The Office of the National Coordinator for Health Information Technology

Driving Clinical Transformation in a Practice Setting with Health Information Technology

A Learning Guide

Presenting lessons learned by the 17 Beacon Community Awardees of the Office of the National Coordinator for Health Information Technology in the U.S. Department of Health and Human Services

September 2013

Putting the I in HealthIT
www.HealthIT.gov

The Beacon Community Cooperative Agreement Program demonstrates how health IT investments and Meaningful Use of electronic health records (EHR) advance the vision of patient-centered care while supporting better health and better care at lower cost. The U.S. Department of Health and Human Services, Office of the National Coordinator for Health IT (ONC) is providing $250 million over 3 years to 17 selected communities throughout the United States that have already made inroads in the development of secure, private, and accurate systems of EHR adoption and health information exchange. Each of the 17 communities—with its unique population and regional context—is actively pursuing the following areas of focus:

- Building and strengthening the health IT infrastructure and exchange capabilities within communities, positioning each community to pursue a new level of sustainable health care quality and efficiency over the coming years;
- Translating investments in health IT to measureable improvements in cost, quality, and population health; and
- Developing innovative approaches to performance measurement, technology, and care delivery to accelerate evidence generation for new approaches.

For more information about the Beacon Community Program, visit www.healthit.gov.

This Learning Guide was developed by the Beacon Nation Project, funded by the Hawaii Island Beacon Community, an awardee of the ONC Beacon Community Program. The Beacon Nation Project seeks to promote innovation in health IT by gathering and disseminating lessons learned from the 17 Beacon Communities about building and strengthening health IT infrastructure; testing innovative approaches; and making strides toward better care, better health, and lower costs.

For more information about the Beacon Nation Project, visit www.beaconnation.org.

Acknowledgements

The following individuals provided expert review, input, and advice on the development of this Learning Guide:

Melinda K. Abrams, Vice President, The Commonwealth Fund

Alex Alexander, MPA, MBA, Senior Project Manager, Center for the Science of Health Care Delivery, Mayo Clinic

Bruce Bagley, Interim President and CEO, TransforMED

Alex Baker, MPP, Project Officer, ONC Beacon Community Program, ONC

Asaf Bitton, MD, Brigham and Women's Hospital/Harvard Medical School

Frank Bragg, MD, Eastern Maine Healthcare System

Roger Chaufournier, CEO, CSI Solutions, LLC

Peter Cucchiara, Managing Director, Performance Improvement, Primary Care Development Corporation

Robert Dale, MD, Vice President of Clinical Affairs and Chief Medical Officer, Delta Health Alliance

Lisa-Nicole Danehy, Project Officer, Regional Extension Center Program at Office of the National Coordinator for Health IT, HHS/ONC Fellows Program

Jac Davies, Director Beacon Community of the Inland Northwest

Ahmed Haque, Project Officer, Office of the National Coordinator for Health IT (ONC) at U.S. Department of Health & Human Services (HHS), HHS/ONC

Susan B. Hunt, MHA, Beacon Project Director, CEO, Hawaii Island Beacon Community

Mat Kendall, Director, Office of Provider Adoption Support, HHS/ONC Regional Extension Center

Janhavi Kirtane Fritz, MBA, Acting Director, ONC Beacon Community Program Office of the National Coordinator for Health IT

Anjum Khurshid, MD, Director Health Systems, Louisiana Public Health Institute

Ronda Kotelchuck, Executive Director, Primary Care Development Corporation

David F. Lobach, MD, PhD, Southern Piedmont Beacon Community

Maria Ludwick, MBA, MPH, Associate Director, Louisiana Public Health Institute

Kimberly Lynch, MPH, Director, Regional Extension Center (REC) Programs, Office of the National Coordinator for Health IT

Nancy Maloney, Western New York Beacon Community

Kerri Petrin, MPH, Project Officer, ONC Beacon Community Program, Office of the National Coordinator for Health IT

Julie Schilz, MBA, Colorado Beacon Consortium

Karla Silverman, Senior Program Manager, PCDC

Delphine Tuot, MD, University of San Francisco Medical Center

Jean Wright, MD, MBA, Vice President of Innovation Southern Piedmont Beacon Community

Mary Zile, Director, Clinical Consulting at HealthBridge

Table of Contents

Table of Exhibits

Introduction

The health care system is under profound pressure to address rising costs, improve the experience of care for patients, and improve the quality of care that is delivered. These goals will not be met through minor improvements to existing systems of care; major transformation of the care system is required. To this end, both the public and private sector are embracing services that offer the potential for improving population health through clinical care transformation at the practice level.

Use of health IT, from electronic health records (EHR) to electronic health information exchange (HIE), is a critical mechanism for facilitating practice-level transformation. The Health Information Technology for Economic and Clinical Health Act and the Affordable Care Act (ACA) established several programs intended to accelerate the transformation of the United States' health care delivery system through the use of technology, including the Beacon Community Program and the Regional Extension Center (REC) Program. The REC Program was established to assist providers across the country in the adoption and meaningful use of EHRs by providing customized, local support. The Beacon Community Program's goal was to bring together stakeholders with a shared vision of improving the health of their communities while optimizing the use of technology as a critical aspect of this transformation. This Learning Guide details the recommended steps for using health IT in the journey toward clinical transformation based on lessons learned from the work of the Beacon Communities since the program's launch in 2010.

Beacon Communities

The U.S. Department of Health and Human Services (HHS) Office of the National Coordinator for Health IT (ONC) provided $250 million over 3 years (2010–2013) to 17 selected Beacon Communities throughout the United States that had already made inroads in using health IT as a foundation for local improvement and innovation. The Beacon Community Program is part of ONC's innovation portfolio and brings together many aspects of ONC's efforts to modernize the nation's health care. Each of the 17 Beacon Communities is building and strengthening local health IT infrastructure, testing innovative approaches for using integrated technology to improve care delivery, and making measurable improvements that benefit both individual and population health. Through these efforts, each community serves as a laboratory of change that can help instruct the work of other cities, counties, and regions.

Beacon Nation Project and Learning Guides

The Beacon Nation Project, launched by the Hawaii Island Beacon Community earlier this year, is translating the experiences and lessons learned from the Beacon Communities into actionable information that can be adapted for use by interested communities. This information is presented in Learning Guides, which describe a promising IT-enabled intervention that can be deployed in a community to accelerate health care transformation.

Clinical transformation is a fundamental component of many activities supported under the Beacon Community Cooperative Agreement portfolio. As the program draws to a close in 2013, an overview of Beacon Community experiences suggests that Beacon Communities faced many challenges as they blazed a trail in using health IT to achieve clinical transformation. This Learning Guide documents the approaches, lessons learned, and best practices of Beacon Communities for using health IT to support clinical transformation in the practice setting. The lessons are grouped by strategic objectives and include illustrations from Beacon Communities. Below are a few items for communities or practices to keep in mind while reviewing the materials:

Learning Guide: A Learning Guide describes a promising IT-enabled intervention that can be deployed in a community to accelerate health care transformation.

- A Learning Guide is not an implementation manual with detailed checklists for installing a new system. Rather, the Learning Guide lays out the most important decisions and considerations for a community interested in applying health IT toward a clinical transformation strategy.
- The steps discussed in this document are laid out sequentially, but they often occur simultaneously. For example, an organization can begin planning workflow changes as it considers the health IT options for improving the health of a specific target population.
- Clinical transformation requires time and expertise on how to adapt key concepts to a variety of practice environments. Communities may have different levels of engagement and readiness when first referencing this Learning Guide. (See "Setting the Stage for Success" for prerequisites for using this Learning Guide.)

This Learning Guide is designed for communities and individual practices that are—

- Interested in engaging physician practices in the use of health IT to support clinical transformation.
- Leading improvement efforts and have a desire to take full advantage of health IT to assist practices with their improvement efforts.
- Supporting practice transformation and facing challenges and barriers associated with the adoption of health IT.

Target Audience. This Learning Guide is designed for individual practices and communities interested in using health IT to support the transformation to medical homes and improving health outcomes for a population.

Background

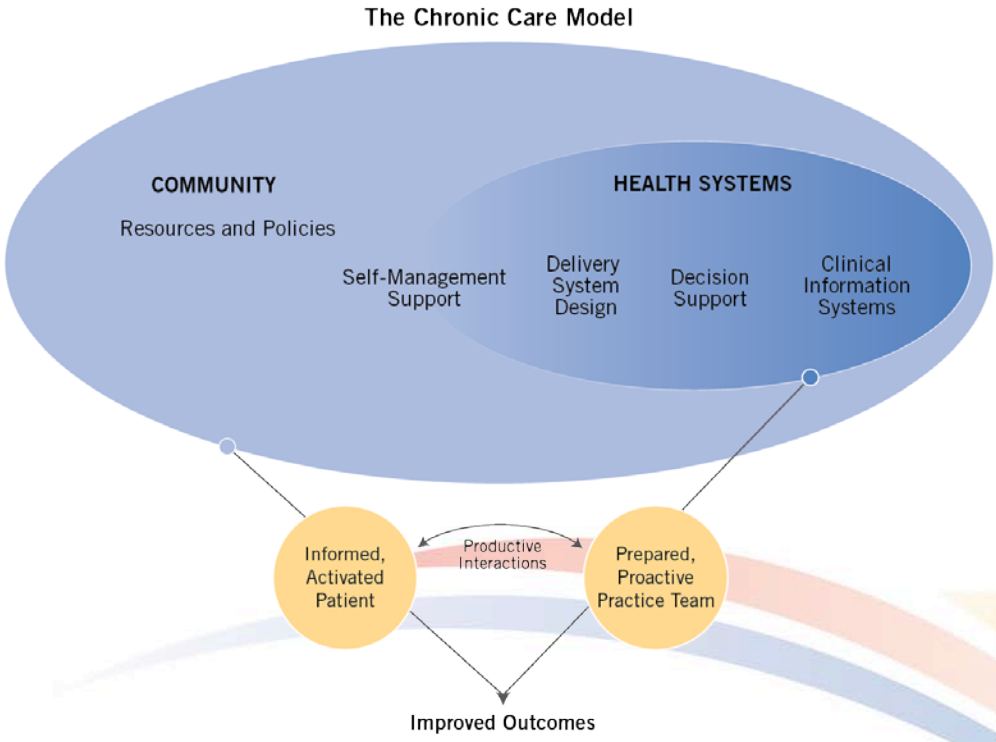
The Evolution of Clinical Care Models in Primary Care Practice Settings

Over the past several decades, primary care in the United States has evolved from a tightly knit model based on individualized care and personal relationships between general practitioners and their patients to a more reactive, provider-centric system of care.

Partially in response to the changing landscape of the health insurance industry, the primary care system began a journey to amend the design of the clinical care system. In the 1960s, the American Academy of Pediatrics (AAP) observed that children with severe persistent chronic conditions benefitted from a delivery model that effectively coordinated complex clinical and social services.[1] This was the birth of the concept of a patient-centered medical home (PCMH), or health home.[2]

In the 1990s, Dr. Edward Wagner and his team at Group Health of Puget Sound in Washington State codified a new system of care for people with chronic conditions based on the principles of the pediatric medical home. Dr. Wagner's team studied best practices in the care for people with diabetes and developed what is now referred to as the *Wagner Care Model* or *Chronic Care Model.*[3] The Chronic Care Model,[4] presented in Exhibit 1, had several important design attributes that differentiated it from the traditional primary care system.

Exhibit 1. The Chronic Care Model



The Chronic Care Model was provocative not only in its design concepts but also in its early results: When the care model was pilot-tested for patients with diabetes, practices demonstrated sustained reductions in HbA1c levels and lower use of specialty care,[5] with a 30% reduction in global per-member–per-month (PMPM) costs compared with a control population.[6] It was on this merit that the care model spread quickly and was incorporated into a variety of initiatives and public policy. In 2009, the four major primary care professional societies issued the "Joint Principles of the Patient Centered Medical Home," and shortly thereafter the National Committee on Quality Assurance (NCQA) began offering external recognition. Dr. Wagner and his team contributed to the development of the original NCQA PCMH standards.[7] Many payers now use NCQA recognition as the basis for enhanced and alternative payment models for clinical transformation. In addition, several states have developed their own recognition programs for transforming practices to a PCMH model. For more information about the *Wagner Care Model*, refer to Appendix F.

The focus of this Learning Guide will be on a key attribute in the Chronic Care Model: **health IT that supports the transformation of a primary care practice into a medical home with strong connections to the medical neighborhood**. This Learning Guide offers key considerations for practice transformation as well as implications of technology for the design of the care team.

The **medical home**, also known as the *patient-centered medical home,* is a team-based health care delivery model that provides comprehensive and continuous medical care to patients with the goal of obtaining maximized health outcomes. The **medical neighborhood** represents an effort to implement the medical home model in concert with other reforms that more effectively align the interests of hospitals and other parts of the health care system toward the improvement of patient care. For more information on the patient-centered medical home, please see Appendices G and I

Primary Care Clinical Transformation and the Role of Technology

For many of the Beacon Communities, the rapid adoption of health IT was the catalyst for clinical transformation. The ability to embed decision support tools into EHRs has transformed overwhelming manual tasks into simple EHR query functions. Information exchange has been enhanced by the introduction of protocol standards for communication using health technologies, such as an alert message between a hospital and a PCMH, allowing care teams to operate beyond the traditional walls of the clinic.

Clinical transformation in this Learning Guide refers to practice- and community-level transformation from current fragmented, uncoordinated care to a medical home or medical neighborhood model.

HIE, as well as the use of other health technologies, is more effective with a focus on clinical transformation. Although practices across the country have made rapid investments in new EHR

technology in recent years, spurred by federal Meaningful Use (MU) incentives, fully understanding the impact of technology on practice workflows and how technology can support improvement will take much longer. Practices that have emphasized clinical transformation as part of their journey are likely to be better positioned to successfully adopt and use new technology tools to achieve quality and cost objectives. The Beacon Nation Learning Guides, *Improve Hospital Transitions and Care Coordination Using Automated Admission, Discharge and Transfer Alerts* and *Strengthening Care Management with Health Information Technology*[8] also provide valuable insights on how IT can support care coordination in the practice setting.

Evolving Payment Landscape

To sustain a coordinated model of care, reimbursement is needed to support services not covered under the fee-for-service payment system. A variety of pilot programs have emerged, initially labeled as pay-for-performance initiatives and more recently under the auspices of PCMH models or accountable care organizations (ACOs). In an ACO environment, a group of providers collaborates to manage the care of a population under a shared savings and global payment arrangement. Current alternative payment models include shared savings, enhanced PMPM payments for care management, bundled payments, and capitated models. In each of these models, there is an aim to shift resources toward evidence-based care provided within an efficient care system.

The ACA has further accelerated payment reform, providing both Medicare and state Medicaid agencies the latitude to support clinical transformation through PCMH and ACO models. As an example, the State of Missouri was the first to receive a waiver for an enhanced PMPM fee paid to primary care practices serving as health homes for complex patients.[9] Under this model, other providers, such as community-based behavioral care centers, can coordinate the health care needs of patients.

Beacon Communities and the Evolving Payment Landscape

In Bangor, Maine, providers participating with the **Bangor Beacon Community, Bangor, ME**, had the opportunity to participate in the statewide PCMH pilot. After the Maine legislature and State Health Plan endorsed the medical home model as a key strategy for making primary care viable in Maine, the Maine PCMH Pilot was created with support of multiple stakeholders. As part of this pilot, payers were encouraged to pay practices differently for better care using a three-component payment model. This model included a new, up-front PMPM care management fee paid to PCMH practices, continued fee-for-service payments, and payment that recognizes excellent performance by the practice, when possible. These initiatives, along with the platform established by the Beacon Community work in Bangor, served as the foundation for the Bangor Beacon Pioneer ACO, which was launched in 2012. Today, the Bangor Beacon Pioneer ACO is reporting successful outcomes as part of the Centers for Medicare & Medicaid Services ACO pilots.

In the **Hawaii Island Beacon Community**, one of the lead organizations, the Hawaii Medical Services Association (the Blue Cross and Blue Shield Association health plan in Hawaii), created a Model Office program enabling primary care practices that meet their PCMH accreditation requirement to move away from fee-for-service to a fixed primary care capitation payment. This program offers practices the opportunity to move to a more sustainable system to provide greater access and affordable quality care with greater efficiency. The Beacon Community provided clinical practice transformation support so that practices could improve their performance to sustain their capitated payments.

Setting the Stage for Success

The Beacon Communities' vision of transforming the health of communities through technology made them early adopters in the transformation of primary care. These clinical transformation activities can be implemented by a single practice, a small group of practices, or a group of community stakeholders (including multiple practices, hospitals, and other stakeholders, such as laboratories and long-term care facilities). Practice-level activities are more limited in scope; they may focus on data improvement activities to support performance goals for a single disease condition and a small number of performance measures. Quality improvement programs, implementation of clinical decision support systems, or participation in community-wide performance improvement initiatives can help drive an individual practice toward clinical transformation.

Community-level initiatives, such as payment reform pilots, often drive community-wide transformation activities. Community-level initiatives are generally larger in scope and

Practice vs. Community

To clarify terminology used in this Learning Guide, a **practice** is a group of physicians in a single location who share office space and financial, staff, and IT resources to support the provision of care to patients. A practice shares a single EHR. A **community** refers to a local group of practices or an HIE with or without one or more hospitals. Multiple EHR systems are likely to be present within a community.

focus on activities to support performance goals for a larger set of measures that cross multiple disease conditions, patient populations, and geographies. Whether the clinical transformation effort is practice-driven or community-driven will determine the resources required and strategies employed.

