EVALUATION OF THE BEACON COMMUNITY COOPERATIVE AGREEMENT PROGRAM

Clinical Transformation in the Beacon Communities

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PRESENTED BY:

NORC at the
University of Chicago
4350 East-West Highway
Suite 800
Bethesda, MD 20814

NORC at the UNIVERSITY of CHICAGO

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Executive Summary

The Office of the National Coordinator for Health Information Technology (ONC) established the Beacon Community Cooperative Agreement Program in 2010, providing 17 diverse awardees throughout the country with funding of $250 million in total over three years—to build and strengthen their health information technology (health IT) infrastructure to support clinical transformation efforts. Awardees (called Beacon Communities or Communities) were typically collaborations led by academic institutions, 501 (c) 3 organizations, integrated delivery networks, or health information organizations.

In 2011, ONC contracted with NORC at the University of Chicago (NORC) to conduct an independent multi-component evaluation of the Beacon Community Program. This report documents the Communities' application of health IT and performance measurement infrastructure to achieve clinical transformation.

The findings presented here are based on baseline interviews with key members of all 17 Beacon Communities, site visits with seven Communities selected to represent diverse program features, follow-up interviews with program staff from the 10 Communities NORC did not visit, and review of each Community's final report to ONC.

Communities' Approaches to Clinical Transformation

Beacon Communities used health IT in routine clinical practice to improve the robustness of information for clinicians and consumers to use in delivering and managing care. All Beacon Communities implemented strategies to enhance IT-enabled care management. Examples include processes to support care managers stationed in hospitals, ambulatory settings and remote locations; patient engagement, education, and outreach; patient-centered medical home (PCMH) models; telehealth services; and medication therapy management. Most Communities (15 out of 17) used IT-enabled tools to provide clinical information at the point of service. Examples include targeted clinical decision support tools, care performance metrics at the physician level, and access to population-level health statistics and associated analyses. The majority of Communities (11 out of 17) adopted interventions that used health IT to improve care transitions. Examples include automated admission, discharge, and transfer (ADT) alerts; discharge planning and patient education; and enhanced primary care provider/specialist communication to improve the specialist referral process.

Communities used health IT as a central element in redesigning and streamlining clinical processes. Nine Communities provided technical assistance to help physicians conduct quality improvement (QI) reviews. Examples include helping providers use data to compare or benchmark performance at the clinician, practice, or community level—comparing their practices to others and gaining insight into what drives high-quality care. Many Beacon Communities developed community-wide learning approaches that engaged participating practices around a common QI curriculum, including learning collaboratives. Communities also enlisted professional and organizational leaders in their Beacon programs to engage providers' support of and trust in the collective Beacon work.

Communities leveraged existing resources and relationships to accelerate clinical transformation though strategic health IT investments. Beacon Communities already organized around health IT or QI before the Beacon award were ahead in the knowledge base needed to implement the health IT–enabled reforms that brought key leaders into the Beacon transformation vision. Beacon Communities that could build upon providers already familiar with health IT enabled more rapid reform of clinical practice. Particularly important were: (1) building on existing electronic health record (EHR) systems and providers' ability to use of those systems and (2) having IT departments with the capacity to make rapid changes to EHRs.

Communities' Challenges and their Associated Mitigation Strategies

One challenge Beacon Communities encountered was engaging providers. Provider reluctance to participate in Beacon interventions was due to varying baseline capacity to undertake reforms, cultural resistance, competing priorities and resources, and difficulty standardizing QI reporting measures. To overcome these challenges, Communities developed assessments to determine baseline IT and workforce capacity for each provider, practice, or hospital to engage in practice redesign; and they tailored their clinical transformation approach and pace to accommodate each provider's situation. Communities also worked to align their goals with those of other local initiatives, provide technical assistance and resources, and demonstrate the value of clinical transformation. In addition, Communities engaged EHR and other software developers to standardize metrics and educate end-users on the importance of accurate and comparable data collection.

Legal and policy barriers to sharing health data hindered Beacon Community efforts to establish necessary Data Use Agreements (DUAs). Communities cited the need for: (1) policy clarification to enable more seamless sharing of information while retaining patient privacy protections and (2) technological advances to enable removal of sensitive data from patients' general records. To work through the issues obstructing their ability to establish DUAs, Communities engaged legal representatives and key decision makers.

IT-related issues around standards for data exchange, technological capabilities, and inadequate provider and staff training in health IT and EHR use slowed clinical practice reform efforts. Communities' leadership cited the need for conversations with national representatives to address the lack of widespread adoption of data exchange standards among EHR and health information exchange (HIE) developers. Communities collaborated with EHR and HIE developers to promote adequate training of and resources for staff in using health IT system software.

Sustaining and Supporting Clinical Transformation in the Post-Beacon Environment

Beacon-funded clinical transformation efforts provided a platform on which to build and sustain long-term clinical transformation efforts through the Affordable Care Act's new delivery system opportunities. Beacon-funded community-wide information services—such as inpatient and emergency department alert services offered by many HIE organizations—are helping institutionalize interventions stimulated by the establishment of accountable care organizations in January 2012. Beacon Communities' clinical transformation activities are serving national demonstration programs, including the Comprehensive Primary Care Initiative and the Community-Based Care Transitions Program. Some Beacon Communities have reconstituted themselves as autonomous community-based organizations to attain financial sustainability for key data infrastructure investments and clinical reforms that depend on electronic data.

Introduction and Background

In 2010, the Office of the National Coordinator for Health Information Technology (ONC) established the Beacon Community Cooperative Agreement Program as part of the Health Information Technology for Economic and Clinical Health (HITECH) Act, enacted under the American Recovery and Reinvestment Act of 2009 (ARRA). Under the program, ONC provided 17 diverse Communities throughout the country with a total of $250 million over three years, to build and strengthen their health information technology (health IT) infrastructure in support of clinical transformation efforts. Awardees (called Beacon Communities or Communities) were typically collaborations led by academic institutions, 501(c)3 organizations, integrated delivery networks, or health information organizations (HIOs).

The Beacon Community program's overall goal was to improve health care quality and outcomes while lowering the cost of care[1]—thus complementing a broader federal strategy of supporting innovative models of care coordination and chronic disease management, to improve both individual and population health outcomes while reducing health care costs.[2] The Communities' diversity in practice organization and local health care environments[3] provided excellent testing grounds for innovative models of care delivery relevant to a wide variety of health care settings and marketplaces.

The 17 Beacon Communities targeted their efforts to combat common diseases with high rates of illness, mortality, and cost—including diabetes, vascular disease, asthma, hypertension, congestive heart failure (CHF), and chronic obstructive pulmonary disease (COPD). They also sought to improve care transitions between inpatient and community settings and manage chronic conditions responsive to preventive and regular ambulatory care.[4] In doing so, the Communities incorporated a range of health IT tools—for example, electronic health records (EHRs), disease registries, and clinical decision support (CDS). They also implemented health information exchange (HIE) services in redesigning clinical practice, workflows, and communication to improve health care quality, patient outcomes, and system efficiency.

Evaluation of the Beacon Community Program

In 2011, ONC contracted with NORC at the University of Chicago (NORC) to conduct an independent, four-year evaluation of the Beacon Community Program, with the following aims:

- Identify elements distinctive to and common across Communities;[5]
- Examine different Community approaches to building and strengthening health IT and performance measurement infrastructures;[6]
- Document the Communities' application of health IT and performance measurement infrastructure to achieve clinical transformation; and
- Assess the impact of clinical practice redesign and care delivery reforms on cost and utilization through secondary data analysis.

This report focuses on the third aim—documenting the Communities' application of health IT and performance measurement infrastructure to achieve clinical transformation.

