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med.* Jun 26 2003;348(26):2635-2645.

2. BRFSS - CDC's behavioral risk factor surveillance system. *Centers for Disease Control and Prevention*. Available at: www.cdc.gov/brfss. Accessed Oct, 2011.

3. Influenza and pneumococcal vaccination coverage among persons aged > or =65 years and persons aged 18-64 years with diabetes or asthma--United States, 2003. *MMWR Morb Mortal Wkly Rep.* Nov 5 2004;53(43):1007-1012.

4. Shenson D, Bolen J, Adams M. Receipt of preventive services by elders based on composite measures, 1997-2004. *Am J Prev Med.* Jan 2007;32(1):11-18.

5. Maciosek MV, Coffield AB, Edwards NM, Flottemesch TJ, Goodman MJ, Solberg LI. Priorities among effective clinical preventive services: results of a systematic review and analysis. *Am J Prev Med.* Jul 2006;31(1):52-61.

6. U.S. Department of Health and Human Services. Healthy People 2010: Understanding and Improving Health. 2nd ed. Washington, D.C.: Government Printing Office; November 2000.

7. Centers for Disease Control and Prevention, Administration on Aging, Agency for Healthcare Research and Quality, and Centers for Medicare and Medicaid Services. Enhancing Use of Clinical Preventive Services Among Older Adults. Washington, DC: AARP; 2011.

8. U.S. Department of Health and Human Services. Healthy People 2010: Understanding and Improving Health. 2nd ed. Washington, D.C.: Government Printing Office; November 2000.

9. Kottke TE, Brekke ML, Solberg LI. Making "time" for preventive services. *Mayo Clin Proc.* Aug 1993;68(8):785-791.

10. Jaen CR, Stange KC, Nutting PA. Competing demands of primary care: a model for the delivery of clinical preventive services. *J Fam Pract.* Feb 1994;38(2):166-171.

11. Woolf SH, Krist AH, Rothemich SF. *Joining Hands: Partnerships Between Physicians and the Community in the Delivery of Preventive Care*. Washington D.C.: Center for American Progress; 2006.

12. Yarnall KS, Pollak KI, Ostbye T, Krause KM, Michener JL. Primary care: is there enough time for prevention? *Am J Public Health.* Apr 2003;93(4):635-641.

13. Whitlock EP, Polen MR, Green CA, Orleans T, Klein J. Behavioral counseling interventions in primary care to reduce risky/harmful alcohol use by adults: a summary of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med.* Apr 6 2004;140(7):557-568.

14. U.S. Preventive Services Task Force. Screening for obesity in children and adolescents: Recommendation statement. *AHRQ Publication No. 10-05144-EF-2, January 2010*. Available at: http://www.uspreventiveservicestaskforce.org/uspstf10/childobes/chobesrs.htm. Accessed Nov, 2011.

15. Frieden TR. A framework for public health action: the health impact pyramid. *Am J Public Health.* Apr;100(4):590-595.

16. Martin-Misener R, The Strengthening Primary Health Care Through Primary Care and Public Health Collaboration Research Team. A scoping literature review of collaboration between primary care and public health. *Canadian Health Services Research Foundation*.