In considering a primary care transformation initiative, the Beacon Community experience highlights several key considerations:

- Assess readiness for clinical transformation
- Ensure sufficient local broadband capability to support health IT
- Communicate expectations
- Build on the efforts of early adopters

Assess Readiness for Clinical Transformation

One of the first steps in any improvement process is to identify assets, strengths, and key areas for improvement. Conducting a readiness assessment will help a community or practice understand existing competencies and improvement opportunities. Readiness assessments and gap analyses enabled the Beacon Communities to identify which practices were in a position to effectively participate in clinical transformation work and what resources were required to enhance the use of technology as part of that transformation work. Readiness assessments are useful both for gauging levels of preparedness for adopting technology and for practice transformation.

The Beacon Community of the Inland Northwest (Washington) developed its own readiness assessment tool that links technology readiness with improvement readiness, which is included in Appendix H. There are also assessment tools that assess the readiness of the clinical practice to function as a medical home, including the PCMH Assessment tool developed by Qualis Health, the NCQA Assessment Tool, and the Primary Care Development Corporation readiness tool. The RECs for health IT have a variety of resources and assessment tools. Several of the RECs partnered with Beacon Communities to aid in completing assessments and developing work plans for adapting technology to support their efforts. For example, the West Virginia Regional Health Information Technology Extension Center used a practice assessment tool that provided a clear picture of the technological capabilities of the clinical practice. A variety of other tools and resources are available to assess readiness are included in Appendices A and B.

Ensure Sufficient Local Broadband Capability to Support Health IT

Broadband access is a required component for practices and communities to be able to effectively support health IT. Although there have been many advances in broadband penetration over the past decade, many communities still lack a robust broadband infrastructure to support their work. For example, some rural and urban communities experience “cellular deserts,” where a lack of cellular access exists. These deserts are often seen in underserved communities because of the lack of a local commercial market. The Delta BLUES Beacon Community (Mississippi) observed that use of the Internet by many of their physician practices in

their rural community was limited because of a lack of local infrastructure for wideband communication. Practices seeking to improve their broadband access can consult their local REC for additional support and guidance.

Communicate Expectations

Clear communication of expectations for participation in a clinical transformation effort allows stakeholders (e.g., physician and nurse leaders, organizational and community leadership) to raise questions or concerns early on in the process and helps build broad buy-in and support. This applies to health IT as well as patient-facing technologies. Although this process can initially be time consuming, it will often save time and effort by facilitating broader buy-in down the road. The Beacon Communities found communication with stakeholders was required through multiple channels, including personal one-on-one dialog, community meetings, medical staff meetings, letters, and community-wide flyers. Messaging was critical to communicate the notion that the participants would be part of a larger effort beyond the walls of their practice.

Build on the Efforts of Early Adopters

Practices identify "bright spots," those early adopters of technology who are willing to lead and test new ways of delivering care (see Exhibit 2). These exemplar sites provide lessons learned or serve as potential partners. Beacon Communities were able to rapidly build an evidence base to demonstrate the feasibility of clinical transformation by focusing on early adopters. The Beacon Communities' selection of candidates for participation in clinical transformation initiatives gave preference to those practices that demonstrated a high degree of engagement and commitment to clinical transformation and who were able to devote the necessary time and resources to the effort. These early adopters then served as ambassadors to engage the broader practice community.

Exhibit 2. Foundational Elements for a Strong Start

Element	Considerations
Commitment and Collaboration	• Is there awareness and agreement among physicians and practices of the need to improve care provided? • Are there providers or practices that have successfully undertaken quality improvement initiatives and would be willing to provide leadership and direction for this project? • Are there established relationships with vendors? If so, are the vendors willing to support continued efforts to improve quality of care? If not, has the importance of vendor engagement been communicated and accepted by physicians and practices? • Is there a willingness to commit resources to improving quality in support of shared goals? • If the initiative extends beyond one practice (i.e., includes multiple practices, a health system, or public health entities), is a coordinating body in place, or does the community have the expertise from within to create one?
Quality Improvement and Performance Evaluation	• Do practices or the community already have clear performance goals or target areas of focus (e.g., improved outcomes for chronic heart disease patients) or a process to facilitate goal setting? • Are patients integrated into the community's quality improvement efforts? • Are there criteria and measures for evaluating outcomes?
Health IT	• Have practices implemented or are they in the process of implementing EHRs and working toward MU certification? • If the initiative extends beyond one practice, is the EHR market in the community well-coordinated? Are one to two EHR products in use in the community, or are many different EHR products in use? • Is an existing health IT infrastructure in place that allows for the exchange of health information across practices?

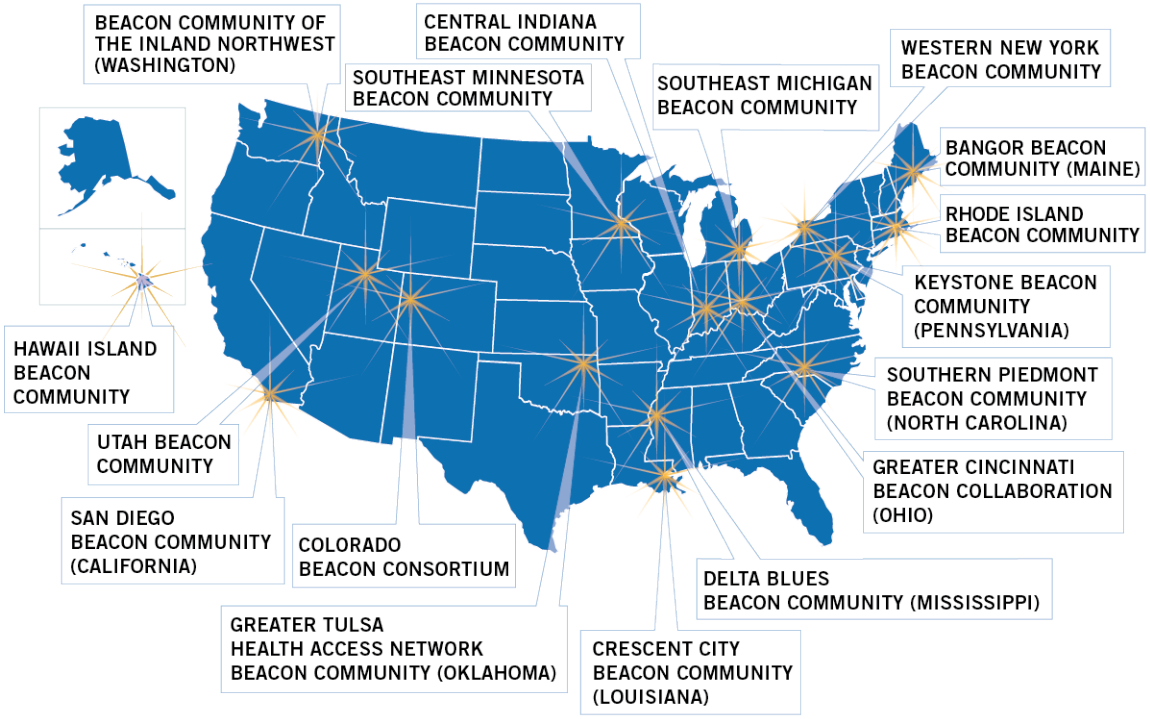
Element	Considerations
Resources & Sustainability	• Do identified resources exist for deploying IT solutions and conducting staff training on new tools? • Are there resources that can provide on-the-ground assistance to implement quality improvement projects, such as a local REC, Quality Improvement Organizations (QIO), or other community-based quality improvement initiatives? • Are local payers or employers engaged in practice transformation efforts? • Are resources (e.g., financial) available from public or private institutions to support ongoing efforts? • Has planning begun for long-term sustainability?

Lessons from the Beacons

The Beacon Communities represent a vast array of experiences with the use of technology to support clinical transformation. Differences in their experiences stem from many factors, such as the existing health IT infrastructure in the clinical practice and community, the degree of health system integration, the level of maturity with HIE, the community's goals and objectives, the readiness of the clinical practices to change, and the presence of informal and formal leadership.

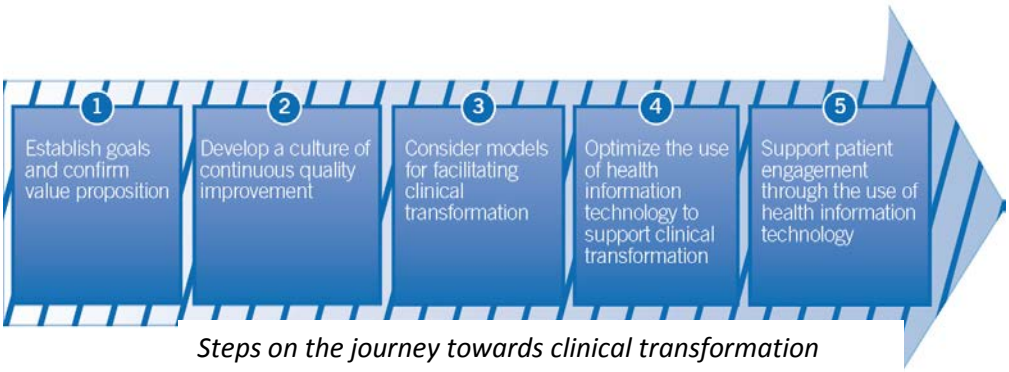
Eight Beacon Communities provided in-depth information about their experiences for this Learning Guide, and additional Beacon Communities provided illustrations and insights with regard to overall direction and content (see Exhibit 3). All 17 Beacon Communities contributed to this guide. They are: Bangor Beacon Community (Maine), Colorado Beacon Consortium, San Diego Beacon Community (California), Hawaii Island Beacon Community, Central Indiana Beacon Community, Beacon Community of the Inland Northwest (Washington), Crescent City Beacon Community (Louisiana), Greater Cincinnati Beacon Collaboration (Ohio), Greater Tulsa Health Access Network Beacon Community (Oklahoma), Southeast Michigan Beacon Community, Western New York Beacon Community, Keystone Beacon Community (Pennsylvania), Southeast Minnesota Beacon Community, Delta BLUES Beacon Community (Mississippi), Rhode Island Beacon Community, Southern Piedmont Beacon Community (North Carolina), and the IC^3 Beacon Community (Utah). The lessons and insights from these communities are presented in the form of five Implementation Objectives

Exhibit 3. Featured Beacon Communities



These Communities' experiences using health IT to effect clinical transformation in the practice setting are synthesized into five primary objectives (see Exhibit 4). Each objective is described in detail in the following sections. See Appendix C for a high-level summary of the Implementation Objectives and action steps recommended for implementing clinical transformation in the practice setting.

Exhibit 4. Implementation Objectives Overview



Steps on the journey towards clinical transformation

Implementation Objective #1: Establish Goals and Confirm Value Proposition

The first Implementation Objective emphasizes the importance of establishing clinical transformation goals that are aligned with organizational goals while also confirming the value proposition for the work. These priorities help establish the focus and buy-in that will increase the likelihood of team success. The Beacons Communities' experience underscored the need for each team to—

- Align clinical transformation with internal organizational goals and external requirements
- Confirm the value proposition.

1.1 Align Clinical Transformation with Internal Organizational Goals and External Requirements

Today's ambulatory care organizations juggle many competing goals and objectives—often leading to more confusion and frustration than improvement. Clinical transformation goals are established and communicated to align with other organizational goals and external requirements. Practices can craft a clear aim statement that outlines the specific goals of transformation, why they are important to the practice and the community they serve, what changes will be made, and how progress will be measured. Beacon Communities found it important to have the physician community contribute to the aims and measures for the clinical transformation process to create a sense of ownership for the success of the initiative. This process applies even if the practice is participating in a payment pilot where the measures are predefined.

Clarifying the benefits of participation in a community clinical transformation initiative is key to engaging multiple practices. Stakeholders can also articulate the role of technology in supporting clinical transformation to meet external requirements or internal goals. An example is the use of patient-facing technologies such as mobile texting. These technologies are provocative and cutting edge, but if there is limited understanding of how they can support clinical transformation, adoption of the technologies is likely to be slow and the investments in these

technologies are likely not to be fully realized. The messaging of the role of technology in supporting clinical transformation efforts aligns with the mission and values of the practice, including how the proposed work will prepare the organization for a rapidly changing environment. Several of the Beacon Communities found that developing a charter for their clinical transformation process provided a concise way to articulate the purpose and expected benefits of clinical transformation.

Appendix K provides a sample charter, which includes—

- The aim of the clinical transformation initiative
- A compelling case for transformation
- Measures to track progress toward agreed-on clinical transformation goals
- The benefits of participation
- The expectations for participation.

1.2 Confirm the Value Proposition

The community as a whole, and each participating practice, must be able to clearly articulate the value proposition for clinical transformation, which may include identifying funding sources and establishing a sustainable financing strategy. Clarifying precisely how the clinical transformation initiative will position the practice for survival in a changing health care environment that is moving toward value-based reimbursement was an important engagement strategy that many of the Beacon Communities use. Once again, the clarification for how technology is an enabler of clinical transformation is important in the overall messaging, which includes acknowledging historical technology and human resource investments made by practices and emphasizing the aim to build on those investments as part of clinical transformation. In many cases, quantifying the shared costs of transformation implemented by the community compared to the investment a practice requires attempting transformation work on its own will help to put the value proposition in perspective.

Clinical transformation requires up-front investments. In addition to the steep costs of electronic health IT acquisition and implementation itself, costs are associated with training staff and with lost productivity as practices transition to the new systems; estimates show up to a 20% dip in productivity in the early transition period[10].

At the same time, these changes provide the opportunity for a practice to address many fragmented aspects of the health care system and improve professional satisfaction. Improved decision support tools lead to fewer medication errors and improved safety for patients.[11] Changing roles can lead to improved collaboration and job satisfaction, thus decreasing stress across the care team.[12] Value is also derived from transparency of information, which allows care teams to see the positive impact they are having on the population they serve. Temporary dips in productivity are often offset by gains in longer-term productivity and an improved business case.[13]

Payers are helping to sustain these practice transformation efforts by continuing to create incentives through pay-for-performance programs, enhanced care management reimbursement, or shared savings programs. Also, funding from grant sources and through the MU incentive program are helping to accelerate the adoption of health IT. Engaging payers early can help to create the best possible conditions for long-term sustainable community collaboration.

Each Beacon Community sought to develop a business case that resonated best with the culture of the practice and the larger regional context and available opportunities.

The Southern Piedmont Beacon Community's Approach to Building a Business Case

The **Southern Piedmont Beacon Community** took a pragmatic approach to sustainability, seeking to demonstrate savings generated as part of its work. The goal of its chronic obstructive pulmonary disease (COPD) management program was to develop a standardized disease-management program that follows patients throughout the continuum of care. This program uses best practices to develop physician guidelines or order sets for COPD treatment, and it works to ensure standardization, wordless patient education, and improved processes to screen for COPD to catch undiagnosed cases as well as to ensure that inpatient COPD nurses focus on high-risk COPD patients and that COPD respiratory therapists focus on patients in the medical home. The Southern Piedmont Beacon Community performed an analysis of core business metrics relating to COPD, including hospital admissions, readmissions, mortality, length of stay, and cost per case. Based on the data from the COPD management program, the results showed that 1,823 patients were screened for COPD, 450 patients were newly identified as high risk for COPD, and there was a 25% decrease in COPD readmissions. This data led to the decision to host an integrated delivery network that proved to be a cost-effective model. They took the data forward to the leadership of the integrated delivery network hosting the pilot program. The model proved to be cost-effective and from an IT standpoint could be replicated as a prototype with general value across the state. It could also serve as a model that was considered worthy of ongoing support.

Implementation Objective #2: Develop a Culture of Continuous Quality Improvement

The ultimate aim of clinical transformation is to improve the health of populations through more cost-effective systems of care. Technology can be a key resource for fostering a culture of continuous improvement in clinical practice. Clinical practices train staff in quality methods and tools such that they are able to design, implement, support, and sustain a quality improvement project over time. This training can also include ways to use technology to facilitate the work.

Many of the Beacon Communities fostered a culture of continuous improvement across provider organizations in their local communities. Technology was a critical resource to enable exchange of health information and make the results more transparent through robust reporting tools.

Through a collaborative effort focused on pediatric asthma, the **Greater Cincinnati Beacon Collaboration** succeeded in fostering an environment for clinical transformation across pediatric practices in the community. Using common measures, transparent reporting, and a BreakThrough Series Collaborative, they were able to drive improvement in core measures of quality. This peer-to-peer engagement around clinical transformation fosters a culture of commitment to continuous improvement.

The steps described below are based on knowledge gained from the experience of the Beacon Communities as well as research into how organizations can effectively build a culture of continuous improvement:

1. Understand the population of focus and set clear target goals.
2. Form an interdisciplinary improvement team.
3. Train staff in improvement methods and tools.
4. Use an improvement methodology to execute change ideas in a rapid cycle.
5. Dedicate time for the improvement effort.
6. Measure progress and transparently share results.

Based on the experience of several Beacon Communities that were using clinical data to drive quality improvement, ONC launched a quality improvement initiative in early 2013 called the *Low-Density Lipoprotein (LDL) Challenge.* High-performing clinics were recruited from the Beacon Communities and Regional Extension Centers and challenged to improve their performance on LDL control for patients with diabetes by 50% from baseline over the course of 16 weeks using technology as an enabler of rapid cycle change. LDL control is a key risk reduction factor for cardiovascular events, which are the leading cause of death for people with diabetes. Five teams competed in this challenge, and each saw dramatic improvements in LDL control within 16 weeks. This Challenge is referenced below to illustrate key concepts.

2.1 Understand the Population and Set Clear Target Goals

It is critical to understand the specific population that is the target of an improvement effort. There are limitations to the amount of time and resources available to address all of the needs of a population. As a result, most organizations find it helpful to identify a priority segment of the population, often referred to as a *population of focus.* For a practice with 1,500 patients, the population of focus for a diabetes improvement effort might be the 300 people with diabetes.. It is important to clearly define the target population and to understand the segments within that population that can be influenced through system changes. A clear example of creating a population of focus on a large scale is the *Million Hearts Campaign* launched by HHS.[14] The aim of the *Million Hearts Campaign*, launched in 2011, is to avoid 1 million heart attacks and strokes by 2017. Partners across the heart care industry are bringing resources, insights, and technologies to prevent heart attacks and strokes. This example represents an ambitious and specific goal with a clear timeframe, linked to a strong evidence base, with a sound business case and a moral imperative.