Defining Clinical Transformation

"Clinical transformation" is a term of art that came into widespread use after the 2001 publication of the Institute of Medicine's (IOM) *Crossing the Quality Chasm.* This influential report presented a vision for a transformed health care system, urging all health care stakeholders to address deficiencies in the safety, effectiveness, efficiency, and patient-centeredness of the U. S. health care system. The report concluded, "…if we want safer, higher quality care, we will need to have redesigned systems of care, including the use of information technology to support clinical and administrative processes (p. 4)."[7]

No single, authoritative definition of clinical transformation exists, although many thought leaders in health care, organizational management, and IT have contributed to a rich characterization of the concept.[8] In this report, we adopt the definition used by the Healthcare Information and Management Systems Society (HIMSS) in its 2011 Clinical Transformation Survey:

> *"Clinical transformation involves assessing and continually improving the way patient care is delivered at all levels in a care delivery organization. It occurs when an organization rejects existing practice patterns that deliver inefficient or less effective results and embraces a common goal of patient safety, clinical outcomes and quality care through process redesign and IT implementation. By effectively blending people, processes and technology, clinical transformation occurs across facilities, departments and clinical fields of expertise."*[9]

Data Sources and Methods

As shown in Exhibit 1, the NORC evaluation used four major data sources: baseline interviews, site visits, follow-up interviews, and review of each Community's final report.

Baseline Interviews. In March and April 2012, NORC conducted baseline interviews with key members of each Beacon Community, including the senior leader or program director, program manager, and evaluation lead.

Site visits. From November 2012 through March 2013, NORC visited seven Beacon Communities, selected specifically to represent diverse program features—including type(s) of clinical intervention; size, composition, and scope of the target patient and provider populations; degree of health IT infrastructure sophistication before the Beacon award; and participation in complementary programs or initiatives. During each visit, NORC conducted semi-structured discussions with a wide range of Community stakeholders—including Beacon program staff; providers, care managers, and care coordinators; and local Beacon evaluators, among other stakeholders.

Follow-up interviews. Between August and October 2013, NORC held a series of semi-structured, 60-minute telephone discussions with program staff from the 10 Communities we did not visit. We typically talked with the project director or project manager, evaluation director, and IT manager, along with other individuals offering insight into the Beacon Community implementation experience.

Final report review. NORC reviewed in detail the final reports each Community submitted to ONC, which documented Community goals and progress throughout the grant period.

Exhibit 1: Data Sources, by Community

Community	Data Sources			
	Baseline Interview1	Site Visit2	Follow-up Interview3	Review of Final Reports
Bangor (Maine)	•	•		•
Colorado	•	•		•
Crescent City (Greater New Orleans, Louisiana)	•	•		•
Delta BLUES (Mississippi Delta)	•		•	•
Greater Cincinnati (Ohio)	•		•	•
Hawai'i Island	•		•	•
Indiana	•		•	•
Inland Northwest (Washington)	•	•		•
Keystone (Pennsylvania)	•	•		•
Rhode Island	•		•	•
San Diego (California)	•		•	•
Southern Piedmont (North Carolina)	•	•		•
Southeast Michigan	•		•	•
Southeast Minnesota	•		•	•
Tulsa (Oklahoma)	•		•	•
Utah	•	•		•
Western New York	•		•	•

1. We conducted most baseline interviews in March 2012; we conducted Keystone and Indiana interviews in April 2012.
2. We conducted the site visits in November 2012 (Inland Northwest), December 2012 (Crescent City), February 2013 (Bangor, Colorado, Keystone), and March 2013 (Southern Piedmont, Utah).
3. We conducted follow-up interviews in August 2013 (Indiana, Greater Cincinnati, Hawai'i Island, Rhode Island, San Diego, Southeast Michigan), September 2013 (Delta BLUES, Southeast Minnesota, Tulsa), and October 2013 (Western New York).

NORC used data from the baseline interviews—as well as annual reports, secondary datasets, Communities' annual reports, clinical intervention spreadsheets prepared by the Beacon Community Program technical assistance contractor (Booz Allen Hamilton), and discussions with Beacon project officers at ONC—to develop profiles of each Community. These profiles highlighted partnership composition, interventions, targeted population(s), demographic and health profile, and health system features, among other characteristics.

In addition, NORC developed detailed summaries of the information gathered in each site visit—including interview transcripts, team observations, and other documents provided by the Communities—to facilitate within-Community analyses of context and stakeholders, intervention strategies, enabling factors, and challenges to progress.

NORC then coded the community profiles, site visit summaries, follow-up interview transcripts, and information from the final reports in NVivo 10.0 (QSR International), using a codebook developed to address the following research questions:

- What were the Beacon Communities' specific approaches and strategies for clinical transformation?

- What approaches and strategies did Communities use to secure provider engagement in clinical transformation? How did these affect providers' response?
- What factors contributed to greater ease of implementation of Beacon interventions?
- What challenges did Communities encounter in the course of implementation?
- What are the Communities' plans for and progress in sustaining services and practices?

The findings presented here reflect: (1) how Communities aligned their health IT infrastructure and performance monitoring and measurement to engage providers and facilitate clinical transformation, (2) common strategies enabling transformation, and (3) challenges encountered and associated mitigation strategies.

Communities' Approaches to Clinical Transformation

Beacon Communities implemented a wide range of interventions designed to expand the use of health IT in routine clinical practice and improve the availability and robustness of information used by clinicians and consumers in care delivery and management. Exhibit 2 summarizes the types of interventions the Communities adopted, organized under the following broader categories to emphasize the purpose of the specific intervention:

- Enabling care management;
- Enhancing availability of clinical information; and
- Improving transitions between care settings and providers, such as admissions to and discharges from hospitals and referrals between primary care providers and specialists.

In this section, we describe the extent to which Beacon Communities used various strategies, highlight themes around the key features of the interventions, and provide examples to illustrate both context-specific adaptations and commonalities in Communities' implementation experiences.

Exhibit 2: Interventions, by Beacon Community

Intervention Category	Intervention Activity	Bangor	Greater Cincinnati	Colorado	Crescent City	Delta BLUES	Hawaii	Indiana	Inland NW	Keystone	Rhode Island	SE Michigan	SE Minnesota	San Diego	Southern Piedmont	Tulsa	Utah	Western NY	TOTAL
Enabling Care Management																			
Care Managers	Hospital-based					X				X				X	X				**4**
	Clinic-based	X[1]	X		X				X	X		X			X		X		**7**
	Remote/ telephone							X	X	X		X							**4**
Patient Education, Engagement & Outreach			X	X		X	X			X		X	X	X			X	X	**10**
Patient-Centered Medical Homes			X	X			X		X	X	X				X				**7**
Telehealth		X						X					X	X	X	X		X	**7**
Medication Therapy Management (MTM)						X											X	X	**3**
Enhancing Availability of Clinical Information																			
Clinical Decision Support (CDS) at the Point of Care	EHR-based		X		X	X			X			X	X				X	X	**8**
	Archimedes IndiGO			X												X			**2**
Population Health Management	Registry-based management	X	X	X	X	X						X	X	X	X	X	X	X	**12**
	Clinical data repositories						X		X			X	X						**4**
Physician Data Reporting			X	X				X	X		X	X				X	X	X	**9**
Improving Transitions between Care Settings and Providers																			
Time-sensitive Communication	Automated admission/discharge/transfer (ADT) notifications		X		X			X			X			X	X		X	X	**8**
	Discharge planning/education		X				X				X		X		X				**5**
Referral Management, Primary Care Provider/ Specialist Communication											X					X	X	X	**4**
EMS	Transfer of information prior to arrival at hospital													X					**1**

[1] While the majority of care managers are based in primary care practices, two are associated with mental health facilities. One is in an inpatient mental health facility and the other is in a community-based outpatient mental health facility.

Strategies to Enhance Health IT-Enabled Care Management

All Beacon Communities implemented at least one strategy to enhance health IT-enabled care management; most used two or more. Care management is an approach "designed to assist patients and their support systems in managing their medical, social, mental health conditions more efficiently," including through case and disease management.[10] Care management enables better treatment of chronic conditions, helping to reduce health care costs and improve quality of care.[11] Health IT tools and services play an important role in care management, as they support communication and coordination among members of a care team and engagement with patients to improve health outcomes.

