The Office of the National Coordinator for Health Information Technology

Strengthening Care Management 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

July 2013

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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 achieving the three-part aim of better health, better care at lower cost. The Department of Health and Human Services, Office of the National Coordinator for Health IT (ONC) is providing $250 million over three 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.

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

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Table of Contents

Table of Exhibits

Background

Patients with chronic and complex health conditions represent a disproportionately large and growing portion of total health care utilization and expenditures. In addition, as demographics change and medical technology advances, patients with chronic conditions are living longer.[1] Providers, payers, patients, and other stakeholders need resources to better manage chronic conditions, to address rapidly rising health care costs, and to improve quality of care. In an effort to achieve these goals, both government and the private sector are embracing health IT options that offer potential services for improving population health through care management.

Although the terminology of care management first emerged in the 1980s when the health insurance industry began implementing utilization review and prior authorization in order to control costs, the concept of care management has expanded far beyond its original inception. This expansion is due in large part to the development of the Chronic Care Model (CCM) in the late 1990s, which inspired a growing body of evidence that the coordination of health care across providers for patients with chronic and complex conditions produces better results at lower costs.[2]

Care management is defined as a set of activities whose objectives are to assist patients and their support systems in managing medical and behavioral conditions to improve patients' functional health status, enhance coordination of care, eliminate duplication of services, and reduce the need for expensive medical services.[3] Care management occurs at various levels of the health care system, including at a population level, at a practice or panel level, and at the individual patient level. Because of the challenges presented by patients with chronic conditions, the focus of care management programs is often a chronic condition such as heart disease, diabetes, or asthma.

The historical reliance of the health care system on paper records made care management very difficult. Paper chart audits were an important tool for assessing quality but did not allow data to be shared easily across providers. As a result, the health insurance industry was the first to use claims-based health IT to aggregate data at a population level to identify opportunities for more focused targeting of patients for care management services. A simultaneous increase in the use of evidence based guidelines in clinical care opened the door for health care analysts and organizations to begin identifying gaps in care by analyzing claims data relative to compliance with evidence -based guidelines.

The role of health IT in care management is to support care management functions, including patient data capture, aggregation, analysis, and reporting. The development of electronic registries and electronic health records (EHR) is enabling care management to move from the health insurance company to the clinical practice. For example, a primary care clinic using health IT is now able to quickly group patients by health condition and identify their unmet needs, enabling care managers to target their services appropriately for each patient and to identify any gaps in care and service for disease-specific populations. Other technologies such as

IT-Enabled Care Management Services: Care management services enabled by a suite of health IT tools that support care management functions including patient data capture, aggregation, analysis, and reporting

interactive voice recognition enable patients to be alerted and encouraged to get needed services, while freeing up care managers for higher-level interventions to close gaps in care.

Health IT tools can also help engage and activate patients with complex chronic conditions outside of the practice setting. Patient portals connected to EHRs enable patients to directly access their health information (such as laboratory results), while secure messaging functions allow patients to interact with their care team electronically for more efficient and timely communication. Remote monitoring devices (e.g., weight scales for patients with congestive heart failure, Bluetooth-enabled glucometers) can support patients' efforts to manage their conditions at home and alert care managers about problematic health status indicators before crises occur. Finally, devices in the home can support face-to-face interactions with providers through videoconferencing applications, enabling care managers and care teams to more effectively coordinate the care needs of people with chronic conditions.

Despite the use of such tools, care management within a practice can still leave critical gaps in care for chronic conditions that arise when patients move across different care settings and different providers. For instance, a patient may be discharged from an acute care hospital to a skilled nursing facility and then back to her primary care provider. For care management services to fully address the needs of these patients across the continuum of care, providers require the ability to identify at-risk patients using comprehensive longitudinal record of care and seamlessly exchange clinical data to support treatment, regardless of where the patient is receiving care. Collaborative use of tools such as EHRs; electronic clinical registries; case management software; admission, discharge, and transfer (ADT)-based alerts from hospitals; and analytics capabilities can support a seamless care management approach for the patient across providers and settings.

Standards promulgated by the Office of the National Coordinator for Health IT (ONC) and the work underway in provider communities are helping to bridge technological gaps and create increasingly integrated health information systems in which patient information can flow across providers and provider settings. As a result, direct patient care is improved and transitions in care can be better managed through coordinated information flow.

The Health Information Technology for Economic and Clinical Health (HITECH) Act, a component of the 2009 American Recovery and Reinvestment Act (ARRA), has had a dramatic impact on expanding the use of health IT tools available to support care management. The legislation offers Medicare and Medicaid incentive payments to providers who adopt and use EHR technology to meet certain objectives. Providers qualify for incentive payments by demonstrating their adoption of certified technologies to achieve a series of graduated steps, referred to as Meaningful Use (MU). The steps for MU include (1) capturing and sharing data, (2) advancing clinical processes, and (3) improving outcomes. A study of 2012 survey data found that 72% of office-based physicians were using an electronic medical record (EMR) or EHR system, and nearly 40% were using an EMR/EHR system that met basic criteria for MU. This is a significant increase from 2011, in which the EMR/EHR system adoption rates were 57% and 34%, respectively.[4]

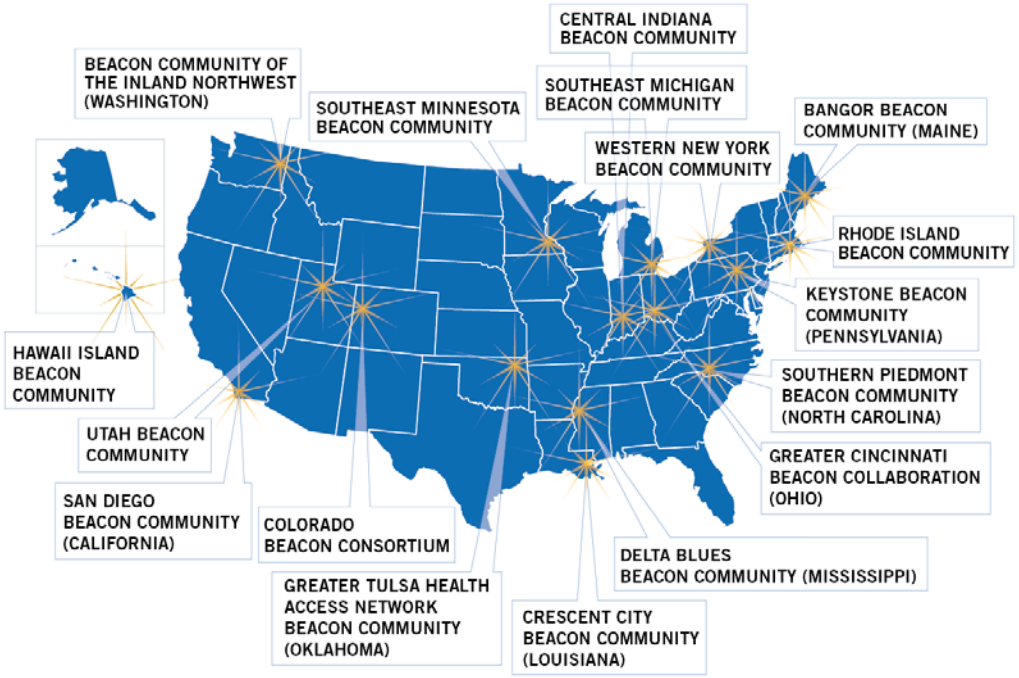
Delivery system reforms included in the Patient Protection and Affordable Care Act (ACA), as well as emerging private efforts, are providing incentives for better value and higher quality care. To achieve these goals, providers are making new investments in care delivery, including targeting resources toward care management. As these investments take place, it is important for providers to consider the

ways in which technology can enhance care management and further drive improvements in health care quality and value.

Beacon Communities

The Health and Human Services (HHS) 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. Exhibit 1 shows the Beacon Communities and their locations across the country. Each of the 17 Beacon Communities is building and strengthening local health IT infrastructure, testing innovative approaches for using connected 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.

Exhibit 1: Beacon Communities Nationwide



Communities that are early adopters of health IT see themselves at a distinct advantage in addressing the needs of patients coping with the burden of chronic conditions and making the transition to a delivery system that is aligned around delivering better outcomes at lower costs for these conditions. This was the heart of the Beacon Community program—supporting community-wide collaboration to explore how technology can enable improvements in the health of populations.

Beacon Nation Project and Learning Guides

The Beacon Nation project, launched by the Hawaii Island Beacon Community in early 2013, 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.

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

Care management is a fundamental component of many activities supported within the Beacon Community Cooperative Agreement portfolio. Assessment of the Beacon Community experience over the past 3 years reveals the many successes that have been achieved through their efforts. Reflection also allows an opportunity to evaluate some of the challenges Beacon Communities encountered and the strategies for success they pursued while deploying health IT to support care management goals. This Learning Guide documents the approaches, lessons learned, and best practices of Beacon Communities for implementing various IT-enabled care management services. The lessons are grouped by strategic objectives and include illustrations from Beacon Communities.

The following are a few items for communities to keep in mind while reviewing the materials:

- A Learning Guide is not an implementation manual with detailed checklists for installing a new system. Instead, the Learning Guide will lay out the most important decisions and considerations for a community interested in applying health IT toward developing or expanding its care management 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 coordinating hospital follow-up care.
- Organizing community stakeholders, identifying leadership, and facilitating collaboration and consensus on the vision and project goals require time. 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).

Although this Learning Guide covers some of the health IT tools used by Beacon Communities to improve their care management functions, it is not an exhaustive list of all technologies related to care management that are available on the market.

Keystone Beacon Community Patient Experience: Hilda's Story

"When 90 year old 'sharp as a tack' Hilda Rothermel appeared confused at a routine doctor visit, her Keystone Beacon care manager turned to Hilda's electronic discharge summary to get a complete accounting of all her medications, particularly the regimen prescribed during a recent hospitalization. Suspecting that Hilda might be taking her 12+ medications incorrectly, her care manager worked with Hilda's care team and her family to resolve the medication issue. Hilda quickly recovered from her confusion and her family regained confidence that she could continue to live independently.

Today Hilda is back to her weekly bridge game and enjoying the company of friends and family. 'It makes me feel very good that the Keystone nurse is looking after me,' she said."

Source: Keystone Beacon Community 2012 Annual Report

Setting the Stage for Success

Care management of patients with chronic and complex conditions is a vital component of national efforts to achieve better, more affordable health care. Over the 3 years in which they received financial and technical support from ONC, the Beacon Communities have demonstrated diverse and innovative approaches for identifying, selecting, and implementing health IT-enabled care management services in their communities. This Learning Guide offers an overview of the major themes and lessons emerging from their efforts. The hope is that this information will help guide other communities as they explore IT-enabled solutions to improve care management. This section addresses the foundational elements that can help to accelerate success.

Target Audience: This Learning Guide is designed for communities that are interested in using health IT to support the integrated and comprehensive delivery of care management services to patients with chronic illness and are leaders in bringing together stakeholders to support a common vision of highly functioning care management system.

This Learning Guide is designed for communities that are:

- Interested in using health IT to support the integrated and comprehensive delivery of care management services to patients with chronic conditions.
- Leaders in bringing together stakeholders to develop a vision for a highly functioning care management system.
- Reorganizing their health care delivery system to incorporate new models of outcome-oriented, value-based care in which care management plays a vital role, for example, Patient-Centered Medical Home (PCMH) models and Accountable Care Organizations (ACO).

This Learning Guide incorporates the experiences of stakeholders, including providers and other entities, who have agreed to work together using health IT to support the health care needs of a population within a defined geographic area. These stakeholders often include a large proportion of primary care, specialist, and emergency facilities within a specified region. Other entities, such as long-term care facilities, pharmacies, specialist providers, health care payers, employers, public health agencies, and other stakeholders are also critical partners. While IT-enabled services can be executed across either small or large networks, data used to improve care management will be more comprehensive in communities with higher provider participation.

An overarching theme across Beacon Communities is the importance of developing trust among key stakeholders to build and sustain a shared vision. Several Beacon Communities had already begun the difficult work of networking across stakeholders, identifying common, long-term community goals, and achieving consensus when they received funding from ONC. As stakeholders approach this work, a number of factors can influence the likelihood of success. Some of these key factors include existing partnerships, the commitment of organizational leadership to advancing care management, presence of common goals, and local experience with collaboration across institutional walls. It is important for stakeholders to understand existing cooperative agreements between organizations that can support collaboration, including service agreements (SA), care coordination agreements (CCA), and data use agreements (DUA). Exhibit 2 summarizes these foundational elements, along with key questions for getting a strong start.

