Practice-Based Population Health: Information Technology to Support Transformation to Proactive Primary Care

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Contents

Executive Summary 1

Chapter 1: Introduction 4

Chapter 2: Project Methodology 5

- Environmental Scan 6
- Initial List of Functionalities 6
- Selection of Experts 6
- First Expert Panel Meeting 7
- Interviews with Primary Care Providers and Office Staff 8
- Second Expert Meeting 9

Chapter 3: Population Health and Primary Care 10

- Understanding Population Health 10
- Practice-Based Population Health 11
- Benefits of PBPH 14

Chapter 4: PBPH Functionalities 15

Chapter 5: Perspectives on and Use of Functionalities 18

- Providers' Perspectives on the Importance of the Functionalities 18
- Practices Performing the Functionalities 18
- Examples of How Practices Are Engaging in Population Health Management 20
- Matching Functionalities to Applications 21

Chapter 6: PBPH Functionalities and Other Health IT Standards 23

- Standards Development and Certification in Population Health 23
- Overlap of PBPH and the Patient-Centered Medical Home Model 24
- PBPH and Meaningful Use 25

Chapter 7: Challenges and Next Steps 27

- Challenges to Adoption of PBPH 27
- Technology Issues 27
- Data Issues 28
- Reimbursement Issues 29
- Paradigm Shift for the Practice of Care 30
- Leveraging Policies to Address Challenges 31
- Health Care Reform 31
- American Recovery and Reinvestment Act (ARRA) 32

Next Steps 33
Additional Research 33
Dissemination 34

Chapter 8: Examples of Population Health Management 35

Indian Health Service: iCare 35
Washington State Department of Health: Chronic Disease Electronic Management System. 36
Vermont Department of Health: DocSite 37
New York City Department of Health and Mental Hygiene Primary Care Information Project: eClinical Works 37
Kaiser Permanente 38
Mayo Clinic 39
Community-Based Practices 40

Conclusion 41

References 42

Tables

Table 1. Expert Panel Members 7
Table 2. PBPH Functionalities 17
Table 3. Crosswalk of PBPH, PCMH, and CCHIT Standards 25

Figures

Figure 1. Project Approach 5
Figure 2. Primary, Secondary, and Tertiary Preventive Care Delivery 11
Figure 3. Practice-Based Population Health, Interactions Between a Primary Care Provider, a Patient, and the Patient Population 12
Figure 4. Practice-Based Population Health in the Context of the Larger Community 13
Figure 5. Numbers of practices That Could Perform the Functionalities in Each Domain, by Technology 19

Executive Summary

The transformation of primary care is a key component of current efforts to improve health care in the United States and of the policy debate on national health care reform. The proactive measurement and management of the panel of patients in an individual practice may be one aspect of that transformation. This approach to care and the concept we developed to characterize its core—Practice-Based Population Health (PBPH)—are the focus of the project presented here.

We define PBPH as an approach to care that uses information on a group ("population") of patients within a primary care practice or group of practices ("practice-based") to improve the care and clinical outcomes of patients within that practice. With funding from the Agency for Healthcare Research and Quality (AHRQ), the National Opinion Research Center (NORC) at the University of Chicago has identified the functionalities necessary to more effectively prevent disease and manage chronic conditions using a PBPH approach. By helping providers focus on the preventive care needs of all of their patients, including those individuals who do not appear in the office for routine care, PBPH can help practices conduct more comprehensive health promotion and disease management. PBPH can also be used to serve a variety of other purposes—for example, to develop lists of patients to invite to a group educational session on smoking cessation or chronic disease self-management; to identify patients to notify in the case of a medication recall; to find patients who are eligible for participation in clinical trials; and to make informed decisions about areas for continuing medical education.

Information Management Functionalities for Practice-Based Population Health

To further develop the concept of PBPH, the project team developed and vetted a series of information management functionalities to support proactive population management. The list was refined through discussions with a group of experts and a series of interviews with primary care providers and office staff. The functionalities were grouped into the following five domains:

- ***Domain 1: Identify Subpopulations of Patients.*** Practices can target patients who require preventive care or tests.
- ***Domain 2: Examine Detailed Characteristics of Identified Subpopulations.*** Information management systems can allow practices to run queries to narrow down the subpopulation of patients or to access patient records or additional patient information.
- ***Domain 3: Create Reminders for Patients and Providers.*** Information on patients can be made actionable through notifications for patients and members of the practice.
- ***Domain 4: Track Performance Measures.*** Practices can gain an understanding of how they are providing care relative to national guidelines or peer comparison groups.
- ***Domain 5: Make Data Available in Multiple Forms.*** Information may be most useful to practices if it can be printed, saved, or exported and if it can be displayed graphically.

Challenges to Adoption of Practice-Based Population Health

During our interviews with providers, we found that practices with electronic health records (EHRs) and registries are performing more of the PBPH functionalities than are paper-based practices, but none of the practices is performing all of the functionalities. More widespread adoption of PBPH will require technological innovations; greater availability of usable data; new methods for reimbursement of primary care; and changes in physicians' views of care delivery and their practice workflow.

Having access to an EHR or a registry increases the likelihood that practices are performing these functionalities, but such access is not sufficient for the adoption of PBPH. For systems to facilitate population management, they need to be user-friendly and contain robust PBPH capabilities. Several of the 27 providers we interviewed said either that they were unable to find systems that include population management functionalities or that the products they had purchased are not living up to their expectations in performing these management tasks. However, most providers are not actively seeking the tools needed for PBPH. With this lack of provider demand there is little incentive for vendors to create tools to support these functionalities.

To engage in PBPH, practices need accurate data in a discrete form. Providers we interviewed explained they often are able to run queries only on billing data, which may be inaccurate and insufficient for supporting PBPH. Practices also need to access patient information that is generated from other parts of the health care system, such as laboratory and pharmacy data. Additionally, for performance reporting, many providers feel that systems need to accommodate exception codes, so that patients who have refused treatment or patients for whom a particular treatment is inappropriate because of their comorbidities can be excluded from calculations of performance measures.

Because clinicians are trained to provide individualized care to one patient at a time, changing providers' focus to the population level will require a paradigm shift. The clinicians we interviewed were also concerned with the disruption of workflow that PBPH could cause because of the time needed to collect and analyze data on the patient population and the increased need for appointments that more proactive care requires.

The providers we interviewed also expressed concern that the current reimbursement system would not cover the costs of more proactive management and coordination of care. Practices are currently using PBPH in limited instances where funding is available through grant programs or insurer incentives that target improved management of particular conditions.

Leveraging Policies to Address Challenges and Next Steps

The movement toward health care reform and unprecedented Federal investment in health information technology (IT) provide a window of opportunity for transforming primary care. To increase the adoption of PBPH, incentives for proactive population management can be incorporated into policies related to provider payment, the health-IT-related economic stimulus provisions in the American Recovery and Reinvestment Act (ARRA), and efforts to strengthen

the primary care workforce. Further research and dissemination could also increase appreciation of the potential of PBPH and support broader adoption of this approach to care.

Proposed efforts to reform the health care system may provide opportunities to change the reimbursement structure for primary care. Reimbursement with a greater emphasis on outcomes could provide additional resources and incentives for primary care practices to engage in PBPH. Increased provider demand would probably motivate IT vendors to develop applications that support population management. Health care reform may also support models like the patient-centered medical home, of which PBPH is a component. Another opportunity presented by health reform is that it may lead to a uniform set of performance measures, which would make it easier for vendors to develop products that address PBPH and meet the needs of primary care practices.

Incentives to Medicare and Medicaid providers who demonstrate “meaningful use” of EHRs, which were introduced in ARRA, are likely to boost health IT adoption. PBPH could most directly be supported by this legislation if PBPH functionalities are incorporated into those criteria. ARRA could also increase the amount of information available in electronic form by boosting EHR adoption and health information exchange nationwide. Finally, the ARRA-funded extension centers could provide training to help providers engage in PBPH.

In addition to assistance in using technology, physicians, nurses, and others in the primary care workforce may require additional training to be able to interpret reports on their patient populations. Medical and nursing schools could also support the advancement of PBPH, by helping providers adopt a more population-focused orientation.

Further research may also be important in fostering PBPH. To make population management tools more useful to primary care providers, research could be conducted to advance learning in a number of critical areas—how to automate preventive care or disease management services; to improve natural language processing for converting text into discrete data elements in real time; to effectively use "messy" data in practice; to develop case studies of best practices in PBPH; and to compile specific data elements for PBPH tools.

To translate this project's findings into practice and, ultimately, influence and advance the transformation of primary care delivery, the concept of PBPH must first be introduced among primary care providers, health IT vendors, educators, policymakers, and third-party payers. Second, the functionalities required for optimal implementation of PBPH need further vetting and refinement among primary care providers and health IT vendors, which could include adding additional technical specifications. Third, educators need to be acquainted with PBPH concepts in order to develop PBPH education and training that incorporates the use of PBPH in primary care practice.

As training and technology to support population management become more available and incentives are established to foster this type of care, PBPH may become a viable option for primary care providers. Such advances will help PBPH contribute to transforming primary care and to improving health care quality, patient health, provider satisfaction, and the efficiency of the health care system.

Chapter 1: Introduction

The transformation of primary care is a key component of current efforts to improve health care in the United States and of the policy debate on national health care reform. Motivation to change the current primary care system stems, in part, from frustration by what Morrison and Smith have called the "hamster health care" model of care.[1] This model is characterized by overloaded primary care practices, fee-for-service reimbursement which pays for acute care services rather than chronic condition management, and the "persistent presence of the 'tyranny of the urgent' in everyday practice."[2] These factors often combine to create a style and pace of practice that is a threat to quality of care, as it neither adequately assesses nor systematically improves the health of the population, or panel, of patients seen by a provider.

A key aspect of primary care transformation is the proactive management of a panel of patients within an individual practice.[3] The project presented here focused on this facet of transformation and introduced a concept to characterize its core—Practice-Based Population Health (PBPH). We define PBPH as an approach to care that uses information on a group ("population") of patients within a primary care practice or group of practices ("practice-based") to improve the care and clinical outcomes of patients within that practice.

This report describes the concept of PBPH and the information management functionalities that may help primary care practices to move forward with this type of proactive management. With funding from the Agency for Healthcare Research and Quality (AHRQ), the National Opinion Research Center (NORC) at the University of Chicago has identified the functionalities necessary to more effectively prevent disease and manage chronic conditions using a PBPH approach. Specifically, through consultation with primary care providers and an expert panel, we have developed and vetted a list of functionalities to support the PBPH approach to care. While this project focused primarily on the information management functionalities that may help primary care practices proactively manage their patient populations, we note that there are a number of other factors important to facilitating this type of care, most notably the need for changes in workflow and new reimbursement models.[4] Tackling these issues will be necessary for the widespread adoption of PBPH, and this report briefly addresses them in the next steps section.