Eleven Beacon Communities used care managers to enhance care management. Care managers (also called care coordinators) are clinical or non-clinical staff designated by practices to monitor and coordinate patients' health care needs, utilization, and progress across settings. The use of health IT systems and tools—such as a common EHR or dedicated care management database—greatly enhanced the work of care manager, which includes medication reconciliation, scheduling and tracking patient visits in accordance with therapeutic regimen, and communicating with multiple providers treating a patient. Communities used health IT to help care managers embedded in inpatient, outpatient, and remote settings to perform care management functions, help patients navigate services and providers, connect patients with community resources, and assist with administrative and logistical tasks.[12] Whether Communities used homegrown care management software solutions or out of the box software, the intent was the same—to document services provided and referrals, and to track information across patient panels.

Using Care Managers

- The *Bangor Beacon Community* placed nurse care managers in individual primary care practices to work directly with high-risk and chronically ill patients, and used transitions managers and a behavioral health care manager centrally. Care managers worked directly with patients to develop individualized care plans, based on information captured in the EHR during intake.
- *Inland Northwest Beacon Community* care coordinators worked in individual practices, or at a central location, to help members of the care team improve adherence to evidence-based guidelines around preventive tests and treatments, through use of a dedicated care management EHR system.
- *Keystone* implemented care management through a three-tiered approach: (1) care managers stationed in ambulatory physician practices assisted patients with medication and care coordination, (2) those embedded in hospitals focused on tasks such as discharge planning and follow-up scheduling with primary care practices, and (3) a centralized call center provided telephonic case management for patients.
- *Southern Piedmont* invested in a tablet version of the Case Management Information System (CMIS), an electronic record of care management activities used statewide by care managers delivering Medicaid services in North Carolina. This new functionality for CMIS allowed care managers to record and access information (e.g., care plans, gaps in care notices) in the field and improve their general efficiency and quality of services.
- Since commercially produced EHRs generally did not include care management functionality, *Keystone* built assessments into Wisdom, a utilization management tool, to capture care management data in a common place.

Ten Communities promoted patient engagement and self-care with diverse interventions. Specific strategies included patient portals, data repositories, personal health records, in-home telemonitoring of blood sugar levels, and mobile device applications such as txt4health. Greater access to relevant information and feedback can enhance patients' participation in the management of chronic conditions and improve adoption of healthier behaviors (such as through diet and exercise). For example, patient portals, which are secure websites that allow patients to access their health information and communicate electronically with their providers, have the potential to improve quality and efficiency of care.[13]

Promoting Patient Engagement and Self-Care

- The *Keystone Beacon Community* established a patient portal, MyKeyCare, to allow patients to access information from facilities participating in KeyHIE, the regional HIE. MyKeyCare allows patients to electronically access health information from all participating providers in one place. Through MyKeyCare, patients can: (1) communicate with providers via secure messaging, (2) upload documents and medication forms, and (3) link to information on MedLine Plus (the National Institute of Health's website for patients and families to research information on diseases, conditions, and wellness issues). Providers used MyKeyCare to send members preventive health reminders concerning services such as flu shots.
- The *Crescent City*, *Southeast Michigan*, and *Greater Cincinnati* Beacon Communities piloted texting programs to disseminate diabetes information to at-risk patients.
- The *Southeast Michigan* txt4health intervention was effective in engaging participants in the intervention, as patients self-reported more willingness to engage in healthier lifestyles.
- The majority of the nearly 4000 residents enrolled in the *Greater Cincinnati* txt4health program who received educational and prevention-focused messages noted the program helped them make lifestyle and behavior changes related to their diet and physical activities.

Seven Communities supported practices in meeting patient-centered medical home (PCMH) requirements through use of EHRs, HIE services, and other health IT tools. A PCMH provides patients with a source of usual care responsible for coordinating all those involved in patients' care—including patients themselves, caregivers, providers, specialists, and community service providers.[14] The PCMH emphasizes safe, high quality, and comprehensive care that reflects patient preferences and priorities and is highly accessible. For the National Committee on Quality Assurance (NCQA) to certify a provider as a PCMH, providers must demonstrate robust information management and care coordination procedures.

Supporting Practices in Meeting PCMH Requirements

- The *Greater Cincinnati Beacon Community* assisted 18 primary care practices achieve PCMH transformation and guided them toward NCQA certification.
- *Crescent City* worked with an EHR developer to design specifications for new EHR standards that support PCMH model requirements. The resulting toolkit provided a comprehensive guide to achieving a patient-centered care delivery model supported by the EHR system—including how to run reports from the system, sample policies and procedures to govern access, and best practices for adjusting practice workflows to optimize EHR system use.
- *Hawai'i* collaborated with TransforMED—an organization that develops and deploys practice transformation curricula—on a structured approach to implement a PCMH model across the Beacon Community's providers through interactive and skill-based training strategies. The Community also helped providers adopt IT within their practices and provided technical support for their EHRs.

Seven Beacon Communities used telehealth to offer services and incorporate data from beyond the clinical encounter. Telehealth is the "use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration."[15] Telehealth services include: (1) telemedicine (technology that allows clinicians to deliver "face-to-face" clinical services from a remote location) and (2) home monitoring technology (in which devices in the home capture patient-generated data clinicians can then review). The ability to offer medical care or monitor patients' health remotely reduces barriers to provider contact and increases access to patient data.

Using Telehealth

- The *Rhode Island Beacon Community* integrated telehealth data directly into its statewide HIE platform, CurrentCare. Visiting nurse or home health agencies sent providers secure, real-time notifications and telehealth reports from remote monitoring devices via Direct (a secure messaging option for point-to-point exchange of data between providers).
- In *Bangor*, home care agencies used remote monitoring equipment to track patients' vital signs. In-home devices also provided a channel to deliver short health status surveys to help care managers gauge patient progress.
- The *San Diego Community* established an innovative remote patient monitoring intervention as part of a transitional care model to reduce readmissions among patients with COPD. The intervention used a cellular-enabled device that allowed nurses to monitor patient vital signs and other indicators daily.
- *Southern Piedmont* implemented virtual home visits for patients with poorly controlled diabetes, using in-home videoconferencing; the Community also tested the efficacy of using iPads for remote care management.
- *The Western NY Community* partnered with home health care agencies to set up telemonitoring to deliver preventive care to patients in the home; physicians could then view the data through the HIE system or via paper reports, as desired.

Three Beacon Communities implemented medication therapy management (MTM) programs to improve the adherence to and effectiveness of patient medication regimens. Inadequate management of medications contributes to increased health expenditures and hospital readmissions.[16] Electronic transmission of medication orders and histories improves the ability of pharmacists and primary care providers to manage medications and advise patients about their use.

Implementing Medication Therapy Management

- The *Utah Beacon Community* incorporated clinical pharmacists already working in University of Utah clinics into the care management strategy for diabetic patients. These pharmacists focused on helping patients with uncontrolled diabetes manage their medications, and communicated closely with providers and care managers as part of a holistic strategy to improve patient care.
- The *Delta BLUES Community* implemented a health IT–enabled MTM intervention, contracting with the University of Mississippi's School of Pharmacy to provide MTM services to practices.
- The *Western New York Community* developed a medication history capability through HEALTHeLINK, a regional HIE organization. This capability sent discharge medication lists from hospitals, as well as medications ordered from long-term care and rehabilitation centers, to primary care physicians. The Community also deployed certified MTM pharmacists to perform a comprehensive medication review for high-risk diabetic patients and make appropriate treatment recommendations to physicians as they are notified following a patient's discharge.

Use of IT-Enabled Tools to Provide Clinical Information at the Point of Service

Most Communities (15 out of 17) used IT-enabled tools to provide clinical information at the point of service. Beacon Communities' clinical transformation efforts included providing additional data and support to clinicians to guide clinician behavior, thus improving delivery of care. These interventions included targeted CDS tools, care performance metrics at the physician level, and access to population-level health statistics and associated analyses.

Ten Beacon Communities integrated CDS tools into their IT platforms to offer providers data at the point of care. CDS tools assist clinicians in making decisions about patient care by making available, at the point of care, evidence-based guidelines and recommendations derived from patient information.[17] Linking health observations and knowledge enables CDS systems to redefine clinical care processes by influencing clinicians' choices to improve patient care.