Available at: www.swchc.on.ca/documents/MartinMisener-Valaitis-Review.pdf. Accessed Oct, 2011.
17. Lasker RD, Weiss ES, Miller R. Promoting collaborations that improve health. *Educ Health (Abingdon).* 2001;14(2):163-172.
18. Weiss ES, Anderson RM, Lasker RD. Making the most of collaboration: exploring the relationship between partnership synergy and partnership functioning. *Health Educ Behav.* Dec 2002;29(6):683-698.
19. Woolf SH, Glasgow RE, Krist A, et al. Putting it together: finding success in behavior change through integration of services. *Ann Fam Med.* Jul-Aug 2005;3 Suppl 2:S20-27.
20. Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. *Milbank Q.* 1996;74(4):511-544.
21. Glasgow RE, Orleans CT, Wagner EH. Does the chronic care model serve also as a template for improving prevention? *Milbank Q.* 2001;79(4):579-612, iv-v.
22. Wagner EH, Glasgow RE, Davis C, et al. Quality improvement in chronic illness care: a collaborative approach. *Jt Comm J Qual Improv.* Feb 2001;27(2):63-80.
23. Shenson D. Putting prevention in its place: the shift from clinic to community. *Health Aff (Millwood).* Jul-Aug 2006;25(4):1012-1015.
24. Bielaszka-DuVernay C. Vermont's Blueprint for medical homes, community health teams, and better health at lower cost. *Health Aff (Millwood).* Mar 2011;30(3):383-386.
25. The Patient Protection and Affordable Care Act. Section 4103. *Public Law 111-148*. 2nd Session ed; 2010.
26. Crabtree BF, Nutting PA, Miller WL, Stange KC, Stewart EE, Jaen CR. Summary of the National Demonstration Project and recommendations for the patient-centered medical home. *Ann Fam Med.* 2010;8 Suppl 1:S80-90; S92.
27. Mechanic RE, Santos P, Landon BE, Chernew ME. Medical group responses to global payment: early lessons from the 'Alternative Quality Contract' in Massachusetts. *Health Aff (Millwood).* Sep 2011;30(9):1734-1742.
28. Blumenthal D, Tavenner M. The "meaningful use" regulation for electronic health records. *N Engl J Med.* Aug 5 2010;363(6):501-504.
29. Farley TA, Dalal MA, Mostashari F, Frieden TR. Deaths preventable in the U.S. by improvements in use of clinical preventive services. *Am J Prev Med.* Jun 2010;38(6):600-609.
30. Lesser LI, Krist AH, Kamerow DB, Bazemore AW. Comparison between US Preventive Services Task Force recommendations and Medicare coverage. *Ann Fam Med.* Jan-Feb 2010;9(1):44-49.
31. Whitlock EP, O'Connor EA, Williams SB, Beil TL, Lutz KW. Effectiveness of weight management interventions in children: a targeted systematic review for the USPSTF. *Pediatrics.* Feb 2011;125(2):e396-418.
32. Barry MB, Saul J, Baily LA. U.S. quitlines at a crossroads: utilization, budget, and service trends 2005-2010. *North American Quitline Consortium*. Available at: http://www.naquitline.org/resource/resmgr/reports_2010/100407_special-report.pdf. Accessed Nov, 2011.
33. Berwick DM. Screening in health fairs. A critical review of benefits, risks, and costs. *Jama.* Sep 20 1985;254(11):1492-1498.
34. Challenges and failures of health fairs and community screenings. *Unite for Sight*. Available at: http://www.uniteforsight.org/health-screenings/health-screenings. Accessed Oct, 2011.

35. The compendium of proven community-based prevention programs. *Trust for America's Health*. Available at: http://healthyamericans.org/report/66/prevention. Accessed Oct, 2011.

36. Neugut AI, Lebwohl B. Screening for colorectal cancer: the glass is half full. *Am J Public Health.* Apr 2009;99(4):592-594.

37. Heyding RK, Cheung AM, Mocarski EJ, Moineddin R, Hwang SW. A community-based intervention to increase screening mammography among disadvantaged women at an inner-city drop-in center. *Women Health.* 2005;41(1):21-31.

38. Potter MB, Phengrasamy L, Hudes ES, McPhee SJ, Walsh JM. Offering annual fecal occult blood tests at annual flu shot clinics increases colorectal cancer screening rates. *Ann Fam Med.* Jan-Feb 2009;7(1):17-23.

39. Potter MB, Gildengorin G, Wang Y, Wu M, Kroon L. Comparative effectiveness of two pharmacy-based colorectal cancer screening interventions during an annual influenza vaccination campaign. *J Am Pharm Assoc.* Mar-Apr 1 2003;50(2):181-187.