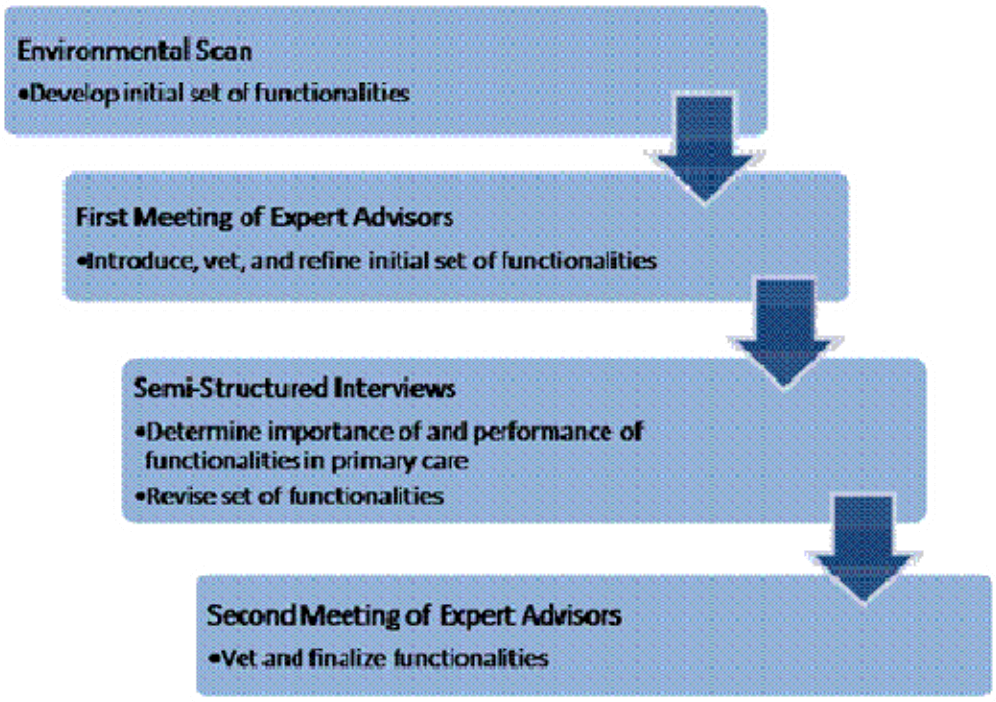
This report begins with a discussion of the methodology employed in the project and an explanation of the project's scope. It then provides a definition of PBPH and a description of its key elements. We present the set of functionalities that was developed and refined as part of this project. We describe how the providers we interviewed are engaging in population management in their practices, and include providers' views on the importance of the functionalities and their ability to perform them. To place the functionalities in a broader context, we discuss the relationship between these functionalities and health information technology (IT) certification efforts, proposed objectives for electronic health record (EHR) incentive programs, and the patient-centered medical home (PCMH) model. Our research suggests that proactive population management is relatively rare and thus we discuss some of the challenges to adopting a PBPH approach, as well as a series of recommendations from our project's experts on how to incorporate PBPH into current policy efforts and specific research and dissemination steps that would serve to foster PBPH. The report concludes with a series of examples, identified through an environmental scan, to illustrate how primary care providers are engaging in some elements of population management.

Chapter 2: Project Methodology

With this project, AHRQ sought to build on earlier work done by the Institute for Healthcare Improvement (IHI). According to the 2007 IHI report, *Health Information Technology for Improving Quality of Care in Primary Care Settings*,[5] health IT may improve primary care through: (1) direct benefits, such as operational efficiency and safety achieved by reduction of administrative or clinical errors; and (2) improvements to the system of care, such as proactive planning for population care and whole patient view for planned care. IHI focused on the second area—systems improvements—and our work on this project continued that focus. We incorporated elements from the recommendations of the IHI report into our initial list of functionalities, which were then refined, as described later in this chapter. This project also expanded on the IHI report by seeking additional examples of the approaches primary care practices are taking to incorporate health IT into population health management.

To develop the concept of Practice-Based Population Health (PBPH) and the functionalities to support it, we conducted an environmental scan, convened a group of expert advisors, and conducted a series of semi-structured interviews with primary care providers and office staff. Figure 1 provides an overview of our approach. Below, we provide additional detail on the methodological steps involved in this project.

Figure 1. Project approach



Environmental Scan

The first phase of this project was a comprehensive environmental scan, designed to identify existing applications for population management and current initiatives supporting their use. We identified and read both peer-reviewed and grey literature. The grey literature included information from primary care provider organizations; disease management groups; Federal, State, and local Governments; and entities such as the National Committee for Quality Assurance (NCQA), Healthcare Information Technology Standards Panel (HITSP), and the Certification Commission for Healthcare Information Technology (CCHIT).

Initial List of Functionalities

A key component of the environmental scan was to identify information management functionalities for population health that could inform the initial set of functionalities for population management to be vetted by the project's experts. Current criteria used to certify population health functionality from two respected sets of guidelines—the National Committee for Quality Assurance (NCQA) Physician Practice Connections®–Patient-Centered Medical Home (PPC-PCMH™) standards and the CCHIT Certification Criteria for Ambulatory EHRs—were reviewed to determine which established guidelines are related to population health in the primary care setting. The PPC-PCMH program aims to assess if physician practices are functioning as a medical home through a set of nine standards and sub-requirements,[6] while the CCHIT Certification Criteria assess EHR capability and capacity for ambulatory settings.[7] To complete the initial set of functionalities, we also reviewed additional guidelines,[8-9] applications,[10-11] and other documents describing information management in the primary care setting.[12-15] We compiled functionalities from all of these documents, grouped them into several categories, and refined them. These draft functionalities served as the foundation of the first expert meeting.

Selection of Experts

Based on findings from the environmental scan and knowledge of the field, we identified individuals to participate in an expert panel. The preliminary list of potential experts was also informed by input from colleagues at NORC and the ARHQ project officer (PO). In November and December 2008, we invited experts to participate in the project. Interested individuals agreed to participate in two group meetings—the first, a WebEx in February 2009, the second, an in-person meeting in June 2009. The final group of experts includes representatives of academic institutions, Government agencies, nonprofit organizations, medical providers, and health IT vendors (Table 1).

Table 1. Expert panel members

Name	Affiliation	Position
Cheryl Austein Casnoff	Health Resources and Services Administration (HRSA)	Associate Administrator for Health Information Technology
Michael S. Barr	American College of Physicians	Vice President, Practice Advocacy and Improvement
Sarah Corley	NextGen Healthcare Information Systems, Inc	Chief Medical Officer
Theresa Cullen	Indian Health Service, DHHS	Chief Information Officer, Director, Office of Information Technology
Stephen Downs	Robert Wood Johnson Foundation	Assistant Vice President, Health Group
Shaun Grannis	Regenstrief Institute/ Indiana University School of Medicine	Research Scientist/Professor, Family Medicine
David Kibbe	American Academy of Family Physicians	Director, Center for Health Information Technology
Terry McGeeney	TransforMED	President and CEO
Donald Mon	American Health Information Management Association (AHIMA)	Vice President, Practice Leadership
Anita Samarth	Clinovations	Managing Partner
Jaan Sidorov	Sidorov Health Solutions	Consultant
Jesse Singer	New York City Department of Health and Mental Hygiene	Director of Quality Informatics, Primary Care Information Project
Micky Tripathi	Massachusetts eHealth Collaborative (MAeHC)	President and CEO

First Expert Panel Meeting

The primary objectives of the February 2009 WebEx meeting were to introduce experts to the project and vet the initial set of health IT functionalities for PBPH. Prior to the meeting, the NORC team provided experts with a background memo including a project overview, objectives, goals, and a graphic model demonstrating the aspects of population health relevant to primary care providers within the project's scope. In advance of the meeting, the NORC team developed and sent to the experts a feedback form to allow them to indicate which functionalities should be prioritized for discussion at the meeting. During the meeting, NORC described the project's objectives and approach and provided an overview of experts' written feedback on the functionalities. Although there was consensus among the experts on the categories of functionalities presented to them, several experts suggested ways to re-categorize the functionalities. Discussion then turned from a general overview of the entire list of functionalities to more targeted discussions about a subset of functionalities about which some experts raised concerns on the feedback form. Following the expert meeting, we revised the list

of functionalities to reflect the suggestions from the experts. This revised list of functionalities served as the basis for the next phase of the project—a series of interviews with primary care practices.

Interviews with Primary Care Providers and Office Staff

NORC researchers conducted interviews with physicians, other clinicians, and office staff in primary care practices of varying sizes and levels of health IT adoption. The goal of these interviews was to learn how primary care practices were conducting proactive population management, to ascertain the perceived importance of the proposed functionalities, and to determine if and how practices perform them. To recruit interviewees, NORC sought assistance from experts; posted announcements about the interviews in listservs for the American College of Physicians and the Medical Group Management Association; and reviewed the literature on population health and health IT to identify individuals who manage population health in innovative ways. Prospective interviewees were sent a short screening questionnaire by email to determine their appropriate category.

NORC developed interview protocols for four categories of interviewees—(1) physicians with high IT adoption (with an EHR or a registry); (2) physicians with limited IT adoption (without an EHR or a registry application); (3) non-physician staff in practices with high IT adoption; and (4) non-physician staff in practices with limited IT adoption. These protocols were approved by the NORC Institutional Review Board under protocol number 081204.[i] Interview protocols included both open-ended and closed-ended questions. Closed-ended questions asked whether the practice has the capability to conduct each of the functionalities developed for this project, and if so, how often they perform that specific functionality. Interviewees were also asked to rank, on a four-point scale, the importance of each of the functionalities for improving patient care and/or making care delivery easier. Open-ended questions asked how providers currently perform PBPH functionalities and the perceived importance of functionalities for population health. Other questions included the importance of population health to primary care and barriers and obstacles to proactive population health management and preventive care in the primary care setting.

Between April and June 2009, a total of 27 interviews were conducted across all categories. This included 18 interviews with physicians and 9 with other clinicians and office staff. Of the total, 10 interviewees were from practices with low IT adoption and 17 were from practices with higher levels of IT adoption. The telephone interviews lasted between 30 and 60 minutes. A NORC senior staff member conducted the interviews, and a research assistant scheduled the interviews and took detailed notes during them. Data collected through open-ended questions were analyzed using traditional methods of qualitative data analysis, based on the discernment of themes and patterns in the data. Findings from the interviews were used to revise the list of functionalities.

[i] Interviews were conducted with fewer than ten individuals in each category and were therefore not subject to OMB review.

Second Expert Meeting

The group of experts was reconvened in June for an in-person meeting in NORC's Bethesda, Maryland office. The meeting objectives were: (1) to refine the functionalities; (2) to enhance understanding of the greatest opportunities and barriers for adoption of PBPH by primary care physicians; (3) to identify recommendations related to technology, policy, and future research needs; and (4) to plan for dissemination of the final report.

Working with a facilitator, members of the NORC team led the experts in both small and large group discussions. The meeting began with a discussion of the functionalities, supported by a PowerPoint presentation with findings from the interviews, including data on which functionalities providers are currently performing; data on which functionalities providers viewed as important to PBPH; and suggested modifications. In small groups, the experts provided additional feedback on the overall content of, as well as specific changes to, the functionalities. Part of the meeting was devoted to a broader discussion of population health management. The experts identified barriers to population health management, discussed innovative approaches to population health in the primary care setting, and developed technology- and policy-focused recommendations for promoting more widespread adoption of PBPH.

Chapter 3: Population Health and Primary Care

Population health is historically thought of in relation to broad groups of individuals. Here we frame the understanding of population health in the context of the patient population of a primary care practice, or patient panel. This section focuses on the components of population health relevant to primary care, and presents a more fully elaborated definition of Practice-Based Population Health. It concludes with a brief discussion of some of the benefits of PBPH.

Understanding Population Health

While there are many definitions of population health, most focus broadly on the "health outcomes of a group of people" and place an emphasis on the determinants of health and the interventions to elevate overall health status.[16] The term population health is often used interchangeably with public health to describe the activities conducted by Governmental public health agencies and community and national organizations to improve the health of a community. In this understanding, the population that is the target of interventions is defined broadly, in many cases encompassing services provided within a particular jurisdiction, whether at the local, State, or Federal level. This project, in contrast, applies the concepts of population health but focuses on a different population—the patients that are seen by one primary care practice.