Using CDS Tools to Provide Data at the Point of Care

- The *Greater Cincinnati*, *Crescent City*, *Delta BLUES*, *Inland Northwest*, *Southeast Michigan*, *Southeastern Minnesota*, *Utah*, and *Western New York* Beacon Communities all sought to install or facilitate clinicians' use of CDS tools within their EHRs.
- *Colorado* and *Tulsa* used the Archimedes Individualized Guidelines and Outcomes (IndiGO) tool with patient data from multiple settings aggregated in a community clinical data repository. The repository generates individualized patient guidelines to assist providers in making preventive care and treatment decisions.

Fourteen Beacon Communities established public health registries and/or clinical data repositories. Such registries/repositories enable clinicians to access patient data supplied from several sources and to monitor their own performance across their patient panels. Community efforts consisted of aggregating the data and providing tools to access and analyze these data within the aggregated form. Clinicians or others can use this information to develop patient intervention strategies or support care coordination and care management.

Using Public Health Registries and Clinical Data Repositories

- *Southern Piedmont* developed a diabetes registry to identify patients lacking specific care services and created performance reports relative to care standards for diabetes across practices and care networks. Additionally, the Community established the Pharmacy Home Project, a database that aggregates information on drug use and transmits it to network pharmacists, case managers, and primary care provides. The system provides a patient-level profile and medication history, as well as reports that identify patients who could benefit from additional medication management.
- *Crescent City* developed a local HIO that included disease registries. Through registries, Crescent City clinics are now able to identify and generate electronic lists of their patients with diabetes, patients who are overdue for tests, or patients not at their treatment goal for their condition—thus facilitating follow-up by clinic staff to arrange for additional services.

Use of Health IT to Improve Care Transitions

The majority of Communities (11 out of 17) adopted interventions that used health IT to improve care transitions. Transitions of care occur when a patient moves from one care setting to another—be it between hospital, ambulatory primary or specialty care, long-term care, home health, rehabilitation facility, or other care setting.[18] Currently, fragmented payment and reimbursement systems often result in lapses in both communication and care continuity across settings, leading to lower quality and higher costs of care. Health reform efforts focused on improving care coordination and reducing communication inefficiencies and costs have underscored the need for innovative uses of technology to enhance care delivery through improved transitions of care.[19]

Eight Beacon Communities developed automated admission, discharge, and transfer (ADT) alerts to improve post-discharge care. Providers can use ADT data to notify a designated primary care provider when an acute care setting has admitted or discharged a patient and prompt the provider to follow up with the patient.[20] As hospital health IT systems already routinely produce these data to track patient transitions in their own systems, Communities noted that this strategy is a rapid way to deliver impact for providers using existing infrastructure.

Using ADT Alerts to Improve Post-Discharge Care

- The *Crescent City Beacon Community* set up an emergency department (ED)/ inpatient notification system to alert primary care providers about patient visits to emergency departments or admissions to inpatient settings. The Community then worked with primary care practices to redesign workflows around these alerts; for instance, it designated an individual to triage notifications, who could then notify the appropriate primary care provider. The Community also worked with select EHR developers to expand on the basic alerts by having clinical discharge summaries delivered directly into providers' EHRs.
- The *Southern Piedmont Community* receives real-time ADT data from its hospital systems through connections with local HIE organizations. When a provider detects an ADT event indicating a hospital discharge, that provider sends a query back to the source HIE system to obtain a continuity of care document (CCD) for the patient. The Community's care management system can display clinical data in the CCD through a CCD viewer. The viewer also displays a discharge summary to care managers when available, giving them timely access to important patient information.

Five Beacon Communities included enhanced discharge planning and patient education as part of their interventions to improve self-care and care transitions. Anticipating a patient's need for follow up services and self-management skills after an inpatient stay improves the likelihood that the patient's condition remains stable, can prevent an unnecessary readmission, and improves transitions of care.[21] Standardizing discharge processes and focusing on patient education increases patients' and their caregivers' understanding of needs post discharge, including understanding their primary diagnoses and how to take their medications and seek follow up care if needed.[22] Self-management support encourages patients to take control of their health to improve health outcomes. Tailoring education and support to align with patients' capacity for and preferences about involvement in their own care through education, training, or coaching can influence patient behavior and improve a patient's ability to self-care.[23]

Enhanced Discharge Planning and Patient Education

- In the *Hawai'i Island Beacon Community*, three participating acute care facilities used CarePASS, a standardized patient discharge summary tool, and provided self-management support, as well as enabling services (such as culturally sensitive patient education programs focusing on self-management of chronic illness, transportation, mental health, and other social service supports).
- *Southern Piedmont* established an inpatient diabetes management program, which targeted patients with poorly controlled diabetes. The program also offered patients diabetes education classes, provided copies of the "Taking Charge of Your Diabetes" booklet, and referred patients to a hospital-based dietician.
- The *Southeast Minnesota Community* developed a solution to engage parents of children with asthma, as well as providers across the continuum of care, in better managing this condition. Using Asthma Action Plans developed to control and monitor a patient's asthma condition (and endorsed by the National Heart, Lung and Blood Institute),[24] Southeast Minnesota developed an online portal in which patients, primary care physicians, and school nurses could access plans uniquely designed for each student to proactively manage attacks.

Four Beacon Communities used health IT to better coordinate management of the specialist referral process by enhancing the primary care provider/specialist communication. Referrals to and communications with specialists from primary care physicians often take the form of telephone calls or written letters, which can be slow or get misplaced. Electronic communications can improve the timeliness and reliability of these messages.

Coordinating Specialist Referrals Using Health IT

- Doc2Doc, the specialist referral and consultation application used by the *Tulsa Beacon Community*'s MyHealth is helping providers to complete the patient referral process—allowing the patient to receive care more quickly and providing the primary care physician with expert advice. The Community has developed bi-directional interfaces to embed Doc2Doc into the workflow of EHR users, resulting in increased electronic referrals.

Factors Enabling Beacon Communities' Efforts to Transform Clinical Practice

A variety of factors facilitated Beacon Communities' efforts to redesign clinical practice, including their ability to engage providers and to leverage existing resources and relationships (Exhibit 3). This section discusses the factors that enabled Communities to achieve their clinical transformation objectives.

Exhibit 3: Enablers Used by Beacon Communities to Transform Clinical Practice

Enabler	How Communities Used these Levers to Transform Clinical Practice
Engaging Providers	
Feedback to providers on meeting clinical performance metrics	▪ Ensured providers and practices have access to their performance data and benchmark their performance compared with their peers ▪ Encouraged providers and practices to understand what the top providers and practices are doing differently and better
Community-wide learning approaches to share best practices	▪ Enabled peer-to-peer learning and diffusion of best practices
Professional stature and credibility of Beacon Community leaders	▪ Facilitated provider buy-in and trust in the Beacon Community initiative
Leveraging Existing Resources and Relationships	
Pre-existing partnership or collaboration around health IT or quality improvement (QI)	▪ Allowed providers to take advantage of existing relationships and ways of working together ▪ Ensured key decision-makers were involved in developing shared goals ▪ Provided Beacon Communities with knowledgeable and experienced staff resources
Use of technology already familiar to providers	▪ Aided Beacon's clinical transformation efforts by having providers use familiar tools and technical infrastructure

Engaging Providers in Using Health IT to Redesign and Streamline Clinical Processes

Engaging providers in using health IT to redesign and streamline clinical processes was a central Community element for achieving clinical transformation. To engage providers fully in clinical transformation efforts, Beacon Communities provided feedback to providers on meeting established clinical performance metrics and involved top local providers in Community-wide learning approaches to share best practices.

Nine Communities provided physicians with reports on clinical measures for their patients for quality improvement (QI) reviews. Ensuring providers have access to the data they need to track their own performance is a critical component of any QI effort. Providers can use data to compare or benchmark performance at the clinician, practice, or community level—which, in turn, provides information about where their practices stand in relation to other practices and offers insight into what drives high-quality care. Providing quality metrics and comparative measures often drove Community providers to find out what other practices were doing differently and better. Communities supported the production of this information for QI in a variety of ways—including helping providers extract data from their EHRs, collecting and harmonizing data across disparate EHR systems, and using third-party aggregation platforms to collect data and provide reports.