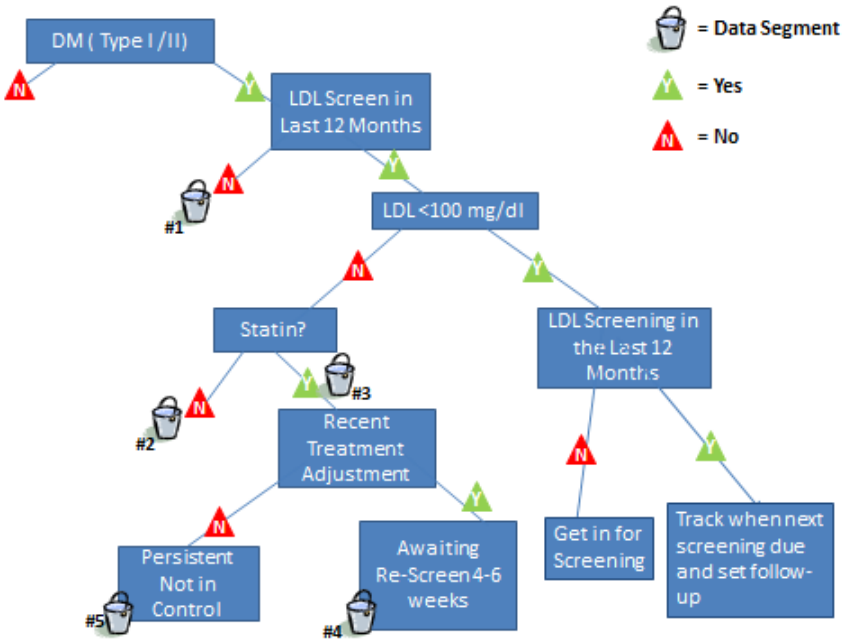
The Beacon Communities clarified a population of focus for their improvement efforts through the use of charters, memoranda of understanding, and aim statements (described above). When clarified, much of their efforts to support practices in clinical improvement focused on helping the practices understand the populations of focus and the care opportunities that existed for those patients. For example, if the aim is to improve diabetes care, the practice would identify the cohort of patients that are overdue for an eye screen, foot check, or lipid screening. This would be considered a gap in care based on the latest evidence base for diabetes care.

The *Low-Density Lipoprotein (LDL) Challenge* teams provide a good example of how technology enabled the practices to better understand their population of focus (patients with diabetes). Participating practices were asked to track diabetes LDL management and control—National Quality Forum (NQF) measure 0064—which is defined as "the percentage of patients with diabetes 18–75 years of age with diabetes whose LDL-C was adequately controlled (<100 mg/dL) during the measurement period." The NQF measure excludes patients with gestational diabetes in the denominator.

Although this measure appears straightforward, the experience of the LDL Challenge revealed that one team considered active patients as any patient seen in the past 3 years, while another only included patients who had been seen within the past year. This example stresses the importance of clarity on what is being measured and the population targeted.

The LDL Challenge also pushed participating practices to understand the population segments that could be targeted for improvement of specific measures. Exhibit 5 provides the framework in which LDL Challenge practices were asked to query their EHRs to use the data to drive improvement. The practices were further challenged to collect the data on a weekly basis and use the information for rapid test of change.

Exhibit 5. LDL Challenge—EHR Query Framework



2.2 Form an Interdisciplinary Improvement Team

It is critical to include the right people on the improvement team for a successful improvement effort. Improvement or implementation teams are heterogeneous in makeup but homogeneous in mindset. The value of bringing diverse personnel, together with deep process knowledge, enables development of profound knowledge of the workflows and opportunities for improvement. For example, teams without front-line staff are bound to fail. Teams led by front-line staff may be successful but lack the ability to overcome roadblocks; therefore, organizational leaders must also be part of the team.

Implementation teams vary in size and composition. Effective teams include members representing three different kinds of expertise within the organization: system leadership, technical expertise, and day-to-day leadership. System leadership might include representatives from senior leadership who have the ability to act as a sponsor for the initiative and can remove barriers and influence redeployment of resources as needed. Technical expertise can include staff with deep process knowledge, IT expertise to perform queries and reporting, and clinical expertise in the topic of focus. Day-to-day leadership represents the front-line leadership of the care teams likely to be doing the daily "tests of change" and using technology to drive clinical transformation. There may be one or more individuals on the team with each kind of expertise, or one individual may have expertise in more than one area, but all three areas are to be represented.

The Beacon Community of the Inland Northwest Develops Clinical Transformation Training and Education Tools

As a part of its care coordination and clinical transformation efforts, the **Beacon Community of the Inland Northwest** developed clinical transformation training and education tools and resources that include on-site quality and process improvement coaching, access to online learning modules, and workflow analysis and redesign consultations to assist with attesting to MU and integrating technology into daily practice. With its On-Site Diabetes Care Team Training, the Beacon Community of the Inland Northwest is also working to improve operational efficiencies to ensure that all levels of the care team are working at the top of their licensure.

A diverse multidisciplinary team also fosters buy-in from a wide range of staff, because all members of the care team are given a stake in the outcome. The Colorado Beacon Consortium challenged their practices to explore how to better optimize use of medical assistants in daily workflows. The Hawaii Island Beacon Community explored ways to use community-based care managers as extenders of the care team. The Southeast Minnesota Beacon Community created relationships with public health care managers as extenders of the care team.

2.3 Train Staff in Improvement Methods and Tools

It is important for clinical practices to understand the importance of building capacity for improvement by training staff in quality improvement methods and tools. A plethora of tools and methods exist to help practices improve their clinical systems (e.g., the principles of Lean, workflow analysis and process mapping tools, data visualization tools). It is important that staff understand the process of improvement and how to test changes in daily workflows. For small practices without access to training resources on quality improvement methods and tools, the state-based QIOs and RECs are a ready resource.

As noted in Section 2.4, the Beacon Communities pursued a variety of pathways to build improvement capacity in their practices, including embedding care managers, providing external quality improvement support, sponsoring formal learning collaboratives, and transparently sharing data on performance.

In the LDL Challenge, the six practices were provided weekly coaching on high-leverage change opportunities and the latest information on the evidence base for LDL control. Information was delivered in short modules, allowing for time to share and plan how the teams might apply the concepts in the next weekly cycle of change.

Colorado Beacon Consortium Transformed Clinical Care Through Collaborative Learning

The **Colorado Beacon Consortium** has focused its efforts on the management of chronic conditions such as diabetes and heart disease. Covering seven counties in western Colorado, the Colorado Beacon Consortium includes 51 primary sites with 240 team members (clinicians, staff, performance coaches, etc.) and serves approximately 258,000 patients. To build capacity in participating practices for quality improvement and change management, the Colorado Beacon Consortium created a learning collaborative for practices. Practices participated in the Community Collaborative for 12–15 months, which included a curriculum consisting of a 3-month prework phase, three quarterly in-person learning sessions, an action period following each learning session for testing new improvement ideas, and a final summit to share success. The practices were staged through four cohorts, helping to build on the learning of early adopters in the beginning cohorts and ensuring that subsequent cohorts would receive adequate support. Topics covered during the collaborative learning sessions included best practices in quality improvement communication with the practice team, patient-centered medical home attributes, front- and back-office work flows, best practices in obesity management, understanding primary care from a patient's perspective, physician engagement in practice transformation, and best practices in getting children immunized. To facilitate the adoption of the recommended change concepts, Colorado incorporated the Model for Improvement, which offers a systematic approach to rapidly testing innovations to help achieve desired improvements.

2.4 Use an Improvement Methodology to Execute Change Ideas in a Rapid Cycle

Organizations have successfully used a variety of methods to make improvements. One approach is to use the Model for Improvement developed by Associates in Process Improvement. The model consists of three fundamental questions and the Plan-Do-Study-Act (PDSA) testing cycle.

The three fundamental questions that guide improvement teams are—

- What is the team trying to accomplish?
- How will the team know whether a change is an improvement?
- What changes can the team make that will result in an improvement?

The PDSA cycle consists of small-scale tests of change in the practice setting, by planning a test, trying it, observing the results, and acting on what is learned. This is the scientific method, used for action-oriented learning. The model includes—

- **First Test of Change.** The first test of change involves a small sample size (typically one health care provider or one member) and can be described ahead of time in a PDSA format so that the team can easily predict what they think will happen, observe the results, learn from them, and continue to the next test.
- **Implementation.** After testing a change on a small scale, learning from each test, and refining the change through several PDSA cycles, the team can implement the change on a broader scale—for example, for an entire pilot population.
- **Spread.** After successful implementation of a change for a pilot population, the team can spread the changes to other parts of the organization or to other organizations.

More information about using the Model for Improvement can be found at www.ihi.org/knowledge/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx.

At a practice level, PDSA cycles can be built into the daily workflow. The Beacon Communities promoted rapid cycle change through the Model for Improvement in many of the local community collaborative improvement projects.

Use of the PDSA Cycle Approach in the Adoption of Technology To Support the Transformed Clinical Model

Family Health Centers of San Diego, a Beacon Community partner, participated in the ONC-sponsored LDL Challenge with the aim of improving the percentage of diabetes patients with LDL in control. The clinic used interactive voice recognition technology to do outbound calls to contact patients in need of LDL screens. In the old system of implementation, a script would be written and broadcast to the whole target population and assumed to be the best effort. One physician at Family Health Centers wrote several alternative scripts using some of the concepts of behavioral economics he heard on an all team call to see whether a particular message would resonate better with the target population as measured by the percentage of population following up and scheduling an appointment. By doing PDSA cycles on key messages, they were able to tailor their strategies to target populations for a better yield in results.[15]

It is important to recognize that numerous approaches exist to continuous quality improvement, and many tools and resources are available, including Lean Six Sigma and reengineering. The Institute for Healthcare Improvement (IHI) is a forum for exchanging best practices and sharing tools and resources; more information can be found at www.IHI.org.

2.5 Dedicate Time for the Improvement Effort

Dedicated time is needed for any improvement effort. This might include time for training staff in improvement methods and tools, time to review population-level data, time to plan tests of changes to systems, and time to review the results and plan the next changes. Where possible, an effort can be made to incorporate improvement efforts into the daily workflow. Practice teams often use a quick huddle before a morning or afternoon panel of patients. In a huddle, tests of changes can be discussed and observations shared on lessons learned. A daily huddle keeps the focus on the improvement process.

The Beacon Communities employed a variety of approaches for engaging practice teams in shared learning and improvement, including formal learning collaboratives and the use of onsite coaches. This required dedicated time for the efforts. These approaches are described in Section 3.

2.6 Measure Progress and Transparently Share Results

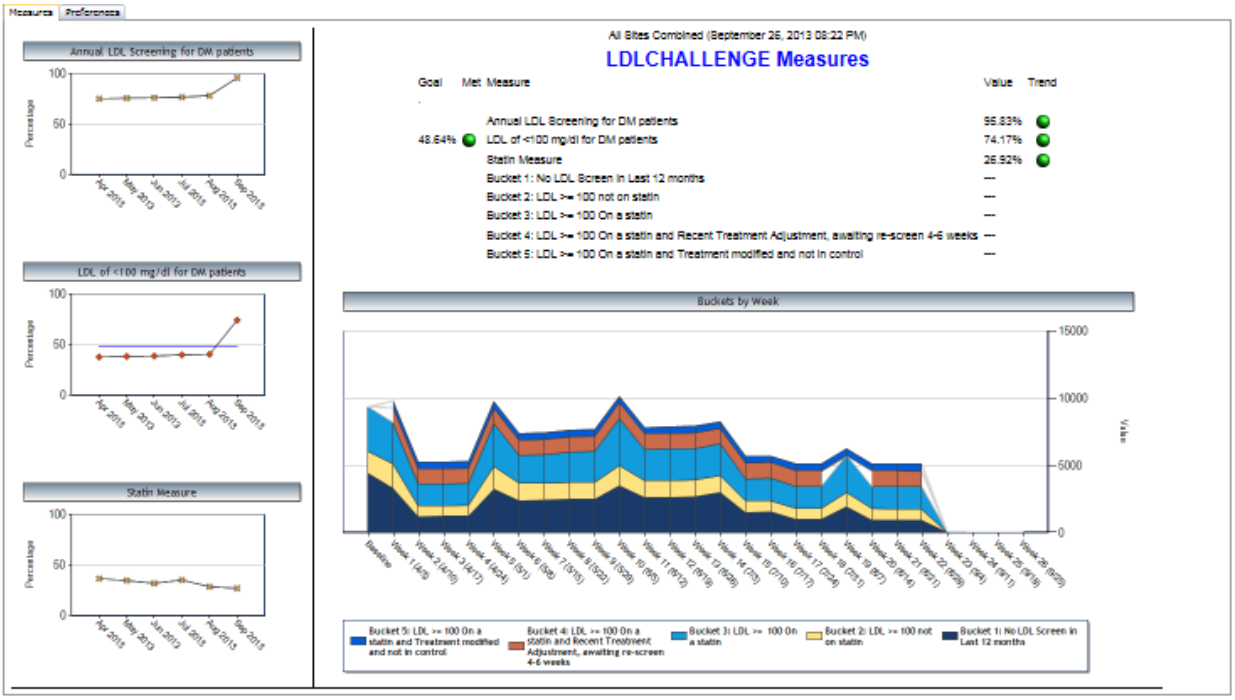
Actionable information is needed for improvement. At a practice level, it is common to see a "data wall" where data from improvement efforts is transparently displayed for the care team to

study and incorporate into their planning for workflow and care process changes. An example from the Rhode Island Beacon Community can be found in Appendix D.

At a community level, most of the Beacon Communities provided performance feedback to practices so they could compare their performance to their peers. At the Western New York Beacon Community and the Beacon Community of the Inland Northwest, Beacon Community data on peer performance was blinded without attribution, but in other environments, such as the Delta BLUES Beacon Community, providers participating in the diabetes collaborative were able to see the performance of all providers. The performance feedback was enabled through the use of health IT, aggregating data and formatting into comparative dashboards for the clinics.

In the LDL Challenge, teams conducted internal meetings to review data on a weekly basis and also participated in a Challenge-wide call to review improvement trends each Friday. Exhibit 6 shows an example of the weekly dashboard that is reviewed and shared with all teams. This figure displays the aggregate data and trends. Individual graphs were also reviewed.

Exhibit 6. LDL Challenge Weekly Dashboard



Implementation Objective #3: Consider Models and Methods for Facilitating Clinical Transformation

With the goals and value proposition established and key participants engaged and trained, the next step is for the practice or cohort of practices to explore potential models to facilitate clinical practice transformation and methods for collaborative learning. The key actions to do so include—

- Considering models for facilitating clinical practice transformation
- Considering methods for collaborative learning.

3.1 Consider Models for Facilitating Clinical Practice Transformation

Clinical transformation models provide a framework for thinking about the uses of health IT to improve care management. There are a number of clinical transformation models that were used by the Beacon Communities. To determine the most appropriate model, practices or communities will consider factors such as community or practice maturity, local relationships community history, clinical transformation goals, health IT resources and needs, experience in clinical transformation, the local staffing patterns, and available human resources. Examples of models used to accelerate clinical transformation by Beacon Communities include the following.

Embedded Care Managers. One model emphasized the use of embedded care managers in the practice. The core functions of care managers include providing health risk assessments, developing care plans, monitoring health status and health services received, providing education and advocacy, arranging for community supports, ensuring continuity among multiple providers, and offering general social support. The care managers were often some of the key users of technology, such as an admission discharge transfer (ADT) feed from a hospital alerting a practice of a recent emergency department (ED) visit or hospital admission.

Use of Embedded Care Managers in Clinical Practice

The **Bangor Beacon Community** funded care managers in clinical practices. The care managers played a major role in using population-level data to identify patients with care opportunities and coordinated bridging the gaps with the care team. A monthly meeting of the care managers enabled peer coaching and sharing of best practices. The Bangor Beacon Community team also worked with its EHR tool to enhance the capabilities of the system and to ensure that it was optimizing the use of the technology to better support care management by ensuring that decision support tools for the core disease states the focus of its improvement efforts supported the care team.

Practice Coaches. Another model is to use practice coaches to aid clinical practice. Practice coaches can either be part of the staff or retained through an external organization. The Beacon Communities' practice coaches used a variety of tools and approaches to guide the practices. They provided face-to-face, Web-based, or on-demand educational programs and were available for questions arising from the field. The coaches worked specifically with the care teams to address changing roles, how to optimize the use of their technology, and how to test and implement improvements in their workflows and care systems. In contrast, care managers focused more on direct engagement with coaching and coordinating care with patients.

Beacon Community Experiences Highlight Various Ways To Use and Incorporate Practice Coaches

Beacon Communities found practice coaches to be an essential part of their practice transformation. The **Hawaii Island Beacon Community** used externally contracted practice coaches to support their clinical transformation efforts. Hawaii found that a standardized approach and curriculum were essential and the best approach for practices having no prior knowledge of redesign theory or methods.

At the **Crescent City Beacon Community**, practice coaches successfully assisted practices in implementation of a care plan for chronically ill patients, incorporating a care team approach and effectively using their EHRs.

The **Colorado Beacon Consortium** opted to hire practice coaches and develop its own training programs for those coaches. These practice coaches underwent extensive training, including a weeklong boot camp based on the Agency for Healthcare Research and Quality's *Practice Facilitation Guide*. The coaches then went on site, completed readiness assessments, and developed work plans to help the practices achieve their aims. Working directly with care teams, they helped practices identify populations of focus and understand the numerators and denominators of their clinical measures.