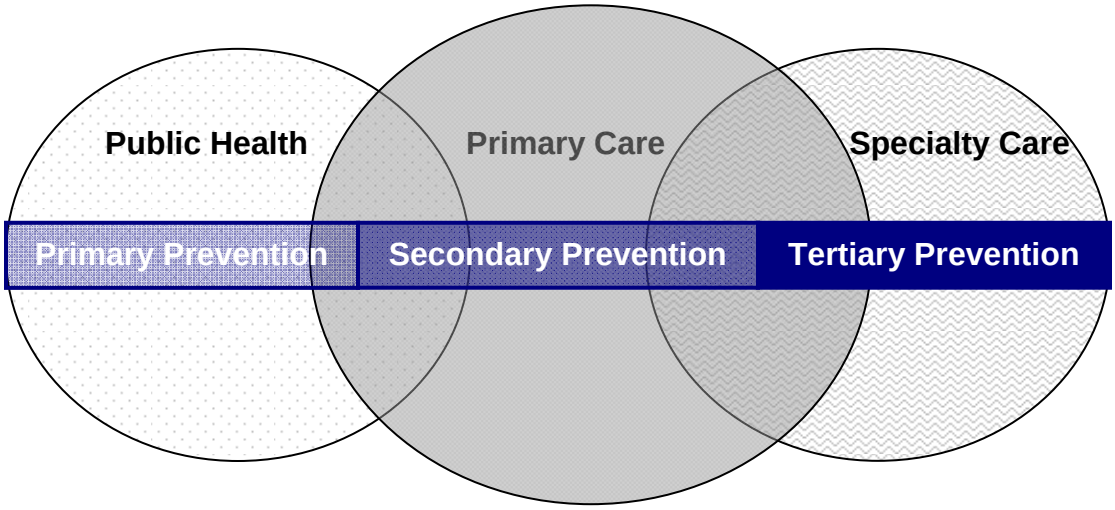
Promoting health and preventing disease are key components of population health both at the societal level and within a primary care practice. There are three different levels of prevention:

- "*Primary prevention* – Prevention strategies that seek to prevent the occurrence of disease or injury, generally through reducing exposure or risk factor levels. These strategies can reduce or eliminate causative risk factors (risk reduction).
- *Secondary prevention* – Prevention strategies that seek to identify and control disease processes in their early stages before signs and symptoms develop (screening and treatment).
- *Tertiary prevention* – Prevention strategies that prevent disability by restoring individuals to their optimal level of functioning after a disease or injury is established and damage is done."[17]

Responsibilities for these different levels of prevention are shared among primary and specialty care providers, and public health Governmental agencies and community organizations, as illustrated in Figure 2.[18] While there are some responsibilities that distinctly fall under the purview of one entity or another, there are also some areas of overlap. Public health entities are at one end of the spectrum, with responsibility principally for primary prevention, including addressing environmental and other social determinants of health, and influencing behaviors such as seatbelt use and smoking through laws and regulations. Public health also addresses some components of secondary prevention, such as campaigns to raise awareness about screening. Specialty care providers are on the other end of the spectrum, primarily focusing on tertiary prevention, such as providing acute care for patients with cancer or heart disease. Primary care providers have responsibilities that fall within all levels of preventive care, including primary preventive services, such as immunizations and health risk counseling;

secondary preventive care services, such as screenings; and tertiary preventive care services, such as treating high cholesterol levels after a heart attack.

Figure 2. Primary, secondary, and tertiary preventive care delivery



This project focuses on the preventive care that occurs within a primary care office, rather than that which is conducted by public health or specialty care organizations. As such, the set of functionalities seek to identify groups of individuals within a provider's patient panel who might benefit from targeted identification and interventions. These may include:

- "Groups of patients generally defined by age and/or gender criteria, who share the need for a defined set of preventive or screening services.
- Groups of patients generally defined by diagnoses, who share a medical condition, often chronic, and who share a need for a class of services often referred to as 'disease management.'
- Groups of patients generally defined by abnormal or unexpected results of screening tests, who share a need for followup services." [19]

Practice-Based Population Health

To delineate the elements of population health that are most relevant in a primary care setting, we developed the term "Practice-Based Population Health (PBPH)." We define PBPH as an approach to care that uses information on a group ("population") of patients within a primary care practice or group of practices ("practice-based") to improve the care and clinical outcomes of patients within that practice. PBPH changes the focus from reacting to the ad hoc needs of individual patients to proactive management of a practice's patient panel.

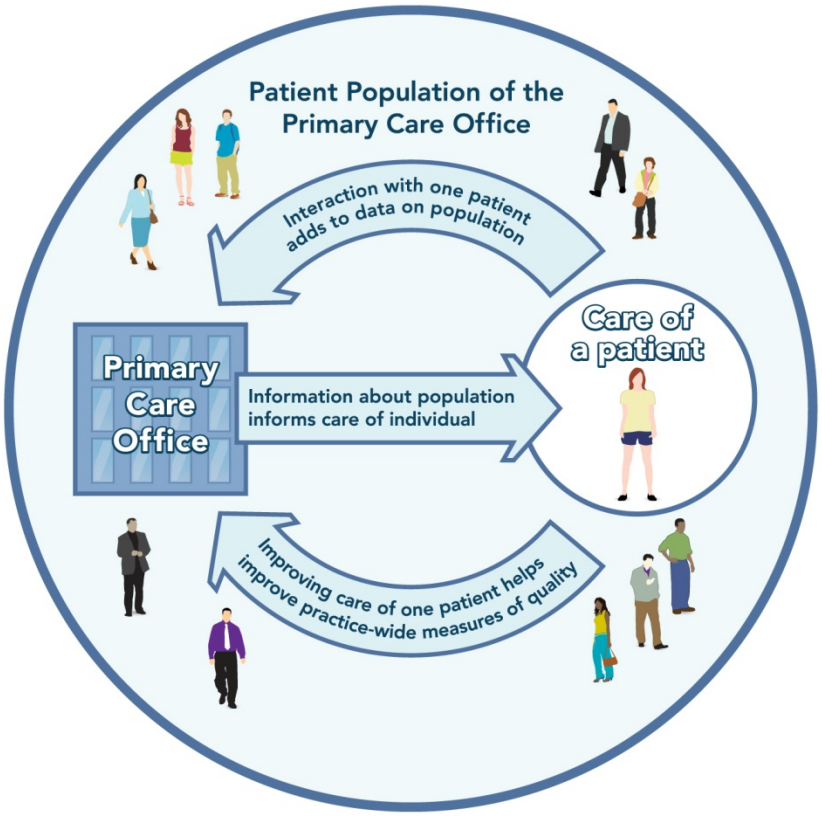
Although PBPH encourages providers to take a broader population view of their patients, primary care centers on the interaction between an individual patient and his or her clinician or

clinical team. There is a series of relationships between the care that is provided to one patient and the care delivered to the practice's patient population. The following relationships constitute the bidirectional connection between individual patients and the practice population:

- **Interaction with one patient adds to data on a population.** Practices learn about their patient populations through the data they accumulate on each individual patient.
- **Information about a population informs care of the individual patient.** Using population-level data, practices can identify populations to which services should be targeted, create reminders for patients and providers, and monitor quality measures. In all of these ways, population data can improve the care delivered to each patient.
- **Improving care of one patient helps improve measures of quality and long-term patient outcomes across a practice's patient population.** Performance measures, and ultimately patient health, will be improved by providing better care for each individual patient. This approach includes ensuring that each patient receives appropriate preventive care and disease management services.

These relationships are illustrated in Figure 3.

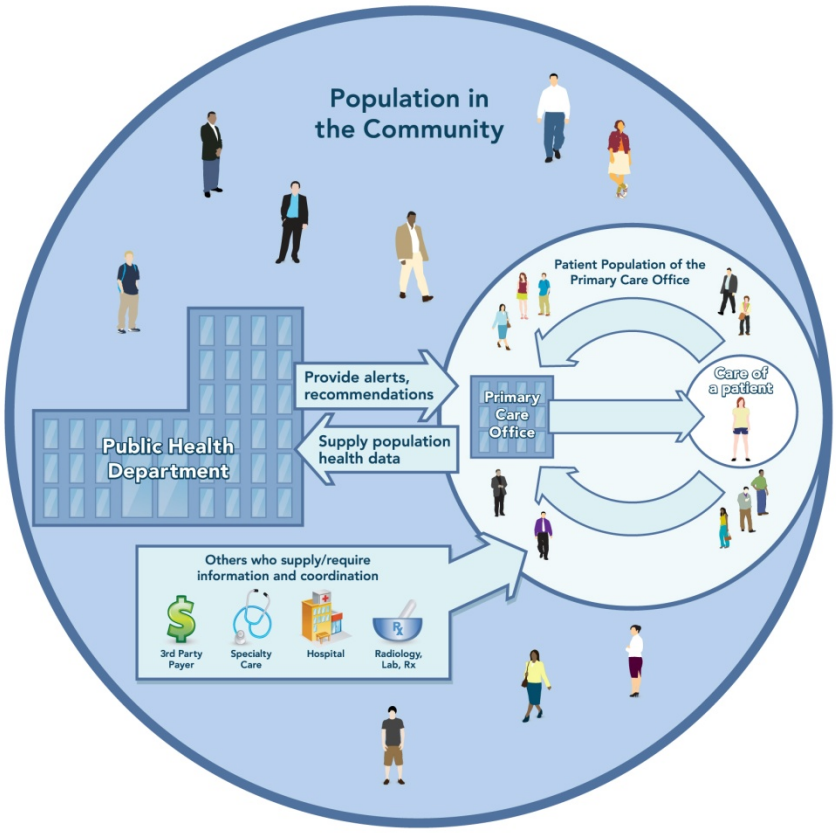
Figure 3. Practice-Based Population Health, interactions between a primary care provider, a patient, and the patient population



PBPH emphasizes the relationships that occur within a primary care practice. However, external entities, including specialists, hospitals, laboratories, radiologists, pharmacists, and third-party payers may also provide important pieces of information that can help primary care providers tailor their care to their patient populations. Figure 4 illustrates how these external entities may influence the delivery of primary care. It is also important to note that primary care may be influenced by information from public health departments that incorporates data from the broader community. If, for example, a public health department alerts a practice to an outbreak of an infectious disease or a potential suicide cluster, primary care providers may respond by contacting or screening targeted populations of their patients. At the same time, the relationship between primary care and public health departments is bidirectional, in that primary care practices also provide public health departments with important information about the health of their communities.

Although data from public health departments may affect care in the primary care practice, the functionalities defined in this project do not specifically address the ways in which those pieces of information flow to primary care practices. Similarly, although data from a primary care practice may inform analyses on the health of broader communities, including disease surveillance, this application of information on a practice's patient panel is also outside the scope of this project. These issues of data exchange are the focus of many local, State, and national initiatives.

Figure 4. Practice-Based Population Health in the context of the larger community



Benefits of PBPH

The goal of PBPH is to help primary care practices engage in preventive care, improve quality of care, and ultimately, to improve health outcomes. The providers we interviewed highlighted many of the benefits of applying a population focus to primary care. PBPH tools allow providers to track the care of all of their patients, rather than limiting their attention to the patients who make appointments. One provider explained that "I thought I was doing a really good job" meeting the prevention and health promotion needs of patients by discussing preventive care during annual physicals or acute visits. However, since adopting a more systematic method of monitoring all of her patients, she said "now it seems that was not the case. We could not pull all the charts to see who needed [a preventive visit]."

Population health tools are also valuable in trying to oversee the care of patients with complex chronic disease management needs. One provider commented that when working with elderly patients with multiple conditions, "Paper charts become very thick documents. To find a specific piece of info, you leaf through hundreds of sheets of papers." In his experience, registries and other population management tools can provide relevant information in "a more easily accessible format for the doctor."