Exhibit 2: Foundational Elements for a Strong Start

Element	Considerations
Partnership, Leadership, and Collaboration	• Is there a commitment to building relationships and trust across participating stakeholders? • Is there engagement and involvement by executive-level leadership among community participants? • Are there one or more strong and passionate champions who are able to establish a unified vision across stakeholders and rally participants to overcome obstacles? • Is there an understanding of the goals and perspectives of each of the stakeholders? • Has the value proposition been clearly stated for each of the stakeholders?
Service, Care Coordination, and DUAs	• Are there existing SAs, CCAs, and/or DUAs among providers and other participating entities that clarify roles and expectations?5
Care Management Aims, Criteria, and Measures	• Do the IT-enabled care management services have well-defined goals? • Are there criteria and measures for evaluating outcomes?
Commitment of Resources	• Are there identified resources for deploying IT solutions and conducting staff training on new tools? • Is it possible to demonstrate the value of the project and articulate the business case for different stakeholders?

Element	Considerations
Privacy and Security	• Is there a shared commitment to developing a secure infrastructure that meets federal and state requirements, including HIPAA and HITECH? • Is there an understanding of the state and federal rules and regulations governing data sharing, such as patient consent? • Are agreements in place for how partners will address patient consent issues, breaches, and other related privacy and security matters?
Health IT	• Is there an existing health IT infrastructure in place that allows for the exchange of health information across participants?

Lessons from Beacon Communities

There are substantial variations in Beacon Communities' experiences with implementing IT-enabled care management services. These differences stem from many factors, such as the existing health IT infrastructure in the community, the degree of health system integration, the community's goals and objectives, population size and demographics, familiarity with available health IT options, and the presence of a strong advocate for implementing ideas.

Five Beacon Communities provided in-depth information about their experiences for this Learning Guide: Bangor Beacon Community (Maine), Greater Cincinnati Beacon Collaboration (Ohio), Keystone Beacon Community (Pennsylvania), Southeast Minnesota Beacon Community, and Southern Piedmont Beacon Community (North Carolina). Several additional Beacons provided important insights with regard to overall content and direction. These include Beacon Community of the Inland Northwest (Washington), Greater Tulsa Health Access Network Beacon Community (Oklahoma), and Western New York Beacon Community.

While examples of these five Beacons' IT-enabled care management experiences are documented throughout the Learning Guide, a brief profile of each of the communities is provided in Exhibit 3. **Appendix A**: IT-Enabled Care Management in Beacon Communities contains more detailed information about IT-enabled care management for each of these five Beacon Communities.

Exhibit 3: Beacon Community Profiles in Health IT-Enabled Care Management

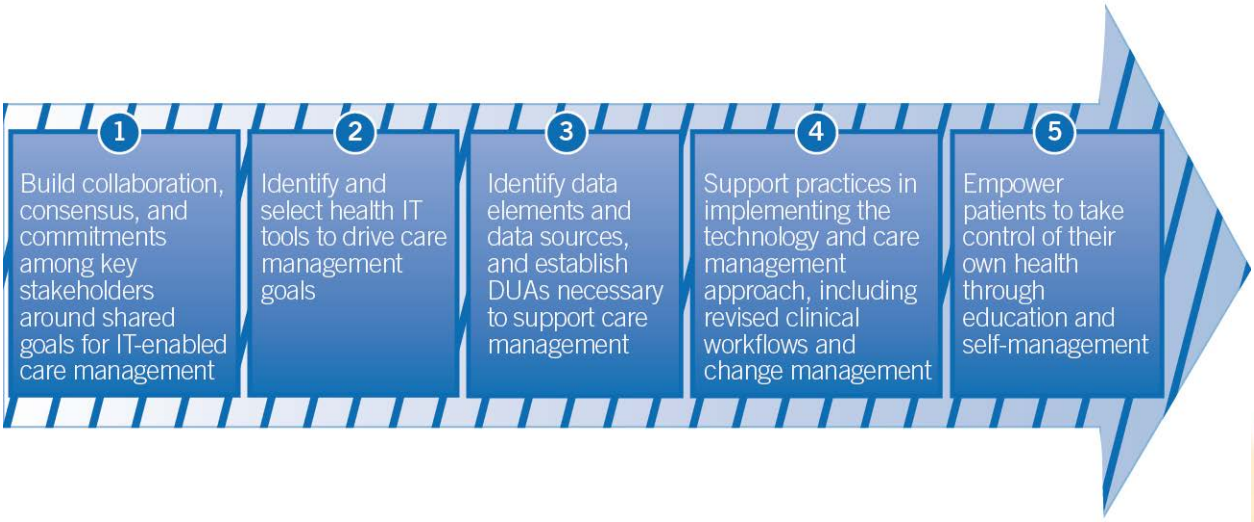
Beacon Community	IT-Enabled Care Management Services to Improve Population Health
Bangor Beacon Community (Maine)	**Bangor Beacon Community** is comprised of 12 partners and is led by Eastern Maine Healthcare Systems. Bangor's IT-enabled care management activities focus on helping patients with diabetes, chronic obstructive pulmonary disease (COPD), congestive heart disease, asthma, and mental health conditions improve management of their own care. Health IT-enabled care management services are carried out through nurse care managers embedded in primary care practices and mental health clinics. A statewide HIE, HealthInfoNet, connects provider practices, hospitals, specialists, long term care facilities, and public health agencies. Nurse care managers use EHRs to capture and track patient information and monitor patients via remote patient monitoring tools. One feature of Bangor's care management efforts involves the development and operation of a care manager forum. The forum, which meets bi-monthly, was designed to establish and promote better communication among providers in different health systems and to improve care coordination across the continuum of care. The forum provides an opportunity for care managers to receive training and education about care management strategies and to share best practices and lessons learned through their experiences with health IT-enabled care management. For additional information about Bangor Beacon Community, please see: http://www.bangorbeaconcommunity.org/
Greater Cincinnati Beacon Collaboration (Ohio)	**Greater Cincinnati Beacon Collaboration** is led by HealthBridge, one of the nation's largest providers of HIE services. The Collaboration includes provider practices and hospitals in 16 counties across three states in the greater Cincinnati metro area: Ohio, Kentucky, and Indiana. IT-enabled care management activities focus on improving care for adults with diabetes and children with asthma. Care managers, embedded in provider practices, have access to a registry with advanced functionality to improve care for the 4,500 children with asthma within the community. The registry allows care managers to identify high-risk patients requiring additional support by incorporating data on social risks, barriers to care, and asthma control assessments care from primary and specialist providers' EHRs, home health agencies, and other sources. For additional information about Greater Cincinnati Beacon Collaboration, please see: http://www.healthbridge.org/WhatWeDo/Projects/BeaconCollaboration.aspx

Beacon Community	IT-Enabled Care Management Services to Improve Population Health
Keystone Beacon Community (Pennsylvania)	**Keystone Beacon Community** is a network of health care providers in Central Pennsylvania led by the Geisinger Health System. The main focus of Keystone Beacon's IT-enabled care management efforts is to reduce hospital admissions, readmissions, and ED visits by high-risk patients with congestive heart failure (CHF) and Coronary Obstructive Pulmonary Disease (COPD). A multi-pronged approach to achieve these goals includes: (1) ambulatory care managers supporting patients in provider offices and clinics, (2) nurse care managers deployed to inpatient settings to facilitate transitions and look for care coordination opportunities, and (3) an experimental remote call center for care managers to follow up with patients by telephone. Keystone Beacon Community has developed several customized technology solutions to facilitate their care management activities. Through the Keystone Health Information Exchange (KeyHIE), care managers are able to access information about procedures and tests their patients receive in various care settings, ED's have the ability to access critical information about patients (existing health problems, medications, allergies), hospital discharge summaries are shared with community physicians, community physicians are able to share health information about their hospitalized patients, and home health nurses have access to additional patient information. For additional information about Keystone Beacon Community, please see: https://www.keystonebeaconcommunity.org/
Southeast Minnesota Beacon Community	**Southeast Minnesota Beacon Community** is led by the Mayo Clinic and includes more than 2,500 providers and five hospital partners across the region. Southeast Minnesota's care management activities focus on childhood asthma and adult Type II diabetes. The Southeast Minnesota team built a customized peer-to-peer HIE capability **(Appendix B:** Peer-to-Peer HIE Framework contains a diagram of the information exchange). Through collaboration between providers, schools, and public health departments, Southeast Minnesota has successfully tested and implemented electronic asthma action plans for school-aged children and established electronic communication lines between schools and primary care providers. Public health social workers have access to information from EHRs, which enables them to coordinate with hospitals to facilitate admissions and discharges. For additional information about Southeast Minnesota Beacon Community, please see: http://semnbeacon.wordpress.com/

Beacon Community	IT-Enabled Care Management Services to Improve Population Health
Southern Piedmont Beacon Community (North Carolina)	**Southern Piedmont Beacon Community**, led by Community Care of Southern Piedmont, is one of the nation's leaders in electronic data sharing and integration to support care management. Southern Piedmont is a network of provider practices, hospitals, and community health clinics covering three counties in North Carolina. Southern Piedmont's care management activities focus on patients with COPD and diabetes, and all patients experiencing care transitions. Multiple care management models are employed, including care managers embedded in provider practices, care managers embedded in hospitals, and care managers deployed to and supporting multiple practices. Sothern Piedmont has developed a suite of IT tools that support five facets of care management: identifying patients and allocating care management resources, coordinating care, documenting care, engaging patients, and evaluating impact. For example, Southern Piedmont developed a decision support tool which flags frequent ED users in real time. When a frequent user arrives at a hospital, a special icon appears on the patient's medical record, allowing a care manager to begin working immediately with the patient to connect him to a primary care medical home, if needed, and to schedule a follow up appointment. For additional information about Southern Piedmont Beacon Community, please see: http://www.ccofsp.com/

Several strategic objectives emerged from discussions with the Beacon Communities' organizational leadership. Strategic objectives (see Exhibit 4) are the key components involved in the deployment of IT-enabled care management within a community. This section provides a comprehensive discussion of each of these strategic objectives. **Appendix C**: Strategic Objectives Summary provides a summary of each of the strategic objectives and their primary components.

Exhibit 4: Strategic Objectives



Strategic Objective #1: Build Collaboration, Consensus, and Commitments Among Key Stakeholders Around Shared Goals for IT-Enabled Care Management

The first strategic objective involves building collaboration, consensus, and commitment among key stakeholders around shared goals. The experiences of Beacon Communities have consistently demonstrated that buy-in, a feeling of ownership, and commitment by the leadership of each stakeholder organization are critical for successful deployment of IT-enabled care management services. Achieving this requires agreement about the community's transformation goals for improving population health, as well as a clear understanding of the technological and financial feasibility of the program for each stakeholder organization. The following includes a detailed discussion of the steps comprising this first strategic objective:

1. Engage appropriate champions, partners, and stakeholders.
2. Clarify and articulate the value proposition and funding requirements for implementing IT-enabled care management services.
3. Reach a consensus across stakeholders about IT-enabled care management goals and most important functions.
4. Assess readiness to use health IT as part of care management.

1.1 Engage appropriate champions, partners, and stakeholders

The presence of one or more strong champions is a critical factor in advancing the deployment of IT-enabled care management services and is vital to the development of successful partnerships across the community. All Beacon Communities stressed the importance of having at least one such influential champion to provide inspiration for a common vision and foster trust across stakeholders in the community.

Partnering to Improve Asthma Care: An Example from Southeast Minnesota Beacon Community

An illustration of effective community partnerships is an initiative of the Southeast Minnesota Beacon Community in which school nurses and local clinics collaborate to improve the care coordination and management of childhood asthma. The partnership began with an agreement between organizational leadership of the Beacon Community and the Community Collaborative Asthma Project, which was an established cooperation among four prominent medical centers and elementary schools in the region whose goal was to identify and manage asthma cases using a shared asthma action plan. In collaboration with the Beacon Community, the program was expanded in the 11-county region to include parent-authorized, standards-based exchange of health information to increase dissemination and accuracy of asthma action plans. The program includes a written action plan for each student, written policies and processes for parental consent, specific actions for staff members to perform in the asthma management program, school policies and procedures for administering medications and protocols for emergency responses for severe asthma episodes, and staff and student education and communication templates. Through a portal, school nurses have access to electronic versions of asthma action plans and can communicate with providers and parents about asthma related issues. (**Appendix D**: Community Partnership to Improve Asthma Care for School-Age Children Through Health IT contains a diagram of the electronic data exchange process between providers, school nurses, and parents.) Schools participating in the Beacon Community collect data on asthma action plans and provide feedback about the portal. The ultimate goal is to develop what Beacon leaders call a "cocoon of care" for children with chronic asthma by coordinating efforts and information about student needs among their homes, health providers, and schools. To see a video of the program, see: http://www.youtube.com/watch?v=OikiIjtg0hU#at=13

Having representation from executive-level leadership of all stakeholder organizations is important when making decisions about goals, feasibility, start-up financing and long-term sustainability, and implementation and evaluation approaches. Stakeholders can include diverse entities, such as health care payers, hospitals, community providers, long-term care and rehabilitation facilities, radiology centers, laboratories, pharmacy benefit managers, patients and families, and organizations that support the health IT infrastructure.