3.2 Consider Methods for Collaborative Learning

Practices that are able to achieve transformation recognize that real, sustainable change requires continuous and collaborative learning. This includes learning and adapting to optimize the use of technology, the roles of the care team, population management strategies, care management programs and initiatives, analytic tools such as risk stratification, and workflow redesign.

A community-wide approach to clinical transformation allows practices to learn from the failures and successes of others in addition to their own. Practices involved in a collaborative learning environment may get a sense of contributing to a positive movement rather than a sense of professional isolation and resistance to change. Here are examples of how community efforts can facilitate learning and change:

BreakThrough Series (BTS) Learning Collaboratives. In a BTS collaborative, provider practice teams are brought together in structured learning sessions and introduced to a set of activities to accelerate clinical transformation. The practices completed the activities during the "action periods" between structured learning sessions through a series of PDSA cycles. During these action periods, there are also conference calls to share lessons learned and solve problems. In addition, email list serves and Web portals allowed for an open virtual dialog to share tools and resources. The collaboratives also focus on a common set of measures to further drive performance. The Delta BLUES Beacon Community, the Hawaii Island Beacon Community, the Greater Cincinnati Beacon Collaboration, and the Colorado Beacon Consortium all used versions of a structured BTS collaborative.[16]

Collaborative Learning in Practice Transformation

The **Greater Cincinnati Beacon Collaboration** works with a multidisciplinary team and uses posters to educate staff on the workflow changes, clinical requirements, and data measurement systems. Beacon Community and REC staff have worked together to align teaching tools for practices. These tools align quality processes so that one tool can monitor multiple quality initiatives. The practice's progress is measured against a visual representation for the practice. A Beacon Community representative also visits the practice and completes a workflow evaluation. This report is given to the practice to help improve workflow, data entry, validation, and EHR reporting. Beacon Community and REC staff have also developed laminated pocket tools that describe the workflow diagram of each MU core and menu item. These tools include visual screenshots that depict the data entry path and steps to enter data into an EHR. Collaborative meetings are held across the Beacon Community and REC programs to address problems and barriers that practices have identified and to maintain a practice-centric approach of greatest benefit for the health care team.

The **Delta BLUES Beacon Community** implemented the Clinical Transformation BTS Diabetes Learning Collaborative to focus on improving the quality of care for at-risk diabetics. Key target outcomes included reducing HbA1c levels, lowering blood pressure, improving cholesterol, and increasing diabetic eye and foot exams. Providers were recruited to receive coaching on clinical transformation approaches while participating in a shared learning environment with their peers. In addition, technical staff helped clinicians configure EHRs to accommodate practice workflows and extracted and presented performance feedback data for each practice. The BTS resulted in valuable lessons about data integrity management and benefits of using EHR technology to drive improvement. Participating practices have been able to demonstrate promising early results on several core clinical measures.

Transparent Sharing of Measure Results. Participants in collaborative learning initiatives found that the transparent sharing of measure results across practices allowed providers to observe the variability in performance and identify high performers. Central Indiana, Rhode Island, Bangor, Western New York and Inland Northwest aggregated performance measure results and made them transparent among the practices. This information allowed providers to learn from high performers and consider opportunities to apply their experience more broadly.

Clinical Network Meetings. A related strategy for shared learning and collaboration is to support monthly face-to-face gatherings of clinicians. As mentioned previously, the Bangor Beacon Community used this approach effectively, which brought together care teams to share results across provider groups and discuss how high performers were achieving their breakthroughs. Dr. Frank Bragg of the Bangor Beacon Community offered, "In one of our meetings, a clinic was showing a very high screening rate. When asked how they had achieved such high levels, the provider simply stated that he had changed the queries of the EHR so that a reminder came up well in advance of when the patient was due for a screening. In that way, a screening could be arranged before the test expired. This enabled the screening rates to jump to a benchmark level."

Web & Action Series. The ONC supported the Beacon Communities with a learning model developed by the Institute for Healthcare Improvement called the *Web & Action Series.* Interested Beacon Community staff participated in a series of three to four webinars spaced several weeks apart. Each webinar focused on a specific topic and was led by subject matter experts on that topic. For instance, after a webinar on care coordination, participants were expected to run PDSA cycles in their practice environments. Subsequent webinars focused on sharing between participants followed by additional modules with subject-specific content.

Challenges. Another method the ONC deployed was to issue "challenges" on specific topics. During a challenge, interested participants volunteered to collaborate with other organizations to meet the challenge. The ONC facilitated the process by bringing together improvement experts to lead coaching calls with the cohort of participants. An example described in the prior section is the LDL Challenge, where practices were recruited to improve the percentage of the population of people with diabetes who are in LDL control by 50% in a 16-week period.

The **Bangor Beacon Community** drove and sustained continuous improvement through its Practice Performance Improvement Initiative. Bangor established 30 shared measures across the provider community that allowed for a common focus on improvement. The initiative sponsored monthly meetings of care teams at which benchmark data was shared and ideas exchanged for how to improve performance across all providers. The monthly meetings created an element of mutual accountability where practices were expected to report on their improvement efforts and help others where there were gains in key measures. In each of these provider communities, clarifying how the use of technology would enable achievement in improvement in key measures and why this transformation work aligned with the values and goals of the participating practices led to greater trust among members and strengthened relationships.

Implementation Objective #4: Optimize the Use of Health IT to Support Clinical Transformation

Although the appropriate use of health IT is critical to improving the delivery of care in practices, selecting the right tools, integrating them within practice workflows, and ensuring that clinicians are using them effectively can be a significant undertaking. Key steps in the use of technology to support clinical transformation are included in Exhibit 7.

Exhibit 7. Key Steps in Using Technology to Support Clinical Transformation

Key Steps	Importance
Optimize EHR use with the practice and through working with vendors	• Ensure that staff understands the capabilities and use of the EHR system to enable a practice to improve performance and deliver better care more cost efficiently.
Assess data integrity	• Adopt appropriate, consistent practices for data capture.
Empanel patients and optimize registry functions	• Ensure that every patient has a consistent primary care provider and care team. • Aid the care team in monitoring the comprehensive health care needs of the patient.
Implement workflow changes	• Ensure that technology is integrated within care practice patterns, and build understanding among staff about how to effectively use that technology.
Provide report and query management	• Ensure adequate resources (training, technology and staffing) to produce reports that are actionable by the care team.
Analyze and Share Data	• Enable the practice to focus its improvement resources, identify and prioritize care opportunities, support day-to-day efficiencies, and identify cost-saving opportunities.
Use EHRs and HIE to communicate across the medical neighborhood	• Capture efficiencies in time and cost with collaboration across provider entities through exchange of health information across settings.

4.1 Optimize EHR Use with the Practice and Through Working with Vendors

Optimizing EHR use in practices participating in a clinical transformation initiative is imperative to support the efficient management and use of clinical information. Clinical transformation is not easily achievable without the use of an EHR, because manual chart audits do not provide the real-time data and decision support tools needed to deliver high-quality population health management. Those practices that have adopted an EHR but find it cumbersome may not have optimized its use or may find that an EHR system purchased many years ago does not have the analytical capability to remain competitive in the current environment. Ideally, an EHR system enables a practice to improve performance and deliver better care more cost effectively.

Collaboration with the EHR vendor is one pathway to optimization of the technology. Participation in vendor-supported user groups and forums can provide information on how to use the system to meet specific needs or the workflows that must be adapted to meet a need. Partnering with other providers sharing the same EHR system to take advantage of shared learning can also be helpful.

New Orleans Successfully Engages Vendor To Create Technological Partnership for Community

Since December 2006, the Louisiana Public Health Institute, awardee of the Beacon Community Program, has facilitated an EMR User Group for the Greater New Orleans area for primary care practices using the EMR vendor SuccessEHS. SuccessEHS is the largest single provider of certified EHR technology in Louisiana health centers, serving nearly 320 providers and more than 1,400 patients. Fifty locations in Louisiana are using SuccessEHS, 16 of which are participating in the Crescent City Beacon Community.

The EMR User Group has been used to connect, share, and enable collaboration among separate health centers to optimize and use their EMRs. This group has continued with the Crescent City Beacon Community with quarterly meetings to discuss management processes, specifications, and standards for data collection and care coordination improvement, to learn how to use EMR tools, to improve care team workflows and risk stratification, and to provide peer to peer assistance on EMR workflows and processes.

This unique community–vendor partnership has served as a platform on which to develop an NCQA PCMH toolkit, which maps all 149 PCMH factors to a relevant EHR workflow, predesigns PCMH reports, and compiles sample policies and procedures. This toolkit was initially accessible only to SuccessEHS clinics within the Crescent City Beacon Community but has since been rolled out to the greater SuccessEHS customer base.

In all of the Beacon Communities, increasing EHR adoption and meaningful use attainment was a high priority.[17] As a result, the Communities either assisted the practices directly with EHR selection and adoption or partnered with the state-based RECs, which provide EHR selection and implementation resources. RECs can be an invaluable asset as part of any community-wide improvement effort. The Hawaii Island Beacon Community contracted with the REC as a sub-recipient and acted as an agent of the REC to better serve the providers on Hawaii Island to achieve MU. Several of the Beacon Communities, such as the Rhode Island and the IC_3 Beacon Communities, served as both a Beacon Community and the REC.

4.2 Assess Data Integrity

As EHR adoption continues to grow, providers are becoming increasingly adept at using their EHR in the daily course of delivering care to patients. Many are still lacking, however, when it comes to the need to adopt appropriate, consistent practices for data capture. Thus, practices embarking on a clinical transformation initiative plan to deliberately assess and improve the integrity of their data at the outset of their work.

Based on the Beacon Communities' experience, there are a few key elements of an approach to assess and improve data: (1) engaging physician champions and stakeholders; (2) identifying measures and mapping data elements needed for measure calculation; (3) conducting an initial data quality review that assesses the quality of the data needed to calculate core measures, considering factors such as the portion of time the field is complete and the degree to which field entries are valid; (4) developing and implementing EHR data quality improvement activities; and (5) establishing a processes to continuously monitor data quality.

An important step in the process is to map selected measures to the fields and queries necessary to report on the measures. All too often in the design of EHR templates, this step is overlooked, causing rework later when the output reports do not reconcile with provider experience or perceptions. Although the process of mapping fields to the underlying database and queries necessary for reporting is time consuming and requires patience, it is a critical step in the process, and it is important for clinical practices to devote the time to own and understand it. Several Beacon Communities learned that this is one area where community-based resources provide great assistance.

The issue of data integrity presents major challenges to the health care industry but must be examined and addressed within the aims of a clinical transformation effort. Several potential root causes exist for poor data integrity. During the initial configuration of an EHR system, there must be careful evaluation of how key information is charted for ease of retrieval. For example, a mammography could be recorded in an EHR in multiple ways (as an order, as a test, as a procedure, or even as a result) depending on the advice of the vendor and the will of the provider. If the data capture is not consistent each time by the provider and across providers in a practice, when the mammography screening rate is generated, it may appear inaccurate. A mammography rate could be 70% for one provider and 8% for another, both using the same process and having similar statistics, but the variation would be caused by how the data was captured and recorded.

4.3 Empanel Patients and Optimize Registry Functions

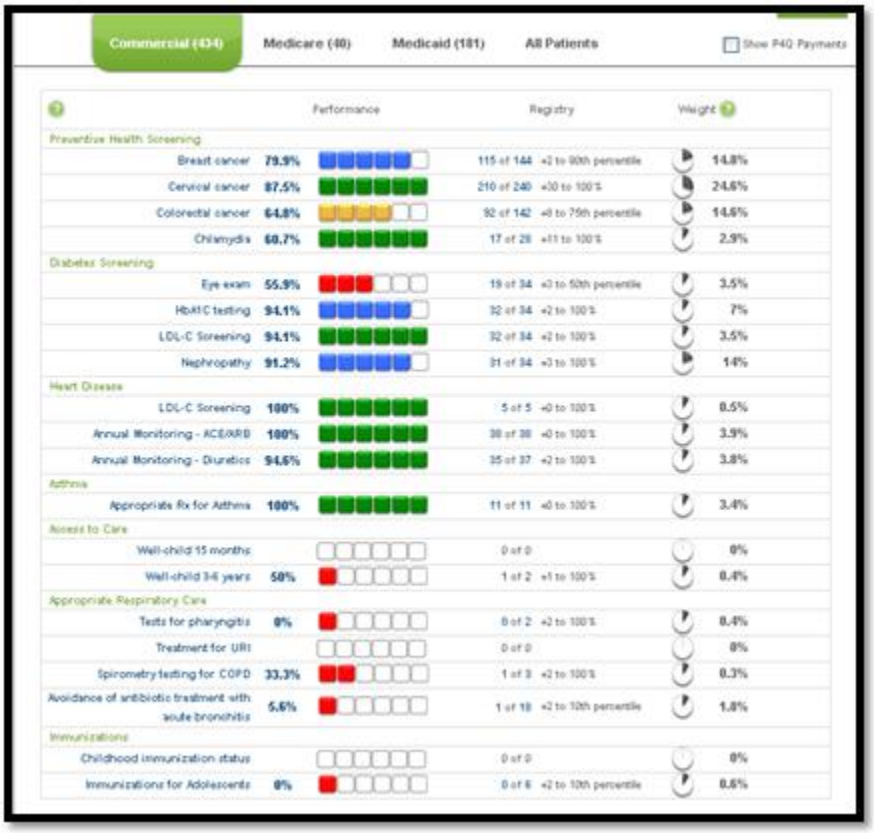
Another important step to optimize the use of technology for clinical transformation is empanelment. ***Empanelment* is the process of ensuring that every patient has a consistent primary care provider and care team.** The care team is responsible for monitoring the comprehensive health care needs of the patient in accordance with the latest medical evidence. In a small practice environment, empanelment is often implicit, but in larger practices such as academic health centers or Federally Qualified Health Centers (FQHC) providing care for large numbers of underserved communities, it has been common for patients seeking care to see any willing and available provider. Assigning patients to a particular care provider is also an important element in the design of ACOs, shared savings, and pay-for-performance programs in which the total cost and quality of care for a given patient needs to be tracked.

For Beacon Communities with centralized HIE services, a master patient index facilitated patient empanelment. Appendix I offers empanelment resources.

An important aspect of empanelment is to understand the registry capability for a particular EHR system and develop a reliable process to assess the needs of the population (see Exhibit 8). A *registry* is a database that is populated with the patients the practice serves and has logic associated with the latest evidence base for the life-cycle need or condition of the patient. A registry allows one to produce population-level reports identifying care gaps or care opportunities (such as the people with diabetes on the panel overdue for an eye screen or foot check). A registry also allows users to produce performance reports on core measures of clinical quality. Registries are a primary tool of population management; therefore, it is important to understand their role and better integrate the registry functionality in EHR applications.

The proliferation of EHR systems has seen increasing movement toward building population-level functionality into a consolidated clinical patient management system. Unfortunately, tremendous variation exists in the capability of EHR systems to provide the core registry functions and agility for population-level reports. For a variety of reasons, including that many EHR systems create databases that are organized around individual patients, the aggregation of data across multiple patients within an EHR can be difficult. A byproduct of this limitation is the integration of ad hoc reporting modules into EHR systems, which necessitates some competency at writing queries into the database. Many of the Beacon Communities provided support to their participating practices by offering centralized registry functions available through their HIEs. This offer enabled information from across the medical neighborhood to be shared and key decision support tools to be leveraged across providers. See Exhibit 8 and Appendix L for Registry examples.

Exhibit 8. Hawaii Island Beacon Community Registry Example



4.4 Implement Workflow Changes

The results of the initial data quality assessment can be translated into strategies and tactics to improve workflow around an EHR system. Such strategies focus on three main areas—people, process, and technology—to help identify and institutionalize changes that improve data capture through standardized and systematic workflow processes:

- *People* refers to the staff (providers and support staff) responsible for capturing patient information and those who will be the focus of workflow improvement strategies.
- *Process* refers to the activities staff members perform to obtain desired results during a patient's visit (e.g., updating patient contact information or recording vital signs).
- *Technology* refers to the tools that assist staff and facilitate the implementation of desired processes and vendor input into functional design and development. This step involves reviewing current workflows and documenting necessary changes to remediate data quality issues (process); implementing data integrity checks and protocols to ensure documentation compliance (technology); and providing training and coaching to staff (people).

Addressing data quality issues within a practice may require implementing a mix of process-, technical-, and training-based solutions. Depending on the outcome of data quality review and issues identified, practices may need to add new steps to the workflow, adjust screens to guide documentation, or provide "at the elbow" training (e.g., one-on-one, in-person interaction) to help staff understand how to use health IT systems. Some issues may require vendor assistance for needed system (re)configuration or new development, while other issues may not have a technical solution but require additional training or creative workarounds for staff to ensure the completeness and accuracy of required data.

Ultimately, a practice may have to assess and reassess its progress toward producing high-quality data and use varied types of solutions to resolve issues.[18] Careful consideration of workflow impact prior to implementation of a health IT solution can avoid disruptions to clinical practice.

Often, practices rely on a vendor's standard implementation without considering how the new technology will support or disrupt efficient workflow. A good example is management of referrals and results reporting. Practices must determine the workflow for who on the care team follows up on a referral and ensures that results are received. Therefore, an important action step is for practices to undertake is workflow mapping.

IT also introduces the opportunity for new and improved workflows for care management. For example, as population-level data identifies a list of patients with care opportunities, someone in the practice needs to act on those opportunities and reach out to contact those patients. Technology allows for standing orders based on evidence-based protocols to create flags, alerts, and reminders for the care team as patients flow through the clinic.

The Beacon Communities took advantage of several tools from ONC programs such as workflow mapping guides. Appendix E provides a workflow mapping resource.[19]

4.5 Provide Report and Query Management

An important aspect of population health management is the ability to gather data reports that inform decisions and action. Practices face challenges in setting up standard queries for EHR information systems necessary for routine reporting on quality indicators and for use in daily workflow planning by care coordinators. In addition, the production of population reports, as actionable tools, can be time consuming and overwhelming for many clinical practices. A practice must plan for the resources to produce reports that are actionable by the care team.