Other providers emphasized the role that PBPH plays in improving the performance of the practice. One provider explained his practice's decision to adopt population management tools in this way: "Our belief as an organization was that we had to control our data…to provide adequate feedback if we were going to improve quality of care and affect populations of patients." He went on to describe this orientation towards quality improvement as "a future, if not current, imperative."

The providers mentioned several specific benefits of PBPH to primary care practice. Being able to easily identify groups of patients can be very valuable in primary care settings. Several practices talked about using population health tools in order to determine which patients might want to participate in group educational sessions focused on diabetes or asthma self-management. Other practices spoke about the importance of being able to locate patients who would need to be notified in the case of a medication recall or to find patients who might be eligible to participate in a clinical trial. PBPH may also facilitate some aspects of practice administration. A better understanding of the patient population could inform decisions about appropriate staffing levels or identify areas where continuing medical education would be most valuable.

Chapter 4: PBPH Functionalities

To foster the development of tools to robustly support PBPH, it is important to clearly define the tasks that such tools will allow primary care practices to perform. This project developed a series of functionalities to enable primary care practices to proactively manage their panel of patients. We describe here the functionalities we developed using the methodology described in Chapter 2.

Functionalities were developed in keeping with several principles:

- Functionalities are not limited to what is commonly available in existing applications, but instead focus on what is most important for PBPH delivery in the primary care setting. In the list of functionalities we indicate some of the functionalities that might be particularly challenging given current technology.
- In defining these functionalities, we did not limit our discussion to one particular type of application. Instead, some or all of these functionalities might be possible in stand-alone registries, EHRs, and EHRs with built-in registries, as well as more basic technology (e.g. Excel spreadsheets, Access databases).
- The functionalities should be easily performed by primary care clinicians and other office staff. One provider stressed that it was imperative that providers could actually view the results of reports themselves in order to make data "actionable."
- The functionalities focus on what can be done with data that are already in a health IT system—i.e., how physicians can manipulate the data that are already available to them. They do not address how data enter the population health management system, although gaining access to the right data in the right form at the right time remains a key challenge in implementing PBPH.
- Although not explicitly mentioned in the functionalities, it is imperative that the privacy of personal health information be protected and that only authorized individuals gain access to such data.

Based on the information collected during the environmental scan, we grouped similar functionalities together into the five domains shown below:

Domain 1: Identify Subpopulations of Patients

Providers must be able to identify subpopulations of patients who might benefit from additional services. Examples of these groups include: patients needing reminders for preventive care or tests; patients overdue for care or not meeting management goals; patients who have failed to receive followup after being sent reminders; and patients who might benefit from discussion of risk reduction.[20]

Domain 2: Examine Detailed Characteristics of Identified Subpopulations

Information management systems can help practices target patients in greatest need of services by allowing the practice to either narrow down the subpopulation of patients using flexible criteria or to access additional patient information on individuals within the identified subpopulation.

Domain 3: Create Reminders for Patients and Providers

Information management systems can make data on patients actionable by generating notifications to prompt patients to make appointments or take other actions and by establishing reminders to alert practice staff of patient care needs.

Domain 4: Track Performance Measures

Having information about their patient populations can help practices understand how they are providing care relative to national guidelines or peer comparison groups, as well as longitudinal improvements. Tracking these quality measures is a key component of larger performance improvement initiatives and can drive decisions about areas where additional resources or training may be beneficial.

Domain 5: Make Data Available in Multiple Forms

Information may be most useful to practices if, in addition to being displayed in the system in which it was generated, it can be printed, saved, or exported to other programs and if it can be displayed graphically.

The final list of functionalities is presented in Table 2.

Table 2. PBPH functionalities

Domain 1: Identify Subpopulations of Patients
1A: Generate lists/reports of subpopulations of patients based on vendor-provided queries of diagnostic codes, lab results, medications, and other codified data fields
1B: Update or revise vendor-provided queries (may be done either by the vendor or locally by the practice)
1C: Develop new queries to identify subpopulations of patients based on diagnostic codes, lab results, medications, and other codified data fields
1D: Save logic from provider-developed queries to be able to run at regular intervals and share with others
Domain 2: Examine Detailed Characteristics of Identified Subpopulations
2A: Customize reports to include desired patient information (e.g., demographics)
2B: Access additional clinical/demographic data about patients within a subpopulation (e.g., offer a link to patient record)
2C: Conduct sequential queries to narrow down the initial list of identified patients
2D: Sort or stratify the list according to severity of condition (e.g., intermittent vs. persistent asthma) or degree of risk (e.g., cardiovascular risk calculator)*
Domain 3: Create Reminders for Patients and Providers
3A: Generate and be able to customize notifications to contact a subpopulation of patients (e.g., mail merge list of patients with form letter, telephone messaging system, emails to patients, reminders in patient portals/personal health records)
3B: Generate and be able to customize reminders for providers about groups of patients who meet criteria for preventive care or disease management (e.g., based on clinical data, provider preference, or insurance requirements)
3C: Create provider-generated reminders to be delivered to provider “inboxes” on specified future dates
Domain 4: Track Performance Measures
4A: Identify clinical patterns within the practice (e.g., the most frequently seen diagnoses in the practice, the number of smokers in the practice*)
4B: Produce reports on how well one provider, one care team, or one practice is meeting quality measures, guidelines
4C: Provide peer comparison reports for one provider, one care team, or one practice
4D: Customize reports to apply different quality measures to different subgroups of patients (e.g., for compliance with grants, funding requirements, or insurance guidelines)
4E: Designate exclusions using reason codes (e.g., patient preference/nonadherence, inappropriate application of guideline given patient’s comorbidities)*
Domain 5: Make Data Available in Multiple Forms
5A: Save reports generated by queries
5B: Export data from queries to other applications (e.g., Excel files for internal use, format for 3rd parties)
5C: Print reports
5D: Provide graphic displays on quality measures, guidelines (e.g., bar graphs, pie charts, dashboards) by provider, care team, or practice
5E: Display trends over time on quality measures, guidelines by provider, care team, or practice

* Indicates that functionality may be difficult to find in currently available technology.

Chapter 5: Perspectives on and Use of Functionalities

After the initial list of functionalities was developed, we conducted research to validate them. In our interviews with primary care providers we sought to understand their perspectives on the importance of each of the functionalities, and to understand which functionalities are being performed in primary care practices today, using a paper-based system, a registry, or an EHR. We collected and present examples of how practices are managing the health of their patient populations today. Based on those examples and discussions with our experts we offer several general observations about aligning the functionalities with different technologies.

Providers' Perspectives on the Importance of the Functionalities

During the interviews, we asked providers to rate the importance of individual functionalities to their practice of medicine. Overall, the primary care providers and office staff with whom we spoke responded favorably to the proposed functionalities, and believed the functionalities could improve the care provided to their patients or make it easier to deliver that care. The majority of the providers and office staff whom we interviewed said that each of the functionalities is either very or somewhat important.[ii] Several of the functionalities stood out for their perceived importance among large proportions of the interviewees. For example, 18 of 24 interviewees thought it is very important to be able to update queries. The primary care providers we interviewed also stressed the importance of being able to customize reports and access additional information about patients in identified subpopulations. Interestingly, the ability to print reports is viewed as very important by 14 of 15 interviewees, suggesting that there will still be a role for paper as practices adopt health IT. Domain 3 functionalities, related to generating reminders for physicians and patients, are seen as very or somewhat important by all but three interviewees.

Other functionalities were viewed as less important for the providers in their practice of medicine. For example, eight of 24 interviewees responded that being able to identify trends in the practice, including the most frequently seen diagnoses, is only slightly or not at all important. Several interviewees also questioned the importance of being able to save reports generated by queries because they see greater value in being able to save the queries and re-run them when necessary. Yet, others argued that it is useful to maintain those historical records. The Appendix provides additional data on providers' ratings of each of the functionalities.

Practices Performing the Functionalities

During the interviews, we also asked providers whether they are currently performing individual functionalities. In analyzing their responses, we divided practices into three categories: (1) paper-based practices, which may have practice management software but have

[ii] The findings from our interviews must be regarded as preliminary and suggestive rather than conclusive because we interviewed representatives of only a small number of practices, not a nationally representative sample. In addition, it should be noted that not all interviewees were asked about all functionalities. For example, individuals from paper-based offices were not asked about functionalities related to printing and exporting data. Further, the wording of the functionalities that was used in the interviews is different from the final wording presented here. The Appendix contains the language of the functionalities used in the interviews.

neither a registry nor an EHR; (2) practices with a registry; and (3) practices with an EHR. It is important to note that this categorization is based on the type of software that has been implemented in the practice; however, it is possible that a practice with an EHR uses a registry or a paper-based strategy to perform some of the functionalities.

Figure 5 provides a summary of our interview findings. The table is divided into three sections. The first section is for interviewees who said they cannot perform any domain functionalities. Within that section, the first row is for practices that are paper-based, the second row for practices with a registry, and the third row for practices with an EHR. The next two sections—for interviewees who said they can perform some of the functionalities in a given domain and for interviewees who said they can perform all of the domain functionalities—are also organized based on the types of technology used in the practice.

Several patterns emerge about the types of technology that are needed in order to perform the functionalities. None of the paper-based practices we interviewed is able to identify subpopulations of patients, yet many are performing some of the functionalities associated with tracking performance measures. While having access to an EHR or a registry increases the likelihood that practices are performing the functionalities, it certainly is no guarantee that practices are engaging in the population health activities described here. Specifically, although five of the practices with EHRs engage in some of the functionalities associated with tracking performance measures (Domain 4), eight of the practices are not performing any of those functionalities, and none of the practices we interviewed is performing all of the functionalities in that domain.

Figure 5. Numbers of practices that could perform the functionalities in each domain, by technology

Portion of Functionalities Practice Can Perform	Using this Technology	In Each Domain				
		Domain 1	Domain 2	Domain 3	Domain 4	Domain 5
Can Not Perform Any Domain Functionalities	Paper	•••••••••	•••••••	••••	••	•••••
	Registry			•	•	
	EHR		••	•	••••••••	•
Can Perform Some Domain Functionalities	Paper		•	••	••••••	•
	Registry	•	•••	•	••	••••
	EHR	••••••	••••••••	•••••	•••••	••••••••
Can Perform All Domain Functionalities	Paper					
	Registry	•••	•	••		
	EHR	•••••••	•••	•••••		••••

Examples of How Practices Are Engaging in Population Health Management

To better understand how practices are performing the functionalities, we asked them to describe the ways in which they are using paper-based systems or technology to manage their patient populations. We found that a few practices interviewed do not have any systematic process for identifying patients who might benefit from preventive or chronic care systems. Some interviewees indicated that their familiarity with their patients and their memory of patients' needs are sufficient for monitoring preventive care needs in their patient populations. However, most of the practices have developed various techniques for engaging in population management.

One approach, commonly used in paper-based offices, is the development of an organized system to review the preventive needs of patients who present to the office for an acute or routine visit. For example, one provider described how the patient charts in her practice include a series of color-coded flow charts to give clinicians a quick overview of relevant patient information. She then described her routine for reviewing vital signs, weight, cholesterol, and other information on the "yellow sheet"; problem list, hospitalizations, and family history on the "blue sheet"; and immunizations on the "purple sheet." She noted that this system also made it easy for the practice to generate data for participation in Medicare's Physician Quality Reporting Initiative (PQRI). As she explained, "Everything is right there. It's almost as good as what an EMR would do." Other individuals who rely on chart audits to track performance are less satisfied. One provider described how, in order to undergo an evaluation using NCQA criteria, she and a nurse had to remember which patients had diabetes so the staff could pull the right patient charts and extract the necessary information. She described the process as "like the Dark Ages."

