FINAL REPORT

Evaluation of the Beacon Community

Cooperative Agreement Program

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Executive Summary

This report summarizes the methods, findings, and policy implications of the national evaluation of the Beacon Community Cooperative Agreement Program.

I. Introduction

In 2010, the Office of the National Coordinator for Health Information Technology (ONC) established the Beacon Community Program, awarding $250 million across 17 Communities to build and strengthen their health information technology (IT) infrastructure in support of clinical transformation efforts. The goals of the program were to improve health care quality and outcomes while lowering the overall cost of care by:[1]

- building and strengthening health IT infrastructure and exchange capabilities within Communities;
- using investments in health IT to achieve measurable 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.

NORC Evaluation

In 2011, ONC funded NORC at the University of Chicago (NORC) to design and conduct a four-year independent evaluation of the Beacon Community Program. The evaluation aimed to: (1) characterize the Beacon Communities, (2) assess their progress in building and strengthening their health IT infrastructure and leveraging this infrastructure to achieve clinical transformation, and (3) assess the impact of the program. Our evaluation consisted of formative, process-oriented assessments to understand the baseline infrastructure and composition of each Beacon Community; summative analyses that distill lessons learned about structures and processes that build infrastructure and transform clinical care; and analyses to measure changes in health care quality, efficiency, and population health.

The Changing Health Care Landscape: Advances in Health IT and Payment and Service Delivery Reform

The Beacon Community Program launched at a time of significant investment in and attention to health IT and clinical service delivery reforms, which affected Beacon Community initiatives in diverse and sometimes unanticipated ways.

Advances in Health IT Adoption and Use

Since passage of the Health Information Technology for Economic and Clinical Health (HITECH) Act in 2009, health IT and clinical services delivery have undergone changes and advances. HITECH spurred investments to promote the adoption and meaningful use of health IT to improve quality of care and outcomes and reduce health care costs. Adoption rates of health IT and electronic health records (EHRs), among both large and small providers, and engagement in exchange increased. Other HITECH-funded initiatives include the Medicare and Medicaid EHR Incentive Programs,[2] State Health Information

Exchange (HIE) Program,[3] HIE Challenge grants,[4,5] Regional Extension Center (REC) Program,[6] and IT Professionals in Health Care (Workforce) Program. The Beacon Community Program served as a capstone to these other HITECH initiatives, complementing and informing other efforts to spur the adoption and meaningful use of health IT. In addition, both private and public sector health care systems and organizations have focused more intensively on clinical practice transformation and active use of data. For the purposes of this report, we define clinical transformation as "assessing and continually improving the way patient care is delivered at all levels in a care delivery organization. It occurs when an organization…embraces a common goal of patient safety, clinical outcomes and quality care through process redesign and IT implementation...."[7] The key drivers of clinical transformation—quality measurement and payment, health IT, and quality improvement collaboratives—were central features of the Beacon Community Program. Through the program, Communities also endeavored to develop the infrastructure to exchange data and enable a learning health care system. Thought leaders and policymakers envision a learning health care system as the path to improved quality of health care,[8,9] through a system with the capacity to capture timely data about care provided and the results of that care, and to enable practitioners to use those data effectively and efficiently to deliver care to their patients.[10]

Payment and Clinical Service Delivery Reform

Concurrently, stimulated by the Affordable Care Act (ACA), the health care system advanced efforts promoting changes to health care service delivery and reimbursement. Several of these policies and programs established under the ACA overlapped with Beacon Community efforts, including the State Innovation Model (SIM) Awards,[11] Health Care Innovation Awards (HCIA),[12] Comprehensive Primary Care Initiative (CPCI),[13] and Community-Based Care Transitions Program (CCTP).[14]

The rise of accountable care organizations (ACOs)—groups of doctors, hospitals, and other health care providers who come together voluntarily to give coordinated high quality care to their Medicare patients[15]—also led to more opportunities for Beacon Communities to leverage payment reform efforts to further their goals. CMS offers several ACO programs, including the Medicare Shared Savings Program, which helps Medicare fee-for-service (FFS) program providers to become an ACO;[16] the Advance Payment ACO Model, which supplements some Shared Savings Program participants, primarily physician-based and rural providers;[17] and Pioneer ACO Model for early adopters of coordinated care moving from a shared savings to a population-based payment model.[18]

The Beacon Community Program complemented this broader federal strategy of supporting innovative models of care coordination and chronic disease management to improve both individual and population health outcomes while reducing health care costs.

II. Methods

NORC used mixed methods and addressed three aims to evaluate the Beacon Community Program:

■ Characterize the Beacon Communities to identify elements that are distinctive to particular Communities and those that are common across groups of Communities.

- Examine approaches to building and strengthening health IT and performance measurement infrastructures and their role in transforming clinical practice; identify the factors that facilitated and impeded this work.
- Assess the impact of Beacon Community efforts to transform clinical care and care delivery.

Qualitative Data Collection and Analysis

NORC undertook a range of qualitative data collection activities under this evaluation. NORC conducted a systematic review of proposals and operational plans and Communities' final reports. In addition, NORC conducted site visits to seven Communities. We also conducted two rounds of telephone interviews, initially with all Communities from March 2011 to February 2012, and then in March and April 2012 with the 10 Communities that did not receive site visits.

Quantitative Data Collection and Analysis

NORC conducted a descriptive analysis, using secondary data from multiple sources to calculate area-wide characteristics of the context in which each Beacon Community operated, including demographics, population health status, health care market features, and health IT use. In addition, we conducted an impact analysis using Medicare claims data to address the extent to which health care utilization for the intervention group—Medicare FFS beneficiaries over age 65 who saw providers participating in Beacon Community initiatives—differed from outcomes in two comparison populations:

- Medicare beneficiaries over 65 years of age who were within the Beacon Communities but not exposed to the intervention; and
- Individuals drawn from a propensity score–matched national sample of Medicare beneficiaries that excluded anyone in a Beacon catchment area.

We also made a third comparison—between all Medicare beneficiaries in the Beacon Community catchment area and a propensity score–matched national sample of similar Medicare beneficiaries, to examine more general trends in the performance of Communities relative to national trends, and observe any spillover effects.

We used difference-in-differences (DiD) estimation as the primary analytic approach appropriate for comparing outcomes between the intervention and comparison groups while controlling for potential biases stemming from differences between the two groups' characteristics and comparisons over time. We analyzed outcomes at the person-year level, reporting report the DiD for 2010 (pre) compared to 2013 (post), modeling outcome measures using multivariate logistic regression.

III. Characteristics of Beacon Communities: Population, Market, Health Status, and Health IT

Beacon Communities were diverse in their geographic location, size, population density, and demographic composition. As a group, the Communities were similar in many ways to the general U.S. population. Unique features of each, however, suggested they would require Community-specific approaches to health IT infrastructure and clinical transformation efforts.

Locations. The 17 selected Beacon Communities represented a geographically diverse set of areas—from Bangor, Maine to Hilo, Hawai'i. Beacon Communities tended to be located near population centers, although several served rural regions. Community urbanicity depended on how the Beacon awardee defined the geographic boundaries of its particular Community (by MSA, county, or multi-state region).

Population Characteristics. Beacon Communities' racial and ethnic composition mirrored that of the U.S. for the white population but represented higher proportions of black or African American, native Hawai'ian or Pacific Islander, multiracial and "other" groups. Diversity across Beacon Communities was broad; the white population ranged from 23 to 95 percent and the percent black or African American from 1 percent to 69 percent. Beacon Communities represented a wide spectrum of socio-economic status, with the proportion of the population living in poverty ranging from less than 10 percent to over 30 percent. Beacon Communities had health uninsurance rates that closely mirrored the U.S. rate of 17 percent.

Population Health Status and Clinical Focus Areas. Beacon interventions primarily targeted diabetes, cardiovascular care, asthma, and chronic obstructive pulmonary disease (COPD)—common chronic conditions across the U.S. with high rates of illness, mortality, and cost.

Health Care System Capacity and Characteristics. Among the Beacon Communities, the average number of primary care providers per 100,000 people ranged from 101 in the Delta BLUES catchment area to 570 in the Southeast Minnesota catchment area. The number of hospital beds per 100,000 people ranged from 173 in San Diego to 486 in Western New York. Across the Beacon Communities, the Herfindahl-Hirschman Index (HHI), a measure of market competition, ranged from 0.15 in San Diego (reflecting low concentration, and the most competitive market among the Beacon Communities) to 0.49 in Southeastern Minnesota (reflecting moderate to high concentration and the least competitive market among the Beacon Communities).

Sophistication in Health IT Adoption and Use. The level of existing health IT capacity within a Community played an important role in the activities and outcomes of the Beacon Communities, and varied substantially across Communities. In 2010, level of EHR adoption among hospitals in Beacon Communities as a whole was close to the national average of 16 percent—but with Communities ranging from less than half of 1 percent in the Colorado catchment area to 47 percent in Southeast Michigan. In sharp contrast, EHR adoption among ambulatory providers as of 2010 was over 50 percent in 10 of the Beacon Communities, compared to the national average of 47 percent. Beacon providers' access and connectivity to a health information organization (HIO) were typically higher than the national average in 2009, but varied across Communities. Most hospitals in Beacon Communities had access to an HIO in their area. In only three Communities was the proportion of hospitals with HIO access lower than the national average. Despite having HIO access, however, not all hospitals were connected to one. The share of hospitals participating in an HIO ranged from 0 percent to 72 percent, with 10 Communities having a higher rate of hospital HIO participation than the national average of 23 percent.

IV. Approaches to Transforming Clinical Care by Building and Strengthening Health IT

Beacon funding provided Communities an opportunity to strengthen or expand existing health IT infrastructure or build new solutions to support clinical transformation. Communities also implemented diverse clinical interventions to support care management, enhance the availability of clinical information, and improve transitions of care.

Infrastructure Development and Data Sharing. Most Beacon Communities (10) strengthened or accelerated the expansion of existing platforms for HIE, while the rest established new vehicles for exchange. Communities accelerating or strengthening existing efforts upgraded software or systems, expanded services, and funded connections with new exchange partners and other data sources. Those creating new solutions established data repositories or disease registries, or connected providers not previously capable of data exchange. Relationships with state and regional HIOs within catchment areas typically aligned with approaches to data sharing, and most Communities (13) used HIOs to facilitate data sharing; the rest were associated with statewide HIE systems.

Enhancing IT-enabled Care Management. All Communities implemented interventions to support care management, with most supporting care management workflow processes in the hospital or clinic setting as well as remotely. Eleven Communities enhanced care managers' work with health IT systems and tools, such as a common EHR or dedicated care management database.[19] Ten promoted patient engagement and self-care with diverse interventions—including patient portals, data repositories, personal health records, in-home telemonitoring of blood sugar levels, and mobile device applications. In addition, seven Communities helped practices meet PCMH requirements using EHRs, HIE services, and other health IT tools to manage and support coordinated care, while seven used telehealth to offer services and incorporate data from beyond the clinical encounter to improve accessibility and timeliness of services and information for providers and patients. Telehealth interventions included virtual home visits and remote monitoring; in some cases, telehealth data were integrated into EHRs via the HIE system. Three Communities implemented medication therapy management (MTM) programs, including integrating medication management directly into care strategies and extending data exchange capabilities to pharmacists, to improve adherence to and effectiveness of patient medication regimens.

IT-enabled tools to Provide Clinical Information at the Point of Service. All except two Communities focused on improving the availability of information for providers to support clinical decision-making and population health management. Ten Communities sought to optimize use of clinical decision support (CDS) tools, most commonly by working with physicians to optimize use of CDS functionality available through their EHRs. Fourteen established public health registries and/or clinical data repositories to enable clinicians to access patient data from disparate sources, and to monitor their performance across their patient panels. Eleven Communities used registry-based management tools and four created clinical data repositories to support provider-based population health management. In addition, most Communities (11) adopted interventions that used health IT to improve care transitions. Communities developed automated admission, discharge, and transfer alerts to improve care post-discharge (8), included enhanced discharge planning and patient education (5), used health IT to better manage referrals to, and coordination with, specialists (4), and focused on electronic data transmission from emergency transport to the hospital ED, to allow for more rapid diagnosis upon arrival (1).

V. An Analysis of Medicare Beneficiary Experience to Measure the Impact of Beacon Community Efforts to Transform Clinical Care

The final evaluation objective, to assess impact on health care utilization and clinical outcomes for all 17 sites, relied on the Medicare claims data set made available to the evaluation by ONC. This data set was subject to a number of limitations in its ability to measure the impact of the Beacon Program. Findings suggest that success across Beacon Communities varied greatly in utilization and claims-based measures of quality of care. Most Communities made improvements on some measures, but results were variable within in each Community across clinical focus areas, yielding no consistent pattern. These findings offer only a partial and illustrative picture of the impact of Beacon Communities' investments and interventions because of the data available to the evaluation. Most notably, because the analysis was restricted to people ages 65 years and older with Medicare FFS only (excluding beneficiaries with a Medicare Advantage plan), we were only partially able to assess a Community's performance. Communities also targeted services to younger adults and children, whose outcomes were not included in the analysis, and strengthened public health services and reporting, which are not measurable with claims data. Last, the window for observation of Beacon Communities' performance was very short, so these results should be considered as early indications, not definitive findings.

VI. Communities' Challenges, Enablers, and Lessons Learned

As Beacon Communities implemented their interventions to build and strengthen health IT infrastructure and enable clinical transformation, they faced challenges and devised strategies to overcome them.

Challenges and Enablers

Technology. Unexpected limitations in EHR developers' capability often delayed the implementation of technology solutions for Beacon Community interventions. In addition, costs of data infrastructure were often barriers, particularly for smaller independent practices that lacked the necessary resources and infrastructure to support Beacon efforts. Leveraging previously established infrastructure and initiatives helped Communities establish data sharing infrastructure and engage partners in Beacon efforts. Communities with experiences in similar initiatives or that built their Beacon initiatives upon previously existing infrastructure were able to advance their initiatives and facilitate the further development of health IT.

Provider Engagement. Providers also had difficulty focusing on meeting Beacon intervention requirements in light of other— often competing—initiatives. Communities with high market competition among hospital systems found provider resistance to engage in data sharing activities. Beacon Communities operating in highly competitive environments also faced resistance from some health systems in sharing data with other systems.

To engage providers in clinical transformation efforts in a meaningful way, nine Beacon Communities provided feedback and assistance to providers on: (1) meeting clinical performance metrics to help physicians conduct quality improvement; (2) extracting data from their EHRs; (3) collecting and harmonizing data across disparate EHR systems; and (4) using third-party aggregation platforms to collect data and provide reports. In addition, recognizing the importance of sharing best practices between

providers and the power of peer-to-peer learning, many Beacon Communities developed Community-wide approaches that engaged participating practices around a common quality improvement curriculum. Communities also used widely trusted local organizations and individuals to serve as Community leaders and facilitate engagement of providers and other stakeholders. Participating providers' familiarity with and use of existing technical infrastructure proved an important enabler in supporting Beacon's clinical transformation efforts. In addition, experience gained by participating in preexisting regional initiatives helped advance clinical transformation projects, particularly those aimed at quality improvement and stakeholder engagement.

Legal and Policy Barriers. Negotiating necessary legal agreements and meeting administrative requirements proved to be more time consuming than Beacon Communities anticipated. In response, Communities found they needed to engage legal representatives and key decision makers to work through the issues. Acquiring patient authorization and consent for retrieving data from repositories also created challenges for some Beacon Communities. Some Communities with opt-in consent policies noted that collection of patient consent was slow and time-consuming, though they often managed to either develop solutions for collecting patient consent or deploy trainers to engage and inform patients about the importance of data sharing. In addition, federal and state policies governing information about behavioral and mental health services often led to limited data being available in repositories and retrievable by other providers. Some Communities reported an inability to share data related to mental health, behavioral health, and substance abuse—citing the need for clarifying policies and technology that allow for the segmentation of sensitive health data. Beacon providers unable to separate sensitive health information from other health data were often unable to share electronically any data with other providers serving the same patients.

Lessons Learned

Communities across the nation that are just beginning efforts to share and exchange clinical health information can draw valuable help from the Beacon Communities' experience.

To address technological limitations, implementing collaborative IT-supported initiatives required substantial lead time. Building in flexibility is important to help practices at all levels of readiness, including smaller practices that may have less sophisticated health IT infrastructure than large hospital systems. To motivate providers to participate, new collaborations should focus on offering services that add value or improve upon providers' existing resources. Integrating data sharing capabilities into providers' EHR systems promotes use of the data sharing systems, because it is more efficient for providers.

Engaging providers and other stakeholders in Beacon efforts required influential stakeholders in leadership positions and buy-in from providers and the Community more generally for establishing HIE infrastructure. In addition, the perceived neutrality of, and commitment to, Community-wide care improvement by the organization managing Community data helped foster trust among providers and consumers. Community involvement in decision-making, although requiring an investment of time and staff resources, solidifies support for sustainable HIE organizations and activities over time. Finding the right pace for introducing new tools, staff roles, and workflows facilitates engagement. One advantage of the trend towards greater alignment of ambulatory care practices with larger health care systems was that,

in some cases, Beacon Communities could then work through larger health systems, hospitals, and physician organization to enlist the smaller practices.

To achieve sustainability of clinical transformation efforts, Beacon Communities aligned with other initiatives and proved the value of continuing interventions to stakeholders. Aligning efforts with existing payment and clinical service delivery initiatives promotes sustainability. The momentum generated by the ACA's delivery system innovations strengthened stakeholder relationships in many Communities and promises to help sustain these efforts over the long run. Adapting the implementation of health IT and quality improvement tools to fit the workflow and culture of each participating entity helps providers adopt clinical transformation tools and initiatives.