Each stakeholder has one or more specific roles and responsibilities in supporting a long-term commitment to the shared vision for IT-enabled care management. Collaboration and partnership among and between organizations and stakeholders in the community can be extremely useful in driving IT-enabled care management services to achieve the community's population health goals. These rarely occur until organizations and stakeholders identify common goals and agree to collaborate in pursuing them. Exhibit 5 lists examples of the main resource, workflow, technological, and privacy factors for each stakeholder to take into account.

Exhibit 5: Key Stakeholder Considerations for Supporting a Long-Term Commitment to a Shared Vision for IT-Enabled Care Management

Stakeholder Group	Considerations
Champions, partners, stakeholders, and interested parties	• Value proposition(s) for developing and using IT-enabled care management systems, based on specific use cases • Up-front and long-term funding requirements • Business model for cost sharing
Community-based providers and practices	• Workflow implications at the practice level or at other levels (such as at the patient level) • Community policies that impact practice participation (consent, privacy, access to information) • Human and systems resources required • Alignment with practice goals and ongoing initiatives, such as existing care management or quality improvement (QI) programs • Alignment with national payment reform initiatives that support long-term sustainability
Hospitals	• Implications for clinical workflow in hospital departments (e.g., ED or pharmacy) • Implications for admitting, billing, and medical records departments • Alignment with other hospital initiatives, including improvement projects focused on reducing readmissions and/or care management • Alignment with national payment reform initiatives that support long-term sustainability • Integration with existing technology environment such as EHRs • Human and systems resources required
IT leadership and decision makers, including HIE organizations	• Technical vendor requirements • Implications for privacy and security and other community policies • Scope of ongoing data monitoring and evaluation • Strength of implementation and enforcement of DUAs • Leadership and accountability to the community-based partnerships for operations
Patients and families	• Goals and plan for care • Impact on quality of care • Privacy and security of patient data • Access to care and cost

Stakeholder Group	Considerations
Payers	• Impact on cost of care and reimbursement models for providers in the community • Alignment with other health insurance quality improvement initiatives • Connectivity between provider and payer electronic data systems

1.2 Clarify and articulate the value proposition and funding requirements for implementing IT-enabled care management services

Clearly articulating the value proposition to the various stakeholders will assist with obtaining buy-in and commitments from all levels of participating organizations. It is extremely important to distinguish between the value of the technology used to support care management services and the value of the care management effort itself. While a considerable amount of research demonstrates the effectiveness of care management in improving quality of care and reducing costs,[6] there is less evidence about the effectiveness of particular technologies to support care management.[7] The factors affecting the value proposition for a particular IT-enabled care management service include not only the cost of the technology but also the effectiveness of the chosen technology in achieving the specified care management goals.

Both financial and non-financial considerations contribute to the value proposition. The expected start-up and operational costs and the potential impact the IT-enabled care management strategies have on revenue in the context of health payment reform are central to a strong value proposition. Nonfinancial benefits are also important. These might include the contribution to each stakeholder's mission and strategic goal, meeting federal and state reporting and MU requirements, impact on the work life of the care team, improved accuracy of reporting and evaluation metrics, or even building goodwill for the organization.

Determine costs and identify financial resources

One of the first steps in articulating a value proposition is to determine the cost for implementing the health IT-enabled care management services. Short-term costs include those related to technology purchases, training, and any needed workforce expansion. Long-term costs include maintenance of the technology, such as service agreements, and workforce, as well as costs to grow the program.

Those costs can vary greatly, particularly during start-up, depending on the size and IT sophistication of the practice or organization. A major factor is the extent to which the entity engages in the electronic exchange of health information and the familiarity of staff and providers with technologies to support care management. For organizations with no existing EHR and no electronic connectivity to support the exchange of health information, the start-up costs will be much higher than for those who already have a fully functional and connected health information system. Other noteworthy start-up costs may include the acquisition of more physical space (within practices, hospitals, or at a center), the recruitment of new staff, training of all staff members in care management activities and processes, travel costs (for piloting, implementation, or evaluation activities), and legal costs associated with agreements to exchange health-related information. Knowing the specific financial needs of each stakeholder organization during the start-up phase will be helpful to the community's organizational leadership as potential funders are identified.

An advantage of a community-level and/or multi-stakeholder approach is that participating organizations can agree to share some of the costs associated with investing in health IT tools and related care management services. Some Beacon Communities, such as the Beacon Community of the Inland Northwest, invested the funding from ONC in developing core HIE infrastructure and connecting interfaces for practices and hospitals. Because reimbursement policies by health care payers tend to lag behind changes to the health care system, many practices and organizations are investing their own time and resources to the deployment of health IT-enabled care management before reimbursement fully compensates for these investments. There are several options for pursuing external funding, however. Resources can be made available through various sources (e.g., grants, pilot projects, and private investments) and at multiple provider and organizational levels (e.g., individual practice level, physician network, hospital, HIE organizations). Federal sources of funds can include, among others, Agency for Healthcare Research and Quality (AHRQ) or Health Resources and Services Administration (HRSA) grants or programs specifically dedicated to health delivery reform. State and county health departments can be tapped as a possible source of financial support. In the private sector, various philanthropic organizations have programs dedicated to investments in health IT efforts to improve population health. Other possibilities include large employers, advocacy organizations, or provider organizations and associations. It may also be possible to negotiate funding through a health insurer, although payers play a much larger potential role in long-term sustainability. Health care payment reform and supporting health IT funding for care management is discussed in more detail in the following section.

Understand payment reform and reimbursement potential for care management

The reimbursement landscape is shifting away from fee-for-service toward value-based reimbursement arrangements (including accountable care organizations and shared savings programs, enhanced fee for service arrangements, and pay for performance programs). In such payment initiatives, providers that can show improved value through outcomes can receive reimbursements that reward those efforts.

Various payment reform initiatives, spurred in large part by changes legislated under the Affordable Care Act (ACA), are being explored by both public and private payers. One such provision in the ACA is the Advanced Practice Demonstration on Medical Homes in Federally Qualified Health Centers (FQHC). In this demonstration, the Centers for Medicare and Medicaid Services (CMS) provides an additional $6 per member per month for Medicare beneficiaries attributed to the medical practice to support care management. Also through the ACA, hospitals are incentivized to avoid readmissions within 30 days of discharge or suffer financial penalties. Early analysis of this program suggests that hospitals have responded to this incentive by hiring care management staff to focus on identifying patients at risk for readmission and to work with patients to mitigate the risk.

Shared savings programs are another reimbursement model that reward value in the provision of health care. Under a shared savings agreement, providers have the opportunity to share a predetermined proportion of savings based on their ability to avoid unnecessary use and waste. CMS has established a Medicare Shared Savings Program to facilitate coordination and reduce costs.[8] This program enables support of models such as ACOs, in which providers collaborate across episodes of care for a condition and share in the savings by working more efficiently to reduce costs below a predetermined payment.

The emergence of new payment models for health care will offer opportunities for providers and delivery systems to incorporate health IT tools into care management services.

1.3 Reach a consensus across stakeholders about IT-enabled care management goals and most important functions

Reaching consensus among stakeholders about the primary vision or goal with regard to IT-enabled health care services is critical. A successful effort requires agreement among key stakeholders about the target population, the desired outcomes, and the health technology tools that can facilitate achievement of those goals.

Care management efforts typically focus on a particular target population based on age, specific health conditions, a combination of chronic conditions, or risk level for developing a specific condition. Various community-level factors can help stakeholders determine what focus is best for them. One factor is the population profile of patients served by the participating providers. Although national trends with regard to disease prevalence and treatment rates are informative, a community's particular population health status profile may be unique. Communities can identify goals based on criteria such as conditions with the highest prevalence, conditions with the highest average cost, conditions that disproportionately affect a vulnerable population subgroup, or conditions that have the largest social impact. In addition, it may be helpful to consult public health agencies at the local or state level. If a major public health initiative is already in place at the state level, leadership may want to define goals that support such an initiative.

Stakeholders can next begin to identify ways in which technology can support those goals and help care providers improve patient outcomes. The solutions vary according to the goal; for example, a community focused on care coordination may look at ADT-based alerts, while another community looking at population reporting may emphasize analytics. The community may also prioritize solutions according to other constraints, such as complexity or available resources. A critical step in this prioritization is understanding what already exists within the community and the community's health IT readiness.

Lessons from Early Pioneers: Vermont Blueprint for Health

The Beacon Communities are not the first to embark on community-wide collaboration with care management as an aim. Community Care of North Carolina, the Robert Wood Johnson Aligning Forces for Quality (AF4Q) community collaborations, the Health Resources Services Administration Health Center Controlled Networks, and the Vermont Blueprint for Health have been leaders in health IT.

As a pioneer in the use of health IT for care management, the Vermont Blueprint for Health continues to be a source of inspiration and ideas as well as of lessons learned. The Vermont Blueprint for Health is a statewide agenda for health system reform featuring local community care management. Years of stakeholder engagement and support resulted in substantial progress toward implementing this vision. The journey began with a disease registry system that is populated from EHRs through Vermont's HIE. A 400-item data dictionary tied to key process and outcome measures was painstakingly mapped to all the EHR vendor solutions used by Blueprint for Health participating providers. Various data integrity issues arose during implementation of this integrated system. To resolve these issues, Blueprint leadership began holding weekly meetings with community clinicians, care managers, and IT staff to reconcile data and standardize workflows to improve data quality.

The experience of the Vermont Blueprint for Health demonstrates that implementing IT-enabled care management across a network of providers and community stakeholders is invariably a long journey. Beacon Communities studied the lessons from such early innovators in IT-enabled care management environments, learned from them, and have contributed their own lessons along the way.

1.4 Assess readiness to use health IT as part of care management

A complete assessment of readiness includes several steps, including determining the existing health technology infrastructure and capacity for exchange of health information, identifying health technology tools currently being used in the community to support care management functions, and determining the readiness of providers and practices to implement health IT-enabled care management services.

Determine existing technology infrastructure and capacity in the community

Generating a complete and thorough overview of the existing technology infrastructure in the community is the first step toward assessing community readiness to use health IT tools as part of a care management objective. Beacon Communities started in very different places in terms of their development of health IT infrastructure. Some Beacon Communities required substantial new investments, while others already had highly sophisticated exchange capabilities in place. In the Southeast Minnesota Beacon Community, for example, there was already 100% adoption of EHRs among providers, and the large health systems (Mayo Clinic, Mayo Clinic Health System, Winona, Allina, Olmstead) had highly integrated systems capable of supporting advanced levels of interoperability prior to the Beacon Community. They were able to use funding from the Beacon Community program to build a completely new peer-to-peer exchange model instead.

Appendix E: Network Architecture of Community-Wide Health Information Exchange provides an architectural diagram of Southeast Minnesota Beacon Community's community-wide data exchange capability.

Identify health IT currently being used to support care management

The next step is to identify the various IT-enabled care management activities already being used in the community. In most communities, one or more provider practices or hospitals are already using health IT to support their care management activities. As an example, many primary care clinics such as FQHCs have used disease registry software programs to plan population-level care and to generate provider decision support at the patient level. A local hospital, as another illustration, might already be providing ADT feeds to one or more primary care providers. These are examples of core elements of a care management system that could potentially be further developed and shared across the community.

Determine practice readiness for adoption and use of health IT to support care management functions

In addition to understanding what is already available in your community, establishing the degree to which practices in the community are ready to deploy health IT to support care management functions is another step toward assessing community readiness. Many providers in Beacon Communities were supported in the adoption and MU of EHRs through one of 62 Regional Extension Centers (REC). RECs were funded by ONC to provide on-the-ground assistance to primary care providers implementing EHRs and advancing toward MU. As part of this assistance, RECs provided data and tools to assess practice readiness and level of maturity with regard to MU of technology.

RECs have identified the following questions as helpful for practices evaluating readiness for health IT adoption:

- Are administrative processes organized, efficient, and well-documented?
- Are clinical workflows efficient, clearly mapped out, and understood by all staff?
- Are data collection and reporting processes well-established and documented?
- Are staff members computer-literate and comfortable with IT?
- Does the practice have access to high-speed Internet connectivity?
- Does the practice have access to the financial capital required to purchase new or additional hardware?
- Are there clinical priorities or needs that should be addressed?
- Does the practice have specialty-specific requirements?