A few practices devised paper-based systems to generate reminders for providers about followup care. For example, one clinician said that her nurse keeps a paper notebook in which she records upcoming care needs, such as the fact that a particular patient requires another CT scan in six months. At the beginning of each month, the patients listed in the notebook for that month are contacted. Although the practice had recently implemented an EHR, this clinician reported that she was still using the paper system for the time being because "I can trust my nurse and her book." Another practice uses a similar system, involving a recipe box with 3x5 cards organized by the month in which the followup is required. The index cards, along with post-it notes, help the provider keep track of upcoming patient needs.

Practices that have not adopted EHRs or registries are still likely to have software to assist with billing or scheduling. Some noted that practice management systems are particularly helpful for tasks such as identifying the most prevalent diagnoses in the practice. However, such systems are less useful in providing clinical information. Appointment scheduling software is a key component of the population management work in one practice. One physician explained how all patients who come in for a visit leave with an appointment scheduled for their next visit. Using the scheduling program, the practice is able to flag patients who do not show up for followup appointments and contact them as appropriate.

Many of the practices use registries to help them capture data about patients with a particular condition. Several practices we interviewed had received funding specifically designated to improve the care of patients with one condition, such as diabetes. Registries help them better track those patients and, if required, provide reports to funders on the care being provided. While it is often necessary for a staff member to manually enter data from a patient chart into a registry, in some instances registries are able to pull information from practice management or other information systems. Registries can also be integrated with other tools, such as automated telephone outreach systems. For example, one practice developed protocols such that the system can leave a phone message for patients who are overdue for a visit asking them to schedule an appointment. The system also allows office staff to track who receives messages and whether the patients indeed schedule appointments.

One feature of EHRs frequently mentioned by interviewees is health maintenance or disease-specific templates. One provider described the health maintenance template as a "quick shorthand way" to gather information on a patient's status on items such as vaccines, colonoscopy, Pap smear, and lipid profile, and to see which items are due. A nurse spoke of a "tracking board" feature in the practice's EHR, which visually flags patients who are overdue for an office visit. According to the interviewee, this system is preferable to what the practice had done before it implemented the EHR: "We used to have to wait for a phone call from them, or for a prescription [request] to come in, which wasn't as accurate or fast."

Several of the practices developed their own systems for population management. One such system allows providers to build watch lists using data from within their EHR. In this way, the application allows the practice to develop a "registry on the fly," with some of the reporting capabilities commonly found in a registry, but using the EHR as the source of data. For example, a provider is able to develop a watch list of all patients with diabetes, and then specify which parameters to monitor, such as last retinal exam, aspirin use, or low-density lipoprotein (LDL) level. Users are able to establish an alert if any of the designated parameters exceeds specified thresholds.

Another practice created a disease management system with a special feature for diabetes patients. Using national guidelines, the system assigns each patient to a red, yellow, or green zone, based on the degree of the patient's control of his or her diabetes. This enables the practice to quickly identify and monitor patients who need to be followed most closely. The disease management system also provides a summary of the preventive needs of each patient. When patients check in at the office, a print out of that summary is generated and given to the provider. This includes information about tests and services that are currently overdue, and ones that will be due in the subsequent 90 days, allowing clinicians to order tests and procedures in advance.

Matching Functionalities to Applications

As described above, to the extent that providers are engaging in proactive population management, they use a variety of tools and strategies to do so. It is important to note that some of the functionalities may be possible in a given application for some types of health care services and not for others. For example, a disease registry may be able to perform the functionalities associated with Domain 3 ("*Create Reminders for Patients and Providers*") for the purpose of alerting a clinician that a diabetes patient is late for a foot exam. However, a registry might not be able to generate reminders for all patients who should receive a

mammogram and are late making that appointment. In order for an application to be able to accommodate a particular type of service, the following three conditions must be met:

All patients for whom the service is appropriate must be in the patient database. If a practice has only a disease-specific registry, it would not contain any data on patients without that condition. For example, a diabetes registry cannot report on those patients who are due for a mammogram unless they are diabetics.

Data relevant to that service must be available for the patients in the database. Disease-specific registries may contain only information that is pertinent to the condition covered by the registry and may therefore be unable to help practices to address the other preventive care needs of the patients in the registry. For example, it may not be possible to identify which women with diabetes are late for a mammogram within a diabetes registry, because it is likely that the registry contains only information on outcomes and services directly tied to diabetes. In addition, because they are typically not designed expressly for population health, EHRs may also lack some useful data for preventive care purposes. For example, an EHR may collect data on smoking status in a simple "yes/no" format, as opposed to a more nuanced "current/former/never" format, which might be more valuable in a population health context.

The system must have clinical guidelines relevant to the service. Not all EHRs, even among those with decision support, have vendor-provided rules and alerts around all preventive health guidelines. For an EHR to generate automatic reminders about mammograms, for example, it needs to be able to compare patient data to clinical guidelines that spell out the criteria for receiving a mammogram, for instance, on a particular timeline.

This project focused on the functionalities that are critical to PBPH, but did not explore the types of preventive care to which those functionalities would apply. This issue is central to determining the utility of a particular application relative to the second and third criteria mentioned here. Future work might identify a core set of data fields and clinical guidelines to support population health.

Chapter 6: PBPH Functionalities and Other Health IT Standards

It is important to place the PBPH functionalities in the context of several ongoing initiatives. Below, we describe how the functionalities relate to several sets of criteria, including criteria developed by the Certification Commission for Healthcare Information Technology (CCHIT); criteria for the patient-centered medical home (PCMH) model; and proposed criteria for "meaningful use" of EHRs, which will be used to determine eligibility for incentive payments introduced as part of the 2009 American Recovery and Reinvestment Act (ARRA). While there is some overlap between the PHPH functionalities and existing standards, these functionalities provide more detailed examination of what is needed to proactively manage a population of patients.

Standards Development and Certification in Population Health

Prior to ARRA, standards development in health IT was primarily driven by the American Health Information Community (AHIC), which became a public-private collaborative called the National eHealth Collaborative (NeHC) at the end of 2008. This body functioned as an advisory committee that provided guidance to the Secretary of the Department of Health and Human Services (HHS). This work resulted in the development of a series of "use cases" to illustrate how IT can be used in several priority areas. These use cases were then harmonized by the Healthcare Information Technology Standards Panel (HITSP), eventually leading to the creation and adoption of standards in the area of a given use case. In the area of population health, however, much of the use case and standards work was related to biosurveillance and other areas outside the scope of the current project. Thus, while there are standards and use cases that support some aspects of PBPH, all of the components of PBPH have yet to be fully described in standards and use cases.

The Certification Commission for Healthcare Information Technology (CCHIT) is a private-sector entity that has been developing and vetting criteria for voluntary certification of health IT. CCHIT first certified ambulatory EHRs in 2006. Approximately 60 products are certified under the 2007 ambulatory criteria and more than 70 products are certified by the 2008 criteria.[21] While requirements for 2009 have been released, no products have this certification as of this time. Although the CCHIT 2009 Ambulatory Criteria are primarily targeted at individual patients rather than a practice's entire patient population, several of these criteria address notifications and reminders for disease management, preventive services, and wellness checks that are due or overdue.

In October 2009, CCHIT began certifying EHRs under an expanded, updated EHR certification program, "CCHIT Certified® 2011." In addition CCHIT will have a 'modular' certification program limited to the scope of standards under ARRA, "Preliminary ARRA 2011." Some off-the-shelf EHRs have tools that enable practices to look at their entire patient panels or to effectively identify a population of patients with similar characteristics; the new criteria may further promote such capabilities.

We recommend several PBPH functionalities that the CCHIT criteria do not address. These additional PBPH functionalities include the manipulation of data to drill down or sort/stratify lists; reminders that occur in the future; and details around tracking performance measures. Moreover, although there is some overlap between the PBPH functionalities and CCHIT criteria, CCHIT certifies products based on their technological capabilities, not on their functional capabilities. As a result, it may be that providers are not able to utilize all of the features of products certified to meet certain population health functionalities.

Overlap of PBPH and the Patient-Centered Medical Home Model

There are a number of ways in which PBPH overlaps with the PCMH model. The PCMH model of health care delivery emphasizes an ongoing personal relationship with a primary care physician and the provision of continuous, comprehensive care. Responsibility for all of the patient's health care needs rests with the primary care physician, who also coordinates and integrates the patient's care across the health care system and in the patient's community.[24]

PBPH aligns with the standards related to Patient Tracking and Registry Functions, as part of the NCQA PPC-PCMH™ Standards and Guidelines.[23] PPC-PCMH provides guidelines on a broader level than PBPH; in contrast, PBPH provides more detail around using data on a patient population. PCMH provides examples of the types of patients one would want to identify, whereas the PBPH functionalities identified in this report focus more on how one would identify them.

To clarify the health IT capabilities and functionalities necessary to support PCMH, the Patient-Centered Primary Care Collaborative (PCPCC) released a resource guide in April 2009.[24] PCPCC states that systems should "offer registry reporting/community view" in order to monitor patients who need care management, to track and improve care for patients with chronic conditions, and to support "anticipatory" care. Another of the PCPCC general functionalities is automated quality measurement. Like PPC-PCMH, PCPCC provides examples of populations to identify and of specific performance measures, while offering less detail on how those patients are identified.

In a recent report, DMAA: The Care Continuum Alliance, a membership organization that represents disease management groups, suggested that the overlaps between the PCMH and population health models of care may allow for the two strategies to be combined.[25] According to DMAA, health IT is perhaps one of the more important areas of overlap between the two models of care. Given the current focus on the use of health IT by the PPC-PCMH recognition program scoring process, the current model of the PCMH may not be feasible for many small practices.

To summarize the relationship between PBPH and other sets of standards, Table 3 presents a brief crosswalk. A more detailed table, illustrating how specific functionalities match up, can be found in the Appendix.

Table 3. Crosswalk of PBPH, PCMH, and CCHIT standards

	PBPH	CCHIT
Functionalities on updating reference materials Functionalities on documenting preventive services		√
Functionalities on manipulating data to drill down or sort/stratify list Functionalities on generating future reminders Details about tracking performance measures (trends over time/graphics)	√	
	PBPH	**PCMH**
Details about tracking and managing performance (e.g., patients' care experience, transmitting reports to external entities, and taking action to improve performance) Examples of the types of groups that might be identified		√
Details about identifying a subpopulation, including updating guidelines and applying them differently to different subgroups Details about manipulating and exporting data	√	

PBPH and Meaningful Use

We turn to the last set of guidelines relevant for comparison with PBPH—those that will be used in ARRA incentive payments for Medicare and Medicaid providers who demonstrate "meaningful use" of EHRs. The Centers for Medicare & Medicaid Services (CMS) will be publishing a proposed rule in late 2009 with a definition of meaningful use.[26] CMS is working closely with the Office of the National Coordinator for Health Information Technology (ONC) on this definition. Although the definition is still under development, the ONC Health IT Policy Council has released a series of recommendations for what capabilities providers would need to display in order to be eligible for those incentive payments.[27]

PBPH corresponds most closely with the Health IT Policy Council's policy priority to "*Improve quality, safety, efficiency, and reduce health disparitie*s." Within that policy priority, two of the care goals highlight central components of PBPH:

- Generate lists of patients who need care and use them to reach out to patients (e.g., reminders, care instructions).
- Report to patient registries for quality improvement, public reporting, etc.