VII. Conclusion and Recommendations

The Beacon Program offers insights for policies and programs that aim to promote and invest in the use of health IT, and to foster and scale sustainable initiatives in service delivery redesign, quality improvement, and payment reform. Results from this evaluation show that Communities achieved mixed progress on broad health care use and quality measures; the extent to which Communities leveraged existing efforts and engaged providers was a facilitator of successful outcomes. Communities also found their efforts hindered in critical ways by challenges stemming from provider readiness, legal and policy constraints, and the technologies used. These findings suggest important considerations for future program design, evaluation, and policy:

- Programs intended to demonstrate meaningful impact on cost, quality, and health outcomes require sufficient time to become operational and demonstrate results.
- Support in aligning regional efforts with federal initiatives will foster continued progress and sustainability of investments made under the Beacon Program.
- Providers, health systems, and health plans would benefit from analyses that demonstrate the need and return on investment for performance measurement and electronic data exchange, as market dynamics and shifts in policy priorities affect their willingness to engage.
- The apparent inability of the private sector to achieve interoperable systems suggests the need for national leadership to support their creation.
- Claims data alone are limited in their usefulness in demonstrating the true impact of programs comprising diverse interventions that are refined over time.

I. Introduction

This report summarizes the methods, findings, and policy implications of the national evaluation of the Beacon Community Cooperative Agreement Program. Chapter I provides an overview of the Beacon Community Program. It also describes the broader policy context surrounding the program, including other health care reform initiatives under way over the same period. Chapter II presents an overview of the methods we used to evaluate the program. Chapter III provides a more detailed description of the demographic, health care market, and health information technology (health IT) characteristics of each Community at the outset of the program. Chapter IV discusses Communities' approaches to their selected interventions. Chapter V presents an overview of our analysis of Medicare claims to measure the impact of Beacon Community efforts to transform clinical care. Chapter VI outlines challenges, enablers, and lessons learned as Communities implemented their interventions. Finally, Chapter VII provides conclusions and recommendations, including policy implications of the evaluation findings.

Overview of the Beacon Community Program

In 2010, the Office of the National Coordinator for Health Information Technology (ONC) established the Beacon Community Cooperative Agreement Program as part of the Health Information Technology for Economic and Clinical Health (HITECH) Act, enacted under the American Recovery and Reinvestment Act of 2009 (ARRA). Under the program, ONC awarded $250 million across 17 diverse Communities throughout the country, to build and strengthen their health IT infrastructure in support of clinical transformation efforts. Awardees (called Beacon Communities or Communities) were typically collaborations led by academic institutions, 501(c)3 organizations, integrated delivery networks, or health information organizations (HIOs). Exhibit 1.1 lists the 17 Beacon Communities, with their lead organization, location, and service area.

Exhibit 1.1 Beacon Communities, Lead Organizations, and Service Area

Beacon Community	Lead Organization	Location	Service Area
Bangor Beacon Community	Eastern Maine Healthcare System	Brewer, Maine	Bangor Metropolitan Area
Central Indiana Beacon Community	Indiana Health Information Exchange	Indianapolis, Indiana	Central Indiana
Colorado Beacon Community	Rocky Mountain Health Plans	Grand Junction, Colorado	Grand Junction
Crescent City Beacon Community	Louisiana Public Health Institute	New Orleans, Louisiana	New Orleans Metropolitan Area
Delta BLUES Beacon Community	Delta Health Alliance	Stoneville, Mississippi	Northwest Mississippi (Mississippi Delta)
Greater Cincinnati Beacon Community	HealthBridge	Cincinnati, Ohio	Greater Cincinnati Region
Greater Tulsa Beacon Community	Community Services Council of Tulsa	Tulsa, Oklahoma	Northeastern Oklahoma, Greater Tulsa
Hawai'i Island Beacon Community	University of Hawai'i at Hilo	Hilo, Hawai'i	Hawai'i County

Beacon Community	Lead Organization	Location	Service Area
Inland Northwest Beacon Community	Inland Northwest Health Services	Spokane, Washington	Northwest Washington State, Spokane Region
Keystone Beacon Community	Geisinger Clinic	Danville, Pennsylvania	Central Pennsylvania
Rhode Island Beacon Community	Rhode Island Quality Institute	Providence, Rhode Island	State of Rhode Island
San Diego Beacon Community	Regents of the University of California, San Diego	San Diego, California	San Diego Metropolitan Area
Southeastern Michigan Beacon Community	Southeastern Michigan Health Association	Detroit Michigan	Greater Detroit Region (Southeastern Michigan)
Southeastern Minnesota Beacon Community	Mayo Clinic College of Medicine	Rochester, Minnesota	Southeastern Minnesota
Southern Piedmont Beacon Community	Southern Piedmont Community Care Plan	Concord, North Carolina	Piedmont area of central North Carolina
Utah Beacon Community	HealthInsight	Salt Lake City, Utah	Salt Lake City Metropolitan Area
Western New York Beacon Community	Western New York Clinical Information Exchange	Buffalo, New York	Western New York (Greater Buffalo Area)

The goals of the program were to improve health care quality and outcomes while lowering the overall cost of care. Beacon Communities focused on:[20]

- building and strengthening health IT infrastructure and exchange capabilities within Communities, positioning each to pursue a new level of sustainable health care quality and efficiency over the coming years;
- using investments in health IT to achieve measurable 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.

NORC Evaluation

In 2011, ONC funded NORC at the University of Chicago (NORC) to design and conduct a four-year independent evaluation of the Beacon Community Program. The evaluation aims were to: (1) characterize the Beacon Communities, (2) assess their progress in building and strengthening their health IT infrastructure and leveraging this infrastructure to achieve clinical transformation, and (3) assess the impact of the program.

Evaluation Logic Model

Building upon the Communities' own framework for the Beacon Community Program, NORC developed a Beacon Community Program Evaluation Logic Model, which provides the conceptual framework for the evaluation (Exhibit 1.2). The top set of boxes illustrates the Beacon Community Program's theory of change and our envisioned pathway, from inputs to actions to change within the Beacon Communities.[21,22] The chief inputs encompass program resources, organization-level starting conditions,

and Community development and governance. Activities include Beacon Community efforts to build and strengthen the health IT and performance measurement infrastructure, along with efforts to transform clinical care. Program outcomes include improved quality of care and population health, lower health care costs, and improved efficiency and sustainability. Four major types of contextual factors at the Beacon Community level—shown in the middle part of Exhibit 1.2—influence the pathway linking the inputs, activities, and outcomes observed among the Communities.

The bottom part of Exhibit 1.2 illustrates our evaluation components as they map to the Beacon Community inputs, activities, and outcomes. As the pathway progresses from inputs to change, evaluation components proceed from formative to summative. Formative, process-oriented assessments provide an understanding of the baseline infrastructure and composition of each Beacon Community (inputs). Summative analyses distill lessons learned about structures and processes that build infrastructure and transform clinical care (actions). Lastly, outcome analyses measure changes in health care quality, efficiency, and population health.

Exhibit 1.2 Beacon Community Program Evaluation Logic Model
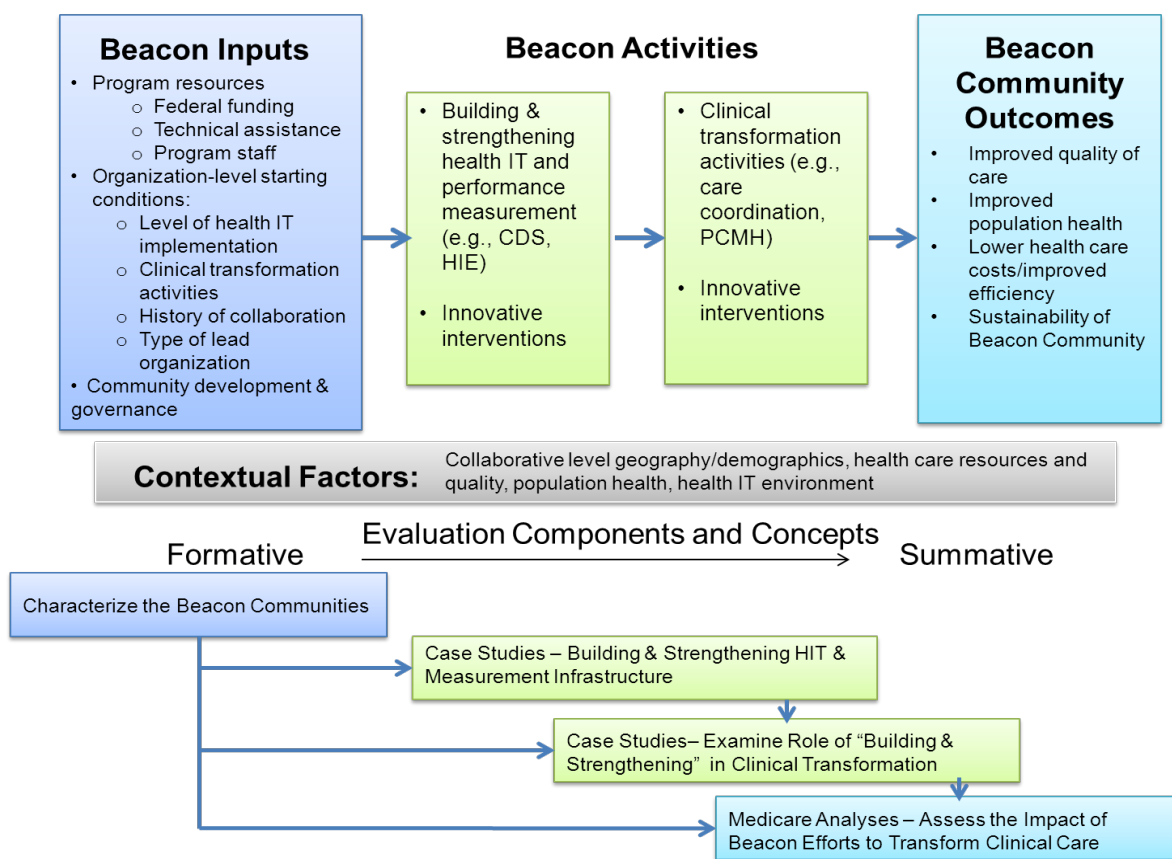
Acronyms legend: CDS=clinical decision support; HIE=health information exchange; PCMH=patient centered medical home

The Changing Health Care Landscape: Advances in Health IT and Payment and Service Delivery Reform

The Beacon Community Program launched at a time of significant investment in and attention to health IT and clinical service delivery reforms, which affected Beacon Community initiatives in diverse and sometimes unanticipated ways. Since passage of the HITECH Act in 2009, health IT and clinical services delivery have undergone many changes and advances. Adoption rates of health IT have increased significantly, as HITECH spurred investments to promote the adoption and meaningful use of health IT to improve quality of care and outcomes and reduce health care costs. Electronic health record (EHR) adoption has continued to grow among both large and small providers, which have a variety of options for exchange. Concurrently, stimulated by the Affordable Care Act (ACA), the health care system has advanced in the number of efforts promoting changes to health care service delivery and reimbursement. Initiatives that support clinical practice redesign and value-based purchasing have spread among providers and both public and private payers. The rest of this chapter provides context for the Beacon Community Program with respect to the changing health care landscape, including other HITECH initiatives and health services delivery reform efforts.

Advances in Health IT Adoption and Use

Under the Beacon Community Program, Communities demonstrated how investments in health IT and health information exchange (HIE), and the meaningful use of EHRs, advanced a vision of patient-centered care while promoting better health, better care, and lower costs. EHR adoption rates have dramatically increased since passage of the HITECH Act. In 2009, 22 percent of office-based physicians had adopted a basic EHR system; this share increased to 48 percent by 2013.[i] While 48 percent of office-based physicians had adopted any EHR system in 2009, 78 percent had done so by 2013.[23] In addition, only 12 percent of non-federal, acute care hospitals had adopted basic EHR systems by 2009; this share increased to 76 percent by 2014.[24]

Engagement in exchange also increased significantly. HIE is the process of electronically and securely sharing a patient's vital medical information among and across health care entities.[25] Electronically exchanging health information, among other benefits, supports access to patient data at the point of care and facilitates coordination of care across providers and care settings—enabling improved health care quality and delivery. Efforts to develop data sharing infrastructure have also expanded, as HITECH-funded initiatives allowed Communities, regions, and states to develop HIE infrastructure or enable HIE. According to a national survey of organizations facilitating HIE services, the proportion of hospitals participating in an HIE effort rose from 14 percent in 2010 to 27 percent in 2012; similarly, the proportion of ambulatory practices engaged in HIE efforts increased from 3 percent in 2010 to 10 percent in 2012.[26] By 2014, 76 percent of non-federal acute care hospitals had exchanged electronic documents (including lab results, radiology reports, clinical care summaries, and medication lists) with an external provider, compared to 41 percent in 2008.[27]

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[i] For more information on how the Communities differed based on various contextual and organization-level characteristics, types of interventions, levels of EHR adoption among hospitals and ambulatory care providers, e-prescriptions, and HIO participation in each Beacon Community, see http://www.healthit.gov/sites/default/files/norc_beaconevalcharacterizingCommunities_march_2013.pdf

Health IT Initiatives Funded under HITECH

In addition to the Beacon Community Program, HITECH funded a number of other discrete programs and initiatives to enable the adoption and meaningful use of health IT (primarily through EHRs) to improve the provision of patient care (see Exhibit 1.3).

Exhibit 1.3 Related HITECH Initiatives

Initiative	Overview
Medicare and Medicaid EHR Incentive Programs	Established by CMS in 2010, these programs provide incentive payments to eligible professionals, hospitals, and critical access hospitals (CAHs) as they adopt, implement, upgrade, or demonstrate meaningful use of certified EHR technology.[28] Through a gradual rollout, the EHR Incentive Programs establish requirements that eligible hospitals and professionals must meet in order to receive payment. Stage 1 of the program emphasizes adoption and implementation of certified technology, while Stage 2 (launched in 2014) and Stage 3 (scheduled for 2017) emphasize the ability of these technologies to be used to support improvements in quality, efficiency, and outcomes.[29,30]
State Health Information Exchange (HIE) Program	Launched in March 2010, the State HIE Program awarded $564 million to 56 states, eligible territories, and qualified State Designated Entities (SDE) to build capacity for exchanging health information across the health care system both within and across states over four years. To rapidly build information exchange capacity, the State HIE Program focused on several core objectives: (1) to ensure that every provider has at least one option for meeting HIE requirements of meaningful use; (2) to foster the creation and use of exchange networks; (3) to fill existing gaps in exchange capacity; and (4) to ensure exchange across networks.[31]
HIE Challenge Grants	Funded by ONC in December 2010, Challenge Grants encouraged development and innovation to address other persistent barriers in HIE—for example, transitions to long-term and post-acute care, and consumer-mediated exchange.[32,33]
Regional Extension Center (REC) Program	This program established RECs in every region of the country to serve as support and resource centers assisting providers in EHR implementation and health IT needs.[34] RECs provide education, outreach, and technical assistance related to health IT, focusing on individual and small practices, critical access hospitals, rural and public hospitals, and safety net providers who serve vulnerable populations and often have few resources to invest in EHRs and HIE. The REC program intended to "bridge the technology gap" by helping providers navigate the EHR adoption process from health IT developer selection and workflow analysis to implementation and meaningful use.[35]
IT Professionals in Health Care (Workforce) Program	This workforce-focused program helped address the increasing and evolving demands for appropriate workers in the current health care and policy environments. The goal of the program was to train a new workforce of health IT professionals to help providers implement and optimize EHRs to improve health care quality, safety, and cost-efficiency.

The Beacon Community Program served as a capstone to these other HITECH initiatives—with the goal of complementing and informing other efforts to spur the adoption and meaningful use of health IT. The program brought together the strands of other HITECH efforts to demonstrate how adoption and meaningful use of health IT can support clinical processes and outcomes. Beacon stakeholders often worked across programs—primarily the Regional Extension Center (REC) and state health information exchange (HIE) programs—to align efforts and promote the building and strengthening of data infrastructure and its capabilities.

Clinical Transformation and the Learning Health System

The health care landscape has also evolved to include a more intensive focus on clinical transformation and active use of data. "Clinical transformation," a term emerging following publication of the Institute of Medicine's (IOM) *Crossing the Quality Chasm,* intends to promote the use of new approaches to address deficiencies in the safety, effectiveness, efficiency, and patient-centeredness of U. S. health care.[36] Though a single, authoritative definition of clinical transformation does not exist, as systems addressed the call to transform clinical practice and delivery system processes, stakeholders across the public and private sectors have adopted and shaped "clinical transformation" as it best suited their missions, capabilities, and circumstances.[37] For its 2011 Clinical Transformation Survey, the Healthcare Information and Management Systems Society (HIMSS) posited the following definition as a frame of reference for respondents:

> *"Clinical transformation involves assessing and continually improving the way patient care is delivered at all levels in a care delivery organization. It occurs when an organization rejects existing practice patterns that deliver inefficient or less effective results and embraces a common goal of patient safety, clinical outcomes and quality care through process redesign and IT implementation. By effectively blending people, processes and technology, clinical transformation occurs across facilities, departments and clinical fields of expertise."[38]*

Achieving clinical transformation using health IT was one of the tenets of the Beacon Community Program. Key drivers of clinical transformation—workflow redesign, data-driven improvement, health IT, and peer-to-peer learning—were all central features of the Beacon Program.