40. Fichtenberg CM, Glantz SA. Association of the California Tobacco Control Program with declines in cigarette consumption and mortality from heart disease. *N Engl J Med.* Dec 14 2000;343(24):1772-1777.

41. Guide to Community Preventive Services. *The Task Force on Community Preventive Services, Centers for Disease Control and Prevention*. Available at: http://www.thecommunityguide.org/index.html. Accessed Oct, 2011.

42. Prevention for a Healthier America. *Trust for America's Health*. Available at: http://healthyamericans.org/reports/prevention08/. Accessed Oct, 2011.

43. Bradley CJ, Yabroff KR, Dahman B, Feuer EJ, Mariotto A, Brown ML. Productivity costs of cancer mortality in the United States: 2000-2020. *J Natl Cancer Inst.* Dec 17 2008;100(24):1763-1770.

44. Yabroff KR, Bradley CJ, Mariotto AB, Brown ML, Feuer EJ. Estimates and projections of value of life lost from cancer deaths in the United States. *J Natl Cancer Inst.* Dec 17 2008;100(24):1755-1762.

45. Bradley CJ, Lansdorp-Vogelaar I, Yabroff KR, et al. Productivity savings from colorectal cancer prevention and control strategies. *Am J Prev Med.* Aug 2011;41(2):e5-e14.

46. Prosser LA, O'Brien MA, Molinari NA, et al. Non-traditional settings for influenza vaccination of adults: costs and cost effectiveness. *Pharmacoeconomics.* 2008;26(2):163-178.

47. Brodeur P. SPARC - Sickness Prevention Acheived through Regional Collaboration. In: Isaacs SL, Knickman JR, eds. *To Improve Health and Health Care, Vol X. The Robert Wood Johnson Anthology*. San Francisco: Jossey-Bass; 2006:145-167.

48. Shenson D, Quinley J, DiMartino D, Stumpf P, Caldwell M, Lee T. Pneumococcal immunizations at flu clinics: the impact of community-wide outreach. *J Community Health.* Jun 2001;26(3):191-201.

49. Shenson D, Cassarino L, DiMartino D, et al. Improving access to mammograms through community-based influenza clinics. A quasi-experimental study. *Am J Prev Med.* Feb 2001;20(2):97-102.

50. Reuben DB, Bassett LW, Hirsch SH, Jackson CA, Bastani R. A randomized clinical trial to assess the benefit of offering on-site mobile mammography in addition to health education for older women. *AJR Am J Roentgenol*. Dec 2002;179(6):1509-1514.

51. Wilson TE, Fraser-White M, Feldman J, et al. Hair salon stylists as breast cancer prevention lay health advisors for African American and Afro-Caribbean women. *J Health Care Poor Underserved.* Feb 2008;19(1):216-226.

52. Walsh JM, Salazar R, Nguyen TT, et al. Healthy colon, healthy life: a novel colorectal cancer screening intervention. *Am J Prev Med.* Jul 2010;39(1):1-14.
53. Chen LA, Santos S, Jandorf L, et al. A program to enhance completion of screening colonoscopy among urban minorities. *Clin Gastroenterol Hepatol.* Apr 2008;6(4):443-450.
54. Holschneider CH, Felix JC, Satmary W, Johnson MT, Sandweiss LM, Montz FJ. A single-visit cervical carcinoma prevention program offered at an inner city church: A pilot project. *Cancer.* Dec 15 1999;86(12):2659-2667.
55. Shenson D, Adams M. The Vote and Vax program: public health at polling places. *J Public Health Manag Pract.* Sep-Oct 2008;14(5):476-480.
56. Rothemich SF, Woolf SH, Johnson RE, et al. Promoting primary care smoking-cessation support with quitlines: the QuitLink Randomized Controlled Trial. *Am J Prev Med.* Apr 2010;38(4):367-374.