The Health IT Policy Council recommendations also include several proposed objectives that relate to PBPH:

- Generate lists of patients by specific conditions to use for quality improvement, reduction of disparities, and outreach (*2011 Objective*).
- Manage chronic conditions using patient lists (*2013 Objective*).

- Send reminders to patients per patient preference for preventive/followup care (*2011 Objective*).

While the Health IT Policy Council's recommendations correspond with the PBPH functionalities proposed here, a more explicit reference to population health management as part of the ARRA incentives might bolster interest among primary care providers in adopting a population focus. The "bar" for meaningful use will likely evolve over time and further integration of additional PBPH functionalities may be appropriate in later years.

Chapter 7: Challenges and Next Steps

Although our interviews and environmental scan identified several examples of primary care practices engaging in proactive population management, there are a number of barriers to its widespread adoption. This section highlights some of the challenges that primary care practices and individual providers face in implementing PBPH. It also includes recommendations from our experts for promoting a population health management approach to primary care.

Challenges to Adoption of PBPH

Through our discussions with providers and other office staff, as well as input from the experts, we identified some of the major barriers to the adoption of PBPH. There are challenges related to both technology and data that need to be overcome. In addition, changes in reimbursement may be needed to support this paradigm. Lastly, a shift in physicians' views of care delivery and their workflow may be necessary.

Adopting either a registry or an EHR may be necessary to support the engagement of a primary care practice in PBPH. However, it is important to acknowledge that at this point, adoption of this technology is far from universal.[28] In 2006, just below 30 percent of office-based physicians reported using full or partial EHR systems, with use increasing with the number of physicians in the practice.[29] Registries may also be more common among larger practices, but one national survey of practices with 20 or more physicians found that fewer than half (47 percent) had a registry for at least one chronic disease.[30]

There are many explanations for the slow adoption of EHRs. In our interviews, providers discussed some of the reasons they have not implemented EHRs including the purchase cost, training expenses, productivity loss, lengthy transition time, and uncertain return on investment. These reasons are echoed widely in the literature.[31] Although it is clear that lack of health IT adoption is a critical obstacle to PBPH, our interviews also demonstrated that implementing an EHR or a registry is not sufficient for a practice to engage in population health management. Below, we focus on those challenges specific to PBPH.

Technology Issues

Among populations that adopt a registry or EHR, technology-related challenges remain. To adequately support PBPH, systems need to be user-friendly and contain robust PBPH capabilities, which lead to improved efficiencies.

Some providers who were initially enthusiastic about technology spoke of how they are disappointed at their inability to use systems in the way they had envisioned. Other providers face challenges in finding systems that have the functionality they require for supporting PBPH. For instance, most available systems do not easily generate reports, nor do they present data in a manner that can easily be applied to practice. To try to make off-the-shelf systems more compatible with their needs, some practices build their own back-end SQL reporting systems to allow them to generate reports. Unfortunately, with this additional layer of complexity, clinicians may not be able to run the reports themselves. Some providers we interviewed felt very

disconnected from the "black box" from which their reports were generated. One provider mentioned that she does not feel that she has time to request a report from a central office; whereas when she had worked in a smaller practice and could generate reports on her own, she was more inclined to do so.

Systems also may not have tickler/notification systems that are easy to implement. The providers we interviewed noted the importance of alerts and reminders for ensuring patient compliance. However, if not chosen carefully, many alerts and reminders usually lead to alert-fatigue, with providers ignoring what may be important information. Many providers said they would like to be able to set reminders that appear in their inboxes at a future date, designed as a tickler system, so that they are not overwhelmed with alerts about followup activities that may be months away. At the same time, providers would like an area within a patient record that summarizes the tests and services due for that patient in the near future, so that scheduling for the next appointment can occur concurrently with the patient's visit. Providers also expressed a desire to be able to prioritize pop-up reminders according to urgency.

Some practices actively seek software that supports PBPH, but in our interviews we found that many do not. According to one expert, many clinicians view usability of technology in terms of what allows them to continue practicing medicine as it was practiced in a paper-based office. This viewpoint may impact the availability and utility of today's products—if providers are not seeking tools needed for PBPH, vendors will not have the incentive to create tools to support these functionalities. Several panelists stated that the functionalities in the systems that vendors sell are the functionalities that customers request. Panelists noted that "enterprise customers," such as cities or regions that represent a large number of providers, have had success in increasing the population health management functionalities offered in vendor products.

Data Issues

Clinicians are quite concerned about obtaining accurate data. At issue are three items: practices must have accurate, comprehensive data generated from within their practice that is in a usable format; practices need access to patient information that is generated from other parts of the health care system, such as laboratory and pharmacy data; and systems must be able to use data to produce standardized and meaningful reports.

Reports generated by information systems are only as good as the data that enter those systems. This data must be entered in a discrete form to support PBPH, so that the data can be searched. Many EHRs do not have data fields for important facets of PBPH. For example, one of our interviewees mentioned that EHRs are typically able to capture smoking status, but are not able to capture smoking history or such subtleties as recording that someone is a social smoker. Although this particular group worked with its vendor to create such functionality, unless there is broad consensus on the types of data fields that are important for preventive care, such fields will be introduced only piecemeal, if at all. Even if appropriate data fields exist, requiring that members of the practice record all relevant information about their patient interactions may generate an unacceptable negative impact on workflow. One provider whom we interviewed noted that it was difficult to train his care team to consistently take note of relevant pieces of information from the patient visit.

In the absence of such data sources, many practices rely on billing data to create reports or identify populations of practice. Such data are often inaccurate and fail to capture sufficient clinical information to support PBPH. For instance, a practice would be unable to use billing data to identify which of the diabetics in the group are poorly controlled.

To fully engage in PBPH, practices need to be able to obtain data from outside of their practices. Those who receive outside data on paper are burdened with manual data entry if they wish to include those data in their systems. Ideally, providers should have access to data exchange mechanisms that allow them to receive patient health information in a standardized, discrete form from laboratories, pharmacies, and other providers and to electronically incorporate this information into their patient records. Many areas in this country lack health information exchange mechanisms, making it difficult for practices to receive patient health information electronically. Even among practices that can receive information transmitted electronically, it may not be in a searchable form. While many EHRs are able to store scanned documents from other providers, the information within these saved documents cannot be searched or captured in reports.

There is a lack of standardization when it comes to generating reports and calculating performance measures. Providers are accountable to a variety of different payers, each with its own guidelines and individualized benchmarks for care. These different requirements impose a large burden on a provider needing to meet the requirements of each of its insurers. As one physician stated, “I want to see standards… rather than each insurer saying they want to look at different things. There's a hoop for each carrier.” The absence of standardized performance measures may force providers to avoid PBPH-type care and to prioritize the allocation of resources according to the reporting required by their payers for reimbursement.

A particularly challenging issue related to tracking quality measures pertains to the denominators used to generate performance reports. First, queries need to have filters to ensure that patients who should not be included, such as those who are no longer living or those who have transferred to a different practice, are not included in the calculation of performance measures. Many of the providers we interviewed explained that systems need built-in mechanisms, such as the integration of exception codes, to be able to exclude from calculations patients who have, for example, refused treatment. Currently there is no consensus on how these types of exception codes should be added into health IT systems, and taken into account by payers and others who use the performance data.

Another limitation is the lack of standards related to accounting for individuals for whom guidelines are inappropriate. One physician pointed out, “If you have a patient with five significant medical problems and you try to manage that patient by following the guidelines for the five chronic diseases, you’ll kill [him]!” Without the ability to make accurate calculations, providers may dismiss performance reporting as inaccurate and meaningless. Developing consensus and standards around performance reporting would help advance population management.

Reimbursement Issues

The current model of reimbursement of care creates disincentives to the practice of PBPH and the proactive management and coordination of care. Currently, care is reimbursed primarily

when there are face-to-face encounters, and practicing PBPH would mean that some of the care would have to be provided without reimbursement. According to current estimates, 40 percent of the primary care workload is not reimbursed under the face-to-face fee-for-service approach to reimbursement.[32] PBPH would add to this already heavy burden. A practice must cover its costs in order to remain viable. Clinicians have little choice but to provide only the care insurers consider to be important, which today does not include a PBPH approach. As one provider said, physicians "do [what] we do now because that's the way we can survive."

In our interviews we saw a pattern of clinicians utilizing PBPH when there are programs in place to reimburse for that care. For example, several practices are using chronic disease management systems to track patient care related to diabetes or hypertension when their payers have programs which reward that care. Others had devised systems to report the measures necessary for Medicare's Physician Quality Reporting Initiative (PQRI). Reimbursement policies that provide incentives for proactive preventive care and disease management more broadly would make the practice of PBPH more viable.

Paradigm Shift for the Practice of Care

The movement towards PBPH requires a shift in how medicine is practiced, including changes in providers' attitudes, workflow, and overall approach to care. As one panelist described it, "PBPH requires moving from running on the hamster wheel to proactively managing a patient panel. This wasn't how most clinicians were trained to conceptualize their job." This shift may be met with some resistance as providers assess the impact of making this change on their practices.

It is not hard to see how and why PBPH may be inconsistent with how providers view the practice of medicine. Clinicians are trained to treat their patient populations by providing individualized care to one patient at a time. As one provider stated, "we define our work by what is done in the exam room." The physician-patient relationship relies heavily on the physician's ability to develop a trusting relationship with the patient to influence health behaviors. Moving the focus from the individual to the population level constitutes a paradigm shift and may alter how providers view their relationships with their patients. As one provider commented, "population management is something that is taking our physicians a long time to understand." Proactively thinking about the entire population is very different from reacting to individual encounters with patients who arrive at the practice.

Several of the clinicians we interviewed were uncomfortable about the implication of proactively reaching out to patients to induce them to seek appropriate care. Currently, practices see only those patients who are sufficiently committed to maintaining their health that they schedule appointments. Some clinicians expressed that they were not interested in providing care to patients who did not seek care. In addition, there was concern that the end result may be for patients to be even less accountable for their care than they are today. This shifting of responsibility from the patient to the clinician may not be a burden clinicians want to undertake, especially for those who feel strongly that this is beyond the scope of their responsibilities.

The clinicians we interviewed also expressed concern as to whether or not their practices have the capacity to expand their scope. Many feel they are working to their limits, with time-constrained schedules, already leading to limited time with patients.[33-35] There is real concern on

the part of providers that PBPH will increase the need for more appointments than their schedules can accommodate.

Adopting PBPH, especially if the use of new technology is involved, has an impact on workflow. For example, rather than relying on dictation of notes following a patient visit, relevant data must be entered into discrete fields in an EHR or a registry for it to be queried and used for population health management. As one physician interviewee commented, “Physicians preferred the EMRs that looked and acted like old paper charts, but [those EMRs] couldn't manage datasets very well.” The loss of productivity as workflows are adjusted and providers learn new techniques is another concern.

Finally, collecting and documenting data on the patient population represents a significant time burden for physicians and can, as one provider stated, “detract from your ability to care for someone.” Some of the providers we interviewed recommended that health IT systems be developed with enough simplicity so that others within the practice are able to query the system and engage in PBPH. If providers are able to delegate query tasks, it may reduce the time and burden associated with implementing PBPH.

Leveraging Policies to Address Challenges

The project experts noted several opportunities to address some of the above challenges and increase the adoption of PBPH. In particular, they discussed how PBPH could be incorporated into important policy initiatives related to health care reform, ARRA, and initiatives to strengthen the primary care workforce.