Thought leaders and policymakers have envisioned a learning health system as the path to improved quality of health care.[39,40] Such a system can be characterized as having the capacity to capture timely data about care provided and the results of that care, and to enable practitioners to use those data effectively and efficiently to deliver care to their patients.[41] A learning health system supports the continuous, efficient flow of information between health providers, patients, and researchers in response to priorities identified and refined by health systems and other stakeholders.[42,43] Information infrastructure to support a learning health system can include population health data, such as measures of disease incidence and prevalence, environmental health exposures, access to care, and vital events,[44] that are stored and retrieved from resources such as community data repositories. Registries, another IT tool, typically capture data on patients with specific diseases or conditions or individuals exposed to a specific environmental hazard.[45,46] Through the Beacon Program, Communities endeavored to develop the infrastructure to exchange data and enable a learning health system.

Payment and Clinical Service Delivery Reform

Passage of the ACA in 2010 created new opportunities and support for health IT and clinical practice redesign. The ACA aims to improve health care quality and efficiency, decrease costs, decrease chronic disease, and improve public health—with health IT integral to achieving these goals. The ACA and the programs it funded relied on HITECH's investments in health IT as integral components of delivery system reform.

The Affordable Care Act's Payment and Clinical Service Delivery Reforms

Several policies and programs established under the ACA have driven systemic changes that have overlapped with Beacon Community efforts (see Exhibit 1.4).

Exhibit 1.4 Related Payment and Service Delivery Reform Initiatives

Initiative	Overview
State Innovation Model (SIM) Awards	Offers states financial and technical support for developing and testing multi-payer health care payment and service delivery models that improve health system performance and quality, and decrease costs. CMMI awarded close to $300 million to 25 states in Round One of the program and over $660 million to 32 states, territories, and the District of Columbia in Round 2.[47] As part of SIM, states are using a variety of health IT tools to achieve service delivery reform, including telehealth solutions, EHRs, and patient-facing digital tools like patient portals and mobile apps, and conducting data aggregation and analytics to improve population health.[48]
Health Care Innovation Awards (HCIA)	Provides $1 billion in funding to organizations implementing innovative ways to deliver better health, improve care, and lower costs for Medicare, Medicaid, and CHIP populations, including through enhanced infrastructure and the use of health IT.[49] HCIA focuses on engaging a broad set of innovation partners to identify and test new care delivery and payment models that originate in the field and that produce better care, better health, and reduced cost through improvement for identified target populations.[50]
Comprehensive Primary Care Initiative (CPCI)	Offers population-based care management fees and shared savings opportunities to participating primary care practices to support the provision of a core set of five key primary care functions: (1) risk-stratified care management; (2) access and continuity; (3) planned care for chronic conditions and preventive care; (4) patient and caregiver engagement; and (5) coordination of care across the medical neighborhood. CPCI currently operates in in seven markets across the country and fosters collaboration between public and private health care payers to strengthen primary care projects through a unique multi-payer model design. [51]
Community-Based Care Transitions Program (CCTP)	Tests models to improve transitions of beneficiaries from the inpatient hospital setting to other care settings, improve quality of care, reduce readmissions for high-risk beneficiaries, and document measurable savings to the Medicare program.[52]

The rise of accountable care organizations (ACOs)—groups of doctors, hospitals, and other health care providers who come together voluntarily to give coordinated high quality care to their Medicare patients—has also led to more opportunities for Beacon Communities and other regions to leverage payment reform efforts to further their goals of improved quality and reduced costs. With establishment of the Medicare Shared Savings Program in January 2012, Beacon Communities gained new opportunities for institutionalizing and financing interventions around chronic disease management, care transitions, and quality reporting in practices. CMS offered several ACO programs concurrent with the Beacon Community (Exhibit 1.5) and continues to build on these models.

Exhibit 1.5 CMS ACO Programs

Initiative	Overview
Medicare Shared Savings Program	The program facilitates coordination and cooperation among Medicare fee-for-service (FFS) providers to improve the quality of care for Medicare FFS beneficiaries and reduce unnecessary costs, in exchange for the opportunity to participate in savings generated relative to benchmark costs. Eligible providers, hospitals, and suppliers may participate in the Shared Savings Program by creating or participating in an ACO.[53]
Advance Payment ACO Model	A supplementary incentive program for selected participants in the Shared Savings Program, designed for physician-based and rural providers who have come together voluntarily to give coordinated high quality care to the Medicare patients they serve. Through the Advance Payment ACO Model, selected participants receive upfront access to future streams of shared savings, which they can use to make important investments in care coordination infrastructure.[54]
Pioneer ACO Model	A program designed for early adopters of coordinated care, allowing these provider groups to move more rapidly from a shared savings payment model to a population-based payment model on a track consistent with, but separate from, the Medicare Shared Services Program. The program works in coordination with private payers by aligning provider incentives, which will improve quality and health outcomes for patients across the ACO, and achieve cost savings for Medicare, employers, and patients.[55]

The Beacon Community Program complemented this broader federal strategy of supporting innovative models of care coordination and chronic disease management to improve both individual and population health outcomes while reducing health care costs. Communities reflected great diversity in practice organization and local health care environments,[56] thus serving as testing grounds for innovative models of care delivery relevant for a wide variety of health care settings and marketplaces across the country.

II. Methods

NORC used mixed methods to evaluate the Beacon Community Program. We collected and analyzed quantitative and qualitative data from multiple sources, to understand how Communities were building health IT capacity and transforming clinical care delivery, as well as the contextual, organizational, and intervention-related factors that contributed to improvements in health care quality, efficiency, and outcomes. In this chapter, we outline the aims of the evaluation, research questions, and data sources used. We then describe our methods and our methodological choices in light of the evaluation's limitations.

Specific Aims, Research Questions, and Data Sources

The Beacon Community Program evaluation addressed three specific aims:

- Characterize the Beacon Communities to identify elements that are distinctive to particular Communities and those that are common across groups of Communities;
- Examine approaches to building and strengthening health IT and performance measurement infrastructures and their role in transforming clinical practice; identify the factors that facilitated and impeded this work.
- Assess the impact of Beacon Community efforts to transform clinical care and care delivery.

NORC designed evaluation activities to address each aim over the course of the program and evaluation.

Exhibit 2.1 summarizes each aim, key research questions, and evaluation activities. In the sections that follow, we describe the methodological approach undertaken to pursue each evaluation aim.

Exhibit 2.1 Evaluation Aims, Research Questions, and Activities

Characterize the Beacon Communities to identify elements that are distinctive to particular Communities and those that are common across groups of Communities	
Research Questions	*Evaluation Activities*
▪ What are the contextual, organizational, and intervention-related characteristics of each Beacon Community, particularly those factors hypothesized to drive or facilitate success? ▪ How do the Beacon Communities compare with national norms with respect to these characteristics? ▪ How do the Beacon Communities compare with one another in their composition, structure, and history of collaboration?	▪ Baseline interviews (17 Communities) ▪ Review of proposal and operational plans ▪ Calculations from secondary data sources

Examine approaches to building and strengthening health IT and performance measurement infrastructures and their role in transforming clinical practice; identify the factors that facilitated and impeded this work.	
Research Questions	*Evaluation Activities*
- What was the level of infrastructure and IT resources among and across major providers in each Community prior to the Beacon award? How did the baseline level of sophistication affect the aims and strategies for building and strengthening? - To what extent did the most influential providers engage in HIE and what mechanisms did they use? - What was the thinking behind the selection of particular building and strengthening activities? - How did Communities coalesce around the particular aims of their respective "building and strengthening" activities? - What leadership and organizational strategies did multi-stakeholder alliances use in the pursuit of these aims? - What specific metrics did Communities develop and use to track the rate and extent of growth of their health IT, HIE, and measurement infrastructures? - How have Communities' priorities shifted over time with respect to their IT infrastructure efforts? - How did Communities coalesce around the particular aims of their respective clinical transformation activities (and what were the aims)? - To what extent did clinical transformation aims drive the selection of IT interventions? To what extent did the technology solution drive the particular provider engagement and clinical transformation activities? - How did leadership shape strategies for engaging providers? How did strategies for engagement affect the response from providers? - How did approaches to clinical transformation vary based on capacity of health IT infrastructure? - How does the health IT/HIE infrastructure support clinical transformation activities? What are the different strategies/mechanisms/applications used to leverage the HIE/health IT infrastructure to support clinical transformation? - What specific metrics did Communities develop and use to track the rate and extent of growth of their clinical transformation activities? - What barriers and facilitators did Communities encounter and how did they address them?	- Baseline interviews (17 Communities) - Site visits (7 Communities) - Follow-up interviews (10 Communities) - Review of final reports
Assess the impact of Beacon Community efforts to transform clinical care and care delivery	
Research Questions	*Evaluation Activities*
- How did the Beacon Communities compare to the national average at baseline (pre-Beacon) in quality, efficiency, and population health outcomes? - Were outcomes among patients served by participating Beacon providers in each Community comparable to the national average at baseline in quality, efficiency, and population health? - Have the quality, efficiency, and population health indicators of patients served by participating Beacon providers improved over time? - Have improvements in the quality, efficiency, and population health among patients served by participating Beacon providers been greater than those among patients at the national level? - Are improvements observed within the populations served by participating Beacon providers attributable to the Beacon intervention/s as opposed to location or other factors? - Have there been spillover effects among patients of the non-participating providers in the Beacon Community resulting from the Beacon interventions?	Medicare claims analysis

Qualitative Data Collection and Analysis

NORC undertook a range of qualitative data collection activities under this evaluation, including review of proposals and operational plans and final reports, site visits, and interviews with key informants (see Exhibit 2.2).

Exhibit 2.2 Qualitative Data Sources and Evaluation Activities, by Community

Community	Data Sources and Evaluation Activities				
	Review of Proposals & Operational Plans	Baseline Interview[1]	Site Visit[2]	Follow-up Interview[3]	Review of Final Reports
Bangor	●	●	●		●
Central Indiana	●	●		●	●
Colorado	●	●	●		●
Crescent City	●	●	●		●
Delta BLUES	●	●		●	●
Greater Cincinnati	●	●		●	●
Hawai'i Island	●	●		●	●
Inland Northwest	●	●	●		●
Keystone	●	●	●		●
Rhode Island	●	●		●	●
San Diego	●	●		●	●
Southern Piedmont	●	●	●		●
Southeast Michigan	●	●		●	●
Southeast Minnesota	●	●		●	●
Tulsa	●	●		●	●
Utah	●	●	●		●
Western New York	●	●		●	●

1. We conducted most baseline interviews in March 2012; we conducted Keystone and Central Indiana interviews in April 2012.

2. Site visits took place in November 2012 (Inland Northwest), December 2012 (Crescent City), February 2013 (Bangor, Colorado, Keystone), and March 2013 (Southern Piedmont, Utah).

3. Follow-up interviews were conducted in August 2013 (Central Indiana, Greater Cincinnati, Hawai'i Island, Rhode Island, San Diego, Southeast Michigan), September 2013 (Delta BLUES, Southeast Minnesota, Tulsa), and October 2013 (Western New York).

Document Review

Proposal and Operational Plan Review. NORC conducted a systematic review of each Community's application for Beacon funding and ONC-approved strategic and operational planning document. The document review focused on extracting details on each Community's starting conditions, including its catchment area, health IT capacity, partnership characteristics, and intervention features. NORC obtained information on Communities' clinical interventions from an Excel spreadsheet developed by the Beacon Community Program technical assistance contractor (Booz Allen Hamilton).

Final Report Review. After the program concluded in 2013, each Community submitted a final report to ONC detailing their goals and progress throughout the grant period.

Site Visits

NORC selected, in consultation with ONC, seven site visit candidates that represented diverse program features observed across all Beacon Communities. These features included type(s) of health IT implemented; size, composition, and scope of the target patient and provider populations; degree of sophistication of the HIE/health IT infrastructure prior to the Beacon award; scope and nature of the challenges encountered as part of building and strengthening activities; and participation in other health IT programs or initiatives.

As part of each two-day site visit, NORC conducted semi-structured discussions with a range of stakeholders in the Communities. We interviewed Beacon Community leadership committees and program staff; state HIE designated entity directors and staff; REC representatives; state public health officials; care managers and care coordinators; large health system and ambulatory care providers; managers and practitioners in federally qualified health centers and Community health centers; Community partners; representatives from health plans; and local Beacon evaluators. Discussions took the form of one-on-one and small group interviews. NORC worked with each program lead to identify potential informants and develop agendas for the site visits.

Telephone Interviews

Initial Interviews. From March 2011 through February 2012, NORC conducted small group interviews with key members of each Beacon Community, including the senior leader or program director, program manager, and evaluation lead. The purpose of the interviews was to confirm and update information obtained from the document review, as well as to introduce the Beacon Communities to the overall evaluation strategy. Prior to the interviews with the Beacon Communities, NORC held individual discussions with Beacon project officers at ONC and with the Beacon technical assistance contractor, to benefit from their observations about and insights into the Beacon Communities.

Follow Up Interviews. In March and April 2012, NORC held a series of semi-structured, 60-minute telephone discussions with program staff from the 10 Communities in which NORC did not conduct site visits. These calls included a range of Beacon Community members—including the project director, project manager, evaluation director, IT manager, and other individuals who could provide insight into the Beacon Community implementation experience.

Analytic Approach

NORC produced transcripts for each discussion. The evaluation team developed a summary of each site visit or follow-up interview based on interview transcripts, team observations, and other program documents provided by the Community—to facilitate a within-Community analysis of context and stakeholders, intervention strategies, enabling factors, and challenges to progress. NORC coded the Community profiles, site visit summaries, interview transcripts, and final reports in NVivo 10.0 (QSR International, Cambridge, MA). We then analyzed these data to identify commonalities and unique factors across Communities that informed approaches to their interventions; roles of providers and other stakeholders; facilitators to implementation and challenges encountered in the course of implementation; and plans for, and progress in, sustaining efforts beyond Beacon Program funding.

Quantitative Data Collection and Analysis

NORC used quantitative data in two evaluation activities—a descriptive analysis of the characteristics of each Beacon Community's geographic region or catchment area, and an impact analysis using Medicare claims data.

Descriptive Analysis of Beacon Community Regions

We defined Beacon Communities in terms of a contiguous geographic region or catchment area, typically a metropolitan statistical area (MSA) or group of rural counties indicated by the awardee in their application. The evaluation team used secondary data from multiple sources to calculate area-wide characteristics of the context in which each Beacon Community operated, including demographics, population health status, health care market features, and health IT use. We selected characteristics in the following domains, based on a literature review and in consultation with ONC regarding the criteria that were important for collaboration, clinical transformation, or health IT implementation:

- context, including demographics, health status, health system features, health IT capacity, history of related activities in the catchment area;
- organizational structure, including partnership composition and leadership; and
- intervention type.

Additionally, we selected indicators that could be operationalized with existing data; were available consistently or from a single data source across all or most of the 17 Communities; and would present valuable information to clinical leaders or policy makers. Data sources included Census data to derive key demographic characteristics; Area Resource File; CMS Chronic Conditions Warehouse to assess percent of Medicare beneficiaries with chronic conditions; Dartmouth Atlas; and AHA Annual Survey.

To calculate the measures, we used each Beacon Community's official catchment area, defined by ZIP code, as described in each initial application. After mapping the catchment area, we computed measures based on each Beacon Community's share of the area population.

We then synthesized the data described above to create profiles of each Beacon Community at baseline. These profiles were an important evaluation resource in identifying areas of similarity and singularity across Communities, and in informing later comparisons across sites, the design of control groups, and interpretation of findings—including underlying factors that may facilitate or impede success—throughout the summative and impact phases of the evaluation.

Appendix A provides additional detail on the methodology for the descriptive analysis.

An Analysis of Medicare Beneficiary Experience to Measure the Impact of Beacon Community Efforts to Transform Clinical Care

The final objective of the evaluation of the Beacon Community Program was to assess the impact of Beacon Program efforts on health care utilization and quality of care for each of the 17 Communities. This analysis relied on Medicare claims data from the Chronic Condition Warehouse (CCW) for fee-for-service (FFS) Medicare beneficiaries for calendar years 2010 through 2013. In consultation with a panel

of technical experts and the Beacon Communities' leadership and local evaluators, we developed claims-based indicators for high-quality chronic disease management, use of hospital-based services, and health outcomes. Appendix B provides a detailed discussion of the methodology, including the measure selection process, patient attribution, comparison groups, and analytic approach. In Chapter V, we discuss the important limitations of this analysis of the Beacon Community Program's effects. It is important to keep in mind that because the analysis was restricted to people ages 65 years and older with Medicare FFS only—excluding beneficiaries who also have a Medicare Advantage plan)[ii]—results provide only a partial assessment of a Community's performance. Communities also targeted services to younger adults and children, whose outcomes are not included in this analysis. Many of the investments and reforms of the Beacon Program may show greater impact over a longer period.

[ii] Across the 17 Beacon Communities, 35 percent of Medicare beneficiaries are enrolled in Medicare Advantage plans, and thus excluded from this analysis. Because of other restrictions on the analytic data set, such as requiring full-year enrollment in both Medicare Parts A and B, the proportion of all Medicare beneficiaries within Community catchment areas who are included in this analysis is 44 percent.