Often, providers are incredulous when they see population-level data and immediately dismiss that data as being wrong; more than likely it is. This response applies to clinical and utilization data, as well. If data is or seems inaccurate, it suggests a need to examine the root causes. Are the issues the result of attribution, of how the data are captured, or of queries that are incorrectly abstracting the data?[20] Sorting through these issues is a time-intensive and exhausting process, but it is also a critical step to establishing the trust of the care team in the integrity of the data.

The ability to generate reports and configure queries for a clinical practice is part of the value of a community-wide infrastructure. Beacon Communities staff supported practices in ensuring that EHR systems were capable of generating the necessary reports, configuring the queries necessary to support reports, and then providing guidance on how to use the data to improve health outcomes for the targeted population. In some cases, the registry or reporting capabilities of the EHR system were not sufficient to produce the data needed, leading to a focus on shared assets such as data warehouses, stand-alone registries importing data from multiple sources, and business intelligence tools. These resources might be challenging to acquire and support on an individual practice basis, whereas at a community level, they are much more cost effective. Beacon Communities played a major role in providing centralized support to many communities for this service.

A simple but poignant example of population health versus care for the individual comes from lessons in diabetes management from CareSouth, a clinic recently recognized by the Robert Wood Johnson Foundation as one of the leading innovative primary care practices in the country. Working diligently on a diabetes improvement initiative, the CareSouth team was able to drive the average HbA1c level down for an at-risk panel of patients from over 9 to 8, and then hit a plateau. CareSouth encouraged providers to try a variety of strategies, including adjusting medications and self-management strategies with patients, but the average level of 8 proved difficult to move.

As a team they began to challenge what they really understood about their population of patients and their data. A team member suggested doing a query to see if there were any co-morbidities that they had not factored into their treatment plans. They discovered a segment of the population that if removed from the population would lower the average HbA1c level to 7. That segment shared two co-morbidities: obesity and depression. When staff began treating the depression and obesity, the HbA1c levels for these patients began trending downward. Because of population management techniques and available data, the staff realized that they had been placing all their energy on diabetes management when in fact the opportunity for improving their outcomes was in focusing on obesity and depression.

4.6 Analyze and Share Data

Production of population-level data is one dimension of population management. Understanding performance and how that performance compares to one's peers can provide important information for focusing improvement resources. A second dimension of population management is the analysis of the data to identify care opportunities that need to be prioritized. As a clinical practice, it is important to review population data reports, analyze care opportunities, and target interventions.[21] It is important to engage these staff early in the process of designing and selecting measures as well as validating extracted information.

As organizations move into an accountable care environment, practices need to be able to identify those patients who are at the highest risk for acute care utilization. In the Hawaii Island Beacon Community, the Hawaii Medical Service Association Blue Cross and Blue Shield plan offers providers specific reports on their patients from the payer-based registry system. Targeting these individuals enables the organization to focus resources where there is the greatest

likelihood of demonstrating impact and value in the form of reduced or avoidable utilization or expenses.

Beacon Communities made efforts to provide tools that enabled care teams to take action. The Southern Piedmont Beacon Community's investments in Community Care of North Carolina's Informatics Center provides an example of centralizing analytics capabilities and quality improvement resources to support care managers in the local network. The MyHealth Access Network, developed by the Greater Tulsa Health Access Network Beacon Community, has also developed a sophisticated exchange platform that offers practices the ability to use business intelligence applications to analyze patients' data stored in the HIE. Appendix J provides an example of a tool from the Bangor Beacon Community registry system that enabled care managers to see an opportunity, click the data element, and access a "work-list" of patients who have care gaps requiring outreach.

A clinical practice routinely shares quality data reflecting the performance of the practice with the care team; transparency is a powerful motivator of change. Being able to see one's performance and how one compares to other providers is critical to improvement and population-level management. Across the Beacon Communities there were efforts to aggregate data and make it available to enable benchmarking of performance. This data was in the form of specific reports as well as aggregate dashboards. Virtually every Beacon Community that led a clinical transformation initiative provided comparative data on a key indicator and found this information critical in driving improvement. In some cases, the feedback was completely transparent and allowed all practices to see high and low performers and the spectrum in between. In other cases, the data was provided in a more blinded format. In any scenario, being able to see data on high performers and what is possible generated inquiry as to what best practices were employed that might be shared with others to improve performance. A sample dashboard can be found in Exhibit 6.

4.7 Use EHRs and HIE Capabilities to Communicate Across the Medical Neighborhood

A powerful use of health IT is the ability to exchange health information across the medical neighborhood. As noted earlier, this can be in the form of ADT alerts from a hospital to a clinic or through mechanisms to expedite referrals to specialists. A clinical practice can avoid spending time administering follow-up calls and tracking down lost or missing information by being able to search for information from multiple sources through HIE technology.

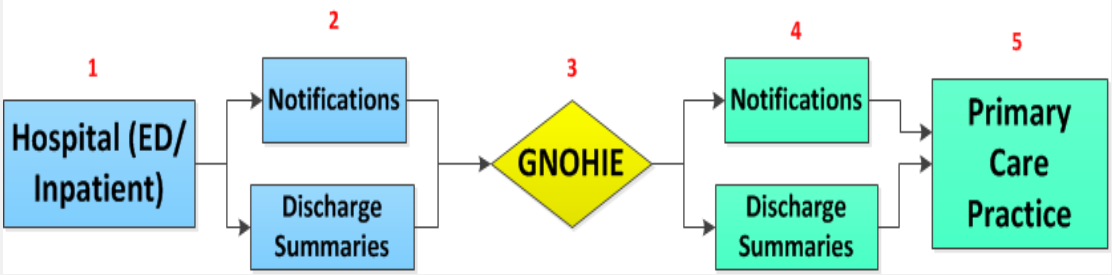
In the Southeast Minnesota Beacon Community, public health nurses working with children in their homes or at school can access a portal connecting the public health system database with the electronic shared care plans medical providers generate, thus saving multiple phone calls and tracking down paper. The Greater Tulsa Health Access Network Beacon Community has focused on connecting providers to streamline referrals across the medical neighborhood. That Community's Doc2Doc tool enables primary care physicians to consult with specialists electronically to determine whether a visit is warranted for a given patient, allowing providers to avoid costly specialty care when it is not needed. In the Greater Cincinnati Beacon Collaboration,

ADT alerts from the hospitals enabled primary care practices to immediately engage patients and families for follow-up visits to avoid future admissions and readmissions. A real-time ED or admission alert system notifies primary care practices when their patients with diabetes or asthma have an ED or inpatient visit at any of the 21 hospitals across the region.

State and local entities delivering HIE services can provide or a community-based collaboration such as the Beacon Communities can provide cost-effective approaches to collaborating across the medical neighborhood.

The **Crescent City Beacon Community** focused on addressing care coordination between hospitals and primary care practices. Specifically, it wanted to use HIE data to notify the primary care practices when a patient presents to an ED or inpatient setting. In addition, the ED and inpatient discharge summary is provided to the primary care practice to ensure that the primary care provider has complete information. Exhibit 9 illustrates how the implementation of the Crescent City Beacon Community ED and Inpatient Notification System was intended to enable data exchange and information flow from the hospital to the primary care provider.

Exhibit 9. ED and Inpatient Notification System



Implementation Objective #5: Support Patient Engagement Through the Use of Health IT

One of the most exciting frontiers in clinical transformation is the role technology can play in engaging patients. Patient engagement is one of the most important aspects of clinical transformation. The evidence base is strong in showing that patients who are self-activated and empowered to self-manage have better outcomes.[22] Technology is increasingly providing new opportunities for substantive engagement of patients and families to empower them to better manage their health care conditions and overall well-being.

Stage II MU places increased emphasis on engaging patients by providing them with electronic access to their clinical encounter-generated health information as well as by requiring electronic exchange of a minimum set of clinical data elements between health providers.

Insights gained from the Beacon Communities' use of technologies to engage patients include—

- Use of technology for patient engagement
- Soliciting community input
- Improving the IT literacy of health professionals
- Engaging community health workers and educators
- Focusing on the IT literacy of patients

5.1 Engage Patients in Clinical Transformation Efforts

Several Beacon Communities engaged patients early on in the design and implementation planning for using technology to support clinical transformation. Patients were involved in all levels of clinical practice transformation planning, including guiding leadership and governance, workflow redesign of the care team, and informing the practice about their own capacity for self-management. Patients in the Bangor Beacon Community volunteered to offer their own video testimonials, which proved to be valuable tools to sustain momentum and accelerate change in the environment.[23] These videos help communicate the impact of a transformed practice acting as a medical home on the patients it serves.

The Beacon Communities tested a variety of patient-facing technology tools as part of their work. Although these projects often focused on small pilots with patients in participating practices, others targeted broader groups of consumers and did so using small-scale PDSA cycles. Exhibit 10 presents a summary of some of the technologies tested by various Beacon Communities.

Exhibit 10. Examples of Patient Engagement Technologies

Technology	Beacon Community	Application	Role
Mobile texting	Utah Beacon Community, Salt Lake City, UT	Used a two-way texting application for adults with Type 2 diabetes. Patients received automated, personalized messages related to self-management coaching and blood sugar checking reminders. The program was expanded to 19 primary care clinics. Patients reported high satisfaction with the program, and a subset of patients with poorly controlled blood sugar at enrollment showed statistically significant improvement in blood sugar control at 6 months.	• Electronic communication between patient and provider
	South-eastern Michigan Beacon Community	Used Text4Health, where patients were able to text 300400 for a free Type 2 diabetes risk assessment. Patients then received a 14-week curriculum of customized messages based on their risk assessment scores. The focus was on hot spots of high-risk patients. Now, there are 1,023 active participants who are self-reporting behavioral changes and a high level of satisfaction.	• Electronic communication between patient and provider
In-home monitoring	Western New York Beacon Community	Established a remote monitoring program in which patients logged in daily to report their blood sugar level and check in with their coach. Participants received routine follow-up calls on lifestyle management and demonstrated reductions in ED visits and hospital admissions. Piloted a mobile application that allowed patients to take portable monitoring equipment with them on vacation, work, etc.	• Electronic communication to medical neighborhood
In-home monitoring	Central Indiana Beacon Community	Implemented remote monitoring for complex high-risk patients upon discharge from the hospital. Were able to reduce 30-day readmission rates.	• Electronic communication to medical neighborhood

Technology	Beacon Community	Application	Role
In-home monitoring, continued	San Diego Beacon Community	Deployed in-home monitoring of patients with congestive heart failure and COPD. Wireless weight scales and remote blood pressure machines provided data to care managers to better manage conditions after discharge.	• Electronic communication to medical neighborhood • Electronic communication with patients
Skype and Apple iPad tablets	Southern Piedmont Beacon Community	Piloted using iPad tablets and Skype virtual office visits to meet the needs of long-haul truckers with diabetes and poor HbA1c control. The truckers were able to connect their glucometer to the iPad and transmit results, and then have a coaching call with their care team via Skype.	• Electronic communication with patients
Patient portals	Southeast Minnesota Beacon Community	Patients within the Mayo system have access to a patient portal that facilitates scheduling, review of results, and messaging to the care team. Through the HIE, the care teams were able to use care managers based in the public health department to engage children with asthma on shared care planning for asthma, and then relay the information to the care team.	• Electronic communication to the medical community • Electronic community-to-school portals • Electronic communication with patients
Patient portals	Western New York Beacon Community	Assisted practices with configuration and educated over 550 diabetic patients in 50 practices to use a patient portal for access to their records, lab results, Rx refills, new appointments, etc., tied to their physician's electronic health record.	• Electronic communication with patients
Patient portals	Keystone Beacon Community	MyKeyCare was a patient portal launched to engage targeted populations, including a local university. 2,500 students have now been enrolled in MyKeyCare. There was a 95% uptake in authorization for information sharing as community relationships increased. Now, 95% of the incoming university class are found to use the system to support their care needs.	• Electronic community-to-school portals • Electronic communication with patients

Technology	Beacon Community	Application	Role
Patient portals, continued	Hawaii Island Beacon Community	Had a patient portal that enabled tracking of appointments and tests. The system is used by 50 physicians on the Big Island to coordinate group visits.	• Electronic communication to medical community • Electronic communication with patients

Community input prior to launching patient-facing technology is strongly recommended to help identify barriers and clarifying how the community can understand its role and voice in the process.

5.2 Improve the IT Literacy of Health Professionals

The pilot projects focused on patient engagement through technology supported by the Beacon Communities also revealed that many members of the health care team were not as technology literate as necessary to support the patient's use of technologies. This required front-end education and training in the use of the technology to prepare the care team to support the patients in their use of the technology. This front-end preparation phase was often overlooked in terms of both timeline and materials needed to support the care team.

5.3 Engage Community Health Workers and Educators

Beacon Communities found that having care team staff or community-based outreach staff engaging patients and encouraging their use of the technology increased patient adoption and use of technology. Use of community health workers to engage patients in their care proved valuable, because these workers are often more familiar with the patient population and are able to garner their trust. In one community, community health workers were able to identify patients (such as those with cognitive decline) who might not be candidates for the remote use of technology, thus optimizing the use of the technology. Recruiting local champions and early patient adopters in the planning and execution enables them to serve as ambassadors for other patients to engender patients' trust in the health care system.

5.4 Focus on the IT Literacy of Patients

In the experience of the Beacon Communities, patients have varying comfort levels with the use of technology; as a result, it is important to assess the IT literacy and understand the characteristics of the population in advance of use of patient-facing technologies. For example, practices can consider preferred languages, visual acuity, and dexterity.

For some demographics, such as older adults and underserved populations, the introduction of patient-facing technology such as a digital glucometer connected to Bluetooth transmission or use of mobile texting reminders was the patient's first exposure to use of IT. For instance, touch

screen technology proved challenging with certain elderly or physically impaired patient segments. Large-print materials also proved critical for older populations.

Building the introduction to the technology into the clinical workflow, where the care team engages the patient as part of the visit using the new technology, was reported to help with adoption rates. If a patient is introduced to the portal or messaging while in the exam room and shown how to access the laboratory or test result, this leads to higher adoption rates than if done after the visit.[24]

An initiative funded by the ONC in partnership with the National eHealth Collaborative outlines several important additional steps that communities and practices can consider when engaging patients and families in health through IT. The ONC funded an effort by the National eHealth Collaborative to develop a framework for patient engagement using technology, presented in Exhibit 11. Further information on the framework can be found in Appendix M.

Exhibit 11. Patient Engagement Framework

Looking Ahead

The following are key areas for consideration as communities continue to accelerate practice transformation using health IT in an evolving policy and payment landscape:

- **Sustainability of Technology to Support Clinical Transformation.** As practices and communities look to the future, planning for sustainability of the technology and the gains from clinical transformation is an important consideration. The sustainability plan will help make sure the gains achieved from improvement efforts, such as improved clinical outcomes or financial savings, do not regress to prior levels of performance. A sustainability plan addresses the costs associated with acquisition and maintenance of supporting technology on an ongoing basis. It also factors in the need for ongoing training of staff, because turnover is inevitable.
- **Reimbursement Reform.** A key future consideration is the need to accelerate reimbursement reform that facilitates shifting resources away from wasteful practices in the health care system (e.g., double-ordering of labs because information is not present) and toward practice transformation and supporting the use of technology as an enabler of population health and care management. Providers and communities need to continue to engage early stakeholders funding health care.
- **Fostering an Environment for Continued Learning and Collaboration.** Mechanisms can be pursued to enable ongoing collaboration across providers. Each practice gains, as does a community, when practices are able to share their insights, lessons learned, and best practices for clinical transformation. Opportunities to collaborate across provider organizations should not be limited to the funding of a grant cycle or specific program. Rather, communities can seek mechanisms to promote long-term collaboration.
- **Promoting Transparent Sharing of Data on Clinical Performance.** Improvement is not possible without understanding current performance and what can be achieved based on results from high performers. Transparent sharing of performance needs to be encouraged and fostered through trusted relationships.
- **Increased Sophistication of Analytic Tools.** As practices increase their use of health IT and their baseline level of comfort in using data to inform clinical practice increases, continued work is needed to develop analytic tools for risk assessment and prioritization that support targeting of patients for whom interventions can have the greatest return on investment and the most impact. The vendor industry will need to continue to focus on development efforts for such tools. In addition, physician practices can continue to increase their sophistication in understanding, analyzing, and using data available to them to target their interventions.
- **Improving Care Management Tools.** Increased effort to advance the development of actionable care management tools that streamline the presentation of needed information for care managers is needed. This is especially true with respect to coordinating care across the continuum of the health care delivery system. Care teams can quickly become overwhelmed with the vast amount of information coming from the medical neighborhood. Actionable care management tools that streamline information

and help care managers direct their time and energy more efficiently are increasingly being recognized as a need.

- **Policy and Standards Considerations.** Health care policy will continue to serve as a lever to drive the health care industry toward transformation. For example, the MU standards will continue to evolve to encourage increased HIE across the continuum of care and to increase the engagement of patients and families through technology. Practices that stay abreast of health IT standards and are aware of the implications for clinical practice and workflow demands will be better positioned for the future. Additional resources exist to help practices engage in the journey toward clinical transformation, such as the RECs, QIOs, Health Center Controlled Networks, state-based primary care organizations, professional societies, and community partners such as Beacon Communities, all of which offer a wealth of experience and lessons learned that can be shared with practices trying to embark on this journey. Several of these resources as well as links to additional information are included in Appendix N.

Appendices

Appendix A: Beacon Community of the Inland Northwest Care Coordination Readiness Assessment

Clinic Name: Date Administered:

Start Time: End Time: Number of Attendees:

Name/Title of Attendees:

Reference as: Weeks DL, Polello JM, Hansen DT, Keeney BJ, Conrad DA. Measuring primary care organizational capacity for diabetes care coordination: the Diabetes Care Coordination Readiness Assessment. J Gen Intern Med 2013; DOI 10.1007/s11606-013-2566-2.