Providing Providers with Performance Data

- *Rhode Island* provided reports to primary care practices, tracking their performance on key quality indicators. Providers had access to these quality reports through a web portal, and could view their own performance relative to that of their peers at a single point or over time. Additionally, the Community offered providers onsite consultative services to support workflow redesign activities for more accurate and consistent data collection across sites.

Beacon Communities also engaged participating practices around a common QI curriculum to share best practices. These peer-to-peer learning models often took the shape of learning collaboratives, where Communities formally sponsored the development of curricula and hosted both didactic and interactive sessions to help providers systematically approach clinical transformation efforts. Across Communities, provider feedback on the learning collaboratives was positive, with most participants finding them helpful and informative.

Engaging Participating Practices in QI

- The *Delta BLUES Beacon Community* launched a Learning Collaborative where they conducted learning sessions and used Plan, Do, Study, Act (PDSA)[25] cycles to drive improvements in provider data quality and patient outcomes. Providers reported that the collaborative led to improvements in their own approach to patient care.[26] Many said they moved away from a "treat the chief complaint" model to treating the whole person through a quality-driven standard of care.
- *Colorado* created a Community-wide learning collaborative to promote the spread of innovation and best practices. The collaborative offered expert speakers on selected topics; it also encouraged peer-to-peer learning by segmenting providers into communities of practice (e.g., users of the same EHR developer) to share experiences and discuss common goals and challenges.
- *Crescent City* worked with the New York City–based Primary Care Development Corporation (PCDC) to facilitate a learning collaborative to help 16 primary care practices adopt, integrate, and sustain QI skills, team-based care delivery, and use of CDS tools, among other approaches. The Community and PCDC developed a "blended" approach that mixed remote and large group trainings with regular one-on-one coaching activities.

Communities incorporated local figures with professional stature and local credibility into their management structure, which helped enable their clinical transformation efforts. These figures included clinicians known for their professionalism and concern to solve problems. They also included Beacon Community lead organizations—such as Regional Extension Centers (RECs), quality improvement organizations (QIOs), and HIE organizations, as well as other organizations that had already established working relationships with facilities and practices around health IT prior to the Beacon award. The reputations and dual roles of such organizations facilitated provider buy-in by engendering trust.

Incorporating Local Leaders and Entities

- Executives from the *Bangor Beacon Community's* three lead organizations had previously established collegial relationships. Providers viewed these leaders as having high integrity and operating transparency, with a genuine interest in delivering better care. Their reputations and records of accomplishment allowed them to institute organization-wide practice changes. These leaders were also committed to engaging and gaining buy-in from all groups of primary care providers.
- HealthInsight, *Utah's* lead organization, is the QIO and REC for the region. As such, it capitalized on its role and reputation as a neutral convener and credible resource to providers in the Salt Lake community to recruit practices and health systems to become Beacon participants. HealthInsight also served as a reliable source of technical support to participating providers.

Leveraging Existing Resources and Relationships

Communities leveraged existing resources and relationships to engage experienced leaders in accelerating clinical practice reform. Building upon existing relationships established through previous collaborative health IT or QI efforts, and using technology and infrastructure with which providers were already familiar, enabled Communities' clinical transformation efforts.

Communities in which health care leadership and staff were accustomed to sharing expertise and resources before Beacon were able to accelerate clinical transformation. Several Communities capitalized on formally established multi-stakeholder entities, tapping into preexisting governance structures to fill governance and executive leadership positions. Some governance structures formed around HIE organizations; others advanced broader agendas around health care reform and QI. Communities cited prior collaborations as useful vehicles for implementing their initiatives, by establishing a culture of QI and data sharing among providers that facilitated clinical transformation through strategic health IT investments.

Capitalizing on Leadership and Staff Experience

- *Tulsa's* lead organization, MyHealth, appointed to the Community's Board of Directors patients and clinicians who were active in MyHealth before the Beacon award. The group of more than 70 executives from organizations across the region that formed this Community also had a shared mission to address poor health outcomes. In addition, MyHealth coordinated governance for Tulsa's Comprehensive Primary Care initiative. Through relationships with such key individuals, MyHealth developed a Community Health Analytics platform for stakeholders and patients. This includes data from its HIE system as well as a multi-payer claims database and decision support tool results provided by the Archimedes product, IndiGO. A Community Analytics Committee guides how the data are organized, mapped and reported for analysis, ensuring providers observe data use policies and protect privacy and security.
- When the *Western New York Beacon Community* launched, HEALTHeLINK in Western New York had been a functioning HIE organization for three years. This Community drew its board of directors from HEALTHeLINK's governing board, which included senior executives of what would become its seven participating organizations, as well as representatives from public health, the local university, the rural community, physicians, and large employers.
- *Colorado's* lead organization Rocky Mountain Health Plans had already been sending QI coaches to work on-site with individual practices. By learning from and expanding upon existing work around QI and reforming delivery systems, Community providers were able to continually improve the way they provided care.

Communities that could build upon technology providers they were already familiar with enabled more rapid clinical practice reform. Participating providers' familiarity with, and use of, existing operational and technical infrastructure to support clinical and administrative processes proved an important enabler for clinical transformation efforts. Particularly important enablers of clinical practice changes were: (1) building on existing EHR systems and providers' ability to use of those systems, and (2) having an IT department with the capacity to make rapid changes to EHRs. Health IT platforms—including those that incorporate decision support tools in EHRs, digitize manual processes, or enable exchange of health information—allowed the Communities to transform their delivery of care.

In addition, the extent to which resources and support were concentrated—such as among hospital-owned physician practices—facilitated coordination of data, system integration, efficient creation of common tools, and shared training.

Building Upon Familiar Technology

- In *Bangor*, HealthInfoNet—the statewide HIE system—was well developed at the start of the Beacon program, and all participating providers were connected to HealthInfoNet. In addition, the state had worked extensively with federally qualified health centers and the Maine Primary Care Association to build a quality data warehouse.
- *Inland Northwest* adapted the care coordination, workflow training, and performance measurement system for quality reporting that its sponsoring partner, Inland Northwest Health Services, had already developed under its contract with the state for managing workers compensation-related services.

Challenges and Associated Mitigation Strategies

Communities used Beacon funding to invest in the "key drivers" of health care transformation—including quality measurement, payment initiatives, and health IT adoption. However, Communities often encountered challenges as they moved to implement complex clinical transformation initiatives that relied on providers' use of health IT tools and adoption of QI and care coordination processes across partner organizations. Challenges included weak provider engagement, legal and policy barriers, and limitations related to technology. Exhibit 4 lists the key challenges encountered by the Beacon Communities and their approaches to addressing them.