III. Characteristics of Beacon Communities: Population, Market, Health Status, and Health IT

Key Findings
■ Beacon Communities tended to be located near population centers, although several served rural regions. Community urbanicity depended on how the Beacon awardee defined the geographic boundaries of its particular Community (by MSA, county, or multi-state region).
■ As a whole, the Beacon Communities' racial and ethnic composition mirrored that of the U.S. for the white population; however, it represented higher proportions of black or African American, native Hawai'ian or Pacific Islander, multiracial and "other" groups. The diversity across Beacon Communities was broad; the white population ranged from 23 to 95 percent, and the percent black or African American from 1 percent to 69 percent. Beacon Communities represented a wide spectrum of socio-economic status, with the proportion of the population living in poverty ranging from less than 10 percent to over 30 percent. Beacon Communities had uninsurance rates that closely mirrored the U.S. rate of 17 percent.
■ Beacon interventions primarily targeted diabetes, cardiovascular care, asthma, and chronic obstructive pulmonary disease (COPD)—common chronic conditions across the U.S. with high rates of illness, mortality, and cost.
■ Across Beacon Communities, the Herfindahl-Hirschman Index (HHI), a measure of market competition, ranged from 0.15 in San Diego (reflecting low concentration, and the most competitive market among the Beacon Communities) to 0.49 in Southeastern Minnesota (reflecting moderate to high concentration and the least competitive market among the Beacon Communities).
■ Among the Beacon Communities, the average number of primary care providers per 100,000 people ranged from 101 in the Delta BLUES Beacon Community catchment area to 570 in the Southeast Minnesota Beacon Community catchment area. With regard to hospital capacity, the number of hospital beds per 100,000 people ranged from 173 in the San Diego Beacon catchment area to 486 in Western New York.

The 17 Beacon Communities were diverse in their geographic location, size, population density, and demographic composition. As a group, the Communities were similar in many ways to the general U.S. population. Unique features of each, however, suggested they would require different approaches to health IT infrastructure and clinical transformation efforts, such as the size and scale of efforts, the clinical conditions on which to focus, and the technical complexity of HIE solutions to document and help coordinate care for patients.

Beacon Community Locations and Population Characteristics

Location and Size. The 17 Beacon Communities represented a geographically diverse set of areas, from Bangor, Maine to Hilo, Hawai'i (see Exhibit 3.1).

Exhibit 3.1   Location of the Beacon Communities
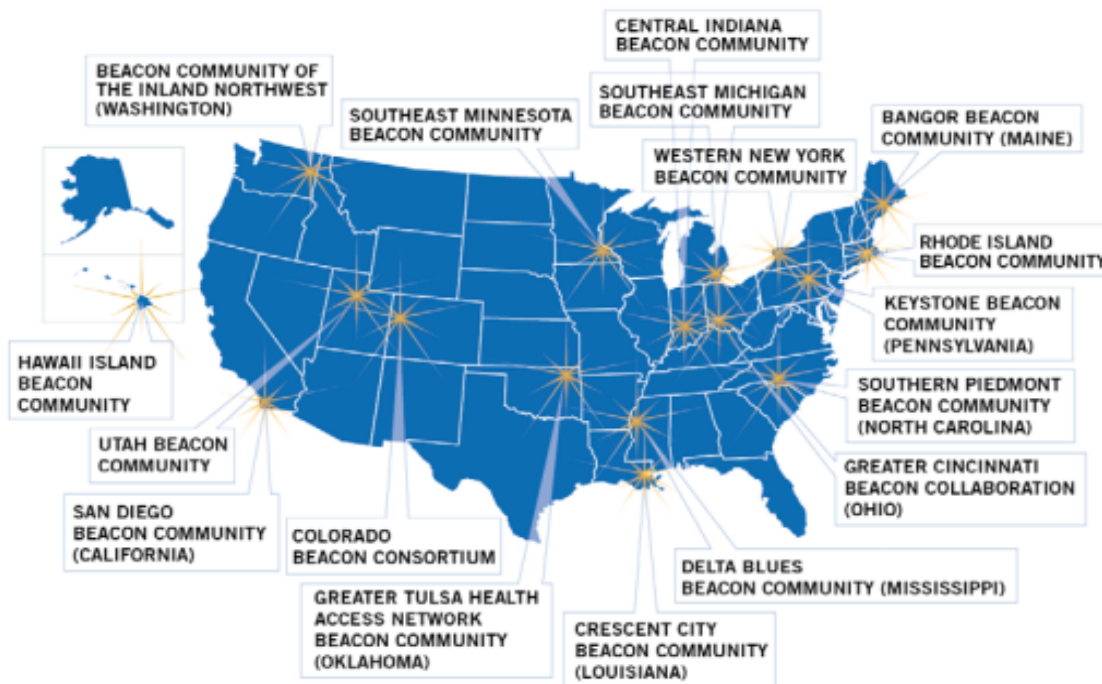
Source: Office of the National Coordinator for Health IT (ONC)

The total population ranged from under 160,000 in Bangor to over three million in San Diego (Exhibit 3.2). Communities tended to be located near population centers, nine of which were urban.[iii] Due to differences in Communities' geographic boundaries, ranging from a small city to a county to a multi-state region, population density varied drastically. Delta BLUES, located in Mississippi, was the most rural Community, with 101 people per square mile; the Southeast Michigan Beacon Community was the densest, with 5,478 people per square mile (see Exhibit 3.2).

[iii]The Bureau of the Census classifies "urban" as territory, population, and housing units located within an urbanized area (UA) or an urban cluster (UC), which has a population density of at least 1,000 people per square mile; and surrounding census blocks with an overall density of at least 500 people per square mile. The Bureau of the Census classifies "rural" as all territory, population and housing units located outside UAs and UCs. Accessed 5/15/2015 at http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/Introduction/defined.html. Because large parts of many "urban" counties may be rural in nature, ONC permitted the designation of "rural" areas within MAs. Census tracts with Rural Urban Commuting Area Codes (RUCA) 4 through 10l were considered rural for the purposes of the Beacon Community Program. More information on RUCAs is available at http://www.ers.usda.gov/briefing/Rurality/RuralUrbanCommutingAreas/.

Exhibit 3.2 Total Population and Population Density in 2010, by Beacon Community

Beacon Community	Total Population	Population Density (people per sq. mile)
Bangor	159,683	415*
Central Indiana	2,869,935	1,272
Colorado	340,713	546*
Crescent City	776,372	4,743
Delta BLUES	310,890	101*
Greater Cincinnati	2,110,333	1,846
Greater Tulsa	1,113,940	1,263
Hawai'i Island	185,079	114*
Inland Northwest	1,280,562	919*
Keystone	295,715	252*
Rhode Island	1,052,567	4,307
San Diego	3,091,958	4,534
Southeast Michigan	875,443	5,478
Southeastern Minnesota	537,160	305*
Southern Piedmont	368,360	524*
Utah	1,127,129	2,985
Western New York	1,535,018	2,408

Source: Census, 2010 *Designates rural populations

Race and Ethnicity. The racial/ethnic composition of Beacon Communities as a whole mirrored that of the U.S. for the white population; however, it included slightly higher proportions of black or African American, native Hawai'ian or Pacific Islander, multiracial and "other" groups. The diversity across Beacon Communities was broad. For example, the percent white ranged from 23 to 95 percent and the percent black or African American from 1 percent to 69 percent (see Exhibit 3.3). The Bangor, Keystone, Southeastern Minnesota, Colorado, Inland Northwest, Central Indiana, Western New York, Utah, and Rhode Island Communities were predominantly white (81 to 95 percent); Delta BLUES, Crescent City, and Southeast Michigan Communities had sizable black and African American populations (41 to 69 percent). The Hawai'i Island Community had the largest Asian, native Hawai'ian and Pacific Islander, and multiracial populations.

Exhibit 3.3 Population Race/Ethnicity in 2010, by Beacon Community*

Beacon Community	White	Black or African American	American Indian & Alaska Native	Asian	Native Hawai'ian/ Pacific Islander	Some Other Race	Two or More Races
Bangor	95%	1%	1%	1%	0%	0%	1%
Central Indiana	83%	10%	0%	2%	0%	3%	2%
Colorado	88%	1%	1%	1%	0%	7%	2%
Crescent City	50%	41%	0%	3%	0%	3%	2%
Delta BLUES	35%	63%	0%	1%	0%	1%	1%
Greater Cincinnati	83%	12%	0%	2%	0%	1%	2%
Greater Tulsa	70%	8%	10%	2%	0%	4%	7%
Hawai'i Island	34%	1%	0%	22%	12%	2%	29%
Inland Northwest	87%	1%	2%	2%	0%	5%	3%
Keystone	94%	3%	0%	1%	0%	1%	1%
Rhode Island	81%	6%	1%	3%	0%	6%	3%
San Diego	64%	5%	1%	11%	0%	14%	5%
Southeast Michigan	23%	69%	0%	2%	0%	3%	3%
Southeastern Minnesota	92%	2%	0%	2%	0%	2%	2%
Southern Piedmont	77%	15%	0%	2%	0%	4%	2%
Utah	82%	2%	1%	3%	1%	8%	3%
Western New York	85%	10%	1%	2%	0%	1%	2%
Beacon Communities overall (weighted average) [TBD]							
United States	*72%*	*13%*	*1%*	*5%*	*0%*	*6%*	*3%*

Source: Census, 2010

*May not add to 100% due to rounding

Socio-economic Status. Beacon Communities exhibited slightly higher rates than the overall U.S. on two measures of socio-economic status—percent of population living in poverty and percent of Medicare beneficiaries also eligible for Medicaid—but with significant variation across Communities. For example, nearly one-third of the Delta BLUES and one-fifth of Southeast Michigan catchment area lived in poverty (Exhibit 3.4). At 34 percent, Bangor Beacon Community had almost two-and-a-half times the national average of Medicare beneficiaries also eligible for Medicaid; the proportions in the Crescent City, San Diego, and Delta BLUES Communities were also relatively high, with approximately one-quarter of Medicare beneficiaries also eligible for Medicaid. Most other Beacon Communities fell closer to the national estimates of 13 percent for persons living in poverty and 14 percent of Medicare beneficiaries who were eligible for Medicaid. Southeastern Minnesota and Utah were at the low end of the spectrum for both measures (each with 9 percent in poverty and 7 percent of Medicare beneficiaries eligible for Medicaid as well).

Exhibit 3.4 Socioeconomic Status in 2008, by Beacon Community

Beacon Community	Persons in Poverty	Medicare beneficiaries 65+ eligible for Medicaid
Bangor	15%	34%
Central Indiana	13%	10%
Colorado	10%	9%
Crescent City	17%	27%
Delta BLUES	32%	23%
Greater Cincinnati	12%	10%
Greater Tulsa	14%	14%
Hawai'i County	13%	18%
Inland Northwest	15%	11%
Keystone	13%	15%
Rhode Island	12%	15%
San Diego	13%	23%
Southeast Michigan	21%	16%
Southeastern Minnesota	9%	7%
Southern Piedmont	12%	14%
Utah	9%	7%
Western New York	14%	15%
National Average	*13%*	*14%*

Sources: CMS Chronic Conditions Warehouse; HRSA Area Resource File, 2008

Insurance Status. Similar to other population-based measures, Medicare Advantage and Part D penetration and uninsurance rates for Beacon Communities as a whole closely mirrored those of the general U.S. population, but with differences across Communities (see Exhibit 3.5). Crescent City and Delta BLUES had the highest proportions of uninsured residents (23 and 22 percent, respectively). Southeastern Minnesota, Hawai'i, and Western New York had the lowest (10 percent each). The Delta BLUES, Bangor, Central Indiana, and Southern Piedmont Communities had lower than average Medicare Advantage penetration (7 to 17 percent); the Utah, Hawai'i County, San Diego, Crescent City, and Western New York Communities had higher than average penetration (34 to 47 percent). By contrast, Medicare Prescription Drug (Part D) penetration was higher in Delta BLUES and Bangor (53 and 65 percent) and lower in San Diego, Crescent City, and Western New York (20 to 28 percent).

Exhibit 3.5 Insurance Coverage in 2009, by Beacon Community

Beacon Community	Medicare Advantage Penetration	Medicare Prescription Drug Plan (Part D) Penetration	Population Uninsured
Bangor	11%	53%	13%
Central Indiana	14%	45%	16%
Colorado	27%	36%	20%
Crescent City	43%	28%	23%
Delta BLUES	7%	65%	22%
Greater Cincinnati	26%	34%	14%
Greater Tulsa	26%	40%	21%
Hawai'i Island	35%	37%	10%
Inland Northwest	20%	43%	18%
Keystone	34%	40%	13%
Rhode Island	36%	34%	13%
San Diego	40%	28%	19%
Southeast Michigan	23%	34%	17%
Southeastern Minnesota	29%	39%	10%
Southern Piedmont	17%	46%	18%
Utah	34%	31%	17%
Western New York	47%	20%	10%
National Average	**25%**	**38%**	**17%**

Sources: HRSA Area Source File; Census Small Area Health Insurance Estimates (SAHIE), 2009

Population Health Status and Clinical Focus Areas

Beacon Communities closely resembled the general U.S. population on measures of diabetes, heart disease, and asthma (Exhibit 3.6). Rates are for the total population in each Community.

Diabetes. Diabetes affected about a quarter of the population in most Beacon Communities, with Southeast Michigan (38 percent) and Colorado (16 percent) as high and low outliers, respectively. Most Beacon Communities (14) focused on diabetes.

Cardiovascular Disease. Approximately one-third of the Communities' populations had ischemic heart disease, and 4 percent had angina or coronary heart disease. Heart disease was more prevalent in Southeast Michigan than in any other Community, with over half the Medicare beneficiaries in that catchment area having ischemic heart disease; Colorado and Utah had the lowest prevalence (21 and 24 percent, respectively). Almost half of the Beacon Communities (8) included a focus on cardiovascular disease.

Asthma and COPD. Asthma affected a smaller share of the Beacon Communities' populations, ranging from 4 percent in Southern Piedmont to 12 percent in Hawai'i County. Six Communities targeted asthma or COPD, two of which focused on pediatric asthma.

Exhibit 3.6 Population Health, by Beacon Community

Beacon Community	Population ever told they have angina or coronary heart disease* (2010)	Medicare beneficiaries with ischemic heart disease (2008)	Population ever told they Have Diabetes (2010)	Population told they currently have asthma (2010)*
Bangor	4%	32%	26%	11%
Central Indiana	5%	33%	27%	12%
Colorado	--	21%	16%	--
Crescent City	5%	32%	31%	7%
Delta BLUES	--	32%	28%	--
Greater Cincinnati	3%	34%	27%	10%
Greater Tulsa	5%	34%	25%	10%
Hawai'i Island	3%	26%	29%	12%
Inland Northwest	4%	26%	23%	11%
Keystone	--	35%	29%	--
Rhode Island	4%	35%	26%	11%
San Diego	4%	31%	25%	8%
Southeast Michigan	7%	52%	38%	12%
Southeastern Minnesota	--	27%	21%	--
Southern Piedmont	4%	29%	28%	4%
Utah	3%	24%	22%	10%
Western New York	5%	38%	28%	12%
National Average	*4%*	*32%*	*27%*	*9%*

*No data at the Community level is available for Delta BLUES, Keystone, Southeastern Minnesota, and Colorado because these states did not estimate these metrics at a sub-state level.

Sources: BRFSS, 2010; CMS Chronic Conditions Warehouse, 2008

Most Communities had interventions focused on diabetes, as noted, and several targeted cardiovascular care, asthma, and chronic obstructive pulmonary disease (COPD) (Exhibit 3.7). They targeted their efforts on these and on other conditions with high rates of illness, mortality, and cost; and they introduced interventions to improve care transitions between inpatient and Community settings and manage these chronic conditions through preventive and regular ambulatory care.[57] A number of Communities also used Beacon funding to support population-based cancer screening, disease registries, or immunization programs.[iv]

[iv]On the advice of NORC's technical advisors on performance measurement, we did not include preventive services in our Medicare claims analysis, because these services frequently are provided by sources (public clinics, employers, pharmacies) that would not generate Medicare claims.

Exhibit 3.7 Clinical Focus Area, by Beacon Community

Clinical Focus Area	Bangor	Central Indiana	Cincinnati	Colorado	Crescent City	Delta Blues	Hawai'i	Inland NW	Keystone	SE Michigan	SE Minnesota	Rhode Island	San Diego	Southern Piedmont	Tulsa	Utah	Western NY	TOTAL
Diabetes	X	X	X	X	X	X	X	X		X	X	X		X		X	X	14
Cardiovascular Care	X	X		X	X		X		X				X	X				8
Asthma	X		X											X				3
COPD	X	X							X									3
Asthma – Pediatric			X								X							2
Other preventive: cancer screening		X													X			2
Other preventive (e.g., immunizations)		X		X				X				X			X			5
TOTAL	4	5	2	5	2	1	3	1	2	1	2	3	1	3	2	1	1	

Source: Beacon Community reports; technical assistance summaries.

Health Care System Capacity and Characteristics

Communities reflected great diversity in practice organization and local health care environments,[58] serving as testing grounds for innovative models of care delivery relevant for a wide variety of health care settings and marketplaces across the country. The health care resources and capacity within a given area influenced the decisions Beacon Communities made with regard to the interventions they selected and implementation approaches they pursued.

Health Care Resources and Capacity. In 2008, the average number of primary care providers per 100,000 people nationally was 248. Among the Beacon Communities, the average ranged from 101 in the Delta BLUES Beacon Community catchment area to 570 in the Southeast Minnesota Beacon Community catchment area. With regard to hospital capacity, the number of hospital beds per 100,000 people ranged from 173 in the San Diego Beacon catchment area to 486 in Western New York.