Development supported by Grant Number 90BC001101 from the Office of the National Coordinator for Health Information Technology awarded to Inland Northwest Health Services.

Domain 1: Organizational Capacity			
Objective	**Measure**	**Level of Importance to Practice**	**Variation Among Providers in the Practice**
1.1 The Care Coordination Mission of the Practice	The practice has a formal, written vision related to care coordination and/or diabetes care. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
1.2a Access to Care	Patients have access to care for diabetes-related issues and can call the practice and be seen within 24 hours. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
1.2b Access to Care	A nurse or other provider is available after hours to assist with patient triage and address emergent cases. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
1.3 Internal Communication Strategies	The practice has defined communication strategies for communication within the practice between staff and the designated providers of care. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
1.4a External Communication Strategies	The practice has defined strategies for communication between the practice and patients. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
1.4b External Communication Strategies	The practice has documented patient communication preferences and implements them across the practice. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
1.5 Data Quality Standards	The practice documents each diabetes preventative health measure in the patient record that is endorsed by a national quality organization such as NCQA. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
1.6a Privacy and Security	Privacy, security and patient consent policies and procedures are given to each patient. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
1.6b Privacy and Security	Privacy, security and patient consent policies and procedures are updated annually. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
1.7 Cultural Competence	Cultural competency strategies have been implemented throughout the practice and are a focal point in office procedures. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low

Domain 2: Care Coordination			
Objective	**Measure**	**Level of Importance to Practice**	**Variation Among Providers in the Practice**
2.1 Adopts Clinical Evidence-Based Guidelines	The practice has integrated the current *ADA Standards for Medical Care for Diabetes* into usual care. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.2 Staffing Capacity	The practice has a staff position dedicated to diabetes care coordination activities with FTE in proportion to the patient case load. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.3 Internal Continuity of Care	Policies and procedures are in place to coordinate care across multiple providers within the practice. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.4 External Continuity of Care	Policies and procedures are in place for identifying and tracking specialty referrals. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.5 Transition of Care	Discharge summaries and follow up recommendations are obtained from the hospital setting including ED visits, in-patient, observation care, and rehabilitation stays within a maximum of 5 working days. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.6 Medication Reconciliation	The practice obtains medication lists from other care providers (e.g., hospitals, specialists), corrects any discrepancies and educates the patient on any changes to the medication regimen, including the timely titration of insulin. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.7 Patient/Family Involvement	Care plans are developed collaboratively with patients and families at appropriate literacy levels. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low

2.8 Patient Assessment/ Plan of Care	Patient assessments and plans of care include clinical, social, psychological, environmental and financial aspects of care. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.9a Resources and Provider Referrals	The practice refers patients with complex needs to specialty care. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.9b Resources and Provider Referrals	The practice evaluates the effectiveness of specialty care resources at least annually. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.9c Resources and Provider Referrals	The practice refers patients to community-based resources for social, psychological, environmental, and financial needs. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.9d Resources and Provider Referrals	The practice updates lists of community-based resources. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.9e Resources and Provider Referrals	The practice assesses effectiveness of community-based resources at least annually. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
2.10 Provider Education	Continuing education is obtained by the entire care team to maintain and build disease-specific chronic care management knowledge and skills. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low

Domain 4: Quality Improvement			
Objective	**Measure**	**Level of Importance to Practice**	**Variation Among Providers in the Practice**
4.1 Staffing Capacity	Clinical and support staff have received training and education in quality improvement tools and models. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
4.2a Monitors Performance Measurement Indicators Across the Practice	Providers monitor clinical performance measures on a consistent schedule. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
4.2b Monitors Performance Measurement Indicators Across the Practice	Providers monitor work flow measures on a consistent schedule. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
4.3a Applies Quality Improvement Across the Practice	The practice completes a quality improvement activity more than once a year that follows a quality improvement methodology based on results from quality indicators within the practice. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
4.3b Applies Quality Improvement Across the Practice	The practice measures provider performance related to diabetes preventive health measures that are endorsed by a national quality organization such as NCQA. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
4.4 Patient/Family Feedback	The practice uses patient/family feedback in quality improvement projects. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
4.5a Maintains an Electronic Patient Registry	The clinic has a current, fully electronic registry of all patient with diabetes that can be stratified by factors such as age, gender, and type of diabetes. (A registry as a systematic list of defined health and demographic data for patient with specific health characteristics that is held in a central database.) ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
4.5b Updates the Electronic Patient Registry Regularly	The clinic updates the registry of diabetes patients at least quarterly to add patients new to the clinic with diabetes and existing patients newly diagnosed with diabetes, and to remove patients with diabetes who are deceased, or who have not been seen at the clinic for at least 2 years. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low

Domain 5: Technical Infrastructure		*Indicates a MU measure	
Objective	**Measure**	**Level of Importance to Practice**	**Variation Among Providers in the Practice**
5.1 Maintain Interfaces to Data Repository	The practice maintains a clinical data repository that allows electronic access to patient information on an individual or population basis. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.2 Generates Patient Reminders for Preventive Clinical Services*	The information system has the ability to generate patient reminders for preventive or follow-up care targeted at the provider. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.3a Policies for consistent Data Management	Data management policies and procedures require that patient data is entered in a standard manner across all providers and staff, in the appropriate field in the electronic medical record. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.3b Policies for consistent Data Management	Processes exist to detect non-standardized data such as text entered for non-numeric lab values. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.3c Policies for consistent Data Management	Process exists for training or re-training all staff when data quality problems are detected. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.4 Privacy and Security	Policies and procedures are in place to assure that patient data is secure and that access is limited to individuals who have a specific need to see the information in order to deliver care to that patient or to conduct necessary administrative activities. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.5 Maintain Data for Accuracy*	Providers and staff consistently record patient clinical data in the electronic medical record system important to care coordination, including: problem list, medication list, allergy list, test results and changes in key vital signs. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.6 Procedures for Patient Access to Records*	Policies and procedures are in place to provide patients with an electronic copy of their health information (including diagnostic test results, problem list, medication lists, medication allergies, discharge summary, procedures), upon request within 3 business days. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.7 Electronic Visit Instructions*	At least 50% of patients are provided with clinical summaries of all office visits within 3 business days. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.8 Clinical Decision Support*	Providers use at least one clinical decision support rule that relates to a high priority condition along with the ability to track compliance with that rule. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.9 IT Support for Effective Use of EMR	The practice has access to user and system support 24/7 for the electronic medical record system. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low
5.10 IT Ability to Electronically Transfer Data	A technical resource is available that can assist with a electronic data transfer to and from external health information technology systems using a standard data format. ☐ Not Prepared ☐ Moderately Prepared ☐ Highly Prepared ☐ Actively Performing	☐ High ☐ Medium ☐ Low	☐ High ☐ Medium ☐ Low

Appendix B: Western New York Beacon Community Practice Assessment

Western New York Beacon Community *Name of Organization and mailing address:* *Date:*					
Team Member Name	*Team Member title*	*Phone*	*Fax #*	*Email address*	*Participated in Assessment Interview*
	Physician Champion				
	Office Administrator and/or Front/Back Office Staff				
	Clinical Staff Member Contact				
	Information Systems Contact				
	Other Team Members Contact				

Exhibit B: Western New York Beacon Community Practice Assessment

Practice :											
	Electronic Health Record (EHR) Assessment										
Number	**Question**	**Response**	**Comments**	**Identified Gaps**	**Potential Cause(s)**	**Option 1**	**Option 1 Risk**	**Option 2**	**Option 2 Risk**	**Option 3**	**Option 3 Risk**
E 1	What EHR is used at your organization?		If Other:								
E 2	What version are you running?										
E 3	How long has your organization been using an EHR?		If Other:								
E 4	How would you rate your organization's use of the EHR?										
E 5	Do you have any plans to change or upgrade your EHR in the next year?										
E 6	If yes, what are your plans?		Details:								
E 7	What number of MD's currently use the EHR?	___ out of __	___ out of __								
E 8	What number of PA's currently use the EHR? (if applicable)	___ out of __	___ out of __								
E 9	What number of NP's currently use the EHR? (if applicable)	___ out of __	___ out of __								
E 10	What number of Nurses currently use the EHR? (if applicable)	___ out of __	___ out of __								
E 11	What other staff currently use the EHR? (if applicable)		If Other:								
E 12	If Other staff using the system, please describe what they are using it for.										
E 13	Is the EHR implemented across all departments (eg registration, nursing, billing, clinical)?										
E 14	If the EHR is NOT used in all departments, which departments are not currently using the EHR? (and how many)	___ out of _	Details:								
E 15	Is the EHR implemented at all locations?		Number of Locations:								
E 16	How many locations are not currently using the EHR?	___ out of __	___ out of __								
E 17	What is the timetable for implementing EHRs at locations currently not using it?	0-6 months	Details:								
E 18	How has the implementation of your EHR impacted clinician productivity?										
E 19	Do you have documented backup processes?		Describe:								
E 20	Do you record race as a separate data element?										
E 21	Do you record ethnicity as a separate data element?										
E 22	Do you record language as a separate data element?										
E 23	Does your EHR meet security requirements for Meaningful Use?										
E 24	Would you like a security assessment conducted on your system?										
	Health Information Exchange Assessment										
H 1	Are you using Computerized Physician Order Entry (CPOE) for medications? (further details assessed under MU)										
H 2	Are you using Computerized Physician Order Entry (CPOE) for labs? (further details assessed under MU)										
H 3	How are your lab orders usually transmitted to the lab?										
H 4	How are you currently receiving most of your Lab results?										
H 5	Are you using Computerized Physician Order Entry (CPOE) for radiology? (further details assessed under MU)										
H 6	How are your radiology orders usually transmitted to the radiology provider?										
H 7	How are you currently receiving most of your radiology results?										
H 8	Who processes the orders and results? (title)										
H 9	Are you using Computerized Physician Order Entry (CPOE) for referrals? (further details assessed under MU)										
H 10	How are your referrals usually transmitted to the specialist?										
H 11	How are you currently receiving most of your consultation reports?										
H 11	How many Endocrinologists do you refer to?		List:								
H 12	How many Cardiologists do you refer to?		List:								

	Electronic Registry Assessment						
Number	Question	Response	Comments	Potential Cause(s)	Option 1	Option 1 Risk	Option 2
R 1	Do you use Registries for Diabetes?						
R 2	Does you use Registries for Medication reconciliation?						
R 3	Does you use Registries for Diabetic patients with Congestive Heart Failure?						
R 4	Does you use Registries for Diabetic patients with Hypertension?						
R 5	How are your Registries generated?						
R 7	Do you record Diabetes and CHF diagnoses using ICD-9 codes						
R 8	Does your EHR generate Medication Lists?						
R 9	Does your EHR generate Allergy Lists?						
R10	Does your EHR generate patient problem lists?						
R 11	Does your EHR contain Immunization Status for Pneumococcus?						
R 12	Does your EHR contain Immunization Status for Influenza?						
R 13	Does your EHR contain Lab Values for HbA1c?						
R 14	Does your EHR contain Lab Values for nephropathy screening (e.g., Microalbumin)?						
R 15	Does your EHR track most recent Dilated Retinal Exam?						
R 16	Does your EHR track Blood Pressure?						
R 17	Does your EHR track Smoking Status?						
R 18	How often do you generate registries?						
R 19	Where in your workflow do you use registries?						
R 20	Do you know how many Diabetic Patients you have in your Practice?						
R 21	If yes, how many Diabetic patients (aged 18-74) are in your practice?						
R 22	Of these, how many do you consider active patients in your practice?						
	Definition; registries are used whenever data must be used consistently within an organization or group of organizations.	Organizations that need consistent definitions of data across time, between databases, between organizations or between processes, for example when an organization builds a data warehouse					

	Patient Portal Assessment								
Number	Question	Response	Comments	Identified Gaps	Potential Cause(s)	Option 1	Option 1 Risk	Option 2	Option 2 Risk
P 1	Does your EHR have a Patient Portal?								
	If you DO have a Patient Portal:								
P 2	Does your practice use the Patient Portal?								
P 3	Do your physicians use the Patient Portal?		out of						
P 4	What percentage of your patients use the Portal?								
P 5	Are there any known issues?		Details:						
P 9	Does your Patient Portal allow patients to Review their Medical Record?								
P 10	Does your Patient Portal allow patients to Review their lab test results, radiology, other test results (Summary of care record)?		List:						
P 11	Does your Patient Portal allow patient Email/Communications ?								
P 12	Does your Patient Portal allow patients to request Rx renewals ?								
P 13	Does your Patient Portal include Patient Self-Management tools?								
P 14	Does your Patient Portal allow patients to schedule appointments ?								
P 15	Does your Patient Portal allow patients to request Referrals ?								
P 16	Does your Patient Portal provide any other functions?		List:						
P 17	Is there any additional functionality desired in the Patient Portal?		List:						
P 18	Can you generate a report of usage frequency for each of the above features?								
	If you DON'T have a Patient Portal:								
P 19	Are you interested in using a Patient Portal?								
P 20	If yes, do you want to use your EHR-specfic Patient Portal?								
P 21	If not interested in using a Patient Portal, can your patients access information electronically? (list how)		List:						

	Clinical Decision Support Assessment Questions								
Number	Question	Response	Comment	Identified Gaps	Potential Cause(s)	Option 1	Option 1 Risk	Option 2	Option 2 Risk
	CDS								
C 1	Are you using Clinical Decision Support (CDS) for patient care?								
C 2	If yes, is it a separate package or is it included in your EHR system?								
C 3	If NO, reason for not using CDS (not available in EHR, etc.) THEN GO TO NEXT PAGE								
C 4	Are you using CDS for Diabetes?								
C 5	If no, reason								
C 6	Are you using CDS for Diabetics with co-morbid CHF?		List:						
C 7	If no, reason		Details:						
C 8	Does the Clinical Decision support system follow known national standards or guidelines (eg. ADA, AACE, AHRQ, ASIM)								
C 9	If yes, which Clinical guidelines does it follow?		List:						
C 10	What do you like most about the Clinical Decision support system?		Details:						
C 11	What do you like least about the Clinical Decision support system?		Details:						
C 12	Do all the Physicians in your group use the Clinical Decision Support system?								
C 13	If no, how many DON'T use it? Why?	___ of____	Why:						
	FEATURES OF YOUR CLinical Decision Support								
	ORDER SETS								
C 14	Do you use EHR CDS Order Sets?		List:						
	If Yes,								
C 15	Do you use EHR Order Sets for Diabetes?								
C 16	Do you use EHR Order sets for Hypertension?								
	ALERTS								
C 17	Do you use "Alerts" in your Clinical Decision Support								
	If Yes,								
C 18	Do you use alerts for drug interactions?								
C 19	Do you use alerts for Diagnostics?								
C 20	Do you use alerts for Allergies?								
	REMINDERS								
C 21	Do you use "Reminders" in your Clinical Decision Support								
	If Yes,								
C 22	Do you use reminders for Appointments?								
C 23	Do you use reminders for Follow-Up appointments?								
C 24	Do you use reminders for Immunizations?								
C 25	Do you use reminders for Testing?								
C 26	Do you use reminders for Post-Discharge appointments?								
	OTHER FEATURES								
C 29	Do you use your Clinical Decision Support to Plan Patient Care								
C 30	Do you use your Clinical Decision Support to Track Quality of Care								
C 31	Do you use your Clinical Decision Support to Share Plans with Other Providers								
C 32	Do you use Patient Education Tools in your Clinical Decision Support								
	BARRIERS/SUPPORT								

	Medication Assessment						
Number	Question	Response	Comments	Identified Gaps	Potential Cause(s)	Option 1	Option 1 Risk
	e-Prescribing						
M 1	Do you currently use e-Prescribing?						
M 2	If yes, what percentage of prescriptions are sent electronically?						
M 3	If yes, is it part of your EHR or another package?		Details:				
M 4	If you are NOT using e-Prescribing, please indicate why		Details:				
M 5	Is technical assistance is needed?						
	Medication Lists						
M 6	Do you maintain medication lists for diabetic patients as structured data?						
M 7	If yes,is it from your EHR? How is it created?		Details:				
M 8	If no, why?		Details:				
M 9	Do you maintain allergies lists for diabetic patients ?						
M 10	If yes, are they generated from EHR? Or other. How created?		Details:				
M 11	If no, why		Details:				
M 12	Are you using age-specific criteria (Beer's , PIM) for patients age 65 and older**[1]** built into your EHR?						
M 13	If no, are you interested in participating in a Beacon pilot using age specific criteria?						
	Medication Reconciliation						
M 15	Are you conducting any type of medication reconciliation?		Details:				
M 16	Are you conducting Surescript pull for medication reconciliation?		Details:				
M 17	Are you checking against any allergy list for medication reconciliation?		Details:				
M 18	Are you conducting any internal reconciliation for medication reconciliation?		Details:				
M 19	Are you using any data (faxes / input, etc.) from specialists for medication reconciliation?		Details:				
M 20	Are you using any data from hospital ADT information for medication reconciliation?		Details:				
M 21	Are you interested in participating in a Beacon medication reconciliation pilot?		Details:				
M 22	What support do you receive from the CDS vendor for medication reconciliation?		Details:				
	[1] This is a list of medications that are generally considered inappropriate when given to elderly people. For a wide variety of individual reasons, the medications listed tend to cause side effects in the elderly due to the physiologic changes of aging.						