Exhibit 4: Challenges Encountered by Beacon Communities and Associated Mitigation Strategies

Challenges Encountered	Communities' Mitigation Strategies
Provider Challenges	
Variability in practices' baseline capacity to engage in clinical transformation	▪ Develop assessments to determine baseline capacity and readiness for each provider, practice, or hospital to engage in practice redesign ▪ Train staff to use assessments to tailor approach and pace of clinical transformation interventions to each practice they assist
Cultural resistance to clinical transformation efforts	▪ Adapt implementation of health IT and QI tools needed for clinical transformation to fit the workflow and culture of each participating entity ▪ Engage a champion, preferably a physician, to garner buy-in from other providers and staff in redesigning practice processes
Competing priorities and resources	▪ Align initiatives and efforts with clinical transformation goals ▪ Provide technical assistance and resources to assist with clinical transformation efforts ▪ Articulate and build the value proposition for clinical transformation
Difficulty standardizing quality measures across providers for QI reporting measures	▪ Engage EHR and other software developers to standardize calculation of quality metrics ▪ Educate end-users on the importance of correctly capturing data
Legal and Policy Barriers	
Inability to share data related to mental health, behavioral health, and substance abuse	▪ Clarify policies around mental health and substance abuse data ▪ Understand technological capabilities and limitations for managing consent and segmenting sensitive health data
Difficulty establishing necessary Data Use Agreements (DUAs) for data sharing	▪ Engage legal representatives and key decision makers from participating organizations in clinical transformation efforts early on
IT-Related Challenges	
Lack of use of data exchange standards by EHR and HIE developers	▪ Engage in conversations with national representatives and other policymakers regarding the need for data standardization across EHR and HIE developers
Limited capabilities of available technology to support clinical transformation efforts	▪ Be prepared and flexible enough to modify interventions as needed based on technology capabilities ▪ Develop assessments to gauge providers' technological capacity (and limitations) to support clinical transformation efforts
Inadequate training for use of health IT and EHRs	▪ Collaborate with EHR and HIE developers and educate providers to ensure adequate training of and resources for staff in using software

Obstacles to Provider Engagement in Clinical Practice Reform

Communities used a range of strategies to address obstacles to provider engagement in clinical practice reform. Common provider challenges included variation in practices' baseline health IT and workforce capacity to engage in clinical transformation, cultural resistance to clinical transformation efforts, competing priorities and resources, and difficulty standardizing quality measures across providers.

Communities addressed variability in practices' baseline health IT and workforce capacity with practice assessments and tailored approaches. Changing practice patterns to enable clinical transformation requires sufficient technological and staff capacity to redesign clinical practices, workflow, and communication. However, variation in baseline capabilities of participating practices challenged Communities' clinical transformation efforts. As a result, many recognized the need for tailored approaches for each provider, practice, or hospital. Communities also used standardized assessments to best assist each practice.

Addressing Variability in Baseline Health IT and Workforce Capacity

- The *Colorado Beacon Community*'s clinical transformation staff, called QI Analysts, initially encountered a high degree of variation in IT and workforce capacity among participating practices. The Community trained its QI Analysts to tailor their approach and pace to each practice they assisted.
- *Inland Northwest* developed an assessment tool to help gauge practices' readiness to undertake workflow redesigns and clinical reforms, and used the assessment results to determine the starting point for working with each practice site.

As Communities met cultural resistance to clinical transformation efforts, they adapted the pace to fit practice workflow and engaged physician champions to garner staff buy-in. In many Communities practices were typically entrenched in traditional job descriptions and roles, which made them hesitant to participate fully in a team-based model of care. In others, practitioners did not interact with one another on a regular basis. In yet others, some providers objected to public posting of individual performance metrics within a multi-practitioner setting. Some providers raised fewer specific objectives but resented the pace of change, which Communities reported as 'change fatigue.' In response, Communities recognized that the collaborative elements of clinical transformation models required practices to undergo a major cultural shift, and that the uptake and use of health IT and QI tools within practices would have to accommodate the capacity and culture of each participating entity. In addition, Communities often recruited physician champions among institutional leadership, to establish an environment receptive to change and garner buy-in from providers and staff for clinical reforms.

Engaging Physician Champions

- *Inland Northwest* noted that a physician champion within a clinic and financial incentives may be necessary to establish behavior change and shift the internal culture of local practices.
- *Keystone* found that, to get doctors on board with case management, it was helpful for physicians to hear about the benefits from fellow physicians.
- *Southern Piedmont* reported that a physician champion with strong and longstanding professional and personal ties to the area enabled the Community to align its goals with those of the local health systems.

Communities handled competing priorities by aligning Beacon goals with those of ongoing initiatives and providing technical assistance and resources to reduce resistance to change. Several Communities found that incentives and deadlines for ambulatory practices to meet meaningful use attestation standards disrupted practices' schedules for adopting Beacon interventions because of necessary upgrades to EHR systems through the EHR Incentive Programs. Payment and delivery system reform was another competing priority. Some Communities' participating practices felt pressure to meet PCMH requirements and align with accountable care organizations (ACOs), which diverted their attention and resources away from Beacon-related activities. Stakeholders noted the importance of showing how Beacon activities could align with other initiatives or provide potential solutions for practices' other priorities. One stakeholder proposed that local and regional initiatives should ideally map onto national initiatives, to optimize timing and minimize the burden on participating sites.

Providing Community physicians with technical assistance and resources for adopting IT tools allowed clinicians to reduce duplicative efforts to meet meaningful use requirements as part of the Medicare and Medicaid EHR Incentive Programs. Technical assistance provided to physicians included guidance on selection of a certified EHR, installation of certified EHR software, set-up of office computer networks and troubleshooting internet connectivity problems, and workflow redesign guidance. Communities frequently partnered with RECs to provide technical assistance and align with meaningful use efforts.

Providing Technical Assistance for Meaningful Use Attestation

- *Southern Piedmont* found that many participating providers were not ready to meet meaningful use standards. To accommodate the different levels of need, Beacon met providers wherever they were on the path to upgrading EHRs and meeting meaningful use requirements, helped practices adopt or upgrade an EHR, and assisted with implementation or training to support providers' consistent use of EHRs.

In engaging providers with competing priorities, Communities made a strong business case for the Beacon vision. In demonstrating that IT improved clinical processes and outcomes, they demonstrated the value proposition in such reforms.

Presenting a Business Case for Beacon

- *Rhode Island* initially found that providers in the state did not have the capacity to take on another initiative without a specific incentive to do so. Aligning interests and timing was important to engage providers. Because Rhode Island was also engaged in efforts to reduce hospital utilization rates, the ADT alerts intervention appealed to providers.
- *Keystone* care managers became valued by practices for more than just case management; they also served as resources for staff using other IT tools, such as the HIE system.

In correctly specifying performance metrics, Communities engaged EHR and other software developers to standardize metrics and educate end-users on data collection. Several Communities reported challenges in aligning quality measures across disparate health IT systems to support QI reporting. Different specifications for performance metrics limited the ability of providers, purchasers, and policymakers to rely on quality measures for comparison purposes.

Aligning Quality Measures

- *Inland Northwest* noted the importance of understanding and validating variations in how different systems identify which patients should be included in the numerator (number of patients or events achieving the quality target) and which in the denominator (total population for whom the intervention is designed). Inland Northwest recommended that EHR and other software developers do more to: (1) standardize how they calculate quality metrics and (2) educate EHR end-users on how to ensure the right data are captured in relevant measures.

Legal Requirements for Sharing Sensitive Health Data

Anticipating the legal requirements for sharing sensitive health data will be important to the success of future community-wide clinical redesign efforts. Beacon Communities encountered legal and policy barriers to enabling clinical transformation, including inability to share sensitive health data and difficulty establishing necessary Data Use Agreements (DUAs).

Communities that reported challenges sharing data cited the need for clarifying policies and technology that segment sensitive health data. Integration of behavioral health and primary care is a major objective for reducing care fragmentation and providing holistic care to patients. In seeking to exchange patient information related to substance abuse and mental health topics, however, providers must comply with rules under 42 CFR Part 2,[27] which protect the confidentiality of alcohol and drug abuse client records and restrict disclosure without patient consent. Communities reported that these rules, and the manner in which stakeholders interpret them, hindered Beacon's ability to seamlessly exchange patient data as part of broader care coordination activities. Communities noted that technological advancements are needed that would allow separation of protected data from patients' general records, as well as clarification to allow for more seamless sharing of information while retaining important patient privacy protections.

Exchanging Sensitive Health Data

- The *Bangor Beacon Community* encountered barriers to exchanging data on patients with substance abuse problems, because of federal regulations (42 CFR Part 2) prohibiting repeated disclosure of certain substance abuse treatment data without additional consent requirements. Because the Community included a program for substance abuse that treats many patients with dual diagnoses for mental health and substance abuse conditions, transmitting clinical information from this provider was restricted, hampering comprehensive care management and clinical oversight.

As Communities encountered challenges establishing necessary DUAs for data sharing, they engaged legal representatives and key decision makers to work through the issues. For many Communities, engaging providers in HIE was a critical component in enabling practice transformation. However, data sharing requires DUAs that outline the necessary permissions and requirements for exchange. Most Communities reported difficulty and delays in establishing DUAs with participating organizations and providers, which delayed timelines and postponed both the establishment of IT infrastructure and clinical transformation activities.