Health Care Reform

Proposed efforts to reform the country’s health care system and provide insurance for a greater number of individuals elevate the importance of re-examining the way primary care services are reimbursed. Reimbursement systems with a greater emphasis on outcomes may incentivize practices to devote additional resources to and more fully engage in PBPH. If providers are more motivated to proactively provide preventive care and disease management services, they may be more likely to demand applications with this functionality. This, in turn, may give IT vendors the incentive to develop such programs. Models like PCMH, which has substantial overlap with PBPH, may also be incentivized in health care reform efforts. This may help support many of the components of proactive population management.

Many of our experts noted that an incremental approach to payment reform may be preferable. It may be appropriate, therefore, to implement rewards for providers who demonstrate that they are performing some population management tasks—like the functionalities outlined here. This could serve as a first step towards payment based on health outcomes.

Health care reform may also smooth the way for PBPH by establishing a uniform set of performance measures. Clarification about what types of measures should be included in a PBPH application will make it easier for vendors to tailor products to the needs of primary care practices. There is already some precedent, on a local level, for this type of harmonization of

performance standards. For example, as part of the Quality Health First Initiative, the Indiana Health Information Exchange (IHIE) and a coalition of local employers convened employers, insurers, providers, and other stakeholders to develop a consensus set of quality measures.[36,37] IHIE generates reports on these measures and disseminates them to participating clinicians. Addressing concerns about inconsistent measures could make PBPH easier for vendors designing products and reduce provider resistance by distilling population-level data into a set of reports that contain, in one place, all the tracking information necessary for the full panel of patients.

A final benefit from health care reform might be establishing a larger role for patients in their own care. One of our experts explained that involving patients with managing their personal health records allowed them to prevent errors, particularly with medication management. More actively engaged patients may help practices to develop a more comprehensive picture of their patients, which is a key requisite for successful population management.

American Recovery and Reinvestment Act (ARRA)

Under the American Recovery and Reinvestment Act of 2009, the Federal Government is investing unprecedented resources into health information technology. A significant portion of this funding—approximately $36 billion[38]—will be used to provide incentive payments to providers who demonstrate "meaningful use" of EHRs. Approximately $2 billion will be allocated to training providers through regional extension centers.

By providing incentives to Medicare and Medicaid providers who demonstrate "meaningful use" of EHRs, ARRA will likely boost health IT adoption. PBPH could most directly be supported by this legislation if the functionalities established as part of this project are incorporated into the meaningful use criteria. As described above, some of the concepts related to PBPH are supported in the initial recommendations for the definition of meaningful use, but the operationalization of those concepts is not yet clear. While it would be optimal to incorporate all functionalities into any new standards that emerge from ARRA, inclusion of a portion would still increase the population health capabilities of future systems.

Another benefit of ARRA that is relevant to PBPH is the potential to increase the amount of information available in electronic form. If more practices adopt EHRs in order to receive the incentive payments, more data will be stored in discrete forms. In addition, ARRA provides support for health information exchange. This could facilitate the collection of data from other providers and parts of the health care system. This additional information is vitally important for practices trying to manage their patient populations.

Finally, ARRA could also promote PBPH through the provision of training to help providers engage in PBPH. The legislation includes funding for extension centers and training grants to support the implementation of health IT. Our interviews with providers suggest that many will require additional training to take advantage of the population management functions in their systems. On several occasions, we spoke with two individuals from the same practice and each had a different understanding of which functionalities could be performed in their system. It is likely that many providers are not using their current systems to the fullest capacity.

ARRA may provide some opportunities for increased training in the use of health IT to support population management, but workforce development may require investment of resources beyond what is available through ARRA. Physicians, nurses, and others in the primary care workforce who are new to EHRs may require training to effectively use those systems. Even among providers who have adopted an EHR, additional assistance may be needed to enable them to create and interpret reports on their patient populations. They will need to understand how to turn population data into information that can inform practice decisions related to such issues as staffing needs and performance improvement. Training may be required to help providers to capture data efficiently and to use such features as exception codes. Technical assistance may also support the integration of PBPH tools into practice workflows.

Additionally, medical and nursing schools could help address one of the other challenges to PBPH—clinician culture. Education and training programs could help providers to adopt a more population-focused orientation. To support this shift in training, it may be necessary to develop PBPH competencies to guide the development of curricula and accreditation exams

Next Steps

In addition to helping identify the policy opportunities described above, experts offered recommendations for additional research and dissemination to better promote PBPH.

Additional Research

One way to increase the uptake of PBPH is to develop systems that have the potential to be time-savers for primary care providers. Applying clinical decision support (CDS) mechanisms to population health data could automate some processes related to preventive care and disease management services. PBPH systems could not only remind providers and patients about upcoming needs, but could also generate the orders for the required tests. Designing products that have demonstrated value to providers—in both improved outcomes and increased efficiency—is a key to encouraging the spread of PBPH.

Some clinicians may prefer systems that allow them to dictate their notes into an EHR. While a great deal of research has been done in the area of natural language processing, further research is needed to effectively convert text into discrete data elements. A greater challenge—one that may call for both technical improvements and new workflows—is to allow those dictated data elements to enter a system in real time so that they can be used to fuel CDS during a given visit.

One potential area for research would be to determine how to make the best use of “messy” data. In addition to trying to make systems that facilitate accurate and complete entry of data, it may be worth determining how to make the most of data that are imperfect. This may entail developing protocols that assess the accuracy of data from different sources and place greater weight on data deemed to be more reliable. Furthermore, a better understanding of the sources of data inaccuracy could inform the development of technology that reduces the likelihood of errors.

A different approach to PBPH-related research would be to gain a better understanding of how practices are able to successfully implement some or all of the functionalities. Through

interviews with a variety of providers, we were able to gather some examples of practices that are managing their patient population. However, the interviews were brief and did not allow us to explore more fully how those functionalities are being performed. It might be valuable to conduct a series of case studies to develop a more complete picture of the methods practices are using to engage in PBPH, the obstacles they face, and their techniques for overcoming them. As part of such an effort, a public repository of examples of PBPH reports and techniques that work well could be developed and used to help providers build on the success of other practices' experiences. In examining PBPH implementations, it would also be valuable to investigate the impact of the functionalities on the efficiency of care delivery and on health outcomes.

Additional research needs include developing a better understanding of the types of data fields and reports that are necessary to support PBPH. As discussed above, the functionalities developed through this effort highlight the ways in which providers should be able to manipulate data to make it actionable. Yet, this project does not provide a list of the specific types of fields that are particularly relevant for primary, secondary, and tertiary prevention. As a followup to this study, clinicians and experts could be consulted to compile a specific list of the data elements that would be important to support a variety of aspects of preventive care, ranging from diabetes management to smoking cessation.

Dissemination

Dissemination of this project's findings is essential to translate them into practice and, ultimately, to influence and support the transformation of primary care delivery. Successful translation from the current recommended functionalities to primary care providers' offices is predicated on marketing the concept to multiple audiences. The experts identified key issues and audiences who will be critical in increasing the uptake of PBPH. First, the concept of PBPH must be introduced among primary care providers, health IT vendors, educators, policymakers, and third-party payers. Second, the functionalities required for optimal implementation of PBPH need further vetting and refinement among primary care providers and health IT vendors. This could include vetting the revised version of the functionalities presented here with a larger number of providers and adding additional technical specifications in order to make the functionalities more specific for health IT vendors. Third, educators need to be acquainted with PBPH concepts, including opportunities for and barriers to implementation, to develop PBPH education and training that incorporates the use of PBPH in primary care practice.

Chapter 8: Examples of Population Health Management

This project has articulated the concept of PBPH and developed functionalities that can support this approach to primary care. Although this specific operationalization is novel, many primary care providers have adopted aspects of population management in practice today. Information on the use of proactive population management among providers is somewhat limited. In a 2005 survey of Massachusetts physician practices, 79.8 percent reported being able to generate registries of patients by diagnosis; 56.1 percent by laboratory result; and 55.8 percent by medication usage.[39] Analyses found that practices with an EHR were more likely than those without an EHR to be able to construct diagnosis, lab, and medication registries. However, even among those with EHRs, 14 percent could not generate lists of diagnoses, 33 percent could not do so for lab tests, and 28 percent could not do so for medications. While limited in their generalizability, these findings do suggest that the capability of providers to answer key questions about their patient panels is far from widespread.

We collected examples from the literature illustrating how technology is supporting proactive population management in primary care practices today. Most of these examples—drawn from a variety of sources including the initiatives' own literature, peer-reviewed literature, and news stories—represent relatively well-developed population health strategies that have been led by local, State, or Federal Government agencies, or large health systems. Many primary care providers may not have easy access to all of the types of population management systems and applications described here. In most cases, these examples utilize applications developed primarily for the purpose of population health management. Of note, several large integrated health care systems have pioneered their own approaches to proactively managing panels of patients. They have independently developed information management systems and redesigned workflow. Early assessments of these changes in workflow and care delivery have garnered positive results.

While there is much to be learned from these Government-funded initiatives and the activities of large health care systems discussed in this chapter, it is also important to consider that some practices have found less resource-intensive ways to incorporate population health management into their care delivery. In the final section of this chapter, we provide examples from community-based practices that have found less resource-intensive ways to incorporate population health management into their care delivery.

Indian Health Service: iCare

At the Federal level, the Indian Health Service (IHS) has developed innovations in population health management. An integrated health system that serves 562 American Indian and Alaskan Native tribes in 35 States, IHS provides medical services through federally run hospitals, health clinics, tribally operated facilities, and urban health centers. IHS's iCare is a Windows-based graphical user interface (GUI) that assists providers in the proactive identification and management of their patients who share similar characteristics. It is designed to run with the IHS's Resource Patient Management System (RPMS) EHR application.[40,41]

The iCare query manager allows providers to create and run data queries. Examples include asking how many 2- to 5-year-olds within their patient panel have a body mass index in the overweight range, or how many patients require screening for obesity, diabetes, hypertension, HIV/AIDS, asthma, and other health problems. With the link to the RPMS EHR, providers can view records of individual patients once they are identified. Visits may be viewed over a defined timeframe, immunization status checked, and reminders sent when necessary. The iCare system can perform analyses of vital signs and other medical data, to flag those with potential chronic diseases. For instance, patients are flagged as potentially having hypertension after a third sequential visit with elevated blood pressure.[42]

While iCare is being utilized successfully in many areas of IHS, some areas are struggling with adoption. Barriers to implementation include geographically disparate sites, lack of communication, and lack of PC security. Recommendations for implementation include training sessions and software installation during site visits and regional training sessions, as well as training delivered via Web sites and WebEx.[43]

Washington State Department of Health: Chronic Disease Electronic Management System

The most common registries make use of public domain products, many of which have been developed and disseminated by State quality improvement organizations.[44] One popular product is the *Diabetes Electronic Management System (DEMS),* originally developed in 1999 by the Washington State Diabetes Prevention and Control Program. The improved functionality and flexibility of the current version, *Chronic Disease Electronic Management System (CDEMS),* allows users to choose which chronic diseases they would like to track. Because CDEMS is a public domain product, program files are available free of charge, and detailed user guides are available on the CDEMS Web site.[45] For users in Washington State, the Washington State Department of Health funds technical support for CDEMS; fee-based support is available to national users.[46]

CDEMS is a Microsoft® Access-based chronic disease registry. The registry database prints progress notes, patient lists, and summary reports. CDEMS allows users to customize measures for related health conditions, medications, services and labs for any chronic health condition. Progress notes summarize the current status of a patient's care for each measure tracked for a particular chronic condition, and serve as a checklist for a provider during a visit. Providers or managers can define ticklers for alerts for services and labs that are due or out of target range. A graph page can show patient trends for weight and blood pressure, and key labs over a 2-year period. CDEMS allows providers to generate statistical summary reports and intervention lists to show who has received care and who has not. Report templates allow users to customize reports to their clinic or practice's selected guidelines, to monitor changes over time for particular subpopulations, and to document progress for quality initiatives.[47]

CDEMS has been used as part of the Washington State Collaborative to Improve Health, sponsored by the Washington State Department of Health. Over 150 practices in the State use CDEMS, monitoring more than 60,000 patients with chronic conditions.[48] CDEMS is being used nationwide both by independent physicians and as part of State-supported initiatives. With funds from the Centers for Disease Control and Prevention (CDC) and from the West Virginia Bureau

of Public Health, the West Virginia University (WVU) Department of Community Medicine, Office of Health Services Research is supporting CDEMS use with approximately 30 clinics.[49] WVU provides support for CDEMS, including educational programs, on-site support, and computer hardware if needed.