Beacon Communities have developed unique and innovative strategies to evaluate practice readiness to support care management functions through health IT. For example, Beacon Community of the Inland Northwest (Washington) developed a tool for practices called the Care Coordination Readiness Assessment (CCRA). Five domains are measured in the assessment: organizational capacity, care coordination, clinical management, quality improvement, and technological infrastructure. Each domain includes a series of objectives, such as "adopts clinical evidence-based guidelines," with a four-item Likert scale to evaluate readiness (from "not prepared" to "actively performing"). The CCRA also includes two questions about each objective: one to determine the level of priority for the practice, and the second to determine the amount of variation in the priority of the objective across providers in the practice.[9]

Strategic Objective #2: Identify and Select Health IT Tools to Drive Care Management Goals

Once a community has engaged stakeholders, performed a readiness assessment, and defined specific care management goals, identification of the appropriate health IT tools can begin. The following section provides an overview of the steps taken by communities to achieve this objective:

1. Identify and select health information technologies that support the community's health IT-enabled care management goals.
2. Consider the most appropriate care management model to implement the selected IT tools.
3. Determine how the health IT-enabled care management efforts will be measured and evaluated.

2.1. Identify and select health information technologies that support the community's health IT-enabled care management goals

There are various health IT options to support the community's care management goals. Functions associated with health IT in care management can be grouped in several ways.[10] To help illustrate their IT-enabled care management framework, Southern Piedmont Beacon Community classified its care management functions into five distinct categories.[11] Borrowing this classification framework, Exhibit 6 shows some of the health IT tools used to support specific care management functions. The exhibit also indicates which Beacon Communities, among the five that provided in-depth information and illustrations for this Learning Guide, used each tool. Each functional category can be supported by one or more health IT tools. Similarly, some tools support more than one care management function.

*Exhibit 6: IT-Enabled Care Management Tools by Care Management Function and Selected Beacons Using the Technology**

Care Management Function	IT-Enabled Care Management Tools	Example	Selected Beacons Using the Technology*
Patient Identification & Risk Assessment	Patient registries	State or community immunization and disease registries (e.g., Minnesota Immunization Information Connection [MIIC])	• Bangor • Greater Cincinnati • Keystone • Southeast Minnesota • Southern Piedmont
	Tools to identify at-risk patients	Internally developed algorithm based on claims data to identify patients who visit the ED frequently	• Southern Piedmont
	Real time alerting about patient health care utilization	Automated ADT-based alerts	• Greater Cincinnati • Keystone
	Increased provider access to patient information via portals and other tools	Access to direct mailbox using secure messaging	• Greater Cincinnati • Keystone • Southeast Minnesota
		KeyHIE Transform MDS/OASIS Web Service (i.e. coordination with long term post-acute care)	• Keystone
		Community Care of North Carolina Provider Portal	• Southern Piedmont
	Standardized Documentation to support care transition, such as Continuity of Care Record (CCR) or Continuity of Care Document (CCD)	Community HIE systems (e.g., KeyHIE, HealthBridge)	• Bangor • Greater Cincinnati • Keystone • Southeast Minnesota • Southern Piedmont

Care Management Function	IT-Enabled Care Management Tools	Example	Selected Beacons Using the Technology*
Care Management Documentation	EHRs	MU-certified EHR products	• Bangor • Greater Cincinnati • Keystone • Southeast Minnesota • Southern Piedmont
	Tools to assess social determinants of health issues	PH-Doc public health system	• Southeast Minnesota
	Care management software	North Carolina Case Management Information System (CMIS)	• Southern Piedmont
Patient Engagement	Patient portals and personal health records, including secure messaging between patient and care team	MyKeyCare personal health record, Blue Button	• Keystone • Southeast Minnesota
	Automated outbound contact of patients with care opportunities	Interactive voice response (IVR) software	• Keystone
	Online scripts and automated decision support for patient coaching	Patient-Reported Outcome Quality of Life (PROQOL) clinical monitoring system	• Southeast Minnesota
	Online assessments/self-assessment tools	Patient Activation Measure (PAM) tool	• Bangor • Southern Piedmont
	Telemedicine, virtual visits, and in-home monitoring devices for chronic disease management	iPad enabled visits, Bluetooth-enabled remote monitoring devices such as weight scales and blood pressure devices	• Bangor • Keystone • Southern Piedmont
Clinical Outcomes Analysis and Evaluation	Clinical data repositories and data warehouses	Community Care of North Carolina Informatics Center	• Bangor • Greater Cincinnati • Keystone • Southeast Minnesota • Southern Piedmont

* Selected Beacon Communities are the five that provided in-depth guidance and illustrations to inform the development of this Learning Guide: Bangor Beacon Community (Maine), Greater Cincinnati Beacon Collaboration (Ohio), Keystone Beacon Community (Pennsylvania), Southeast Minnesota Beacon Community, and Southern Piedmont Beacon Community (North Carolina).

2.2. Consider the most appropriate care management model to implement the selected IT tools

Once the health IT to support care management services has been identified, the next step is for the community to reach consensus about the best model (or combination of models) to implement the health IT-enabled care management services. A care management model refers to the general structure and distribution of staffing and technology resources to enable the deployment of the chosen technology tools. The care management models used by Beacon Communities to support health IT-enabled services can be loosely categorized into three groups, as shown in Exhibit 7. In their execution, however, the models can overlap. Leadership across the participating organizations may decide to implement a mixture of approaches.

The primary distinction across the care management models is the location of care management staff and the execution of care management functions in relation to providers and patients. Typically led by a doctor, a care team can include a nurse care manager, a medical assistant, a health coach, a formal home caregiver, or any other care management staff working in concert with the medical provider to support a panel of patients. The care management functions and health IT tools that support them can be executed at provider offices, at a centralized location such as a call center, or within hospitals.

Exhibit 7: Care Management Models Employed by Selected Beacon Communities to Support Population Health Goals

	Practice-Based Care Management	Community-Based Care Management	Hospital-Based Care Management
Bangor Beacon Community (Maine)	✓		
Greater Cincinnati Beacon Collaboration (Ohio)	✓		
Keystone Beacon Community (Pennsylvania)	✓	✓	✓
Southeast Minnesota Beacon Community	✓		
Southern Piedmont Beacon Community (North Carolina)	✓	✓	✓

Practice-based care management

Many communities chose to implement embed some of the health IT-enabled care management functions at the practice level. In a practice-based model, often referred to as an *embedded care manager mode,* services are implemented by care managers who work directly on behalf of the practice or clinic. Each of the five Beacons who provided in-depth review for this Learning Guide employed a

practice-based model to conduct care management functions (e.g., identification of patients for care management, medication management, and developing action plans).

Hospital-based care management

A priority for care management is to improve care transitions as patients move from a hospital inpatient or emergency department setting to their home or other post-acute care setting. One way to address a potentially harmful gap surrounding patient care transitions is to place care managers directly into the hospital setting. In a hospital-based care management model, care management functions can be carried out either by staff working in a hospital's ED or by staff working on inpatient units. For configurations in which hospital staff implement care management in the ED, the focus is to help bridge the transition between the ED and primary care. When inpatient hospital staff implement care management functions, their focus is to help track hospitalized patients and coordinate with primary care providers and the community.

Several Beacons used the Project BOOST methodology to flag patients at risk for hospital readmission and then worked aggressively to minimize this risk and support the patient's care needs upon transition back into the community. Some hospitals already use Project BOOST to help improve the transition process for patients, but coordinating those efforts with health IT-enabled care management across providers offers patients an additional level of support.[12]

Community-based care management

IT-enabled care management functions can also be implemented at the community level. In this approach, care managers and care management functions are either deployed from the community to the practices or are shared across providers and settings. Some Beacon Communities found that deploying staff through the community but working at the practices was an effective model to support practice and microsystem care management. Southern Piedmont Beacon Community, for instance, deploys centralized staff for care management, IT support, and analytics to support health care delivery at the practice level. Some Beacons executed care management activities from a centralized location, such as a call center. The Keystone Beacon Community, for instance, had staff at the practices and hospitals but also had a call center supporting care management functions. The community-based care managers are equipped to provide care coordination functions and follow outreach for the practices. Health IT and accompanying health information sharing allows the care team to expand their functions across practices and health systems.

Greater Cincinnati Beacon Collaboration: Using Emergency Department (ED) Alerts to Improve Pediatric Asthma Care Management

Cincinnati Children's Hospital Medical Center (CCHMC), one of Greater Cincinnati Beacon Community's partners, operates four primary care pediatric practices and has a long-standing focus on improving outcomes for children with asthma. In March 2012, CCHMC began to receive ED/Admission Alerts through Greater Cincinnati's HIE, HealthBridge, to supplement care management interventions and technology used within the practice for high-risk asthma patients. These alerts notify CCHMC when one of their primary care patients has an ED use or hospital admission at any of the 21 participating hospitals in the community. Primary care providers (PCP) using the system have said it gives them a daily look at their patients and the alerts help to transform care for better management and outcomes. The CCHMC team is incorporating the alert system into their existing follow-up processes, which includes an innovative Care Coordination program that has had great success in decreasing unnecessary ED visits and improving care during inpatient visits for pediatric asthma patients.

2.3. Determine how the health IT-enabled care management efforts will be measured and evaluated

Establishing metrics and criteria for evaluating the impact of IT-enabled care management services in the community is essential. Evaluation activities can monitor outcomes related to both quality of care and cost. Different community stakeholders may focus more on one or the other of these evaluation metrics. Illustrations of general IT-enabled care management objectives may include—

- Increased provider adherence to practice based guidelines
- Reduced medical errors
- Improved patient engagement around care plan
- Improved population health
- Improved quality outcomes for chronic disease management
- Reduced hospital utilization.

For evaluating changes in quality of care, communities are often prompted to follow specific performance measures based on program sponsorship requirements, accreditation organizations, or health care payers. Measures may capture care processes, intermediate outcomes, health outcomes. Patients with diabetes are one of the most frequent targets of IT-enabled care management efforts. Process measures for diabetes are informed by standard indicators for diabetes care management, including blood pressure control, LDL-C control, and HbA1c control, among others. Outcome measures for quality of care related to diabetes can be captured in various ways, such as changes in quality of life assessments using general scales such as the diabetes impact measurement scales (DIMS) or diabetes quality of life measure (DQOL). Reductions in the use of emergency services and avoidance of visits related to poor management of chronic conditions such as diabetes are other outcome measures.

Exhibit 8 lists some of the core metrics reported quarterly to ONC by Beacon Communities. While metrics related to particular health IT-enabled care management tools are not separated from those for overall Beacon efforts, the table highlights key areas of focus for these communities. Each Beacon Community reached consensus on how to evaluate the effectiveness of its specific programs. In most cases, a dashboard of measures was developed and shared at the leadership level.

Exhibit 8: Select Measures Reported by Beacon Communities

Beacon Community	Select Measures Reported to ONC
Bangor	• Diabetes: LDL-C Control (<100 mg/dL) • Diabetes: Blood Pressure Control (<140/90 mmHg) • Diabetes: HbA1c Control (<8.0%) • Diabetes: HbA1c Poor Control (>9.0%) • CVD: LDL-C Control (<100 mg/dL) • CHF: Blood Pressure Control (<140/90 mmHG) • Health Care Use: ED Visits, Non-Urgent Care Visits and Hospital Admissions for All Causes (Diabetes, CHF, COPD, asthma)
Greater Cincinnati	• 30-day Heart Failure Readmission Rate • Percent of High-Risk Asthma Population Rated "Well-Controlled" Over the Prior 12 Months • Diabetes: D5 Composite Measure • Medicaid Asthma ED/Urgent Care Visit Rate Over the Prior 12 Months
Keystone	• 30-day Readmissions for Patients with CHF • 30-day Readmissions for Patients with COPD • 30-day Readmissions for Patients with Both CHF and COPD • Medication Reconciliation Conducted for KBC-Enrolled Patients
Southeast Minnesota	• Asthma: Overall ED Use • Asthma Patients with Assessment of Triggers and Documented Asthma Action Plans • Asthma Action Plans on File for Students
Southern Piedmont	• Preventable Readmissions Rate • Diabetes: HbA1c Poor Control (>9.0%)

Evaluating the effectiveness of IT-enabled care management services can also include economic analysis, such as cost-effectiveness and return on investment (ROI).There are many parameters involved in conducting an economic evaluation, most of which need to be determined and even measured before the IT-enabled care management services are implemented. For instance, a community may want to track costs per member per month (PMPM), a common metric, to evaluate their IT-enabled care management activities for patients with diabetes. The average PMPM cost prior to the deployment of IT-enabled care management is compared with the average PMPM cost after the services have been implemented.