Establishing DUAs

- *Greater Cincinnati* reported that its forecasted timelines for establishing DUAs were insufficient, delaying implementation of clinical transformation activities. To accelerate gaining buy-in for data sharing, the Community developed a Health Transformation Data Workgroup comprising legal representatives and decision makers from hospitals to work on DUAs. The DUAs outlined how hospitals would share their readmission data and what participants could do with the data. The Community had to take time to educate hospital leaders on the need for, and obtain consensus on, the agreements.

IT-Related Challenges

Communities worked with software developers and trained staff to address IT-related challenges. Community-reported IT-related challenges primarily related to lack of data exchange standards, limited technological capabilities of EHR and HIE systems, and inadequate provider and staff training to use health IT, particularly EHRs.

Communities cited the need for conversations with national representatives to address the lack of data exchange standards. Lack of data exchange standards between EHRs, and between EHRs and HIE systems, prevented providers in many Communities from effectively sharing data and supplying the data needed to drive population management tools. Communities noted that national guides or review criteria would be helpful in disentangling the variety of EHR and HIE developers and the relative advantages of different products.

Lacking Data Exchange Standards

- *Southern Piedmont* noted the lack of well-defined data exchange standards challenged data sharing efforts.
- *Inland Northwest* reported that working with each developer to extract data for the HIE system and clinical data repository required extraordinary effort and feared the drive for community change initiatives was ahead of the capabilities of the developer community.
- *Greater Cincinnati* noted that both data extraction from ambulatory EHRs and the deep data integration needed for quality reporting and performance measurement were difficult to do with EHRs currently on the market—as lack of data standardization hindered care coordination, data sharing, and cross-system alerting. This Community also commented that data standardization would be most effectively addressed at the national level, and by the health IT industry.

Many Beacon Communities cited the importance of flexibility, to modify interventions based on the capabilities of the available technology. The health IT market has not always supported the uptake and effective use of its products by clinicians. A number of Communities reported that EHR developers over-promised and under-delivered or abandoned the market, leaving providers unsupported and ill-equipped. Although many small participating organizations purchased EHR systems that met the minimum certification standards, their systems failed to provide the functionality promised. Even some well-established products revealed serious deficiencies, forcing affected providers to discontinue their EHR adoption efforts or face significant modification and enhancement costs. Yet moving to a new developer and a new system often proved prohibitive in both financial and time costs.

As a result, some Communities changed the scope of their effort, while others refined their interventions to accommodate changing technological capacity. To determine the appropriate level of assistance for each practice, Communities found readiness assessment tools useful to gauge practices' capability and workforce capacity. Readiness assessments also informed design of the learning collaborative projects discussed above.

Implementing Readiness Assessments

- Critical to *Crescent City's* intervention was determining each practice's levels of PCMH, health IT, and care management capabilities and skills, as they related to the five focus areas for the Community's learning collaborative. Determining "readiness" early on in the process ensured the Community could design a comprehensive curriculum that addressed core concepts, activities, support levels, and technology capabilities.
- *Inland Northwest*—after reviewing available readiness assessment tools (including PCMH tools and tools for chronic disease management)—developed a new tool focused specifically on each practice's baseline capabilities in care coordination practices, QI capabilities, and health IT infrastructure. Clinics' administrative, clinical, and front-line nursing or medical assistant staffs were able to complete in-person assessments at each clinic and address improvement needs accordingly.

Communities had to educate providers on how to work with systems developers to understand health IT and EHR technology. Most Beacon Communities discovered they had underestimated the time and effort needed to train clinic staff to effectively use new software. Even when providers had already purchased all necessary software for Beacon tasks, they needed more instruction on how to use it than available through the implementation support and training provided by the typical developer.

Educating and Supporting Providers

- The *Colorado Beacon Community* found it beneficial to deploy QI Analysts as practice coaches to provide resources and training to help providers re-engineer their workflow processes. The Community also made a business analyst available to assist practices in evaluating their reporting capabilities and aligning reports and measures with national Beacon requirements. The QI Analysts and the business analyst visited each practice periodically, providing support and serving as a resource for sharing best practices and innovation regarding health IT reporting and workflow. Since providers varied substantially in IT and workforce capacity, the Community trained its QI Analysts to tailor their approach and pace of change to each practice they assisted.

Sustaining and Supporting Clinical Transformation in the Post-Beacon Environment

Early in their funding periods, Beacon Community leadership teams looked for organizational and financing strategies to sustain not only the health IT–related components of their interventions, but also the new approaches to care delivery and workflow central to their ultimate objectives. Fundamental shifts in the health policy environment and their ripple effects into local and regional health care markets over the course of the Beacon funding period (2010–2013) created uncertainties and challenges, but they also stimulated new opportunities to find sponsors for the Communities' collective vision. First and foremost among these shifts was passage and early implementation of the Affordable Care Act. The diffusion and heightened awareness of the Accountable Care Organization (ACO) model—as well as other service delivery and payment reform initiatives piloted by the Centers for Medicare & Medicaid Services (CMS), state Medicaid programs, and private payers—facilitated the Beacon Communities' transitions to governance, institutional, and financing structures more closely aligned with local stakeholders.

Leveraging Beacon to Support Accountable Care Organizations

Communities used infrastructure and interventions established through Beacon funds to support ACO efforts. Launch of the Medicare Shared Savings Program and establishment of ACOs in January 2012 presented Beacon Communities with new opportunities for institutionalizing and financing interventions around chronic disease management, care transitions, and quality reporting. In some Beacon Communities, new ACOs are using community-wide information services funded under Beacon, such as

inpatient and ED alert services offered by many HIE organizations. These opportunities to retain savings from greater efficiency and improved practices increased the interest among health systems and providers in the data and QI initiatives supported by the Beacon program.

Supporting ACOs

- The *Bangor Beacon Community's* lead grantee, Eastern Maine Healthcare Systems, used investments in care transformation as part of the Beacon program to support a new ACO organization, Beacon Health LLC. Beacon Health was one of 32 original participants in the Pioneer ACO program overseen by the Center for Medicare & Medicaid Innovation (CMMI).
- *Keystone*, led by Geisinger Health System, is drawing on the care transitions interventions conducted as part of the Beacon program to manage the care of patients attributed to Keystone ACO, which includes the Geisinger hospitals as well as other physician groups in central Pennsylvania.
- *Rhode Island*'s only ACO has become one of the largest customers of the CurrentCare Hospital Alerts and CurrentCare Viewer services developed with Beacon funding. ACO leadership has recognized this service as a unique offering for providing timely access to reliable data needed to manage attributed patients.
- The *Indiana Beacon Community* provided information from its clinical data repository as well as inpatient and ED alerts to several ACOs in the state. Both information services were integral to the ACOs' successful management of care transitions and chronically ill patients.

Leveraging Beacon to Support Other Initiatives

Communities' clinical transformation activities complement other CMS, state, and private payer initiatives, thus promoting sustainability of Beacon efforts. The Beacon Communities' clinical transformation activities are also serving national demonstration programs. These include CMMI's Comprehensive Primary Care Initiative (CPCI)—a multi-payer initiative operating in seven markets to foster collaboration between public and private health care payers to strengthen primary care projects. They also include the Community-Based Care Transitions Program (CCTP)—an initiative to test models for improving care transitions from the hospital to other settings and reducing readmissions for high-risk Medicare beneficiaries.

Transitioning to Other National Demonstration Programs

- The *Colorado Beacon Community's* lead agency, Rocky Mountain Health Plans (RMHP), extended its work by serving as a CMMI technical assistance contractor for 14 ambulatory practices participating in the CPCI, 10 of which had participated in the Community. Post-Beacon, RMHP has established a program sponsored by the RMHP Foundation that continues the Beacon's on-site practice transformation efforts with eight new ambulatory practices.
- *Tulsa* is supporting a local CPCI effort with analyses of gaps in care produced by its lead agency, MyHealth, and provided to participating practices.
- *San Diego's* care transitions initiative—which expanded a pilot in a single hospital to reduce readmissions among high-risk patients to three additional hospitals—served as the forerunner to a CCTP initiative begun in 2013 that established similar programs at 11 participating San Diego hospitals.