	Tele-monitoring Assessment Questions						
Number	Question	Response	Comment	Identified Gaps	Potential Cause(s)	Option 1	Option 1 Risk
T 1	Does your EHR support Tele-monitoring?						
T 2	Do you have a Tele-monitoring service?						
T 3	If yes, please describe (If no, skip to T9)						
T 4	Are you currently using Tele-monitoring for Glucose readings?						
T 5	Are you currently using Tele-monitoring for Weight?						
T 6	Are you currently using Tele-monitoring for BP?						
T 7	Are you currently using Tele-monitoring for any other purpose?		Describe:				
T8	Approximately how many patients do you have enrolled in Telemonitoring?						
T 9	If you do not use Tele-monitoring, would you be interested in using this?						
	Definition; use of mobile devices in collecting community and clinical health data, delivery of healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vital signs, and direct provision of care						

Appendix C: Implementations Objective Summary

Exhibit C-1. Implementation Objectives Summary and Action Steps

#	Objective	Actions
1	**Establish goals and confirm value proposition**	1. Align clinical transformation with internal organizational goals and external requirements. 2. Confirm the value proposition.
2	**Develop a culture of continuous quality improvement**	1. Understand the population of focus, and set clear goals. 2. Form an interdisciplinary improvement team. 3. Train staff in improvement methods and tools. 4. Use an improvement methodology to execute change ideas in a rapid cycle. 5. Dedicate time for the improvement effort. 6. Measure progress and transparently share results.
3	**Consider models and methods for facilitating clinical transformation**	1. Consider models for facilitating clinical practice transformation. 2. Consider methods for collaborative learning.
4	**Optimize the use of health IT to support clinical transformation**	1. Optimize EHR adoption (within the practice and through working with vendors). 2. Empanel patients, and optimize registry functions. 3. Assess and improve data integrity. 4. Implement workflow changes. 5. Provide report and query management. 6. Analyze data. 7. Promote transparency and feedback. 8. Use EHRs to communicate across the medical neighborhood.
5	**Support patient engagement through the use of health IT**	1. Focus on the IT literacy of patients. 2. Solicit community input. 3. Improve the IT literacy of health professionals. 4. Engage community health workers and educators. 5. Use technology for patient engagement.

Appendix D: Measuring Progress Through Transparency

The **Rhode Island Beacon Community** has established a comparative data methodology to engage Beacon Community practice providers and quality improvement teams in discussions around their clinical outcomes and performance. Through a collaboration consisting of three different PCMH programs, the Rhode Island Beacon Community established a set of common measures and consistent definitions, including three diabetes outcome measures and two process measures for depression screening and tobacco cessation intervention.

Displaying practice-level performance relative to that of others in the community provides a strong foundation for improvement. The Rhode Island Beacon Community's comparative performance reporting process involves the following components: (1) calculation of community-level and practice-level results; (2) ranking and display of performance levels for each clinical quality measure and a five-measure composite score using randomly blinded practice, site, and provider identities; (3) use of simple, color-coded performance charts, indicating placement relative to targets as below (red), near (yellow), or above (green); (4) recognition for making comparative improvements even if below target values; and (5) dissemination of comparative results to all parties in a convenient and efficient forum.

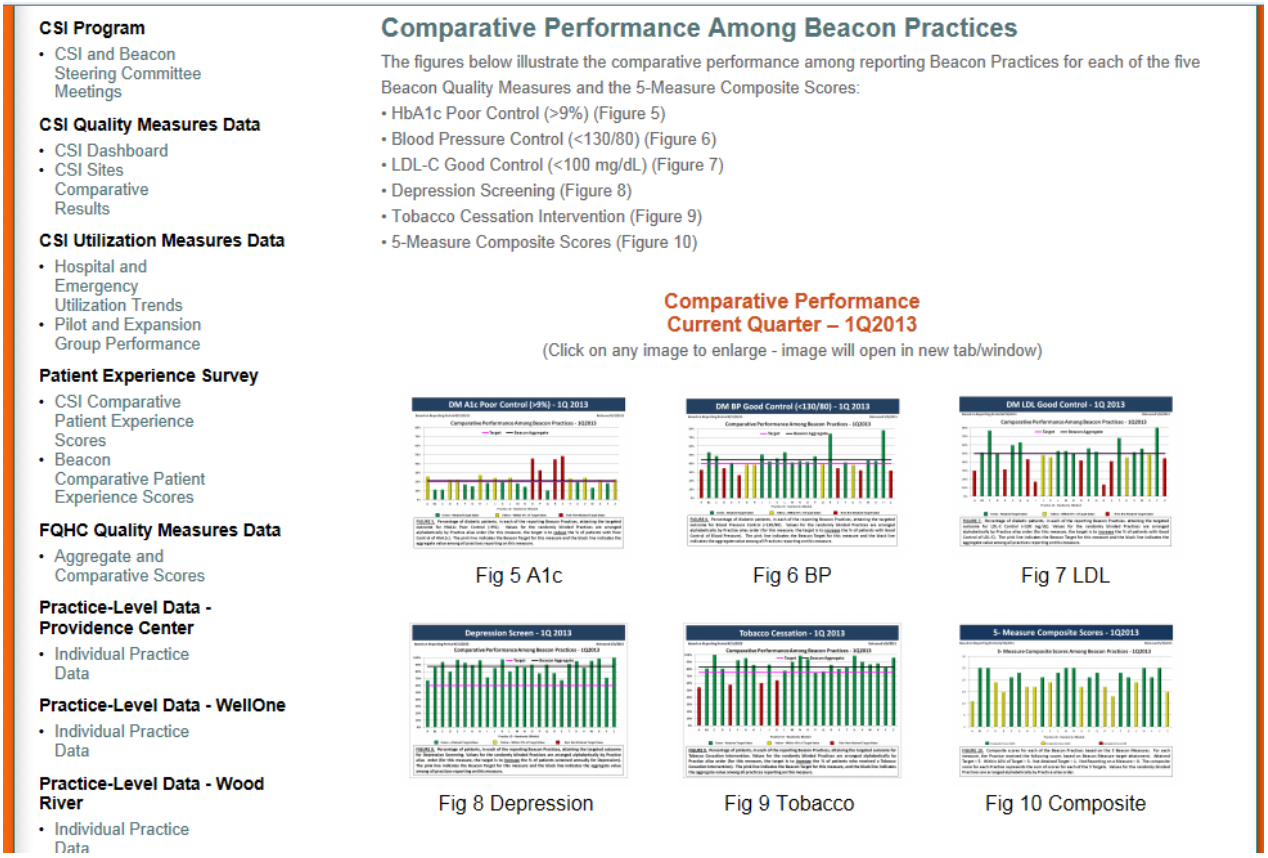
The Rhode Island Beacon Community has also made this work transparent. All Beacon Community practices can access this data through a collaborative portal, and each can receive posters summarizing community-wide data, individual practice data, and comparative data. Practices can display these posters for their care teams and in their patient waiting rooms. By promoting transparency in this way, they aim to more actively engage patients in the metrics associated with their conditions and the measurable outcomes of their treatment. Practice leaders also use this comparative data to foster dialog between providers and quality improvement directors. Making comparative data available has helped some providers to realize that they are not all performing as well as they thought relative to peers within and outside their practice. They now have evidence that there is room for improvement.

Data are made available to all Beacon Community practices through the Rhode Island Beacon Community portal, and each Beacon Community practice receives summary posters that contain a combination of Beacon Community data, individual practice data, and comparative data so that it can share results among its care teams and patients. Some practice leaders are regularly using this comparative data to drive discussions in their team meetings among providers and quality improvement directors. One practice with several sites around the state indicated that the comparative data has helped its providers to realize that they are not all performing as well as they thought—and certainly not relative to their peers within and outside their practices. They now appreciate that there is room for improvement based on their position in the performance rankings.

The Rhode Island Beacon Community practices also use the posters to display their results and community ranking to their coworkers throughout the practice, and some practices display them in their patient waiting rooms to share their performance with patients. By promoting

transparency, they hope to prompt patients to become more engaged in the metrics associated with their conditions and the measurable outcomes of their treatment.

Exhibit D-1: The Beacon Community Collaborative Portal Displaying Comparative Performance



CSI Program
- CSI and Beacon Steering Committee Meetings

CSI Quality Measures Data
- CSI Dashboard
- CSI Sites Comparative Results

CSI Utilization Measures Data
- Hospital and Emergency Utilization Trends
- Pilot and Expansion Group Performance

Patient Experience Survey
- CSI Comparative Patient Experience Scores
- Beacon Comparative Patient Experience Scores

FQHC Quality Measures Data
- Aggregate and Comparative Scores

Practice-Level Data - Providence Center
- Individual Practice Data

Practice-Level Data - WellOne
- Individual Practice Data

Practice-Level Data - Wood River
- Individual Practice Data

Comparative Performance Among Beacon Practices

The figures below illustrate the comparative performance among reporting Beacon Practices for each of the five Beacon Quality Measures and the 5-Measure Composite Scores:

- HbA1c Poor Control (>9%) (Figure 5)
- Blood Pressure Control (<130/80) (Figure 6)
- LDL-C Good Control (<100 mg/dL) (Figure 7)
- Depression Screening (Figure 8)
- Tobacco Cessation Intervention (Figure 9)
- 5-Measure Composite Scores (Figure 10)

Comparative Performance
Current Quarter – 1Q2013

(Click on any image to enlarge - image will open in new tab/window)

Fig 5 A1c

Fig 6 BP

Fig 7 LDL

Fig 8 Depression

Fig 9 Tobacco

Fig 10 Composite

Appendix E: Office Visit Workflow Example

Exhibit E-1. Sample Office Visit Workflow with Specific Steps for Clinical and Administrative Staff

Aim: To maintain a comprehensive and accurate registry of our patients with Diabetes in order to perform appropriate and timely care.

Diabetes Registry Measures:	Average A1c / % of patients have A1cs < 7%	% of patients with two A1cs in the last 12 months	% of patients with last BP < 130/80 / % of patients with last LDL < 100	% of patients are current smokers	% of patients have an annual foot exam / % of patients have an annual eye exam	% of patients with an annual self-management goal documented

	Actions					
Operations	Print off Diabetes registry and workflow the first Tuesday of every month.					
Front Desk	Review registry for last visit, blood pressure, eye exam, foot exam, lipids, and A1c.					
	Visit	**Blood Pressure**	**Eye Exam**	**Foot Exam**	**Lipids**	**A1c**
	If more than six months, make appointment. Otherwise, review Blood Pressure, Lipids and A1c for follow-up guidelines.	If blood pressure <130/80 use other risk factors to determine follow up needs. If BP Systolic is >130 or BP Dyastolic is >80 follow up at least every month.	Add patients without eye exam in the last 12 months to wait list for eye clinic. Contact patient when slot opens with date of clinic.	If no foot exam in the last 12 months, schedule an appoitment.	If LDL <100 use other risk factors to determine follow up needs. If LDL >100 but <130 follow up should be at least every three months. If LDL >130 follow up should be at least once a month.	If Hgb A1c > 9, follow up every month. If Hgb A1c >7 but <9 follow up should be at least every 3 months. If HgbA1c <7 follow up should be every three to six months
Case Manager	Review registry for risk stratification, tobacco, and self-management goal. **Note:** For patients who do not have information populated in the flowsheet, CM will open NextGen and determine if patient is actually a diabetes patient. Alert clinical team to patients on huddle report.					
	Tobacco	**Self-Management**	**Group Visits**			
	If current smoker, review for tobacco cessation counseling. Advise patient to quit at next contact.	Monitor patients on registry for annual goal. Responsible for connecting with patient to set goal when in for a visit.	Determine which patients/providers do groups. Coordinate DM group visits for pod by doing the following: • Determine provider availability • Denise's schedule availability • Coordinate with NTM on support staff availability • BHP schedule availability Call pts and schedule for DM GV as needed.			
Provider	Review the flowsheet every visit and enter any new data. Review registry for any patients for which there are concerns and patients who are MOGE. Provide information to CM.					
MA	Review the flowsheet every visit and enter any new data. Responsible for patients on registry who are in for visit today.					
Nurse	Reviews copy of registry given by CM to ensure all follow-up has been completed and is accurate.					

Source: Clinica Campesina

Appendix F: Wagner Care Model Design Attributes

The design attributes of the Wagner Care Model included the following:

Organization of the Health System. The Care Model recognized that effective care management can only be accomplished in an environment that supports efficient and effective care delivery. All aspects of the primary care practice's policies, contractual arrangement, and systems should reflect a culture of proactive care management at the panel (population) and patient level. This is reflected in policies, leadership, and overall payment practices that support planned and proactive care management at a population level and patient level. These issues need to be addressed in tandem with other change concepts in the care model.

Self-management and Whole-Person Orientation. Fundamental to Wagner's Care Model is the concept that patients ought to have a clear understanding of their conditions and how to manage them. Further, the model suggested that continuity of care was an important driver of quality and utilization. Through continuity with the care team, patients could develop productive relationships with their medical home, enabling them to become more self-activated in managing their own care. In fact, the model demonstrated that highly self-activated patients had better outcomes. As a result, the model relies heavily on self-management as a design attribute.

Reliance on Evidence-Based Medicine. Under Wagner's Care Model, evidence-based guidelines rather than the presiding physician's judgment drives medical decision making. It also suggests that decision support should not just be the purview of the physician but that these guidelines should be the basis for planning and organizing work more effectively and spread across a multidisciplinary care team. As a result, new workflows could be built in the clinical practice, allowing for improved flow and efficiency.

Population-Focused and Patient-Centric Care. The model introduced the concept of proactive planned care. This concept relied on the ability of the care team to have access to necessary clinical and utilization information to identify which patients had care opportunities because of lack of compliance with the evidence-based guidelines. This approach enabled data on the whole panel to be reviewed to ensure that the patient's visit was as patient-centric as possible. The model also revealed that a certain amount of population-level work could be done by adjunct members of the care team such as care managers or other support staff reaching out and contacting patients due for a follow-up wellness check or preventive screening.

Delivery System Design and Multidisciplinary Care Team. The Care Model suggested that high-performing primary care teams were expanded beyond the traditional model and evolved to include a multidisciplinary care team. A traditional model included a care team consisting of the physician and the physician's "support staff" as well as the physician assistant and a nurse—often with some of these support staff shared across physicians. The traditional model might have included a ratio of three support staff per provider. In the new model, that care team might be expanded to include a care manager, a dietician, a pharmacist, and a social worker or behaviorist.[25]

Connection to the Community. The final design attribute was the recognition that patients spend a small amount of time in the physician's office (less than 2 hours per year) and spend most of their time in the community in which they live. As a result, the model suggests a need for the health care system to engage the community supporting the panel of patients and to explore support systems that foster the ability of patients to self-manage when they leave the clinical practice. In fact, it is often the social determinants of health that drive behaviors and affect utilization that need to be addressed as part of any comprehensive care strategy.

Clinical Information Systems as a Driver. It was immediately recognized through the best-practice research that health IT was a disruptive innovation enabling population-level work. The precursor to EHRs was simple electronic registry systems that could be linked to the evidence base and enabled tracking of patients and their care needs. Registry functionality allowed organizations to link the evidence-based guidelines to tracking tools for populations of patients. An example of one of the earliest registry applications was the diabetes electronic management system that was built by the Washington State Diabetes Control Program (funded by the Centers for Disease Control and Prevention) during a practice transformation initiative following the Wagner Care Model and funded by the Health Resources Services Administration, called the *Health Disparities Collaboratives* (HDC).[26] This initial Microsoft Excel software program imbedded diabetes guidelines and offered a database that could be populated as patients visited the clinic. The system allowed population-level reports to be generated on overdue screenings (e.g., foot exams, LDL screens, eye exams, microalbumin). The system also enabled patient-level reminders to be checked at the time a patient arrived at the clinic. The registry also provided the opportunity to display report outcomes and process measures over time to see the performance of the system and how it was improving. The HDC served as the basis for many other clinical registries and for registry functionality to be built into EHRs.

Appendix G: Medical Home Consensus

American Academy of Family Physicians (AAFP); AAP; American College of Physicians (ACP); American Osteopathic Association (AOA)

Joint Principles of the Patient-Centered Medical Home (February 2007)

Introduction

The PCMH is an approach to providing comprehensive primary care for children, youth, and adults. It is a health care setting that facilitates partnerships between individual patients and their personal physicians and, when appropriate, their family.

Principles

The AAFP, AAP, ACP, and AOA, representing approximately 333,000 physicians, developed the following joint principles to describe the characteristics of the PCMH:

Personal Physician. Each patient has an ongoing relationship with a personal physician trained to provide first-contact and continuous comprehensive care.

Physician-Directed Medical Practice. The personal physician leads a team of individuals at the practice level who collectively take responsibility for the ongoing care of the patient.

Whole-Person Orientation. The personal physician is responsible for providing for all the patient's health care needs or taking responsibility for appropriately arranging care with other qualified professionals. This approach includes care for all stages of life, acute care, chronic care, preventive services, and end-of-life care.

Care is coordinated or integrated across all elements of the complex health care system (e.g., subspecialty care, hospitals, home health agencies, nursing homes) and the patient's community (e.g., family, public and private community-based services). Care is facilitated by registries, IT, HIE, and other means to ensure that patients get the indicated care when and where they need and want it in a culturally and linguistically appropriate manner.

Quality and safety are hallmarks of the medical home:

- Practices advocate for their patients to support the attainment of optimal, patient-centered outcomes that are defined by a care planning process driven by a compassionate, robust partnership among physicians, patients, and the patients' family.
- Evidence-based medicine and clinical decision support tools guide decision making.
- Physicians in the practice accept accountability for continuous quality improvement through voluntary engagement in performance measurement and improvement.
- Patients actively participate in decision making, and feedback is sought to ensure that patients' expectations are being met.
- IT is used appropriately to support optimal patient care, performance measurement, patient education, and enhanced communication.

- Practices go through a voluntary recognition process by an appropriate nongovernmental entity to demonstrate that they have the capabilities to provide patient-centered services consistent with the medical home model.
- Patients and families participate in quality improvement activities at the practice level.

Enhanced access to care is available through systems such as open scheduling, expanded hours, and new options for communication between patients, their personal physician, and practice staff.