Market Competition. The extent of local health care market competition can affect the likelihood and nature of voluntary collaborations in a region. The Herfindahl-Hirschman Index (HHI) is a measure of market competition, using a range of 0 to 1.0 to measure the degree of concentration within a given market. Values closer to 0.0 reflect a larger number of smaller firms; a value of 1.0 reflects a single monopoly provider. In 2009, the HHI for Beacon Communities as a whole was .32, close to the nationwide average. Across Beacon Communities, the HHI ranged from 0.15 in San Diego, reflecting low concentration and the most competitive market among the Beacon Communities, to 0.49 in Southeastern Minnesota, reflecting moderate-to-high concentration and the least competitive market among the

Communities (Exhibit 3.8). Changes in the health care market during the program, including the formation of accountable care organizations (ACOs), propelled further mergers, alliances, and health care system consolidation.[59,60]

Exhibit 3.8 Hospital System Concentration within the Beacon Communities, Based on the Herfindahl-Hirschman Index (HHI), by Beacon Community
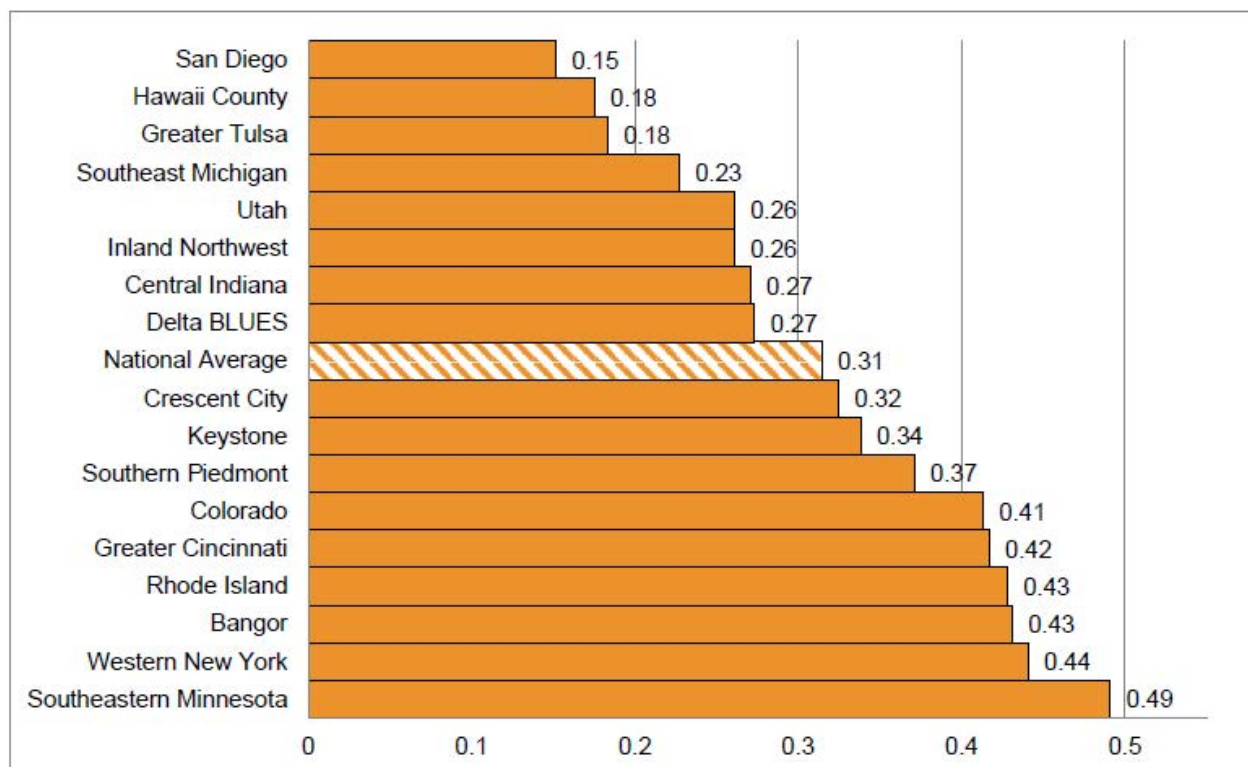
Source: AHA Annual Hospital Survey, 2009

Sophistication in Health IT Adoption and Use

Existing health IT capacity within a Community, including EHR adoption and established HIE infrastructure, played an important role in the activities and outcomes of the Beacon Communities. Although ONC selected the Beacon Communities in part because they were already health IT users, the Communities varied substantially in their levels of staff, financial resources, infrastructure, and stage of implementation and adoption of health IT, including their rates of EHR adoption, which affected their ability to enable exchange.[v]

EHR Adoption. In 2010, the EHR adoption rate among hospitals in Beacon Communities as a whole was close to the national average (16 percent)—but with Communities ranging from less than half of a percent

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[v] For more information on how each Community differed based on various contextual and organization-level characteristics, types of interventions, levels of EHR adoption among hospitals and ambulatory care providers, e-prescriptions, and HIO participation in each Beacon Community, see
http://www.healthit.gov/sites/default/files/norc_beaconevalcharacterizingCommunities_march_2013.pdf.

in the Colorado catchment area to 47 percent in Southeast Michigan (Exhibit 3.9). In sharp contrast, EHR adoption among ambulatory providers as of 2010 was over 50 percent in 10 of the Beacon Communities, compared to the national average of 47 percent; in only four Communities was EHR penetration among ambulatory providers lower than the national average. Adoption rates among ambulatory providers were highest in Southeastern Minnesota and Southern Piedmont (74 and 72 percent, respectively) and lowest in Crescent City, Delta BLUES, and Southeast Michigan (34, 32, and 35 percent, respectively).

HIE Access and Participation. Beacon providers' access and connectivity to a health information organization (HIO) were typically higher than the national average in 2009, but varied across Communities. Most hospitals in Beacon Communities had access to an HIO in their area. All hospitals (100 percent) in the Hawai'i Island, Colorado, and Utah Beacon Communities had access to an HIO in 2009, compared with the national average of 45 percent (see Exhibit 3.9). In only three Communities was the proportion of hospitals with HIO access lower than the national average (Delta BLUES and Southern Piedmont at 0 percent and San Diego at 30 percent). Despite having HIO access, however, not all hospitals were connected to one. The share of hospitals participating in an HIO ranged from 0 percent (Delta BLUES and Southern Piedmont) to 72 percent (Crescent Cincinnati and Greater Cincinnati)—with 10 Communities having a higher rate of hospital HIO participation than the national average of 23 percent.

Exhibit 3.9 Health IT Capacity at the Start of Beacon Program, by Community

Beacon Community	Hospitals with Fully Functioning EHR (2010)	Ambulatory providers that adopted an EHR (2010)	Hospitals with HIOs in Area (2009)	Hospitals Participating in an HIO (2009)
Bangor	17%	56%	66%	25%
Central Indiana	26%	56%	93%	61%
Colorado	.4%	65%	100%	60%
Crescent City	25%	34%	72%	72%
Delta BLUES	5%	32%	0%	0%
Greater Cincinnati	11%	50%	83%	72%
Greater Tulsa	3%	41%	51%	11%
Hawai'i County	9%	68%	100%	50%
Inland Northwest	15%	64%	79%	70%
Keystone	20%	63%	97%	62%
Rhode Island	23%	42%	54%	17%
San Diego	12%	42%	30%	10%
Southeast Michigan	47%	35%	60%	60%
Southeastern Minnesota	10%	74%	48%	20%
Southern Piedmont	29%	72%	0%	0%
Utah	15%	68%	100%	71%
Western New York	6%	49%	76%	47%
National Average	*16%*	*47%*	*45%*	*23%*

Sources: SK&A, 2010; AHA IT Supplement, 2009

IV. Approaches to Transforming Clinical Care through Building and Strengthening Health IT

Key Findings
■ Most Beacon Communities (10) strengthened or accelerated the expansion of existing platforms for health information exchange; seven established new vehicles for exchange. Communities that accelerated or strengthened existing efforts focused on activities such as upgrading software or systems, expanding services, and funding connections with new exchange partners and other data sources. Those that created new solutions established data repositories or disease registries, or connected providers that previously had not been able to exchange data electronically.
■ All Beacon Communities implemented interventions to support care management, with the most common supporting care management workflow processes in the hospital or clinic setting, as well as remotely.
■ All except two Communities also focused on improving the availability of information for providers to support clinical decision-making and population health management, through clinical decision support tools, data repositories, and feedback reporting.
■ Most Communities (11) addressed care transitions, such as hospital admissions and discharges and primary care provider to specialist referrals.

Beacon Communities implemented different strategies to foster the use of health IT and data exchange in routine clinical practice. Beacon efforts were an opportunity to strengthen or expand existing health IT infrastructure or build new solutions to support clinical transformation; and the Communities implemented diverse clinical interventions to support care management, enhance the availability of clinical information, and improve transitions of care. This chapter describes the extent to which Beacon Communities opted to build or strengthen their data-sharing infrastructure to support programmatic goals and identifies trends in the types of interventions implemented. Chapter VI elaborates on enabling factors, challenges, and lessons learned about the implementation and progress of these efforts.

Approaches to Infrastructure Development and Data Sharing

Many Beacon Communities (10) strengthened or accelerated the expansion of existing HIE platforms; the remainder established new solutions (Exhibit 4.1). The Communities that accelerated or strengthened existing efforts (Bangor, Central Indiana, Colorado, Greater Cincinnati, Inland Northwest, Keystone, Rhode Island, Southern Piedmont, Utah, and Western New York) focused on activities such as upgrading software or systems, expanding services, and funding connections with new exchange partners and other data sources. Communities that deployed new solutions in their catchment areas (Crescent City, Delta BLUES, Hawai'i, San Diego, Southeast Michigan, Southeast Minnesota, and Tulsa), connected providers that previously had not been able to exchange data electronically and engaged in activities such as establishing new clinical data repositories and disease registries.

Exhibit 4.1 Approach to Exchange Infrastructure Development, by Community

Beacon Community	Lead Organization*	Approach to Infrastructure Development	HIE Infrastructure
Bangor	Eastern Maine Health System	Strengthen	Statewide
Central Indiana	Indiana Health Information Exchange, Inc. (IHIE)	Strengthen	Regional
Colorado	Rocky Mountain Health Plan	Strengthen	Regional
Crescent City	Louisiana Public Health Institute (LPHI)	Build	Regional
Delta BLUES	Delta Health Alliance (DHA)	Build	Statewide
Greater Cincinnati	HealthBridge	Strengthen	Regional
Hawai'i	University of Hawai'i at Hilo, College of Pharmacy	Build	Regional
Inland Northwest	Inland Northwest Health Services	Strengthen	Regional
Keystone	Geisinger Health System	Strengthen	Regional
Rhode Island	Rhode Island Quality Institute (RIQI)	Strengthen	Statewide
San Diego	U.C. San Diego	Build	Regional
Southeast Michigan	Southeastern Michigan Health Association (SEMHA)	Build	Regional
Southeast Minnesota	Mayo Clinic	Build	Regional
Southern Piedmont	Community Care of Southern Piedmont	Strengthen	Regional
Utah	HealthInsight	Strengthen	Statewide
Tulsa	MyHealth Access Network	Build	Regional
Western New York	HEALTHeLINK	Strengthen	Regional

*Lead organization is the lead applicant for the Beacon Community in response to the Funding Opportunity Announcement (FOA).
Source: Program data collected by NORC, 2011

Just over half of the Beacon Communities (9) were led by not-for-profit, Community-based organizations with a previous convener role in their Communities; the rest were led by integrated delivery networks, HIOs, or academic institutions. In each Beacon Community, a lead organization served as the convener and hub of the collaborative activities. The lead organization had to play a neutral role in negotiating agreements among collaborative partners with differing priorities and interests,[61,62] while also being trusted to act in the interest of the collaborative as whole rather than putting the interest of the lead organization first.[63] This balance was to prove particularly important in the more competitive markets, where forging alliances among health systems and providers turned out to be a major challenge.

Organizations that served as health care leadership forums, health services management and consulting organizations, quality improvement organizations, or a health plan led nine of the Beacon Communities. The common thread was their well-established role as third-party convener for health improvement endeavors in their Communities. Other types of lead organizations included integrated delivery networks (3 Communities), academic institutions (2), and HIOs (3).

Most Beacon Communities (13) used regional HIOs to facilitate data sharing; the other four were associated with a statewide HIE system. Relationships with state and regional health information organizations (HIOs) that oversaw HIE among organizations in their catchment areas typically aligned with Communities' approaches to data sharing. For example, regional HIOs led Beacon efforts in Indiana, Greater Cincinnati, and Western New York, whereas the state-designated entity for enabling HIE services under the State HIE program led or worked with the Bangor, Delta BLUES, Rhode Island, and Utah

Beacon programs. Regardless of infrastructure, all Communities enabled secure point-to-point data exchange among providers (directed exchange) through their data-sharing infrastructure.

Strategies to Enhance IT-enabled Care Management

Care management encompasses case and disease management, and assists patients and their caregivers to manage their medical, social, and mental health conditions more efficiently.[64] Care management enables better treatment of chronic conditions, thus helping to reduce health care costs and improve quality of care.[65] Health IT tools and services play an important role in care management, as they can support communication and coordination among care team members and engagement with patients.

All Beacon Communities implemented at least one strategy to enhance IT-enabled care management; most used two or more. To enhance care management in participating practices, Beacon Communities implemented IT-enabled processes that supported the workflows of care managers stationed in hospitals, ambulatory settings, and remote locations; patient engagement, education, and outreach; patient-centered medical home (PCMH) models; telehealth services; and medication therapy management. Here we highlight the types of care management interventions used across Communities (see Exhibit 4.2 for specific examples).

Eleven Beacon Communities supported care managers with IT systems. Care managers, also referred to as care coordinators, are clinical or non-clinical staff designated by practices to monitor and coordinate patients' health care needs, utilization, and progress across settings. Their work encompasses activities such as medication reconciliation, scheduling and tracking patient visits in accordance with a therapeutic regimen, and communicating with multiple providers treating a patient. These processes can all be enhanced by the use of health IT systems and tools such as a common EHR or dedicated care management database. [66] In the Beacon Communities, care managers embedded in inpatient, outpatient, and remote settings used health IT to perform care management functions, help patients navigate services and providers, connect patients with Community resources, and assist with administrative and logistical tasks. Some Beacon Communities built their own care management databases; others used out-of-the-box software to document services provided and referrals, and to track information across their patient panels.

Ten Communities used a diverse array of IT tools to promote patient engagement and self-care. Specific strategies included patient portals, data repositories, personal health records, in-home telemonitoring of blood sugar levels, and mobile device applications such as Txt4Health (a health reminder and information service based on recommendations from national health experts).[67] Greater access to relevant information and feedback can enhance patients' participation in the management of their chronic conditions and improve adoption of healthier behaviors.

Seven Communities helped practices meet PCMH requirements using EHRs, HIE services, and other health IT tools to manage and support coordinated care. A PCMH provides patients with a source of usual care that is responsible for coordinating all those involved in patients' care—including patients themselves, caregivers, providers, specialists, and Community service providers.[68] In order for the National Committee on Quality Assurance (NCQA) to certify a provider as a PCMH, providers must demonstrate robust information management and care coordination procedures. Several Beacon Communities provided technical assistance to providers in implementing health IT solutions to support

PCMHs; one worked with an EHR developer on design specifications for new EHR standards to support PCMH model requirements.

Seven Beacon Communities used telehealth to offer services and incorporate data from beyond the clinical encounter to improve accessibility and timeliness of services and information for providers and patients. Telehealth is "the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration."[69] Telehealth services include: (1) telemedicine, technology that allows clinicians to deliver "face-to-face" clinical services from a remote location; and (2) home monitoring technology, where devices in the home capture patient-generated data that clinicians can then review. The ability to offer medical care or monitor patients' health remotely reduces barriers to provider contact and increases access to patient data. Telehealth interventions in Beacon Communities included virtual home visits and remote monitoring; in some cases, telehealth data were integrated into EHRs via the HIE.

Three Beacon Communities implemented medication therapy management (MTM) programs to improve adherence to and effectiveness of patient medication regimens. Inadequate management of medications contributes to increased health expenditures and hospital readmissions.[70] Electronic transmission of medication orders and histories has improved the ability of pharmacists and primary care providers to manage medications and advise patients about their medication use. MTM interventions in Beacon Communities involved integrating medication management directly into care strategies for patients with diabetes, by extending data exchange capabilities to pharmacists.

Exhibit 4.2 Selected Strategies of Beacon Communities IT-enabled Care Management

Intervention	Examples of Strategies	Beacon Communities
Care Managers, Hospital or Clinic based	■ Nurse care managers in individual primary care practices working directly with high-risk and chronically ill patients. ■ Care managers stationed in ambulatory physician practices assisting patients with medications and care coordination. ■ Care managers embedded in hospitals to focus on tasks such as discharge planning and follow-up scheduling with primary care practices.	Bangor, Keystone
Care Managers, Remote	■ Transitions managers and behavioral health care manager available by telephone. ■ Care coordinators to help members of the care team improve adherence to evidence-based guidelines around preventive tests and treatments through use of a dedicated care management electronic record system. ■ Centralized call center to provide telephonic case management for patients.	Bangor, Inland Northwest, Keystone
Care Management Tools	■ Addition of care management functionality to utilization management tool, to capture care management data in a common place. ■ Tablet version of electronic record of care management activities used statewide. New functionality allowed care managers to record and access information (e.g., care plans, gaps in care notices) in the field and improve efficiency and quality of services.	Keystone, Southern Piedmont

Intervention	Examples of Strategies	Beacon Communities
Patient engagement, patient portal	■ Regional HIE allowing patients to access information from facilities participating in the regional health information organization. Functions included: ● communicate with providers via secure messaging, ● upload documents and medication forms, and ● link to information on MedLine Plus (the National Institute of Health's website for patients and families to research information on diseases, conditions, and wellness issues). ■ Providers use of HIE to send patients preventive health reminders concerning services such as flu shots.	Keystone
Patient engagement, Mobile Applications	■ Texting programs to disseminate diabetes information to at-risk patients or educational and prevention-focused messages.	Crescent City, Southeast Michigan, Greater Cincinnati
PCMH	■ Technical support to providers for PCMH transformation and NCQA certification. ■ Work with EHR developer to design specifications for new EHR standards that support PCMH model requirements. Resulting toolkit included guidance on reporting, sample policies, and procedures to govern access, and best practices for adjusting practice workflows to optimize use of the EHR system.	Greater Cincinnati, Crescent City, Hawai'i Island
Telehealth	■ Integration of telehealth data directly into a statewide HIE platform. Visiting nurse or home health agencies sent providers secure, real-time notifications and telehealth reports from remote monitoring devices via Direct (a secure messaging option for point-to-point exchange of data between providers). ■ Home care agencies use of remote monitoring equipment to track patients' vital signs. In-home devices also provided a channel to deliver short health status surveys to help care managers gauge patient progress. ■ Cellular-enabled device that allowed nurses to remotely monitor patient vital signs and other indicators daily. ■ Virtual home visits for patients with poorly controlled diabetes using in-home videoconferencing. ■ Partnering with home health care agencies to set up telemonitoring to deliver preventive care to patients in the home. Physicians could then view the data through the HIE system or via paper reports, as desired.	Rhode Island, Bangor, Western New York, Southern Piedmont
Medication Therapy Management (MTM)	■ Incorporation of clinical pharmacists already working into the care management strategy for diabetic patients. These pharmacists focused on helping patients with uncontrolled diabetes with medication management, and closely communicated with providers and care managers as part of a holistic strategy to improve patient care. ■ Implementation of a health IT–enabled MTM intervention and contracting with an academic school of pharmacy to provide MTM services to various practices. ■ Development of a medication history capability through a regional HIE organization that sent discharge medication lists from hospitals, as well as medications ordered from long-term care and rehabilitation centers, to primary care physicians. Certified MTM pharmacists were also deployed to perform a comprehensive medication review for high-risk diabetic patients and make appropriate treatment recommendations to physicians when notified following a patient's discharge and appropriate treatment recommendations to physicians.	Utah, Delta BLUES, Western New York

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

Beacon Communities' clinical transformation efforts included providing additional data and tools to clinicians to support more informed decision-making and quality improvement activities. These interventions included targeted clinical decision support (CDS) tools, care performance metrics at the physician level, and access to population-level health statistics and associated analyses (Exhibit 4.4).