Strategic Objective #3: Identify Data Elements and Data Sources, and Establish DUAs Necessary to Support Care Management

Once the community has assessed the technology landscape, identified the health IT tools for care management, and determined the best care management model to follow, communities can define the exact work needed to accomplish these goals and can assign tasks across stakeholders and their staff to maximize availability and skills. The following steps will be discussed in this section:

1. Determine necessary data elements and identify their sources.
2. Collect and aggregate data to feed into care management tools.
3. Create or review and amend existing DUAs to support IT-enabled care management services.

3.1 Determine necessary data elements and identify their sources

A vital lesson from Beacon Communities is that technology can quickly overwhelm end users with information. This section discusses issues related to identifying essential data elements and locating sources of information. When determining the must-have data elements, consider the tradeoffs between the utility of the data being sought and the challenges in accessing it. For example, if specific clinical data is not available through an automated process, it may be best to rely on proxy data elements that allow approximation of clinical information.

The number and specific data elements required will differ for each community, based on care management goals and the metrics chosen to achieve and evaluate those goals. The most important factors to consider are data accuracy, accessibility, and usefulness.

Once the essential data elements have been selected, identification of data sources is required. Participants must consider what can be accessed from existing source system(s). Using existing interfaces, data elements, and reports will reduce the need for new build and can support maintenance and enhancements of workflows. Examples of data that can be part of a successful health IT-enabled care management program, along with possible sources, include—

- Clinical information (from EHRs)
- Primary risk screening data such as patient behavior (from tools such as Patient Health Questionnaire [PHQ-9] or Screening, Brief Intervention, and Referral to Treatment [SBIRT])
- Patient self-activation information (from tools such as PAM or HowsYourHealth)
- Demographic information (from hospital or practice management systems)
- Utilization and cost data (from payers' claims systems)
- Risk stratification scores (from third-party systems such as Archimedes, Interqual, M&R, Episode Treatment Groups [ETG] or Adjusted Clinical Groups [ACG] grouper tools)
- Pharmacy data (from Pharmacy Benefit Management [PBM] systems such as SureScripts)
- Laboratory data (from third-party laboratory providers such as hospital-based or commercial laboratories)
- Public health data (from public health departments, such as disease surveillance)
- Daily clinical data from patients with chronic or complex conditions (from remote monitoring or in-home devices such as Health Buddy and GE Healthcare)

- Patient-generated data (from patient portals)
- Information gained from mobile texting devices.

Avoiding Information Overload: Key Data Elements for IT-Enabled Care Management

As tools for collecting and sharing data improve and their use becomes more widespread, it is easy to see how care managers can become overwhelmed with information. The threat of too much information to successfully translate into improved care management functions has been a common theme in the literature.[13] The importance of developing a focused list of key data elements was discussed during a meeting of representatives from communities that are leaders in the use of health IT to support care management. During the meeting, participants developed a list of the most important and useful data elements for care managers in the field. The list included (in alphabetical order)—

- Advance directives
- Allergies
- Caregiver
- Complete list of medical teams, if relevant (e.g., PCP, cardiology)
- Future care scheduled
- Health insurance status
- Labs and radiology results
- Medical problems
- Medications
- Name and demographics
- Patient goal(s)
- Recent events (ER, long-term care, preauthorization, missed appointments)
- Social context and community group membership (based on "social determinants of health" model)

Note: The meeting was hosted jointly by the ONC's Beacon Community Program and RWJ's AF4Q Program and included representatives from the following communities: Wisconsin AF4Q; Humboldt County AF4Q, Cleveland AF4Q, Western New York AF4Q, Wisconsin AF4Q, Maine AF4Q, and Southeast Minnesota, Southern Piedmont, Keystone, and Bangor Beacon Communities.

3.2 Collect and aggregate data to feed into care management tools

Once essential data elements and their sources have been identified, data must be collected, aggregated, and operationalized.

Collecting and Aggregating Data

Ideally, health IT facilitates a seamless flow of health-related information across providers and practices to support care management activities. Such a high level of interoperability, however, is rarely present. The Beacon Communities found that, among organizations within the community, there were different

systems, configurations, levels of overall technology adoption, and standards for exchange. Even an organization with a robust EHR may want to exchange data with a registry or public health agency to inform and improve its care management offerings. One theme articulated by Beacon Communities that successfully implemented health IT-enabled care management services is the importance of exercising creative ways to work with disparate data sources. In fact, most Beacon Communities reported using at least some workarounds and adaptations of various tools to meet their data needs. Solutions and workarounds include—

- Manual data extraction and upload or entry
- Scanning paper documents and uploading as PDFs
- Using a different system (i.e., using claims data if it is more accessible)
- Focusing on "low-hanging fruit," or data that is most easily used and exchanged
- Reaching a consensus on national standards to support exchange and interoperability.

Using and Displaying Aggregate Data

With the data collected, Beacon Communities also emphasized the importance of displaying the data to users in the most meaningful way. Packaging data into visualization tools, for example, enables a care manager to act on the information without having to search multiple locations. A simple example is to group decision points by timeframe; assign a traffic light coding system; and present the information in an actionable report (filter by red = overdue, yellow = due in the next 60 days, and green = current). Some recommendations for displaying data to maximize usefulness include—

- Weave data into workflows so that information can better inform point-of-service care decisions.
- Break information into timely, consumable packages.
- Key data are needed during all transitions (within sites of care or across sites of care).
- To avoid information overload, extract only the necessary EHR information necessary and do not replicate the EHR.
- Push information, along with the needed action step, to the next player (e.g., from case management to physician).
- Determine data visualization based on the functional needs of the care team.
- Display the data to indicate high-priority items that provide decision support.
- Prioritize or order information by urgency or severity.

3.3 Create or review and amend existing DUAs to support IT-enabled care management services

DUAs are a core requirement for the exchange of health information of any type. DUAs are legal agreements between two or more organizations detailing the specific terms under which data can be exchanged and used. DUAs establish the terms and boundaries for permissible use of data, provisions for transferring and managing data, mechanisms in place to protect data privacy, and the requirements of each entity participating in data exchange.

Several steps are needed to analyze and amend DUAs and reach consensus. First, identify the organizations that will be sharing the information and determine the direction in which information will flow. Then provide each participating entity with a copy of the existing DUA, if one exists, for review by

their legal counsel. It may be helpful to then have all attorneys discuss whether amendments, changes, or new DUAs are required, as well as the most expedient strategy for achieving consensus and executing the changes. Finally, leadership from each organization works with all stakeholders and the legal teams to complete the task and execute the documents. The entire process, even for communities with some established agreements, can take up to several months.

The Hudson Valley Initiative: Innovators in Health IT-Enabled Care Management

The Hudson Valley Initiative (HVI) is a pioneer in demonstrating the ability to use health IT as a catalyst to achieve health care transformation across a community. HVI is a collaboration of three organizations: (1) Taconic Independent Practice Association (a 5,000+-physician multispecialty IPA), (2) Taconic Health Information Network and Community (THINC, a multi-stakeholder convening organization), and (3) MedAllies (health IT partner). HVI's shared goal is to increase the quality, safety, and efficiency of health care services in New York's Hudson Valley through health IT-enabled care delivery transformation.

Several HVI initiatives use health IT to improve care management. MedAllies Direct Solutions® is a tool that advances patient care transitions across providers and health care organizations. The tool enables patient information to be pushed from one provider's EHR to another provider's EHR, ensuring that the recipient clinician's data is accurate and up to date without disrupting established EHR workflows. MedAllies Direct is currently focused on the sharing of data at two critical transition points: hospital discharge to primary care providers, and between primary care providers and specialists.

Another HVI project that supports care management through the use of health IT is the Taconic's community supported embedded care management (ECM) program. The ECM program deploys nurse care managers to practices to help coordinate care for high-risk patients. The care managers, embedded in the primary care team, actively collaborate with specialists, hospitals, and long-term care providers. The ECM program draws on lessons learned from Geisinger ProvenHealth® Navigator and other successes; however, Taconic designed and implemented its own practice-based approach, targeted for an open community.

HVI's model of leveraging health IT to support population health management, physician practice transformation, and value-based purchasing has led to measurable improvements. Published peer-reviewed evaluations of the HVI experience demonstrate that the use of electronic prescribing significantly decreased the frequency of medication errors[14] and that use of an electronic portal for viewing lab results was independently associated with higher care quality.[15]

Strategic Objective #4: Support Practices in Implementing the Technology and Care Management Approach, Including Revised Clinical Workflows and Change Management

While addressing technical and data implementation needs, communities must also look at the implications for staff responsibilities and workflows. This section will cover the following people-related considerations:

1. Test and refine the technology by working with early adopters.
2. Clarify the roles and responsibilities within the care team, including the information required for each role and the technology tool that will provide it.
3. Redesign clinical and administrative workflows to incorporate new tools and information.
4. Train and prepare users, including care managers, IT and other support staff, and clinicians, for changes in workflow.

4.1 Test and refine technology tools by working with early adopters

A major lesson Beacon Communities learned is to test innovative approaches on a small scale with early adopters. Through this process, both technology and user needs are tested. A pilot test provides valuable feedback to developers on any weaknesses in the technology that should be corrected prior to full release. Pilots also allow a limited number of users to test tools without overwhelming a broader group of stakeholders with new functionality. Importantly, user reactions to technology and seeing how it changes care management workflows enables the community to develop effective training programs and other support resources required to ensure a program's success.

Introducing new workflows is a change management challenge. Care team members can be uncomfortable with new technology and may worry that it will burden day-to-day workloads. As a result, rather than moving forward with large-scale implementation for all patients or an entire organization, it is prudent to do a small-scale trial of a change and then refine implementation strategy based on the lessons learned during that pilot.

A small pilot or prototype will allow for exploring specific design choices by testing various system models and validating new concepts, especially where there are interactions across community organizations. If using a rapid prototyping design and development process, each iteration should include design, architecture, and integration activities. Pilots provide feedback to the project team about the volume, quality, utility, and frequency of data updates. In addition to piloting functionality, early adopters can be an invaluable resource during the design and implementation process. Communities should plan on working with early adopters at each step, including—

- Understanding current workflows
- Validating future-state workflows and how new technology facilitates workflows
- Creating and validating new content (e.g., assessments, reports)
- Testing user acceptance
- Piloting functionality and post-live assessments.

4.2 Clarify the roles and responsibilities within the care team, including the information required for each role and the technology tool that will provide it

Throughout implementation, communities will validate and revalidate both current- and future-state workflows. A first step is to identify which care team members will directly use new tools as well as those who provide and/or receive information necessary to the workflow. To be successful, communities must ensure that the right functional role gets the right actionable information.

To optimize a multidisciplinary care team, make the roles of all team members clear; delineate tasks; and make information available efficiently and promptly. This is especially important when considering a broader community effort where resources outside of the practice or hospital—such as public health workers or community-based care managers—can augment the care team and play a role in patient and caregiver engagement and activation.

While evaluating staff roles and responsibilities, it is important for the organization to consider workload. Care manager caseload is a central issue. One design principle with regard to staffing is to move as much work as possible to the lowest skill level of the care team as allowed by state scope of practice laws.

For instance, once a practice has stratified patients most at risk for admission or readmission to the hospital using available data, staff will need to reach out and contact those patients overdue for a screening or follow-up visit. Instead of care managers primarily focused on clinical disease management conducting this outreach, stakeholders should explore how to diversify workforce roles by focusing on how support staff, medical assistants, or community-based resources in a call center can assume responsibility for these tasks.

Beacon Communities deploying ADT-based alerts, where primary care providers receive notification when their patients have been admitted or discharged from the hospital, likewise found that practices needed to designate a member of the care team to routinely check for and triage alerts and ensure appropriate next steps were taken. Workflow mapping tools can help simplify the task of working through these decision processes.

Reallocating care team responsibilities is a powerful concept, but effective implementation might require certain retraining of medical assistants as well as new decision support tools to support those medical assistants. Such tools might include reconfiguration of care guides from EHRs or development of prompts and reminders adapted in the medical record.

4.3 Redesign clinical and administrative workflows to incorporate new tools and information

The impact of adding IT-enabled care management tools to workflows will vary across organizations and communities. The most common care management workflow revisions involve activities related to communications, including patient status updates to the care team, treatment plan collaboration, and use of information in decision making and action planning. Health IT can also allow the patient to join the communication loop and better participate in his or her own care. Most importantly, workflows must be revised in a way that allows staff to take advantage of new information.