Payment appropriately recognizes the added value provided to patients who have a PCMH. The payment structure should be based on the following framework:

- It should reflect the value of patient-centered care management work by physician and non-physician staff that falls outside of the face-to-face visit.
- It should pay for services associated with coordination of care both within a given practice and among consultants, ancillary providers, and community resources.
- It should support adoption and use of health IT for quality improvement.
- It should support provision of enhanced communication access such as secure email and telephone consultation.
- It should recognize the value of physician work associated with remote monitoring of clinical data using technology.
- It should allow for separate fee-for-service payments for face-to-face visits. (Payments for care management services that fall outside of the face-to-face visit, as described above, should not result in a reduction in the payments for face-to-face visits.)
- It should recognize case mix differences in the patient population being treated within the practice.
- It should allow physicians to share in savings from reduced hospitalizations associated with physician-guided care management in the office setting.
- It should allow for additional payments for achieving measurable and continuous quality improvements.

Background of the Medical Home Concept

The AAP introduced the medical home concept in 1967, initially referring to a central location for archiving a child's medical record. In its 2002 policy statement, the AAP expanded the medical home concept to include these operational characteristics: accessible, continuous, comprehensive, family-centered, coordinated, compassionate, and culturally effective care.

The AAFP and the ACP have since developed their own models for improving patient care called the *medical home* (AAFP, 2004) or *advanced medical home* (ACP, 2006).

For More Information

American Academy of Family Physicians:

http://www.futurefamilymed.org

American Academy of Pediatrics:

http://aappolicy.aappublications.org/policy_statement/index.dtl#M

American College of Physicians:

http://www.acponline.org/advocacy/?hp

American Osteopathic Association:

http://www.osteopathic.org

Appendix H: Assessing Staff Computer Skills Before EHR Implementation

1. Title of Leading Practice

Assess staff computer skills before EHR implementation; provide training as needed.

2. REC Focus Areas

Assessment

3. Key Words: Topic

Readiness Assessment, Training, Computer Skills

4. Key Words: Clinical Setting

Clinical Practice Context (Any)

5. Key Words: Target Audience

Clinical Practice Stakeholders

6. Problem Being Addressed

Medical practices that do not assess their staff members' computer knowledge prior to EHR implementation will not know whether the staff have the computer skills necessary for successful use of an EHR system

7. Summary Description

Before implementing an EHR system, a medical practice can assess staff computer knowledge and provide computer training, as needed.

8. Implementation

To successfully implement and sustain an EHR system, a medical practice needs office staff with basic computer knowledge. Therefore, an essential part of the assessment phase of EHR implementation is assessment of staff computer knowledge. Before EHR implementation, staff members' computer skills can be assessed by administering the Computer Knowledge Evaluation Tool (available at http://hitrccollaborative.org/confluence/download/attachments/8618481/Computer+Knowledge+Evaluation+To ol.doc?version=1&modificationDate=1280494499000). This tool includes questions about basic computer skills such as using email, printing basics, Internet use, word processing functions, and basic computer operations. A favorite assessment used with nurses, according to Carolyn Hartley, is the P.A.T.C.H. (available at http://www.nursing-informatics.com/niassess/Personal_Plan_2007.pdf). If staff lack basic skills, the medical practice can provide computer training before EHR implementation. Often overlooked, Carolyn Hartley notes, is training on tablet and hand-held devices that contain protected health information, third-party software such as voice recognition or handwriting-recognition software, and encryption software.

9. Things To Consider

N/A

10. Settings with Implementation Experience

N/A

11. Challenges and Successes

N/A

12. Author

Liz Freedman, Westat

13. Source

This leading practice and the references and supporting documentation were discussed on August 2, 2010, at the Nashville, Tennessee, REC meeting presentation on assessment tools given by Denise Scott, M.M., B.A., RN-BC; email dscott@masspro.org; phone 781-419-2896; from Masspro (www.masspro.org). Additional content provided by Carolyn P. Hartley, MLA, President, CEO, Physicians EHR, Inc., email carolyn@physiciansehr.com; Westat contractor.

14. References and Supporting Documentation

See slide 34: http://hitrccollaborative.org/confluence/download/attachments/8618481/EHR+Readiness+assessment.xls? version=1&modificationDate=1280494500000. Computer Knowledge Evaluation Tool available at http://hitrccollaborative.org/confluence/download/attachments/8618481/Computer+Knowledge+Evaluation+To ol.doc?version=1&modificationDate=1280494499000.

Appendix I: Resources with Information About the Patient-Centered Medical Home

From the American Academy of Pediatrics: PCMH Joint Principles

From the National Committee for Quality Assurance: NCQA Standards

A Microsystem Self-Assessment, Diagnosis and Treatment Plan: Clinical Microsystems

An implementation guide for empanelment from the Safety Net Medical Home Initiative: Empanelment - Implementation Guide

Appendix J: Resources for Practice Work Flow

Health Information Technology Toolkit for Physician Offices: DOQ-IT Toolkit

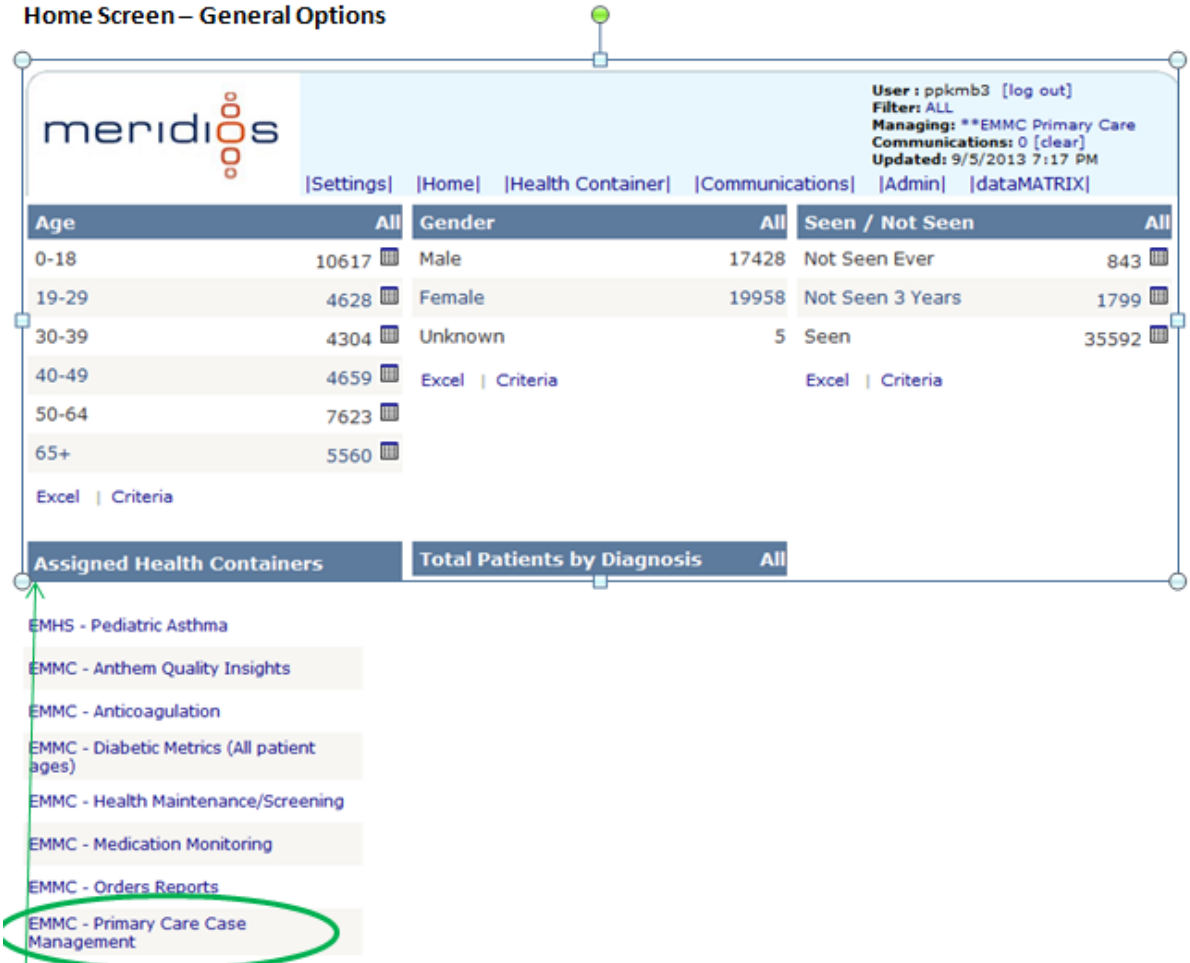
Slide presentation titled “Using Information More Effectively to Improve Care Delivery and Outcomes”: CDS/QI Overview Presentation

Appendix K: LDL Challenge Charter

Beacon Community Program LDL Challenge Charter: LDL Challenge Charter

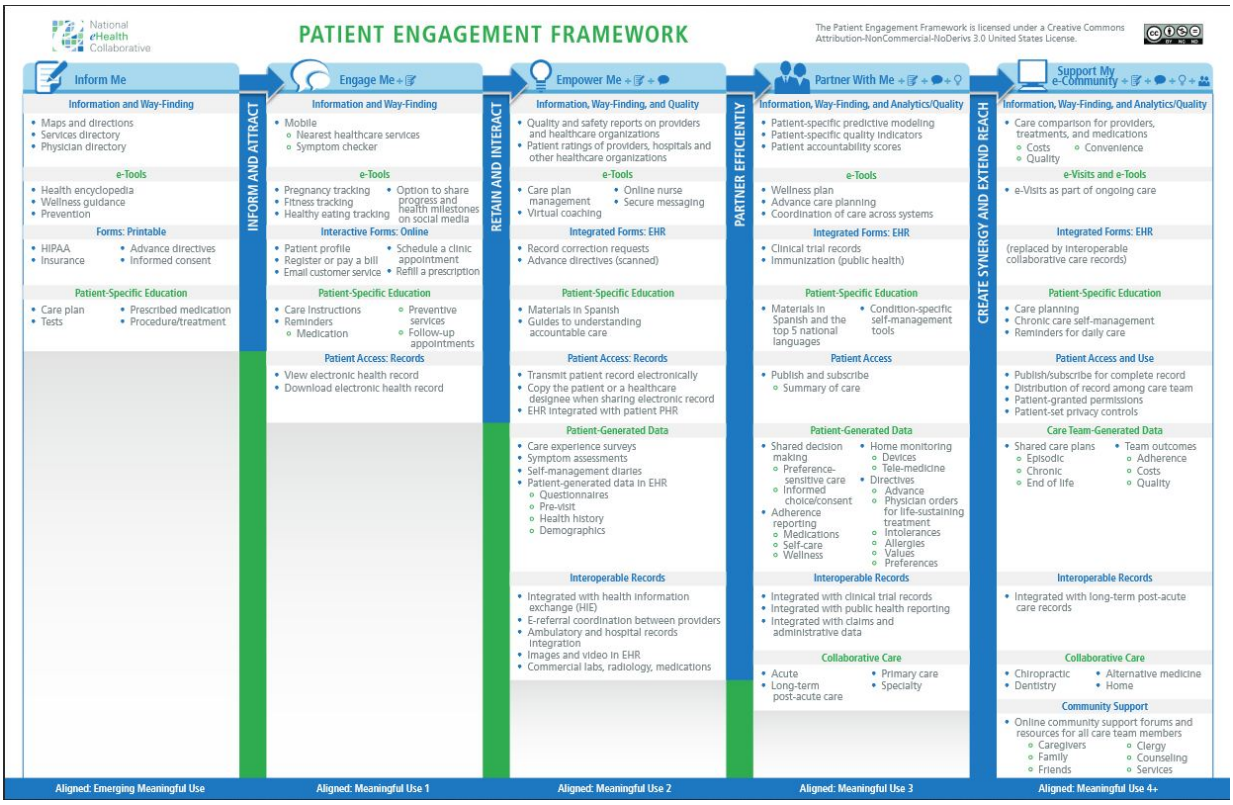
Appendix L: Bangor Beacon Community Registry Example

Home Screen – General Options



These are specific to depts. or specific pt groups. Drill into specific container of choice.

Appendix M: National eHealth Patient Engagement Framework



Appendix N: References

[1] Sia, C., Tonniges, T. F., Osterhus, E., & Taba, S. (2004). History of the medical home concept. *Pediatrics, 113*(supplement 4), 1473–1478.

[2] American Academy of Family Physicians, American Academy of Pediatrics, American College of Physicians, & American Osteopathic Association (2007). *Joint principles of the patient-centered medical home*. Philadelphia, PA: ACP; 2007 Mar [cited 2009 Nov 20]. Retrieved on September 26, 2013, from http://www.acponline.org/running_practice/pcmh/demonstrations/jointprinc_05_17.pdf

[3] Bodenheimer, T., Wagner, E., & Grumbach, K. (2002). Improving primary care for patients with chronic illness: The chronic care model. *JAMA, 288*(15), 1775–1779.

[4] Bodenheimer, T., Wagner, E., & Grumbach, K. (2002). Improving primary care for patients with chronic illness: The chronic care model. *JAMA, 288,* 1775–1779.

[5] Wagner, E. H., Sandhu, N., Newton, K. M., McCulloch, D. K., Ramsey, S. D., & Grothaus, L. C. (2001). Effect of improved glycemic control on health care costs and utilization. *JAMA, 285*(2), 182–189.

[6] Bodenheimer, T., Wagner, E. H., & Grumbach, K. (2002). Improving primary care for patients with chronic illness. *JAMA, 288*(15), 1909–1914.

[7] NCQA's Patient-Centered Medical Home. (2011). *Appendix 2: NCQA's patient-centered medical home (PCMH) 2011 and CMS stage 1 Meaningful Use requirements.* Retrieved on September 26, 2013, from http://www.ncqa.org/Portals/0/Public%20Policy/NCQA_PCMH_2011_Meaningful_Use_Crosswalk_11.21.2011.pdf

[8] Beacon Nation Learning Guide. (2013). Strengthening care management with health information technology. Retrieved on September 26, 2013, from http://www.healthit.gov/policy-researchers-implementers/beacon-community-program/learning-guides

[9] The Henry J. Kaiser Family Foundation. (2012). Medicaid and the uninsured: Medicaid health homes for beneficiaries with chronic conditions. Retrieved on September 26, 2013, from http://kaiserfamilyfoundation.files.wordpress.com/2013/01/8340.pdf

[10] Kennebeck, S. S., Timm, N., Farrell, M. K., & Spooner, S. A. (2012). Impact of electronic health record implementation on patient flow metrics in a pediatric emergency department. *Journal of the American Medical Informatics Association, 19*(3), 443–447.

[11] Bates, D. W., & Gawande, A. A. (2003). Improving safety with information technology. *New England Journal of Medicine, 348*(25), 2526–2534.

[12] Schuetz, B., Mann, E., &, Everett, W. (2010). Educating health professionals collaboratively for team-based primary care. *Health Affairs, 29*(8), 1476–1480.

[13] Reid, R. J., Coleman, K., Johnson, E. A., Fishman, P. A., Hsu, C., Soman, M. P. . . . Larson, E. B. (2010). The group health medical home at year two: Cost savings, higher patient satisfaction, and less burnout for providers. *Health Affairs, 29*(5), 835–843.

[14] Frieden, T. R., & Berwick, D. M. (2011). The "Million Hearts" initiative—preventing heart attacks and strokes. *New England Journal of Medicine, 365*(13), e27.

[15] Leila, A., & Ericson, K. M. (2012, July).LDL team presentation on behavioral economics for scripting messages, Boston University, Boston, Massachusetts.

[16] *The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement.* IHI Innovation Series white paper. Boston: Institute for Healthcare Improvement, 2003. Retrieved on September 26, 2013, from http://www.IHI.org

[17] Harvard School of Public Health, Mathematica Policy Research, * Robert Wood Johnson Foundation. (2013). *Health information technology in the United States: Better information systems for better care, 2013.* Retrieved on September 26, 2013, from http://www.rwjf.org/content/dam/farm/reports/reports/2013/rwjf406758

[18] Beacon Nation Learning Guide. (2013). *Capturing high quality electronic health records data to support performance improvement.* Implementation Objective 3, p. 24. Retrieved on September 26, 2013, from http://www.healthit.gov/policy-researchers-implementers/beacon-community-program/learning-guides.

[19] Beacon Nation Learning Guide. (2013). *Capturing high quality electronic health records data to support performance improvement.* Implementation Objective 2.1, p. 16. Retrieved on September 26, 2013, from http://www.healthit.gov/policy-researchers-implementers/beacon-community-program/learning-guides.

[20] Beacon Nation Learning Guide. (2013). *Capturing high quality electronic health records data to support performance improvement.* Implementation Objective 2, p. 16. Retrieved on September 26, 2013, from http://www.healthit.gov/policy-researchers-implementers/beacon-community-program/learning-guides.

[21] Beacon Nation Learning Guide. (2013). *Strengthening care management with health information technology*. Retrieved on September 26, 2013, from http://www.healthit.gov/policy-researchers-implementers/beacon-community-program/learning-guides.

[22] Bodenheimer, T., Lorig, K., Holman, H., & Grumbach, K. (2002). Patient self-management of chronic disease in primary care. *JAMA, 288*(19), 2469–2475.

[23] Bangor Beacon Community Patient Voices website. Retrieved on September 26, 2013, from http://www.bangorbeaconcommunity.org/patient-voices.aspx

[24] Interview with Dr. Sarah Chouinard; Medical Director of Community Care of Clay County West Virginia. Clay County was a pilot for a patient health record application in West Virginia.

[25] Keegan, D. W. (2011). *Innovative staffing for the medical practice: Create the "right" care team for your medical practice.* Englewood, CO: MGMA-ACMPE. Retrieved from http://www.mgma.com/store/Books/Innovative-Staffing-for-the-Medical-Practice/?kc=BLOG11WE00

[26] Hupke, C., Camp, A. W., Chaufournier, R., Langley, G. J., & Little, K. (2004). Transforming diabetes health care, part 1: Changing practice. *Diabetes Spectrum, 17*(2), 102–106.