Most Communities (15 out of 17) employed IT-enabled tools to provide clinical information at the point of service

Ten Beacon Communities sought to optimize use of CDS tools to offer providers data at the point of care. CDS tools assist clinicians in making decisions about patient care by making evidence-based guidelines and recommendations derived from patient information available at the point of care.[71] By linking health observations and knowledge, CDS systems can redefine clinical care processes by influencing choices made by clinicians and thus improve patient care. The most common approach was to work with physicians to optimize use of CDS functionality available through their EHRs; two Communities, however, used the Archimedes Individualized Guidelines and Outcomes (IndiGO) tool with patient data from multiple settings aggregated in a Community clinical data repository.

Fourteen Beacon Communities established public health registries and/or clinical data repositories. The registries/repositories enabled clinicians to access patient data supplied from several sources and to monitor their own performance across their panel of patients. These efforts consisted of aggregating data in a common place and providing tools for data access and analysis. Clinicians or others could then use this information to develop patient intervention strategies or support care coordination and care management. Eleven Communities used registry-based management tools; four created clinical data repositories to support providers' population health management efforts.

Most Communities (11) adopted interventions that used health IT to improve care transitions

Transitions of care occur when a patient moves from one care setting to another—be it between hospital, ambulatory primary or specialty care, long-term care, home health, rehabilitation facility, or other care setting.[72] Currently, fragmented payment and reimbursement systems often result in lapses in both communication and care continuity across settings, leading to lower quality and higher costs. Health reform efforts to improve care coordination, reduce communication inefficiencies, and cut costs have underscored the need for innovative uses of technology to enhance care delivery through improved transitions of care.[73] Exhibit 4.3 describes Communities' strategies for using health IT to improve care transitions.

Eight Beacon Communities developed automated admission, discharge, and transfer (ADT) alerts to improve care post-discharge. Providers can use ADT data to notify a designated primary care provider when an acute care setting has admitted or discharged a patient, and to prompt the provider to follow up with the patient.[74] As hospital health IT systems already routinely produce these data to track patient transitions in their own systems, this strategy is a rapid way to deliver impact for providers using existing infrastructure. In addition to alerts to primary care providers about ED visits and inpatient

admissions, ADT interventions in Beacon Communities included direct delivery of discharge summaries and continuity of care documents to primary care providers' EHRs and care managers.

Five Beacon Communities included enhanced discharge planning and patient education as part of their interventions to improve self-care and care transitions. Anticipating a patient's need for follow up services and self-management skills after an inpatient stay improves the likelihood that the patient's condition remains stable, can prevent an unnecessary readmission, and improves transitions of care.[75] Standardizing discharge processes and focusing on patient education increases patients' and caregivers' understanding of post-discharge needs, including understanding the primary diagnosis and how to take the specified medications and seek follow up care if needed.[76] Self-management support encourages patients to take control of their health to improve health outcomes. Tailoring education and support to align with patients' capacity for, and preferences about, involvement in their own care (through education, training, or coaching) can influence patient behavior and improve a patient's ability to carry out self-care tasks.[77]

Four Beacon Communities used health IT to better manage referrals to, and coordination with, specialists. When communications between primary care physicians and specialists depend on phone calls, letters, or notes given to patients, important information can be delayed or lost in transmission, thus undermining provision of prompt and effective care. Dedicated electronic communication avenues among providers can standardize such exchanges and make them faster and more reliable.

One Community focused on electronic data transmission from emergency transport to the hospital ED, to allow for more rapid diagnosis upon arrival. San Diego, for example, addressed the need for more timely care for patients suspected of having a myocardial infarction by equipping ambulances with the capability of sending the receiving ED measurements of cardiac function en route.

Exhibit 4.3 Selected Strategies of Beacon Communities Using Health IT to Improve Care Transitions

Intervention		Examples of Strategies	Beacon Communities
Clinical information at the point of service	**Integrated CDS tools into their IT platforms**	■ Installation and optimization of clinicians' use of CDS tools within their EHRs. ■ Use of the Archimedes Individualized Guidelines and Outcomes (IndiGO) tool with patient data from multiple settings aggregated in a Community clinical data repository. The repository generates individualized patient guidelines designed to assist providers in making preventive care and treatment decisions.	Greater Cincinnati, Crescent City, Delta BLUES, Inland Northwest, Southeast Michigan, Southeastern Minnesota, Utah, and Western New York, Colorado and Tulsa

Intervention		Examples of Strategies	Beacon Communities
Clinical information at the point of service,. continued	Public health registries and clinical data repositories	■ Development of a diabetes registry to identify patients lacking specific care services and creation of performance reports relative to care standards for diabetes across practices and care networks. ■ Establishment of the Pharmacy Home Project, a database that aggregates information on drug use and transmits it to network pharmacists, case managers, and primary care providers. The system provides a patient-level profile and medication history, as well as reports that identify patients who could benefit from additional medication management. ■ Development of a local health information organization (HIO) that included a disease registry. The registry enables clinics to identify and generate electronic lists of their patients with diabetes, patients who are overdue for tests, or patients not at their treatment goal for their condition, facilitating follow-up by clinic staff to arrange for additional services.	Southern Piedmont, Crescent City
Use health IT to improve care transitions	Admission, discharge, and transfer (ADT) alerts	■ An ED/inpatient notification system to alert primary care providers about patient visits to EDs or admissions to inpatient settings. then Working with primary care practices then enabled them to redesign workflows around these alerts; for instance, by designating an individual to triage notifications who could then notify the appropriate primary care provider. Working with select EHR developers also enabled them to expand on the basic alerts by having clinical discharge summaries delivered directly into providers' EHRs. ■ Receiving real-time ADT data from hospital systems through connections with local HIE organizations. When a provider detects an ADT event indicating a hospital discharge, it sends a query back to the source HIE system to obtain a continuity of care document (CCD) for the patient. The Community's care management system can display clinical data in the CCD through a web-based viewer. When available, the viewer also displays a discharge summary to care managers, giving them timely access to important patient information.	Crescent City, Southern Piedmont
	Enhanced discharge planning and patient education as part of their Beacon interventions to improve self-care and care transitions	■ Providing acute care facilities with a standardized patient discharge summary tool, and self-management support, as well as enabling services (such as culturally sensitive patient education programs focusing on self-management of chronic illness, transportation, mental health, and other social service supports). ■ Establishment of an inpatient diabetes management program, which targeted patients with poorly controlled diabetes, offered patients diabetes education classes, and referred patients to an inpatient dietician. ■ Development of a solution to engage parents of children with asthma, as well as providers across the continuum of care, in better managing this condition. This included an online portal in which patients, primary care providers (PCPs), and school nurses could access plans uniquely designed to proactively manage attacks.	Hawai'i Island, Southern Piedmont, Southeast Minnesota
	Enhancing the primary care provider/ specialist communication	■ Development of a specialist referral and consultation application to help providers complete the patient referral process, allowing the patient to receive care more quickly and providing the PCP with expert advice. This includes development of bi-directional interfaces to embed the application into the workflow of EHR users, resulting in increased electronic referrals.	Tulsa

Exhibit 4.4 Clinical Transformation Interventions, by Beacon Community

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

Source: Program data collected by NORC, 2011-2013

V.   An Analysis of Medicare Beneficiary Experience to Measure the Impact of Beacon Community Efforts to Transform Clinical Care

Key Findings and Limitations

- The performance of Beacon Communities in terms of measured outcomes for the fee-for-service (FFS) Medicare population varied.
- Most Communities made improvements on some measures relative to comparators; we observed no consistent patterns in performance within a Community across clinical focus areas.
- The analysis of Medicare claims data captures only the initial period of Beacon implementation. Many Communities made substantial up-front infrastructure investments and did not launch their clinical interventions in full until 2012 or even 2013. Following the Beacon population for a longer time could show more definitive impact than we are able to see looking at 2013 outcomes, the last year for which data was available.
- Our observations are limited to Medicare FFS beneficiaries. The Beacon Communities served patients and populations of all ages—children with asthma, adults with Medicaid under age 65 years, and persons enrolled in Medicare Advantage (Part C) plans. The analysis was unable to measure the impact on these groups.
- Some interventions, such as public health immunization screening and follow up, or electronic physician orders for life sustaining treatment (ePOLST), are not measurable in claims data; thus, this analysis does not capture these important interventions.
- Because the Beacon program extended or supplemented existing activities in many Communities, there is not a defined line between pre-intervention and intervention, making a comparison difficult. Many Communities were testing other innovations concurrently with Beacon programs; there is insufficient information to allow us to distinguish the independent effects of the various activities.

Beacon Communities engaged in interventions at the provider level to improve health-care delivery, chronic disease management, and health outcomes. Many of these Communities focused on creating patient-centered medical homes or facilitating post-hospital care transitions. Communities varied in their history and maturity related to health IT and cross-practice cooperation, the timelines along which they implemented their Beacon programs, and the spread of their interventions. Achieving and demonstrating improved care and outcomes are daunting and ambitious goals, particularly in the context of the technological reengineering that was the hallmark of Beacon Communities and within the relatively short timeframe of the 36-month Beacon program.

The tools available to assess Beacon program outcomes consistently across the 17 Communities were limited to administrative data for a single national population cohort—Medicare fee-for-service (FFS) enrollees. We recognize the partial view of every Beacon Community's performance that this data set offers. Ideally, an analysis of the impact of Beacon Community efforts to improve and redesign care delivery and population health interventions would take account of the experience of all of the patients served by providers participating in the Beacon program and all residents of the Communities' catchment areas.

Overview of Methodological Approach

As explained in Chapter II, we conducted an analysis of Medicare claims data to address the extent to which health care utilization for the defined intervention group—Medicare FFS beneficiaries over age 65

who saw providers participating in Beacon Community initiatives—differed from outcomes in two comparison populations:

■ Medicare beneficiaries over 65 years of age who were within the Beacon Communities but not exposed to the intervention; and

■ Individuals drawn from a propensity score–matched national sample of Medicare beneficiaries that excluded anyone in a Beacon catchment area.

We also made a third comparison—between all Medicare beneficiaries in the Beacon Community catchment area and a propensity score–matched national sample of similar Medicare beneficiaries, to examine more general trends in the performance of Communities relative to national trends and observe any spillover effects.

We used difference-in-differences (DiD) estimation as the primary analytic approach appropriate for comparing outcomes between the intervention and comparison groups while controlling for potential biases stemming from differences between the two groups' characteristics and comparisons over time. We analyzed outcomes at the person-year level, reporting report the DiD for 2010 (pre) compared to 2013 (post), modeling outcome measures using multivariate logistic regression.

We provide detailed discussion of the methodology and reasoning behind our analytic choices in Appendix B, including discussions of outcome measure selection, patient attribution, comparison groups, and analytic approach.

Evaluation Design Challenges and Limitations

There are several difficulties inherent to this type of quantitative analysis. These difficulties include:

- **Overcoming the short timeframe for evaluation.** The interventions sought to change the trajectory and costs of chronic diseases, but the data for this evaluation covered three years of the intervention, at most. Because many Communities made substantial up-front investments and did not launch their clinical interventions in full until 2012 or even 2013, and the evaluation did not have data after 2013, the analysis captures only the initial period of Beacon implementation, which was too short to practically measure impact, particularly as related to improvement of chronic disease. Following the Beacon population for a longer time could show more definitive impact than we are able to see looking at 2013 outcomes. In addition, programs designed to test new and innovative delivery system models may see rates of change that vary across different aspects of the complex model or intervention. We would expect to see more effects well downstream; in fact, in the first few years of the intervention, we might expect to see higher costs or use even though expected value of the intervention might be positive over the long run.

- **Capturing effects beyond counts of services.** While Communities all collected data on clinical quality measures, our quantitative analysis is limited to Medicare claims. The analysis of Medicare claims does not capture outcomes of interventions such as public health immunization screening and follow up, or electronic physician orders for life sustaining treatment (ePOLST), which do not bill Medicare. This analysis also does not capture the experiences of those not

enrolled in Medicare. Qualitative data are thus critical to answer questions for which Medicare data are unsuited, helping to tease apart the relative roles of the interventions and other dynamics at play, and highlighting the importance of Communities' circumstances and particular mechanisms at work.

- **Identifying beneficiaries touched by the intervention.** The nature of the Beacon interventions was to work on changing providers' behavior and tools, rather than to address the care of specific patients. Therefore, using claims data to measure the effects of an intervention relied on the correct specification of the Beacon providers so that claims could be correctly identified as being for a patient encounter touched by the intervention. Tax identification numbers and CMS Certification Numbers could change over time, as could the individual practitioners engaged in the intervention. Further, many of the practitioners involved do not bill Medicare using their own National Provider Identifier (NPI). All of these identifiers and enumerations are critical to a complete assignment of claims to Beacon intervention as opposed to nonintervention. Further, interventions were not limited to the Medicare FFS population, and the analysis does not fully reflect the performance of these interventions, which at times were the main interventions for a Community. For example, Cincinnati and Southeast Minnesota had substantial childhood asthma interventions, whereas Crescent City, Delta BLUES, and Southeastern Michigan targeted outreach efforts on non-elderly Medicaid beneficiaries. Several sites targeted care for Medicaid beneficiaries, or for children, data not captured by Medicare claims. Even the Medicare population is not fully covered by claims data. Information on health care use by enrollees in managed care plans is not captured in the FFS claims data, and in some Beacon areas, managed-care penetration rates were very high. Ideally, an analysis of the impact of Beacon Community efforts to improve and redesign care delivery and population health interventions would take account of the experience of all of the patients served by providers participating in the Beacon program and all residents of the Communities' catchment areas. To the extent that Beacon interventions affected Medicare FFS enrollees differently than others in the community, the quantitative analysis cannot be generalized.

- **Accounting for multi-faceted interventions.** Among the challenges of attempting to quantify the impact of programs such as Beacon is isolating the specific components of the intervention. All of the Beacon Communities implemented multiple strategies, such as developing new data exchange capacity and coaching ambulatory care practice staff in the use of their EHR population management tools. Even where Communities used a similar strategy—such as use of care managers—the approach, tools, and implementation of these strategies varied across Communities. Interviews and site visits with Communities have informed our interpretation of the quantified findings with respect to these activities.

- **Measuring a dose response.** The information Beacon Communities were able to provide the evaluation on implementation timing and provider participation was often incomplete and not comparable. In addition, providers within the Beacon Communities were engaged in the Beacon interventions to varying degrees, as a function of both the time elapsed since implementation and the particular components of the program in which they are involved. In all multivariate analyses, therefore, we used the providers' dates of adopting the Beacon intervention as a control variable. This addresses any unobserved factors correlated with date of adoption, further helping us to

understand the independent effects of Beacon interventions. We also conducted a supplemental analysis that aggregated information across Communities, to examine both the time following the Beacon award to launch of the clinical interventions and the penetration of the Beacon Program within each Community.

- **Disentangling Beacon from other programs.** In some Communities, the Beacon program extended or supplemented existing activities. In those Communities, there is not a defined line between pre-intervention and intervention, making a comparison difficult. Many Communities were testing other innovations concurrently with Beacon programs; there is insufficient information to allow us to distinguish the independent effects of the various activities.

Overview of Results

The outcome measures derived from the Medicare data available for this evaluation did not provide a clear or consistent message about the impact of Beacon Program interventions. Our detailed findings, provided in Appendices B and C, are quite likely conditioned by the challenges described in this chapter. It also is difficult to compare our results with the Communities' own reports of program impact, as most Communities with clinical and process outcomes results relied on EHRs, which included all Beacon Program participants, not only the Medicare beneficiaries we studied.[vi] In summary, the scope of this analysis by itself allows for limited inferences about the overall success of the Beacon Community Program. Rather, this component of the evaluation suggests some possible relationships between program and outcomes, and offers a framework for a longer term, albeit partial, impact analysis of a complex regional initiative. The results we report must also be placed within the context of the evaluation's qualitative findings, described in Chapters III, IV and VI.