Appendix F: Office Visit Workflow Action Steps provides an example workflow for an office visit for diabetes care and enables one to break out the tasks of what has to be done and by whom, where the

task should take place (e.g., exam room versus ancillary space) and when, to better organize care management efforts.

One of the advantages of using health IT to support care management is improved availability of information for clinical decision making. Evidenced-based guidelines, for example, can be translated into decision support tools that enable more effective care management at the point of service by the care team. Clinical decision support is critical at the point of service to ensure optimal care management. Point-of-service decision support tools might include—

- Standing order protocols
- Use of traffic light signals in care gap reports to indicate patients who have not received all the appropriate treatments for a condition, to flag patients overdue, near due, or complete for screenings or follow-up
- Reminders built into the EHRs providing timely and pertinent information for staff in preparation for pre-visit huddles
- Swim-lane diagrams outlining workflows and who is responsible for a particular task
- Visual cues such as use of "data walls" in the clinic presenting current data for key measures being tracked.

The most difficult transitions with regard to workflow involve the introduction of tools that are completely new to staff or tools that involve a completely new interface. When introducing new tools, it helps to consider the relationship between new tools and old ones. When possible, integrate a new data system or tool with an existing system. This will minimize any confusion and loss of efficiency from moving between IT-enabled care management tools. For instance, it can be very frustrating for staff to flip between screens to access information and enter it. If the existing workflow involves paper records, additional training may be required. In general, leave adequate time for integrating new health IT tools, not only for technical aspects of system configuration and customization but also for staff familiarization with the new technologies.

4.4 Train and prepare users, including care managers, IT and other support staff, and clinicians, for changes in workflow

Technical expertise of care managers, clinicians, and support staff is important to consider when integrating a new health IT into an established workflow. As noted earlier, staff can quickly become overloaded with information. All too often the training of staff in new technologies, tools, and workflows is overlooked or underestimated in terms of need.

One training mechanism increasing in popularity comes from the field of leadership training: *scripting moves,*[16] in which specific guidance is provided to staff about the new health IT tools at various points in the workflow. An example of a scripted move connecting technology to workflows in a clinic would be as follows:

> *Scripted Move for Medical Assistant: Prior to morning huddle confirm panel of patients; query EHR system for gaps in care for each patient; and ensure each gap is assigned to care team member to be addressed according to care protocols. Check for ADT alert messages.*

The addition of a new technology that augments care delivery may require basic technology or literacy training. As tools such as iPads for videoconferencing or smartphones for text messaging are introduced, communities may find it necessary to provide introductory training with these technologies. Beacon Communities experimenting with virtual site visits using iPads, for instance, found that staff required training on the unique aspects of integrating virtual visits—in contrast with clinic visits—into workflow.

The same principles of technology training also apply to patients in the community. Helping patients adjust to new technologies, including home monitoring tools, may require development of training materials and curricula to meet the wide variety of patient cultural contexts.

Strategic Objective # 5: Empower Patients to Take Control of Their Own Health Through Education and Self-Management

Self-activation and self-management as concepts represent a paradigm shift in health care. Care models have historically assumed that patients did not have the health literacy, educational level, or sophistication to understand their disease process and be able to self-manage. Recent research, however, demonstrates that patients who have a higher level of self-activation and believe themselves to be empowered to self-manage have better outcomes than those who do not feel capable of self-managing.[17] A primary aim of care management is to empower patients to become self-activated, better manage their own care, and work with their care teams as partners in health.

Health IT tools can allow patients to regularly and easily communicate with the care management team, whether through home devices that facilitate videoconferencing with a provider, secure messaging capabilities delivered through a patient portal, or monitoring devices in the home that allow patients to easily share daily vital signs or other indicators with their provider. These tools help patients easily access health care providers when they need to, allowing patients to utilize the care management relationship to stay healthier and mitigate problems that can lead to unnecessary hospital visits. The effectiveness of care management efforts is also bolstered by health IT tools that facilitate patient access to their health history, increase health literacy, and deliver interactive tools for tracking progress against health goals.

Stakeholders deploying technology for patient engagement in care management models should—

1. Understand the technology options available to engage patients in their care management.
2. Plan to monitor progress, resolve discrepancies, and overcome challenges.

5.1 Understand the technology options available to engage patients in their care management

Health IT tools to support patient engagement and activation range from patient portals to electronic data capturing technologies, such as in-home monitoring using technology (remote patient monitoring), that result in more accurate and actionable diagnostic information.

Personal health records (PHR), patient portals, and online assessments allow patients to track health information. PHRs and assessments can be connected to EHRs, which further allows patients to communicate with the care team and view health information without having to manually enter it or call the medical records department for a paper copy of a medical record. Patients may track demographic information and health information (e.g., allergies, medications, immunizations), receive recent results,

refill prescriptions, and schedule appointments. Some portals allow patients to run self-monitoring tools on entered data. Most portals offer patients a way to retrieve their data (e.g., .PDF download, Blue Button) so that it can be shared with other doctors or caregivers. In the Southeast Minnesota Beacon Community, patients are able to schedule visits with their care team, view laboratory results, and maintain personal diaries of activity and diet. Email messages also facilitate access to information and avoid unnecessary visits.

In-home monitoring through technology can also be a valuable resource for involving patients in care management by allowing them to receive home care while still reporting data to care providers. Many peripheral devices are available that can be connected through Bluetooth technology. As an example, Western New York Beacon Community conducted a pilot to test preventive telemonitoring for high-risk diabetics. The in-home monitors submit glucose, blood pressure, and weight readings that are transmitted via the HIE and made available on a portal that can be accessed by the patient's care team. From an analysis of the pilot, the Beacon found that many of the patients showed improvement in HbA1c levels and reported having more freedom to carry out their daily life activities.

Align tools with care management goals and change management

How a patient engagement tool aligns with and supports overall care management goals can be a factor in choosing the appropriate solution for an organization or community. A community, for example, focusing on allowing patients to access medical records information may choose to pursue interfaces with medical devices at a later time.

Similarly, stakeholders may need to evaluate not only how well the solution fits with the community's goals but how, in reality, clinical staff will use and interact with the tool. For example, secure messaging via a PHR may support a community's goal to improve efficiency and openness of communications between a patient and care team. A successful implementation, however, would require appropriate staff at the clinic to check for messages and respond in a timely manner. An overwhelmed practice may need additional training or support before being able to fully adopt the new system and workflows.

5.2 Plan to monitor progress, resolve discrepancies, and overcome challenges

Stakeholders may benefit from evaluating progress toward meeting patient engagement goals and integrating this information with other operational measurement reports. Some organizations, for example, found it helpful to roll out new tools for patient engagement in phases to avoid overwhelming patients as well as clinicians. This monitoring informs decisions about the overall success of the project and can also identify barriers to further engagement through health IT.

In terms of system adoption, patient engagement challenges can result from processes as well as technology. Common challenges include the following:

- Some organizations struggle with how best to use and integrate patient-provided data because of its potential unreliability. The data is not clinically validated and may include errors or discrepancies, such as a common scenario in which a patient reports a prescription but forgets the name, instead calling it "a white, round pill." If data conflicts with what already exists in the medical record, they must understand how to resolve the differences in the system.

- Consent, credentialing, and authentication security workflows for accessing patient records can also present challenges to practices. They must have a way to inform patients about, for example, a PHR, receive consent to pull EHR data into the PHR, and capture the necessary documentation to create a unique credential (e.g., user name and password) for that user. Minor patients can be particularly challenging. Parents may insist on having access to a teenager's health record, for example, which could raise both legal and technical questions.
- Some organizations insist on a delay before lab results reach a patient's PHR to give physicians opportunity to contact the patient to discuss the results, particularly when results are abnormal. This can be less confusing for the patient as well as more personable. This may be dependent, however, on the PHR and EHR vendor(s). At a minimum, it is preferable that lab results be accompanied by a reference range and other information that explains the result in patient-friendly language.

Creating clear, defined policies around patient engagement and use of patient information prior to implementation helps to improve the experience for patients and staff by addressing issues in advance.

Although patient satisfaction is important for any IT-enabled care management services, it is perhaps most important for technology tools used directly by patients to help them and their care managers. The capacity to capture important information about the patient's health, such as weight or blood glucose levels, is only effective if patients feel confident in their use and the process isn't a burden. In addition to outcome metrics such as QI, measuring patient satisfaction for IT-enabled patient engagement services is critical. A patient satisfaction scale provides a relatively simple but effective way to capture patients' experiences with the technology and allows care managers to identify potential areas of improvement.

Looking Ahead

IT-enabled care management tools will continue to evolve as care management concepts advance and market demands change. IT-enabled care management tools will only be effective if they successfully support those who are delivering, managing, or receiving care. The following are a few key areas for consideration as communities continue to build on our current understanding of the value and effectiveness of these tools in an evolving landscape:

- Understanding Risks Across Patient Populations. Given the growing trend of patients with chronic conditions, many players in the market are investing in technologies to better understand their population and their risk profiles—including payers, communities, medical groups, hospitals, and public health departments. These risk stratification tools are not all created equal; for example, some tools do better at predicting risk of health care use for the elderly and disabled population. In addition, these tools are only as good as the underlying data that feeds into them. As more and higher-quality data become available and as predictive analytic tools evolve, it is important to evaluate whether the piloted tools systematically identify the population that would derive the greatest benefit from care management.
- Workflow Impact. Care management tools that are designed to directly impact the clinical workflow must be regularly evaluated to be sure that the tool itself does not inadvertently introduce suboptimal care or even introduce errors. For example, it is vital that timely updates

be made in accordance with evolving evidence (standards of care, recommended screening, tests, or treatment) to support clinical decision making. Technical diagnostics and regular use case testing can help communities continuously monitor the effectiveness of their tools.

- Design for the User. An area of rapid IT evolution is the field of user design and experience—and care management tools are no exception. Tools that take the user design and experience research into account have the potential to address real problems of information overload and user engagement. For example, visual displays to help the care manager prioritize cases and actions; dashboards to help clinicians understand trends in a patient's HbA1c levels over time; and verbal prompts and reminders are all technological possibilities that exist now or are in development. Patient engagement tools have the potential to capture patient-generated data that can be used to enhance patient data available through HIE systems or an EHR. These tools can empower patients to prevent the onset of chronic conditions and actively manage existing conditions.
- Value. As communities continue to evaluate the clinical and cost-effectiveness of IT-enabled care management tools and models and determine their ability to improve clinical outcomes, dissemination of that information will help other communities design their own systems. Beacon Communities are testing a number of different methods to measure and evaluate their programs. As more data becomes available, communities can pool their knowledge into a core set of effective tools for creating and measuring impact. Care management tools that can generate reports and that are easily understood by decision makers (e.g., dashboards on quality of care, cost, and use trends) are especially valuable to facilitate continued evaluation.
- Health Care Payment Reform. The reimbursement landscape is in the midst of dramatic change from the fee-for-service-dominated model to a value-based payment model. Care management has been demonstrated to improve care delivery, and new investments in health IT tools to enhance care management have seen promising early results. Thus, provider organizations investing in health IT tools to support care management are well-positioned to derive benefit from payment arrangements that offer shared saving and incorporate accountability for care outcomes.

Over the coming years, we will see development of new tools and the refinement of existing strategies, combined with an increased focus on patient engagement. These elements, joined with a growing body of knowledge about the impact of IT investments and new payment models will drive progress in IT-enabled care management. These advances will support providers as they deliver coordinated, patient-centered care resulting in better care and ultimately better health.