Sustaining Beacon Programs Under New Auspices

Communities tailored their organizational structures and financial strategies to sustain new processes of care established under Beacon auspices. To achieve financial and organizational sustainability for their health IT–related initiatives, some Beacon Communities became autonomous community-based organizations, while others continued their Beacon activities under the auspices of their original sponsors. In either case, Communities leveraged infrastructure and processes developed under the Beacon program to support other state and federal value-based payment initiatives—including State Innovation Models (Inland Northwest, Southeast Minnesota, Bangor), Comprehensive Primary Care Initiative Markets (Colorado, Cincinnati, Tulsa), Pioneer ACOs (Bangor, San Diego), and Medicare Shared Savings (Crescent City, Indiana, Keystone, Western New York). Exhibit 5 shows the organizational and financial strategies each Community adopted to sustain or build upon Beacon activities after the end of their three-year Beacon grants.

Exhibit 5: Beacon Community Organizational Strategies for Sustainability

Community	Organizational Structure Strategies for Sustainability			Description of Organizational Structure Post Beacon
	Beacon Organization Continued	Reconstituted Under New Auspices	Activities Devolved to Individual Beacon Partners	
Bangor (Maine)		•		Bangor Beacon Community handed over its activities to Beacon Health, LLC, an ACO).
Colorado		•		Providers who completed the Beacon clinical transformation course are now participating in other CMS initiatives and programs. The Community lead organization is sustaining and recruiting new providers to the Learning Collaborative established under Beacon.
Crescent City (Greater New Orleans)		•		The Beacon Community transitioned its operations and business development to the non-profit Partnership for Achieving Total Health (PATH), which will continue to work with the original Beacon sponsor, the Louisiana Public Health Institute.
Delta BLUES (Mississippi Delta)			•	Beacon interventions are being sustained in their current form or with modifications by a range of participating organizations.
Greater Cincinnati (Ohio)	•			The lead organization (HealthBridge) is participating in several new payment and data collaborations with CMS to sustain improvement, including the CPCI.
Hawai'i Island			•	Partner organizations have elected to sustain many of the Hawaii Beacon Community initiatives.
Indiana	•			The lead agency, IHIE, plans to continue several services.
Inland Northwest (Washington)			•	The lead organization, Inland Northwest Health Services, has made a commitment to maintain the Community's technology platform and online educational modules through 2014.
Keystone (Pennsylvania)			•	Participating physician organizations are sustaining components of the Keystone Beacon Community care transitions strategy.
Rhode Island	•			Rhode Island Quality Institute plans to sustain HIE-related and other core services until 2015, at which point participants will evaluate their options.
San Diego (California)		•		UCSD, the original Cooperative Agreement holder, has transferred activities to the new community non-profit entity, San Diego Health Connect.

Community	Organizational Structure Strategies for Sustainability			Description of Organizational Structure Post Beacon
	Beacon Organization Continued	Reconstituted Under New Auspices	Activities Devolved to Individual Beacon Partners	
Southern Piedmont (North Carolina)			●	Three major health systems participating in the Southern Piedmont Beacon Community will independently sustain many of the Beacon interventions.
Southeast Michigan			●	Participating organizations—including health systems, hospitals, federally qualified health centers, private practices, payers, and educational institutions—will sustain clinical transformation activities initiated by the Community.
Southeast Minnesota			●	Operational responsibility for Beacon initiatives has transferred from the original team to participating organizations and health systems. Rochester Epidemiology Project will absorb the data repository. Financial support from the health care system will maintain Beacon's Asthma Action Plan (AAP) and school nurse portal interventions.
Tulsa (Oklahoma)	●			Activities will remain in place post-Beacon through the technical, organizational, and financial infrastructure and tools for participating providers established under Beacon.
Utah			●	Beacon Community Partners (HealthInsight, University of Utah, Intermountain Healthcare) are building on their respective initiatives. Utah Beacon Community has transferred ePOLST to a nonprofit community organization.
Western New York	●			Three major insurers and four hospitals in the region will continue to fund HIE operations.

Common Best Practices Developed by Beacon Communities

The Beacon Community Program envisioned the three years of project funding, technical assistance, and collective learning for the 17 Communities as an investment in models of enhanced care delivery that: (1) would become organic features of local and regional health care ecology, and (2) could be adopted and adapted elsewhere. Each Beacon Community established its own distinctive activities and collaboration, followed its own path, and manifested its own legacy within its region. Despite the heterogeneity of Beacon interventions and clinical transformation strategies, the Communities developed an instructive set of common best practices for leveraging health IT to transform clinical practice.

Prior to Implementation

Conduct readiness assessments for clinical transformation

At the health system level, this means that cooperative leaders should:

- Develop and implement a plan that examines existing operational and technical infrastructure and capacity to support clinical and administrative processes. Assess the impact the initiative may have on practice workflow and the capability of current health IT systems.
- Identify experienced, professional, and trusted leaders for leadership positions within the initiative who have already established relationships with practices and other organizations.
- Assess existing legal frameworks for data sharing and engage legal representatives and key decision makers from participating organizations in clinical transformation efforts early on**.**
- Understand legal and technological capabilities and limitations for managing consent and segmenting sensitive health data, such as mental health and substance abuse information.
- Assess variation in the quality and performance metrics in use and in the tools used by practices and other organizations.

At the provider and health professional level, this means cooperative leaders should:

- Obtain physician and health care staff buy-in at the outset. Provide physicians a strong business case for using IT to improve clinical processes and outcomes, make use of IT-adoption champions and peer-to-peer learning, and consider clinic and financial incentives programs.
- Use a readiness assessment tool to gauge practices' capability and workforce capacity.
- Work with physicians around performance metric specifications.

During Intervention Planning

Work with health IT developers and clinicians to ensure functionality and connectivity across systems

- Build upon technology providers are already familiar with, and use existing operational and technical infrastructure and capacity to support, clinical and administrative processes.
- Ensure that data exchange standards among EHRs, and among EHRs and HIE systems, are harmonized and standardized.
- Ensure EHR and other software developers standardize calculation of quality metrics.
- Have a competitive review process for EHR developers, with technology-expert input, to avoid over-promising or under-delivering by ensuring proposals are within the company's capacity.

Although many EHR systems may meet minimum certification standards, for example, this does not guarantee that such systems provide the functionality promised.

- Participate in data standardization discussions at the national level and with the health IT industry.

Work with clinicians so they "own" the quality and performance measures

- Work with a physician champion to help foster an environment receptive to change, and garner buy-in from providers and staff for clinical reforms.
- Provide training to providers on selected measures to confirm their understanding of the performance indicators.
- Engage health providers/systems on specification of measures.
- Be willing to tailor the health IT approach across practices, depending on the baseline capabilities of participating practices.
- Make custom built (or EHR-based) case management records systems available to all staff, not just licensed clinicians.
- Build the interfaces for clinical data capture and management with providers and other health care staff.
- Educate all end-users on the importance of correctly and comparably capturing data.

After Implementation

Continue training health care staff to optimize use of IT and seek continuous feedback

- Collaborate with EHR and HIE developers to ensure adequate training of, and resources for, staff in using software.
- Provide physicians with technical assistance and resources for adopting IT tools, to reduce duplicative efforts to meet meaningful use requirements as part of the Medicare and Medicaid EHR Incentive programs.
- Use practice coaches to provide resources and help providers re-engineer their workflow processes.
- Consider using a business analyst to help evaluate the reporting capabilities of a practice and continually align reports and measures with new federal requirements.
- Find the right pace for introducing new tools and staff roles, and for facilitating continued engagement of health care professionals. Be flexible about intervention implementation timelines.
- Establish learning collaboratives to provide an opportunity for participating providers to learn from each other and share best practices and common practices.

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