[vi]The Beacon Communities' 2013 annual (final) reports are a source for their own impact analyses.

VI. Communities' Challenges, Enablers, and Lessons Learned

As Beacon Communities implemented their interventions to build and strengthen health IT infrastructure and enable clinical transformation, they faced challenges and devised strategies to overcome them. In this section, we discuss challenges Beacon Communities faced, enablers they used, and lessons they learned in implementing their interventions (Exhibit 6.1).

Exhibit 6.1 Challenges Encountered by Beacon Communities and Mitigation Strategies

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

Cross-Cutting Enablers

In most Communities, previously established relationships, health IT infrastructure, and governance structures were crucial enablers for promoting data sharing. In addition, Communities identified effectively engaging providers as a key driver of clinical transformation efforts. These efforts included feedback reporting to help physicians conduct quality improvement reviews, sharing best practices among clinicians and providers, and peer-to-peer learning models. Communities reported a variety of promising practices that emerged over the course of the program.

Beacon Communities' ability to engage providers effectively in the use of health IT to streamline clinical processes was a central element in achieving clinical transformation

To engage providers in clinical transformation efforts in a meaningful way, Beacon Communities provided feedback to providers on meeting clinical performance metrics, used Community-wide learning approaches to share best practices, and selected widely trusted local organizations and individuals to serve as Community leaders.

Nine Communities provided feedback reporting to help physicians conduct quality improvement activities. Ensuring providers have access to the data they need to track performance is a critical component of any quality improvement effort. Providers can use data to compare or benchmark performance at the clinician, practice, or Community level, which in turn provides information about where their practice stands in relation to other practices and offers insight into what drives high-quality care. Competition created by providing quality metrics and measures in comparison to other practices often drove Community providers to want to know what other practices were doing differently and better. Thus, Communities supported performance feedback reporting for clinicians in a variety of ways, including providing technical assistance to help providers extract data from their EHRs, collecting and harmonizing data across disparate EHR systems, and using third-party aggregation platforms to collect data and provide reports.

In addition, recognizing the importance of sharing best practices between providers and the power of peer-to-peer learning, many Beacon Communities developed Community-wide approaches that engaged participating practices around a common quality improvement curriculum. These peer-to-peer learning models often took the shape of learning collaboratives, for which Communities formally sponsored the development of curricula and hosted both didactic and interactive sessions to help providers approach clinical transformation efforts systematically. Across Communities, provider feedback on the learning collaboratives was positive, with most participants finding them helpful and informative.

The professional stature and credibility of Beacon Community leaders facilitated the engagement of providers and other stakeholders. These included respected professional individuals known for their professionalism and concern to solve problems. They also included lead organizations—such as Regional Extension Centers (RECs), quality improvement organizations (QIOs), and HIOs—that had already established working relationships with facilities and practices around health IT prior to the Beacon program, thus bringing understanding of the local environment. The reputation of these organizations facilitated provider buy-in and engendered trust. In addition, pre-existing collaborative activities around

health IT or quality improvement ensured that stakeholders had some knowledge of the process of implementing health IT-enabled reforms.

Leveraging previously established infrastructure and initiatives helped Communities establish data sharing infrastructure and engage partners in Beacon efforts

Communities with experiences in similar initiatives, or who built their Beacon initiatives upon previously existing infrastructure, were able to advance their initiatives and facilitate the further development of health IT. Participating providers' familiarity with and use of existing technical infrastructure proved an important enabler to supporting Beacon's clinical transformation efforts. Particularly important enablers of clinical practice changes were: (1) building on existing EHR systems and providers' ability to use of those systems, and (2) having an IT department with the capacity to make rapid changes to EHRs and other data systems.

Experience gained by participating in preexisting regional initiatives helped advance clinical transformation projects. In particular, initiatives aimed at quality improvement and stakeholder engagement afforded some Communities a head start in their subsequent Beacon efforts to redesign care delivery and make use of electronic health information systems that involved multiple partners (Exhibit 6.2).

Exhibit 6.2 Examples of Beacon Communities Cooperation with Related Initiatives

Program	Description
Aligning Forces for Quality (AF4Q) Initiative	Lead organizations and/or partners from six Communities (Bangor, Cincinnati, Keystone, Southeast Michigan, Southeastern Minnesota, and Western New York) also participate in AF4Q, a ten-year Robert Wood Johnson Foundation effort launched in 2006 in 16 Communities to lift the overall quality of health care, reduce racial and ethnic disparities, and provide models for national reform.[78]
Chartered Value Exchanges (CVEs)	Lead organizations and/or partners from nine Communities (Bangor, Cincinnati, Colorado, Crescent City, Central Indiana, Southeast Michigan, Southeastern Minnesota, Keystone, Western New York) were part of the Agency for Healthcare Research and Quality (AHRQ) CVEs. This national program that funded 25 Communities, initially in 2007 or 2008, to address quality improvement and transparency through multi-stakeholder collaboratives of patients, payers, and providers.[79]
State HIE Program	At least 12 Beacon Communities were connected with ONC's State HIE Cooperative Agreement Program through partnerships, with the lead organization in one Beacon Community (Rhode Island) also serving as the qualified State Designated Entity (SDE) under the State HIE Cooperative Agreement.
ONC Regional Extension Centers (RECs)	At least 12 Beacon Communities were connected with ONC's Health IT Extension Program through partnerships with RECs, with lead organizations in three Beacon Communities (Cincinnati, Utah, and Rhode Island) actually serving as the REC.
Patient Centered Medical Home (PCMH)	At least seven Beacon Communities had prior experience implementing PCMH models through collaborations involving multiple partners (e.g., Bangor, Cincinnati, Crescent City, Rhode Island, and Western New York), and the chronic care model had been implemented on a wide scale in Colorado prior to the Beacon award.

Pre-existing multi-organizational regional initiatives helped Beacon Communities advance clinical transformation projects and strengthen health IT infrastructure, as Communities often tapped into pre-existing leadership to fill governance and executive positions within the Community leadership. These concurrent and overlapping activities provided substantive expertise and experience to lead organizations, which in many cases allowed Communities to deploy resources more efficiently, leverage partnerships, and coordinate activities. Some governance structures formed around HIE organizations; others advanced broader agendas around health care reform and quality improvement.

Most Communities noted that leveraging previous collaborations and relationships eased buy-in from key stakeholders to exchange information, develop infrastructure, and enable clinical transformation efforts to achieve connectivity. In particular, Beacon Communities' collaborative work around care management, quality improvement, and delivery system reform prior to HITECH often proved instrumental in ensuring key players were involved in decision-making and shared goals, and had productive and trusting working relationships. Communities cited prior collaborations as useful vehicles for implementing their initiatives, by establishing a culture of quality improvement and data sharing among providers. Communities where health care leadership and staff were already accustomed to working together and sharing expertise and resources were well-positioned to accelerate clinical transformation though strategic health IT investments.

Challenges

As Beacon Communities moved forward with implementing their interventions, they encountered a range of common challenges. Many Communities found that variation across practices in levels of EHR adoption, types of EHRs, and practice styles complicated the task of achieving interoperability between systems. In addition, Communities often encountered challenges as they moved to implement complex clinical transformation initiatives that relied on providers' use of health IT tools and the adoption of quality improvement and care coordination processes across partner organizations. Challenges included weak provider engagement, legal and policy barriers, and limitations related to technology.

Communities encountered infrastructure and technical issues with limitations in EHR developers' capabilities and costs

Issues of interoperability, inadequate technological solutions, and the resources committed to other IT-related endeavors under way at the time often caused delays in the implementation of Beacon program initiatives.

Unexpected limitations in EHR developer capability often delayed the implementation of technology solutions for Beacon Community interventions. The health IT industry has not always provided appropriate support for the uptake and effective use of its products by clinicians. Limitations in EHR products and developers' readiness to meet meaningful use requirements meant that providers had to focus on upgrading or replacing their EHR systems for meaningful use attestation in parallel with additional technology projects related to the Beacon work. A number of Beacon Communities reported that EHR developers over-promised and under-delivered or abandoned the market, leaving providers unsupported and ill-equipped. Communities noted that implementation support and training provided by

EHR developers, while available, assumes IT competencies within clinical practices that often are not present.

Although many small participating organizations purchased EHR systems that met minimum certification standards, their systems often failed to provide the functionality promised. Even some well-established products revealed serious deficiencies, forcing some providers to discontinue their EHR adoption efforts. Some Communities reported that a range of health IT out-of-the-box products were unable to meet their needs, forcing them to seek out other software developers for solutions that allowed them to achieve the Communities' intended goals. In addition, for smaller practices, costs of moving to a new system often proved prohibitive, due to both the financial costs of switching to a new system and the time lost deploying interventions while still implementing a new system. As Communities encountered limited technological capabilities to support clinical transformation efforts, they found they had to be flexible in their interventions and educate providers on learning from developers how to understand the technology.

The costs of health information exchange often acted as barriers, particularly for smaller independent practices that lacked the necessary resources and infrastructure to support Beacon efforts. Practices not part of larger health systems often lacked sufficient infrastructure and administrative bandwidth to assume additional tasks related to data exchange. Even with additional investments under the Beacon program, smaller ambulatory and independent providers faced resource challenges to adopting HIE within the Beacon Communities.

Legal and policy factors influenced Communities' abilities to exchange health information and establish necessary legal agreements

The federal, state, and local policy landscape for information exchange, including laws and policies governing patient consent, protection of sensitive data, and privacy and security, can have a significant impact on both how information exchange is established and the strategies needed to drive adoption. In particular, acquiring patient authorization and consent for retrieving data from repositories, as well as federal and state policies governing information about behavioral and mental health services, often led to limited data being available in repositories and retrievable by other providers.

Consent policies for exchanging health data created challenges for some Beacon Communities. Across Communities, Beacon leadership emphasized the importance of patient engagement around consent and data sharing. Patients' consent for providers to share their health information with other providers may occur on either an "opt-in" or "opt-out" basis. Beacon Communities in opt-in states often experienced challenges collecting patient data and acquiring a critical mass of data in their exchange systems and clinical data repositories. Some Communities with opt-in consent policies noted that collection of patient consent was slow and time-consuming, though they often managed to either develop solutions to collecting patient consent or deploy trainers to engage and inform patients about the importance of data sharing.

Some Communities reported an inability to share data related to mental health, behavioral health, and substance abuse, citing the need for clarifying policies and technology that allow for the segmentation of sensitive health data. Federal and state requirements intended to protect sensitive health information presented challenges for Communities looking to exchange health data. Federal law (42 CFR Part 2) protects the information of any patient in most substance abuse education, treatment, or

prevention programs; in some places, state laws mirror or exceed these regulations. Beacon providers unable to separate sensitive health information from other health data were often unable to share electronically any data with other providers serving the same patients.

Beacon Communities encountered challenges due to legal standards and safeguards, competing priorities for providers, cultural resistance, and market competition

Negotiating necessary legal agreements and meeting administrative requirements proved to be more time consuming than Beacon Communities anticipated. Unanticipated delays in negotiating legal agreements for connectivity were a common occurrence among Communities; often they encountered difficulty establishing necessary Data Use Agreements for data sharing. In response, Communities found they needed to engage legal representatives and key decision makers to work through the issues.

Providers were reluctant to take on the demands of Beacon participation given other, often competing, initiatives and program requirements. Due to new financial and service delivery arrangements stemming from the ACA and parallel funding initiatives, including the State HIE Program, the REC Program, the EHR Incentive Programs, and various PCMH programs, both large and small providers often had to focus on handling major regulation and reimbursement changes concurrent with the implementation of Beacon interventions. In some instances, clinicians who declined to participate in Beacon interventions were unpersuaded of the need for performance measurement or electronic data exchange with other providers.

Communities with high market competition among hospital systems found provider resistance to engage in data sharing activities. Beacon Communities operating in the more competitive environments faced increased challenges from some health systems in sharing data with other systems. In competitive markets, some health care organizations may have additional incentives to view patient records data as a commercial asset[vii,viii] and believed retaining control of their data was a way to maintain market share. While health systems in some competitive Beacon markets moved towards increasing collaboration, in others, competition led hospitals to focus more on internal data-sharing capabilities and capacity-building, proprietary interests, and developing accountable care organizations than on participating in Community-wide data sharing.[ix]

Lessons Learned

Communities across the nation that are just beginning efforts to share and exchange clinical health information can draw valuable help from the Beacon Communities' experience over the past three years. We base the lessons presented in this section on major insights offered by the Beacon Communities themselves combined with summary findings from the evaluation.

[vii] See also Adler-Milstein J, DesRoches CM, and Jha AK, "Health information exchange among American hospitals," in Am J Man Care 17 (11), 761-8, 2011.

[viii] See also http://www.healthit.gov/sites/default/files/casestudysynthesisdocument_2-8-13.pdf

[ix] See also http://www.healthit.gov/sites/default/files/wa_casestudyreport_final.pdf for additional contextual information on Washington State's HIE experience.

Communities used a multitude of approaches to address issues related to technological limitations

Substantial lead-time is needed to implement collaborative IT-supported initiatives. The process of laying the groundwork for automated performance measures, reporting, and data exchange involves many steps and is resource-intensive. Several Beacon Communities at first underestimated the lead time needed to prepare for clinical data exchange and practice-based performance measurement, given delays in establishing infrastructure, developing necessary business use agreements or other documents needed to formalize connections, and acquiring the trust and buy-in from the Community needed to achieve results.

Building in flexibility is important to help practices at all levels of readiness, including smaller practices that may have less sophisticated health IT infrastructure than large hospital systems. Communities quickly learned that their ability to connect smaller practices to their exchange infrastructure often required additional one-on-one assistance, as these practices often lacked resources or staff to adequately maintain their EHR infrastructure. Many independent practices required support for basic business and administrative functions, as well as privacy and security training to be compliant with the Health Insurance Portability and Accountability Act (HIPAA). Communities also found that small practices are more likely to have no prior experience with performance improvement processes, such as Plan-Do-Study-Act (PDSA), performance measurement, and monitoring. In response to these challenges, many Beacon Communities cited the importance of flexibility and willingness to conduct practice-based readiness assessments and tailor approaches to each practice's individual needs. Some Communities changed the scope of their effort, while others refined their interventions to accommodate changing technological capacity. Communities also noted that—given the variety of developers and the difficulty in understanding the relative advantages of different products—national guides or review criteria for selection would be helpful.

To motivate providers to participate, new collaborations should focus on offering services that add value or improve upon providers' existing resources. Communities found it necessary to be strategic about the kind of services offered. Many institutions already have their own programs and services, so a Community collaborative must identify value-added services that their constituents' internal systems cannot provide. These include information exchange and support for achieving meaningful use.

Integrating data sharing capabilities into providers' EHR systems promotes use of the data sharing systems, because it is more efficient for providers. Multiple portals and logins to access HIE capabilities can create provider frustration, as additional logins and extra clicks detract from a provider's workflow. A feature of significant value to participating providers is a single point of access to the HIE system or clinical data repository from within practices' EHRs.

Engaging providers and other stakeholders in Beacon efforts required influential stakeholders in leadership positions and finding the right pace for implementation

The involvement of influential stakeholders in leadership positions helps garner buy-in from providers and the Community more generally for establishing HIE infrastructure. Strong leadership is essential for influencing policy and maintaining a clear vision throughout the establishment of data-

sharing infrastructure. Many Communities mentioned physician leadership to champion the Beacon innovations as a necessary element for success.

Perceived neutrality of the organization managing community data and leading community-wide care improvement efforts helps foster trust among providers and consumers. Some Beacon Communities established, or benefited from, the presence of a neutral convener—to establish trust and garner buy-in from key Community stakeholders on the importance of data sharing to achieve clinical transformation. It is important to note, however, that while a neutral organization can convene disparate parties, it may lack the influence and in-house resources that a large health system can bring to a collaborative endeavor and inspire confidence in its sustainability.

Community involvement in decision-making, although requiring an investment of time and staff resources, solidifies support for sustainable HIE organizations and activities over time. Although the stakeholder engagement process is often time consuming, without this key step, the infrastructure developed may not serve the needs of the Community—a failure that may ultimately prevent providers from using the infrastructure.

Finding the right pace for introducing new tools, staff roles, and workflows facilitates engagement. To determine the appropriate level of assistance for each practice, Communities found readiness assessment tools useful to gauge practices' capability and workforce capacity. A guiding philosophy was "meet the practices where they are," meaning an explicit commitment to work with each practice site individually to identify barriers and challenges to meeting the project's goals and construct plans that meet those challenges.

Where smaller practices were aligning with larger health care systems, Beacon Communities were able to work with larger health systems, hospitals, and physician organization to enlist the smaller practices. Communities noted that the trend of small and ambulatory providers joining larger health systems facilitated engaging these practices in data sharing. Several Communities operated within an area that had a dominant health plan or integrated delivery system. In those areas, smaller practices affiliated with large hospital systems could often use the resources and expertise of those systems to enable connectivity, often via internal networks.

To achieve sustainability of clinical transformation efforts, Beacon Communities aligned with other initiatives and proved the value of continuing interventions to stakeholders

Aligning efforts with existing payment and clinical service delivery initiatives promotes sustainability. The momentum generated by the ACA's delivery system innovations strengthened stakeholder relationships in many Communities and promises to help sustain these efforts over the long run. With the launch of the Medicare Shared Savings Program and establishment of ACOs in January 2012, Beacon Communities encountered new opportunities for institutionalizing and financing interventions around chronic disease management, care transitions, and quality reporting in practices. Clinical transformation activities undertaken by Beacon Communities are also serving national demonstration programs, including CMS' Comprehensive Primary Care Initiative (CPCI) and Community-based Care Transitions Program (CCTP).