Appendices

Appendix A: IT-Enabled Care Management in Beacon Communities

Exhibit A: Summaries of IT-Enabled Care Management in Select Beacon Communities

Beacon Community	Health System Community Characteristics	Care Management Model(s)	Target Population(s) for IT-enabled Care Management	Technological Infrastructure
Bangor Beacon Community (Maine) Bangor Beacon Community	**Lead Grantee:** Eastern Maine Healthcare Systems (EMHS) **Geography:** Covers several counties in Maine across the Bangor Hospital Service Area including: Penobscot, Piscataquis, Hancock, Waldo, Somerset **Provider Participation:** • 150 primary care providers • 3 hospitals • 2 Federally Qualified Health Centers and community health clinics	• Nurse care managers embedded in primary care practices • Behavioral health care managers embedded in mental health clinics	• Patients with diabetes, COPD, congestive heart disease, asthma, and mental health	• A statewide HIE (HealthInfoNet) that served as a backbone connecting primary care practices, hospitals, specialists, homecare facilities, public health agencies, long-term care facilities • Data warehouse supporting data analytics • Remote monitoring technology, including automated medication dispensers, weight monitors, and blood glucose monitors • Secure file transfer protocols (FTPs) for connecting providers and care managers to other providers and care managers • Community wide adoption of EHRs

Beacon Community	Health System Community Characteristics	Care Management Model(s)	Target Population(s) for IT-enabled Care Management	Technological Infrastructure
Greater Cincinnati Beacon Collaboration (Ohio)	**Lead Grantee**: HealthBridge **Geography:** 16 counties across three states in Greater Cincinnati metro area which includes Ohio, Kentucky, and Indiana **Provider Participation:** • 725 physicians • 18 hospitals • 7 FQHCs and community health clinics	• Care managers embedded in provider practices	• Pediatric asthma • Adult diabetes	• HIE (HealthBridge) • EHRs and Meaningful Use • Developed Direct, used a secure messaging system for ED/Admissions alerts for patients with diabetes or asthma • Integrated registry with advanced care management features • Electronic risk assessment tool

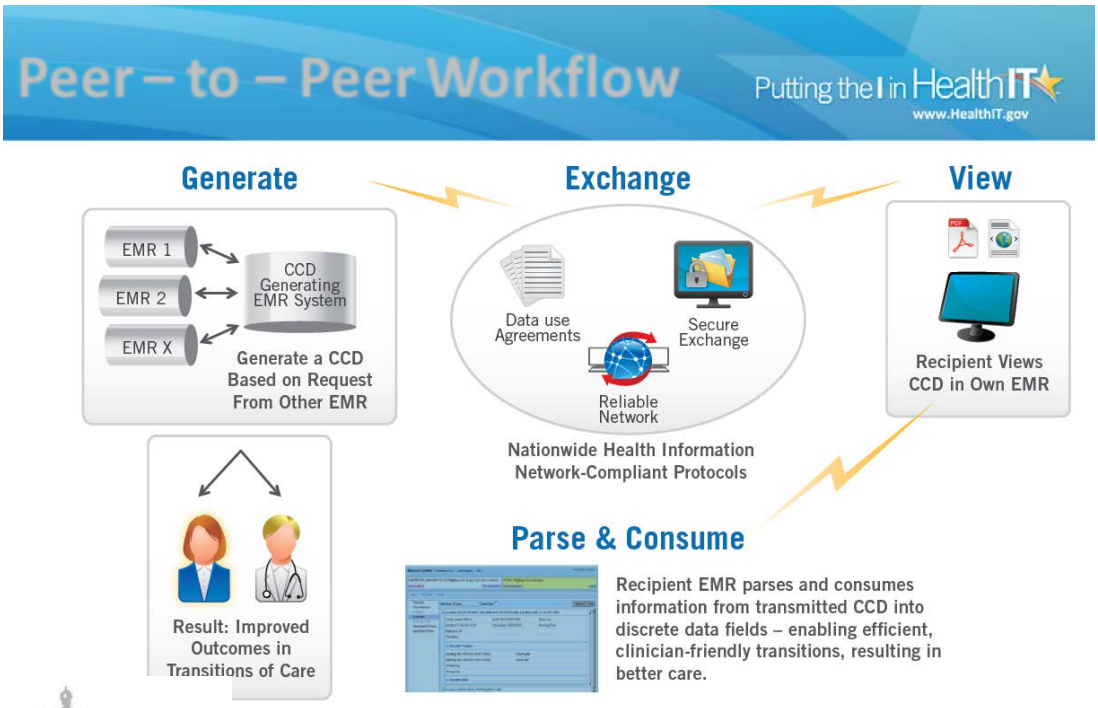
Beacon Community	Health System Community Characteristics	Care Management Model(s)	Target Population(s) for IT-enabled Care Management	Technological Infrastructure
Keystone Beacon Community (Pennsylvania)	**Lead Grantee:** Geisinger Health System **Geography:** Five counties in central Pennsylvania, including Columbia, Montour, Northumberland, Snyder & Union **Provider Participation:** • 54 providers • 4 hospitals	• Care managers embedded in provider practices • Nurse care managers deployed to inpatient hospital settings. • Community level, remote call center was tested in which care managers contact patients by telephone for follow up	• High risk patients with COPD and CHF discharged from hospital	• HIE (KeyHIE) providing secure data transport serving 286 care sites and 4.4 million patients • Direct, secure, transmission of health information using KeyHIE DIRECT, which allows information to be sent to clinicians who participate in KeyHIE • A personal health record (MyKeyCare) that allows individuals to view their historical healthcare information from all KeyHIE participating clinicians, scan/upload additional health information, and share additional information • A software tool that transforms patient assessment information from long-term care facilities and home health organizations without an EHR into a standard Continuity of Care Document format that can be read through KeyHIE • Use of a case management software (called Wisdom) by care managers to capture information about post-discharge follow up, scheduling of outpatient physician visits, care gaps, and other information required for coordinating care • Bluetooth scales for in-home remote monitoring of weight gain in CHF patients • Interactive Voice Recognition technology for outbound reminders to patients regarding flu vaccine reminders

Beacon Community	Health System Community Characteristics	Care Management Model(s)	Target Population(s) for IT-enabled Care Management	Technological Infrastructure
Southeast Minnesota Beacon Community 	Lead Grantee: Mayo Clinic **Geography:** Covers 11 counties including: Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Rice, Steele, Wabasha, Winona **Provider Participation:** • 2,500 providers involved • 5 hospitals	• Care managers embedded in provider practices	• Pediatric asthma • Adult Type II diabetes	• Secure, NwHIN standards-based exchange via the CONNECT open source solution • Peer-to-peer health information exchange software with iPad interface • A clinical data repository (CDR) with quality measures reporting hosted at the Regenstrief Institute • A portal enabling authorized school based care coordinators to access student asthma action plans and hosted by the Olmstead County Public Health Department • A web enabled portal providing access to CCD records for authorized public health nurses acting as in-home care managers

Beacon Community	Health System Community Characteristics	Care Management Model(s)	Target Population(s) for IT-enabled Care Management	Technological Infrastructure
Southern Piedmont Beacon Community (North Carolina)	**Lead Grantee:** Community Care of Southern Piedmont **Geography:** Covers 3 counties including: Cabarrus, Rowan, Stanly **Provider Participation:** • 230 providers involved • 3 hospitals • 1 Federally Qualified Health Center and community health (3 sites)	• Care managers embedded in hospitals. • Care managers embedded in single primary care practices. • Community-based care managers deployed to and supporting multiple practices. • Care management teams including RNs, pharmacists, social workers, respiratory therapists, clinical services navigator for diabetes and CHF, and pharmacy technicians	• Patients with COPD, CHF, and diabetes • Patients experiencing care transitions	• A data warehouse and analytic tools that aggregate administrative claims data for Medicaid and selected data from 10 partner organizations including hospitals, public health agencies, FQHCs, and 73 primary care practices • Clinical decision support for identifying gaps in care, inappropriate service utilization, and medication adherence issues • Disease registries enabling tracking of patients • A care management information and care coordination system, including patient information summaries and longitudinal records • A provider portal with secure messaging • Web-accessible scheduling (24/7)

Appendix B: Peer-to-Peer HIE Framework

Exhibit B: Peer-to-Peer HIE Developed by Southeast Minnesota Beacon Community



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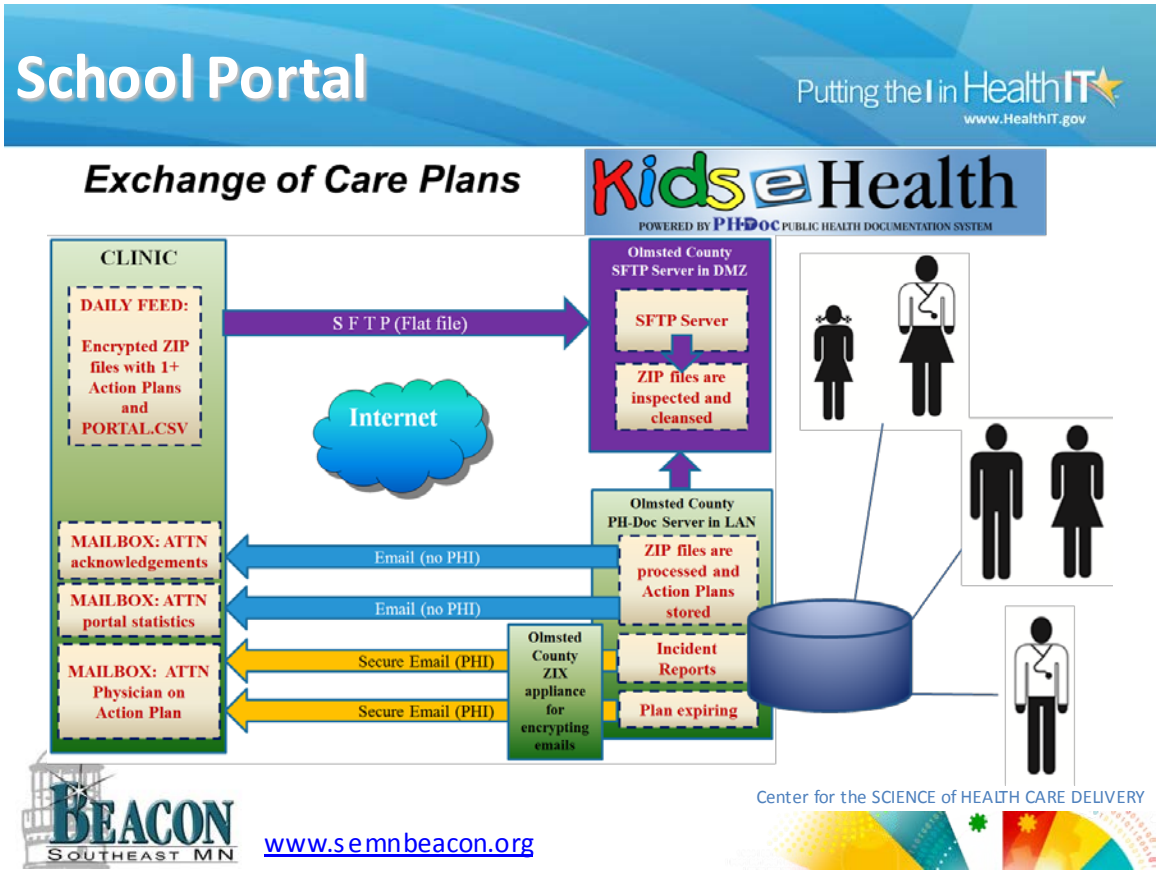
Appendix C: Strategic Objectives Summary

Exhibit C: Strategic Objectives and Action Steps

#	Strategic Objective	Actions
1	**Build collaboration, consensus, and commitments among key stakeholders around shared goals for IT-enabled care management**	1. Engage appropriate champions, partners, and stakeholders 2. Clarify and articulate the value proposition and funding requirements for implementing IT-enabled care management services 3. Reach a consensus across stakeholders about IT-enabled care management goals and most important functions 4. Assess readiness to use health IT as part of care management
2	**Identify and select health IT tools to drive care management goals**	1. Identify and select health information technologies that support the community's health IT-enabled care management goals 2. Consider the most appropriate care management model to implement the selected IT tools 3. Determine how the health IT-enabled care management efforts will be measured and evaluated
3	**Identify data elements and data sources, and establish DUAs necessary to support care management**	1. Determine necessary data elements and identify their sources 2. Collect and aggregate data to feed into care management tools 3. Create or review and amend existing DUAs to support IT-enabled care management services
4	**Support practices in implementing the technology and care management approach, including revised clinical workflows and change management**	1. Test and refine the technology by working with early adopters 2. Clarify the roles and responsibilities within the care team, including the information required for each role and the technology tool that will provide it 3. Redesign clinical and administrative workflows to incorporate new tools and information 4. Train and prepare users, including care managers, IT and other support staff, and clinicians, for changes in workflow
5	**Empower patients to take control of their own health through education and self-management**	1. Understand the technology options available to engage patients in their care management 2. Plan to monitor progress, resolve discrepancies, and overcome challenges