With grants from the CDC and the Health Resources and Services Administration (HRSA), the Kansas Diabetes Prevention and Control Program (KDPCP) has enabled 45 organizations to implement CDEMS at 80 different sites (as of June 2008).[50] KDPCP provides training and technical assistance to participating providers, many of whom are in small, rural physician practices. The estimated cost of the program is $10,000 per organization initially, dropping to $5000 in each succeeding year. The Kansas Office of Local and Rural Health provided some additional funds to help providers cover staffing costs associated with the program. While some physicians find the Web-based query system relatively easy and not time consuming, smaller clinics are concerned about the workload associated with data reporting.[51]

Vermont Department of Health: DocSite

Vermont is one of several States implementing extensive health IT initiatives as part of larger health reform or quality improvement efforts. The Vermont Blueprint for Health, the statewide partnership to improve health care for chronic conditions, has piloted a Web-based clinical tracking system using DocSite software.[52] In July 2008, the Vermont Blueprint for Health began using DocSite's patient registry with point-of-care decision support to track and manage chronic disease care and quality improvement.

The Web-based DocSite registry allows for measurement and outcomes tracking at both an individual and group level. DocSite is an enhanced registry with three main functions: (1) treatment guidance at time of visit; (2) electronic prescribing; and (3) flexible reporting capability. The flexible reporting capability allows both practices and community care teams to pull up reports. For example, at the beginning of the week, teams can pull up a report of all people who have an elevated cardiovascular risk and have not had an appointment in six months. The teams can then follow up with these patients and schedule visits.[53] DocSite has clinical alerts, and can provide letters, education, messaging, mailing and phone lists, drillable reports, and workflow links to other systems. The DocSite registry can be customized, and is able to cover both chronic diseases (asthma, cardiovascular disease, depression, diabetes) and preventive services, including immunizations and cancer screenings and followup.[54]

As of August 2008, the DocSite tool had been introduced at the first of three pilot communities that are developing patient-centered medical homes, supported by locally based, multidisciplinary care coordination teams.[55] Five medical practices, including a hospital-based clinic and four Federally Qualified Health Centers are involved in the first pilot. Blueprint for Health is giving practices the infrastructure they need to change their systems.

New York City Department of Health and Mental Hygiene Primary Care Information Project: eClinical Works

The New York City (NYC) Department of Health and Mental Hygiene (DHMH) Primary Care Information Project (PCIP) supports the adoption and use of prevention-oriented EHRs

with the goal of increasing the quality of care in medically underserved areas. The City of New York contributed $30 million in start-up funds to the initiative, which was supplemented by an additional $28 million from New York State; various Federal grants, including a CDC Center of Excellence in Public Health Informatics grant; the New York City Council; private foundations; and partner practices.[56] One of the key priorities of PCIP is to build population health into EHRs. PCIP also focuses on changes in practice workflows and payment rewarding the effective prevention and management of chronic disease.[57]

Part of the strategy of PCIP is to define and design required EHR functionalities for improving population health, such as population-level preventative health measures, clinical decision support tools and public heath interfaces.[58] In March 2007, NYC DHMH awarded a $20 million contract to eClinicalWorks and collaborated with them to develop a package of EHR software and services for providers. A condition of this contract was that eClinicalWorks incorporate registry functionality into its product and make the enhanced software available to all its clients nationwide at no additional cost.[59]

The Take Care New York (TCNY) features added to the EHR focus on ten population health indicators identified as most important to the health of the NYC population—having a regular doctor, being tobacco free, having a healthy heart, knowing HIV status, getting help for depression, treating substance abuse, getting cancer screenings, getting immunized, maintaining a healthy home, and having a healthy baby.[60] TCNY Population Health Tools include (1) a clinical decision support function; (2) a comprehensive order set; (3) a quality measure report function; and (4) an enhanced registry function. The eClinicalWorks query and reporting system allows providers to rapidly identify cases of interest, access data for reporting purposes, and create customized disease registries. Providers are able to track performance in managing patients with specific chronic diseases or conditions (e.g., identify groups of patients with diabetes and monitor their hemoglobin A1c levels, blood pressure, and LDL cholesterol). Providers can rapidly identify and contact subsets of patients who would otherwise be very difficult to identify.[61] The population disease management feature of the eClinicalWorks EHR allows physicians to quickly review their entire patient population through the EHR and identify patients who require outreach or targeted interventions (e.g., identifying and contacting patients who were prescribed Vioxx after the recall by the FDA).[62]

Approximately 1,400 providers from numerous private medical practices, community health centers, and hospitals currently use the prevention-oriented TCNY version of eClinicalWorks. These practices serve over 200,000 patients in NYC.[63] PCIP projects that is will have 2,500 providers enrolled by 2010, over half of all high-Medicaid practices in NYC.[64] The NYC DHMH offers eligible practices—primary care providers with over 30 percent Medicaid and uninsured patients—a subsidized package of EHR software and services, including onsite training, data interfaces, and two years of maintenance and support. Eligible practices must cover the costs of hardware and network infrastructure and contribute $4,000 to the Fund for Public Health in New York for ongoing technical support. PCIP is also helping noneligible practices integrate the prevention tools into their own EHRs.

Kaiser Permanente

Kaiser Permanente (KP) has piloted an approach to population health which they refer to as panel management. They define panel management as “a set of tools and processes for

population care that are applied systematically at the level of a primary care panel, with PCPs [primary care physicians] directing proactive care for their empanelled patients."[65] In contrast to KP's prior approach to intensive care management for patients with major chronic conditions, which emerged in the 1990s, panel management: (1) more tightly links processes to identify and address unmet care needs within primary care practices; and (2) utilizes less intense, individualized outreach and followup for more patients through telephone calls with panel management assistants (PMAs), who communicate the recommendations of physicians to patients.[66] An evolution of the Wagner Chronic Care Model in primary care, panel management includes four key components:

- Dedicated primary care physician time to address the chronic care needs of patients who have not visited the office.
- A Web-based, internally developed, panel-based registry to identify gaps in care.
- Dedicated PMAs who identify patients with the greatest needs, gather summary information from physicians, and reach out to patients by phone.
- A workflow to make sure that proactive outreach is not sacrificed due to urgent needs.[67]

In 2002, the Kaiser Medical Center in Richmond, California began using a Diabetes Panel Management Tool. To systematically and repetitively review the facility's entire population of patients with diabetes and cardiovascular disease, Kaiser Permanente's Richmond facility created the position of PMA. PMAs print out 10 worksheets with lab and medication data on 10 individual patients.[68,69] At least twice a week, during a dedicated 15 minute time block, the provider reviews these "tools," which include a checklist of tasks. After reviewing the worksheet, the provider indicates new interventions or recommendations—including ordering lab tests, adding or adjusting medications, or referrals—using checkboxes or writing notes. The provider also checks a box to indicate when he next wants to review a worksheet on that particular patient. The PMA follows up with the patients based on the provider's instructions and enters any information collected into the database.

Mayo Clinic

The Mayo Clinic Rochester Division of Primary Care Internal Medicine developed a Web-based information system (PRECARES [PREventive Care Reminder System]) to assist appointment secretaries in proactively managing mammography for primary care group practice.[70] PRECARES utilizes Mayo's Primary Care Physician Portal (PPP), a Web-based information system that merges data from institutional operational, clinical, and administrative data sources. Among its many functions, the PPP allows physicians to identify those patients eligible for preventive services and whether or not they have received those services. Through PRECARES, female patients ages 40-75 were sent letters inviting them to undergo mammography, beginning three months before they were due for annual screening. Non-responding patients were telephoned for followup. In a randomized control trial, breast cancer screening rates improved significantly among the trial group of patients relative to a control group. In 2005, following the completion of the study, the system was implemented for the entire practice population. A 0.2 full-time equivalent appointment secretary manages the mammography practice for all physicians' patients.

Community-Based Practices

Through the environmental scan, we learned about several practices that were able to conduct some information management functionalities using software such as Microsoft® Excel and Access or publicly available products. For example, one practice created a registry using an Excel spreadsheet and has provided the template online for other providers to use.[71] This registry tracks selected interventions and clinical indicators for diabetes management, and alerts the user to problems. Using "conditional formatting," the file is designed so that a cell will be highlighted in a different color if it requires attention. For example, if a patient's last lipid test is more than 90 days old, the cell will appear yellow and if the test was last taken more than 180 days ago, the cell will turn red. This system can also be used for all patients in the practice to track preventive services, such as mammograms, Pap smears, or colon cancer screenings. A general internist solo practitioner in Connecticut created a registry by using his practice management software to generate a list of all patients with their demographic information.[72] He opens the list in Excel, adds headings to the spreadsheets on diagnoses and the performance targets he has chosen to track, and then imports that list into Comorbid Disease Management Database (COMMAND), an Access-based registry developed by the Mississippi Quality Improvement Organization (QIO), available free of charge.

Conclusion

The technology to support a shift from “hamster health care” to proactive population management is part of a larger transformation of primary care. Although some primary care providers are beginning to adopt a proactive, panel-based approach to care, primary care in the U.S. has not yet undergone this paradigm shift. While not sufficient, health IT tools are necessary for conducting PBPH. There is currently a paucity of effective, usable tools to support a population health approach to primary care. This report outlined the key IT functionalities for PBPH, developed from the perspective of providers.

Defining these functionalities is an important step towards greater adoption of PBPH, but many challenges remain. While the adoption of PBPH, as defined in this report, has the potential to improve the quality, efficiency, and effectiveness of primary care delivery, implementation of this approach will require broader changes to the way health care is delivered in this country, including changes in reimbursement systems, data accuracy and availability, and provider culture and training. Providers currently lack the incentive to pursue a proactive, population-based approach to care, given the limitations of the existing reimbursement system. As long as there is limited demand from providers, it is unlikely that vendors will develop the appropriate tools or that consensus will be established on the specific algorithms and data fields necessary for PBPH. Funding for pilot projects to support the development of tools designed by clinicians for clinicians is warranted. As technology evolves, products will incorporate features that will make tools both easier to use and more valuable to providers.

ARRA and pending health care reform legislation offer tremendous opportunities to support the transformation of primary care. The definition of meaningful use for the ARRA incentives is still under discussion. While components of PBPH are included in preliminary recommendations to the National Coordinator, more explicit consideration of objectives to encourage population-based care may be warranted. Significant funding from ARRA has been devoted to training providers through regional extension centers. Targeted PBPH training for the health care and health IT workforce will empower providers to better use existing tools and become more savvy consumers. Health reform legislation may also offer opportunities to promote PBPH, especially if restructuring reimbursement for primary care is a critical component of reform.

As training and technology to support a population health approach to primary care become more available and incentives are established to foster this type of care, PBPH may become a more widely viable option for primary care providers. Such advances will help PBPH contribute to transforming primary care and to improving health care quality, patient health, provider satisfaction, and the efficiency of the health care system.

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