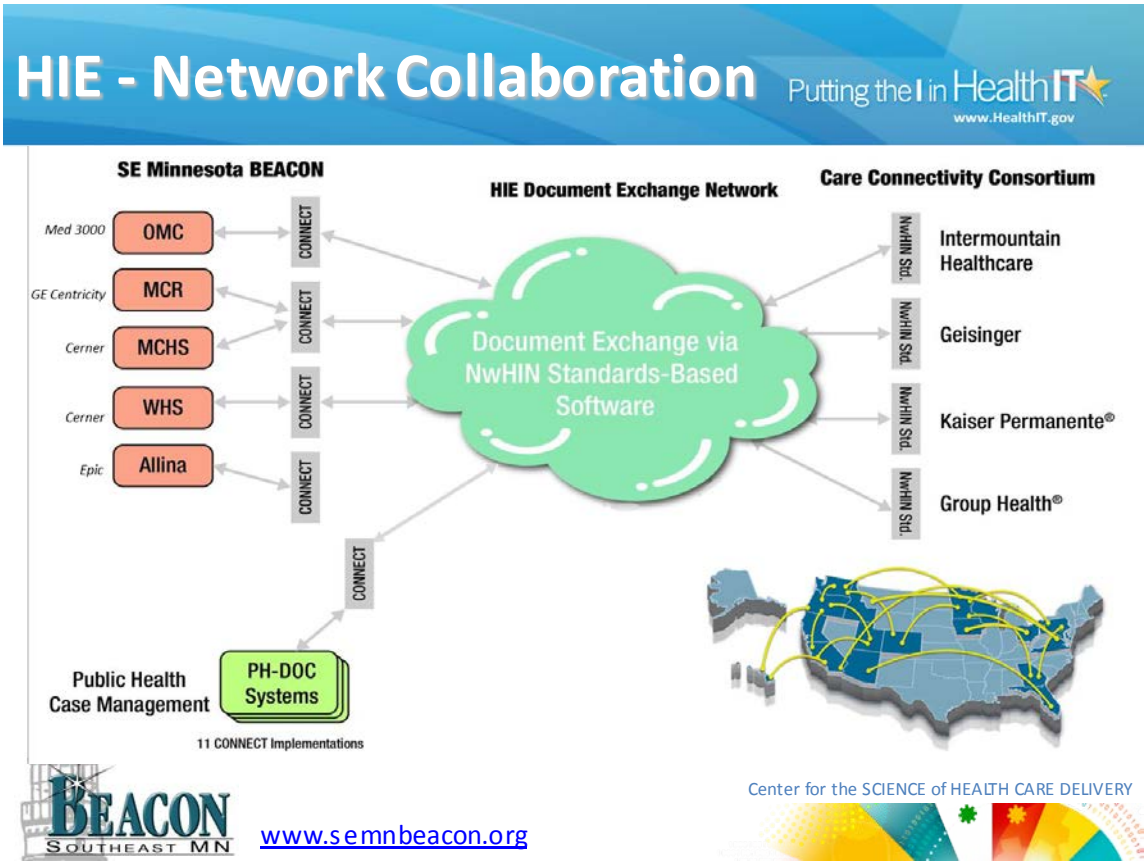
Appendix D: Community Partnership to Improve Asthma Care for School-Age Children Through Health IT

Exhibit D: Electronic Data Exchange to Support Care Management of Children with Asthma in Southeast Minnesota Beacon Community



Appendix E: Network Architecture of Community-Wide Health Information Exchange

Exhibit E: Architecture of Southeast Minnesota Beacon Community's HIE



Appendix F: Office Visit Workflow Action Steps

Exhibit F: 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 Family Health Services

Appendix G: Acronyms and Definitions

Exhibit G-1: Acronyms

Acronyms	
ACA	Affordable Care Act
ACG	Adjusted Clinical Group
ACO	Accountable Care Organization
ADT	Admission, discharge, and transfer
AF4Q	Aligning Forces for Quality
AHRQ	Agency for Healthcare Research and Quality
ARRA	American Recovery and Reinvestment Act
AVS	After-Visit Summary
CCA	Care Coordination Agreement
CCD	Continuity of Care Document
CCHMC	Cincinnati Children's Hospital Medical Center
CCM	Complex Care Management
CCRA	Care Coordination Readiness Assessment
CCR	Continuity of Care Record
CDR	Clinical Data Repository
CM	Case Management
CMIS	Case Management Information System
CMS	Centers for Medicare & Medicaid Services
DIMS	Diabetes impact measurement scale
DM	Disease Management
DQOL	Diabetes quality of life measure
DUA	Data Use Agreement
ED	Emergency Department
EHR	Electronic Health Record
EMR	Electronic Medical Record
ETG	Episode Treatment Group
FQHC	Federally Qualified Health Center

HHS	Health and Human Services
HIE	Health Information Exchange
HIO	Health Information Organization
HIPAA	Health Information Portability and Accountability Act
Health IT	Health Information Technology
HITECH	Health Information Technology for Economic and Clinical Health
HL7	Health Level 7
HRSA	Health Resources and Services Administration
IVR	Interactive voice recognition
MIIC	Minnesota Immunization Information Connection
MCC	Multiple Chronic Conditions
MPI	Master Patient Index
MR	Management Review
MU	Meaningful Use
NC-HIP	North Carolina-Health Information Portal
ONC	Office of the National Coordinator for Health IT
PAM	Patient Activation Measure
PBM	Pharmacy Benefit Management
PCP	Primary Care Provider
PCMH	Patient-Centered Medical Home
PHI	Personal Health Information
PHQ	Patient Health Questionnaire
PMPM	Per member per month
PROQOL	Patient-Reported Outcome Quality of Life
QA	Quality Assurance
QC	Quality Control
QI	Quality Improvement
REC	Regional Extension Center
ROI	Return on investment
SA	Service Agreement

SBIRT	Screening, Brief Intervention, and Referral to Treatment
SOA	Service-Oriented Architecture
TOC	Transition of Care
UI	User Interface
UM	Utilization Management
UR	Utilization Review
VPN	Virtual Private Network

Exhibit G-2: Definitions

Definitions	
Care Coordination	The deliberate organization of patient care activities between two or more participants involved in a patient's care to facilitate the appropriate delivery of health care services.[18]
Care Coordination Agreement (CCA)	Written agreements that articulate the respective responsibilities of two or more providers or entities for ensuring coordination of patient care over a specified time period. CCAs are typically executed between a PCP and a partner, including a specialty practice, hospital, long-term care provider, urgent or emergent care provider, or community-based organization.[19]
Care Management (CM)	A set of activities whose objectives are to assist patients and their support systems in managing medical and behavioral conditions to improve patients' functional health status, enhance the coordination of care, eliminate the duplication of services, and reduce the need for expensive medical services.[20]
Continuity of Care Record (CCR)	A health summary standard designed to contain the most relevant and timely key health information about a patient, such as patient demographics, insurance information, diagnoses and problem list, medications, allergies, and care plan.
Health Information Exchange (HIE)	The secure electronic movement of health-related information among organizations according to nationally recognized standards. By allowing a patient's data to exist within a community, rather than a single system, HIE facilitates many care management data-related needs, including (1) access to patient clinical information across various health care organizations, (2) coordination of care, (3) the ability to maintain and access metrics to show outcomes of patient care, (4) the ability to use electronic transmission of data to payers and insurers, (5) the ability to automate with EHRs to capture more data, and (6) the ability to engage consumers with services to accelerate services such as scheduling, physician communication, and request for records.
Data Exchange/ Interoperability	Data exchange interoperability refers to standards for the exchange of health information and data, including terminology, vocabulary, and messaging structure. These standards allow the health information being exchanged to be interpreted by the receiving systems and users and aggregated with data from other sources, such as other practices or hospitals, to produce a complete view of a patient's medical record for care managers and other care providers.
Care Management Systems	Software solutions or applications for common care manager workflows. Common functionality includes care plans, population stratification and predictive modeling, and time management tracking.
Clinical Data Repository	A central database of patient-centric health data.

Clinical Decision Support (CDS)	CDS provides clinicians, staff, patients, or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and health care. CDS encompasses a variety of tools to enhance decision making in the clinical workflow. These tools include computerized alerts and reminders to care providers and patients; clinical guidelines; condition-specific order sets; focused patient data reports and summaries; documentation templates; diagnostic support; and contextually relevant reference information. A common CDS for care coordination involves having hospitals send notifications to a PCP or care manager when a patient visits the ED, is admitted to the hospital, or is discharged.
Disease Management	A system of coordinated health care interventions and communications to help patients address chronic disease and other health conditions.
Master Patient Index	Part of an overall master data management strategy that focuses on matching the identities of individual patients scattered across disparate care settings (for more information, see http://www.healthit.gov/sites/default/files/master_data_management_final.pdf)
Patient Engagement	The engagement of patients and their families in patients' health care is a prominent goal of the EHR Incentive Program (also called *Meaningful Use*). As the second of five health policy priorities, this policy priority aims to improve patients' understanding of their health and related conditions so they take a more active role in their health care. It also encourages the involvement of patients' families, as many patients depend on their support. Giving patients access to their health information and providing them with tools to electronically communicate with their clinical care team are two IT-enabled approaches for making health care more patient-centered.
Project BOOST	A national initiative led by the Society of Hospital Medicine to improve the care of patients as they transition from hospital to home. The main objectives include identifying high-risk patients on admission and targeting risk-specific interventions; reducing 30-day readmission rates for general medicine patients; reducing length of stay; improving facility patient satisfaction and H-CAHPS scores; and improving information flow between inpatient and outpatient providers. For more information on Project BOOST, see http://www.hospitalmedicine.org/AM/Template.cfm?Section=Home&CONTENTID=27659&TEMPLATE=/CM/HTMLDisplay.cfm.
Regional Extension Center (REC)	ONC has funded 62 RECs across the country to help more than 100,000 PCPs adopt and use EHR. The focus of the RECs is to provide on-the-ground assistance for individual and small practices; medical practices lacking resources to implement and maintain EHRs; and those who provide primary care services in public and critical access hospitals, community health centers, and other settings that mostly serve those who lack adequate coverage or medical care. More information about RECs can be found at http://www.healthit.gov/providers-professionals/regional-extension-centers-recs.

Screening, Brief Intervention, and Referral to Treatment (SBIRT)	A comprehensive, integrated, public health approach to the delivery of early intervention and treatment services for persons with substance use disorders, as well as those who are at risk of developing these disorders. Primary care centers, hospital emergency rooms, trauma centers, and other community settings provide opportunities for early intervention with at-risk substance users before more severe consequences occur. For more information, see http://www.samhsa.gov/prevention/sbirt/.
Service Agreement	See Care Coordination Agreement (CCA).

Appendix H: Endnotes and Works Cited

Endnotes

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[1] Machlin, Cohen & Beauregard, 2005; Soni, 2007; Anderson, 2010.

[2] Wagner,1998.

[3] Bodenheimer & Berry-Millett, 2009

[4] The MU criteria for basic EMR/EHR system adoption includes functionality in all the following areas: patient history and demographics, patient problem lists, physician clinical notes, comprehensive list of patients' medications and allergies, computerized orders for prescriptions, and ability to view laboratory and imagine results electronically. See Hsiao & Hing, 2012.

[5] Service agreements and care coordination agreements are often used synonymously to refer, broadly, to written agreements articulating respective responsibilities for two or more entities for ensuring coordination of patient care. There are two main types of agreements: master service agreements, which specify how providers will conduct referrals and manage care transitions; and co-management agreements, in which specific understandings about the division of tasks for managing patients with particular conditions are established. See Carrier, Dowling & Hoangmai, 2012.

[6] Marchibroda, 2008.

[7] Dorr, et al., 2007.

[8] Shared Savings Program, Centers for Medicare and Medicaid Services. Retrieved on June 28, 2013 from http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/index.html?redirect=/sharedsavingsprogram/.

[9] Beacon Community of Inland Northwest's Care Coordination Readiness Assessment (CCRA) helps practices evaluate their readiness to particulate in IT-enabled care coordination. The tool is embargoed at the time of this writing because it is awaiting publication.

[10] For instance, Marchibroda (2008) aligns IT-enabled tools for care management with the four strategies for quality improvement in Wagner's chronic care model (CCM): data sharing for

performance measurement, engaging consumers, improving health care delivery, and aligning benefits and finances.

[11] Lobach, et al.,2012.

[12] Project BOOST is a national initiative led by the Society of Hospital Medicine to improve the care of patients as they transition from hospital to home. Key objectives are to identify high-risk patients on admission and target risk-specific interventions, reduce 30-day readmission rates for general medicine patients, reduce length of stay, improve facility patient satisfaction and H-CAHPS scores, and improve information flow between inpatient and outpatient providers.

[13] Marchibroda, 2008; Dorr, et al., 2007.

[14] Kaushal, et al., 2010.

[15] Kern, et al., 2008.

[16] Heath & Heath, 2010.

[17] Hibbard & Greene, 2013a. Hibbard & Greene, 2013b.

[18] McDonald, et al., in Shojania, McDonald, Wachter & Owens, eds, 2007.

[19] Carrier, Dowling & Hoangmai, 2012.

[20] Bodenheimer & Berry-Millett, 2009.

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