VII. Conclusion and Recommendations

The Beacon Community Program offers insights into policies and programs that aim to: (1) promote and invest in the use of health IT and HIE, and (2) foster and scale sustainable initiatives in service delivery redesign, quality improvement, and payment reform.

Programs intending to demonstrate meaningful impact on cost, quality, and health outcomes require sufficient time to become operational and demonstrate results. This consideration is especially important for programs established through the ACA, given that the ACA requires that HHS end demonstrations that fail to show signs of saving money or improving care within three years.[80] Beacon Communities' experience demonstrates that the time required for multi-stakeholder collaboratives to start up, implement interventions, and operate long enough to achieve impact is not trivial. Even in Communities considered advanced in their use of EHRs and readiness for health information exchange, significant time was required to foster trust and buy-in among stakeholders, formalize agreements with participants, establish infrastructure, make the infrastructure operational, and implement course corrections along the way. For some, this process took up to two years, and the Beacon Communities are far from unique in making slower than expected progress on program goals.[81]

Support in aligning regional efforts with federal initiatives will foster continued progress and sustainability of investments made under the Beacon Program. With the infrastructure and collaborations now established through the Beacon Program, along with major public and private efforts at delivery and payment system reform under way, investments in health IT infrastructure to improve care are primed to demonstrate their payoff now and in the future. ONC has recently awarded $38 million to 20 entities to continue the work started under HITECH.[82] Opportunity and need are ripe for federal efforts to support alignment of local and regional efforts to strengthen health IT infrastructure for clinical transformation, as part of this and other federal initiatives to transform service delivery and payment. Attention to improving the alignment of regional and federal efforts would protect and nurture federal investments in health IT infrastructure and systems.

Providers, health systems, and health plans would benefit from analyses that demonstrate the need and return on investment (ROI) for performance measurement and electronic data exchange, as market dynamics and shifts in policy priorities affect stakeholders' willingness to engage.[83,84] Large-scale programs—such as Beacon and the new cooperative agreements to improve coordinated health information sharing[85]—can provide additional support to their awardees when market competition or policies appear to exert countervailing pressures on providers and health systems. This support may include: (1) information on the return on investment achievable with performance measurement and electronic exchange, and (2) hands-on technical assistance to align program efforts with broader policy movements. The Beacon Communities aspired to demonstrate an ROI but were not able to document a full track record within a three-year funding period.

Slow progress towards interoperability during the period of Beacon funding underscores the need for the health IT industry to move to adopt national standards, in accordance with federal certification initiatives, and public-private collaboration around making the standards work in practice. The lack of interoperability presented the Beacon Communities with a formidable challenge.

Communities invested significant time and resources to create workarounds or customized solutions, but this nonetheless affected their timelines for implementation of clinical reforms. Federal agencies and leadership can provide funding for regional and local efforts to provide robust technology assessments to guide selection of technologies for delivery system redesign. The federal government can also spur the adoption of standards for interoperability through certification programs. Communities also cited the need, given the current limited technological capabilities and lack of interoperability, for engagement with national industry representatives—to address the lack of widespread adoption among developers of data exchange standards. The federal government is ideally situated to convene such discussions.

Claims data alone are limited in their usefulness in demonstrating the true impact of programs comprising diverse interventions that are refined over time. A project of the magnitude of the Beacon Community Program faces many challenges—including the difficulties of attributing measurable outcomes to program-specific interventions, discrepancies in the timeframes for producing measurable effects and conducting the evaluation, the inherent limitations of available data sets (e.g., Medicare claims), and the diversity of environmental conditions and interventions across sites. While quantitative data can assess impact on clinical and population health outcomes, qualitative analysis is crucial to explore the degree to which efforts have been successful and the factors that underlie success. Our analysis of data from program documents, site visits and repeated interviews with the Communities' leadership and staff have enabled us to generate a robust understanding of organizational, market, and regulatory context. This understanding is key to interpreting observed quantified outcomes, and essential for informing policy and guiding future efforts. The challenges in measuring impact using imperfect data underscore the importance, in complex evaluations such as Beacon, of framing research questions appropriately and acknowledging the limited generalizability of findings. Relying on several data sources and types allows for a richer picture of the mechanisms at work and programmatic impact, while also illuminating the qualities and dynamics unique to each site.

In conclusion, findings from the Beacon Program evaluation suggest important considerations for future program design, evaluation, and policy. Overall, results from this evaluation show that Communities achieved mixed progress on broad health care use and quality measures, with success tied to the extent to which Communities leveraged existing efforts and engaged providers. Likewise, Communities varied in the degree to which they collaboratively sustained their investments in shared resources for HIE following the end of Beacon funding. While we see some success on both fronts—performance metrics and sustained HIE infrastructure—challenges stemming from provider readiness, legal and policy constraints, and the technologies used hindered Communities' efforts in critical ways.

Appendix A. Detailed Methodology for the Descriptive Analysis of Beacon Community Regions

For the descriptive analysis, which formed the formative part of the evaluation, we characterized the Beacon Communities to explore the ways in which the 17 Beacon Communities differed in terms of specific contextual factors and organization-level baseline characteristics. We focused on collecting and analyzing data from interviews with Beacon Community project leads, program documentation, and secondary sources to generate profiles summarizing each Beacon Community's inputs at baseline. We conducted the formative phase from March 2011 through February 2012.

We examined the following domains and sub-domains of Beacon Community characteristics:

■ Context, including demographics, health status, health system features, health IT capacity, history of related activities in the catchment area;

■ Organization, including partnership composition and leadership; and

■ Intervention, including target populations; clinical features; health IT features; the activity as new, continuing, or expanding; and level of innovation.

Selection of Community Characteristics

The evaluation team selected each characteristic based on a literature review and in consultation with ONC as adhering to the following criteria:

■ Is important for collaboration, clinical transformation, or health IT implementation;

■ Can be operationalized with existing data;

■ Is available consistently or from a single data source (e.g., Medicare or Behavioral Risk Factor Surveillance System[x] data) across all or most of the 17 Communities; and

■ Is valuable information for clinical leaders or policy makers.

Exhibit 1 describes each Community characteristic we examined, data source, and year. We used secondary data from multiple sources that described the context in which each Beacon Community operated, including demographics, population health status, health care market features, and health IT penetration. The data sources included the most recent versions of the following as of March 2011:

■ Census Data (2010) – to derive key demographics measures, including household population, race/ethnicity;

■ Health Resources and Services Administration (HRSA) Area Resource File (2008, 2009) – to assess Medicare Advantage and prescription drug plan penetration, percent persons in poverty, and measure availability of primary care physicians and hospitals;

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[x] BRFSS data are available for most but not all Beacon Communities, depending on the size and configuration of states' particular sampling frames. Despite this limitation, BRFSS offers an important view of Community health, access, and services where it is available.

- Census Small Area Health Insurance Estimates (2009) – to assess percent uninsured;
- CMS Chronic Conditions Warehouse (2008) – to assess percent of Medicare beneficiaries with chronic conditions, including breast cancer, chronic kidney disease, diabetes, and heart failure;
- Dartmouth Atlas (2006-2007) – to measure the annual percent of diabetic Medicare enrollees having Hemoglobin A1c and blood lipids (LDL-C) tests and female Medicare enrollees having mammograms, mortality, ambulatory care sensitive conditions discharges, readmission rates, and Medicare payments; and
- AHA Annual Survey (2009) – to assess hospital market competition and hospital HIE levels.

Exhibit A.1 Definitions of Characteristics

Characteristic	Data Source	Year	Definition
Dimension: Demographics			
Total household population	Census	2010	This measure is the estimated total persons in the United States, using data from the 2010 U.S. Census.[86]
Race/ethnicity	Census	2010	These race/ethnicity distributions present the percent of respondents that identified themselves as: White, Black or African American, American Indian and Alaska Native, Native Hawai'ian and Other Pacific Islander, Some Other Race, Two or More Races, and/or Hispanic, using data from the 2010 U.S. Census.[87]
CMS (Centers for Medicare & Medicaid Services) Medicare Advantage penetration	HRSA Area Resource File	2009	This measure is from the State County Penetration Data for Medicare Advantage Files. Penetration is the ratio of enrollees over eligibles multiplied by 100. 'Enrollees' are defined as individuals who are currently enrolled in a Medicare Advantage plan. 'Eligibles' are defined as those enrolled in either Medicare part A (hospital insurance) or part B (supplemental medical insurance).[88]
CMS Medicare Prescription Drug Plan penetration	HRSA Area Resource File	2009	This measure is from the State County Penetration Data for Prescription Drug Plan Files, as of December 2009. Medicare prescription drug coverage is also known as Medicare Part D. The Medicare Prescription Drug Improvement and Modernization Act (MMA) of 2003 added prescription drug coverage to Medicare (Part D) beginning January 1, 2006. Penetration is the ratio of enrollees over eligibles multiplied by 100. 'Enrollees' are defined as individuals who are currently enrolled in a Stand Alone Prescription Drug Plan. 'Eligibles' are individuals who are either currently, or were formerly, entitled to or enrolled in either Part A or Part B original Medicare.[89,90]
Percent uninsured	Census Small Area Health Insurance Estimates (SAHIE)	2009	This measure is modeled using county estimates of the number of people with and without health insurance coverage by age, sex, and income. The 2009 SAHIE estimates are adjusted so that for key estimates, before rounding, the county numbers sum to their respective state totals and similarly the states sum to the national 2009 American Community Survey (ACS) poverty universe for the numbers insured and uninsured. The Census SAHIE uses the following data inputs to create their estimate: ACS, Annual Social and Economic Supplement of the Current Population Survey, County Business Patterns, Demographic Population Estimates, Federal Tax Returns, Supplemental Nutrition Assistance Program (SNAP) Benefit Recipients, Medicaid Participation, Children's Health Insurance Program Participation, and Census 2000.[91]
Percent persons in poverty	HRSA Area Resource File	2008	This measure is from the Bureau of Census' Small Area Income Poverty Estimates (SAIPE) files. The SAIPE are constructed from statistical models based, in part, on summary data from the ACS, prior year federal income tax returns, data about participation in SNAP, and the previous census.[92]

Characteristic	Data Source	Year	Definition
Dimension: Population Health			
Percent of Medicare beneficiaries with breast cancer	CMS Chronic Conditions Warehouse	2008	This measure is calculated using the count of Medicare beneficiaries with breast cancer (numerator) divided by the Medicare beneficiaries age 65+ with full fee for service (FFS) Medicare all 12 months of 2008 (denominator). Full FFS Medicare is defined as 12 months of Part A and B coverage and zero months of managed care coverage for 2008. Age is the beneficiary's age at the end of 2008. Of this population, beneficiaries with the Chronic Care Warehouse (CCW) 2008 CNCRBRST chronic condition flag values of "1" or "3" were determined to have had breast cancer.[93]
Percent of Medicare beneficiaries with chronic kidney disease	CMS Chronic Conditions Warehouse	2008	This measure is calculated using the count of Medicare beneficiaries with chronic kidney disease (numerator) divided by Medicare beneficiaries age 65+ years with full FFS Medicare all 12 months of 2008 (denominator). Full FFS Medicare is defined as 12 months of Part A and B coverage and zero months of managed care coverage for 2008. Age is the beneficiary's age at the end of 2008. Of this population, beneficiaries with CCW 2008 CHRNKIDN chronic condition flag values of "1" or "3" were determined to have had chronic kidney disease.[94]
Percent of Medicare beneficiaries with diabetes	CMS Chronic Conditions Warehouse	2008	This measure is calculated using the count of Medicare beneficiaries with diabetes (numerator) divided by Medicare beneficiaries age 65+ years with full FFS Medicare all 12 months of 2008 (denominator). Full FFS Medicare is defined as 12 months of Part A and B coverage and zero months of managed care coverage for 2008. Age is the beneficiary's age at the end of 2008. Of this population, beneficiaries with CCW 2008 DIABETES chronic condition flag values of "1" or "3" were determined to have had diabetes.[95]
Percent of Medicare beneficiaries with heart failure	CMS Chronic Conditions Warehouse	2008	This measure is calculated using the count of Medicare beneficiaries with heart failure (numerator) divided by Medicare beneficiaries age 65+ years with full FFS Medicare all 12 months of 2008 (denominator). Full FFS Medicare is defined as 12 months of Part A and B coverage and zero months of managed care coverage for 2008. Age is the beneficiary's age at the end of 2008. Of this population, beneficiaries with CCW 2008 CHF chronic condition flag values of "1" or "3" were determined to have had heart failure.[96]
Dimension: Preventative Care			
Average annual percent of diabetic Medicare enrollees age 65-75 having Hemoglobin A1c test	Dartmouth Atlas	2006-2007	This measure is calculated by dividing the number of non-HMO Medicare enrollees age 65-75 with diabetes that received Hemoglobin A1c testing (numerator) divided by the total number of non-HMO Medicare enrollees age 65-75 (as of 12/31/2007) with a diabetes diagnosis. To qualify as a diabetic, an individual needs two face-to-face encounters with different dates of service in an ambulatory setting or non-acute inpatient setting or one face-to-face encounter in an acute inpatient or emergency room setting during either the measurement or prior year.[97]
Average annual percent of diabetic Medicare enrollees age 65-75 having blood lipids (LDL-C) test	Dartmouth Atlas	2006-2007	This measure is calculated by dividing the number of non-HMO Medicare enrollees age 65-75 (as of 12/31/2007) with diabetes that received blood lipids testing (numerator) divided by the total number of non-HMO Medicare enrollees age 65-75 (as of 12/31/2007) with a diabetes diagnosis. To qualify as a diabetic, an individual needs two face-to-face encounters with different dates of service in an ambulatory or non-acute inpatient setting or one face-to-face encounter in an acute inpatient or emergency room setting during either the measurement or prior year.[98]
Average percent of female Medicare enrollees age 67-69 having at least one mammogram over a two-year period	Dartmouth Atlas	2006-2007	This measure is calculated by dividing the number of non-HMO female Medicare beneficiaries' age 67-69 (as of 12/31/2007) that had a mammogram within the past two years by the total number of all non-HMO female Medicare beneficiaries ages 67-69.[99]

Characteristic	Data Source	Year	Definition
Dimension: System Capacity			
Total primary care physicians per 100,000 residents	HRSA Area Resource File	2008	This measure is calculated using data from the Area Resource File (ARF), adding the total Medical Doctors (M.D.s) to the total Doctors of Osteopathic Medicine s (D.O.s), dividing by the total population, and multiplying the quotient by 100,000. The estimates for total non-federal M.D.s and D.O.s were obtained by the ARF from the 2008 American Medical Association Physician Masterfiles. The 2008 population estimates were obtained by the Health Resources and Services Administration (HRSA) for the ARF from the Census Bureau. The Census data estimate the number of people living in an area from a components of change model that incorporates information on natural change (births, deaths) and net migration (net internal migration, net international migration) that has occurred in an area since a Census 2000 reference date.[100]
Total hospital beds per 100,000 residents	HRSA Area Resource File	2008	This measure is calculated using data from the ARF, dividing the total Short Term General Hospital Beds by the total population, and multiplying the quotient by 100,000. All hospital data in the ARF are from the American Hospital Association (AHA) Annual Survey of Hospitals database. To be reported as a "hospital," an institution must have at least six inpatient beds, cribs, or pediatric bassinets that are continually available for the care of patients. Beds by hospital type were calculated using the AHA hospital survey variable "Beds Set Up and Staffed at End of Reporting Period". The variable "Statistical Beds" was derived by adding the total number of beds available each day during the hospital's reporting period and dividing this figure by the total number of days in the reporting period. Short Term General Hospitals are those coded with: Length of Stay = '1', Short term; and, Type of Service = '10', General medical and surgical. These hospitals provide non-specialized care, and the majority of their patients stay for fewer than 30 days. The 2008 population estimates were obtained by HRSA for the ARF from the Census Bureau. The Census data estimate the number of people living in an area as of July 1, 2008 from a components of change model that incorporates information on natural change (births, deaths) and net migration (net internal migration, net international migration) that has occurred in an area since a Census 2000 reference date.[101,102]
Total hospitals per 10,000 residents	HRSA Area Resource File	2008	This measure is calculated using data from the ARF, dividing the Total Short Term General Hospitals by the total population, and multiplying the quotient by 10,000. All hospital data in the ARF are from the AHA Annual Survey of Hospitals database. To be reported as a "hospital," an institution must have at least six inpatient beds, cribs, or pediatric bassinets that are continually available for the care of patients. Short Term General Hospitals are those coded with: Length of Stay = '1', Short term; and, Type of Service = '10', General medical and surgical. These hospitals provide non-specialized care, and the majority of their patients stay for fewer than 30 days. The 2008 population estimates were obtained by HRSA for the ARF from the Census Bureau. The Census data estimate the number of people living in an area as of July 1,2008 from a components of change model that incorporates information on natural change (births, deaths) and net migration (net internal migration, net international migration) that has occurred in an area since a Census 2000 reference date.[103,104]
Herfindahl-Hirschman Index - hospital system market competition	AHA Annual Hospital Survey	2009	The Herfindahl-Hirschman Index (HHI) is calculated from 2009 AHA Annual Hospital Survey data. The HHI is a commonly used measure of market concentration. It is an estimation of the size of firms in relation to the industry and an indicator of the amount of competition among those firms. The HHI can range from 0 to 1, ranging from a large number of small firms to a single monopolistic producer. It is calculated by squaring the quotient of the number of hospital beds in the unit of interest (in this case, the hospital system), divided by the total number of hospital beds in the hospital referral region.[105,106] This measure was calculated using data from the AHA Annual Survey of Hospitals Database. To be reported as a "hospital," an institution must have at least six inpatient beds, cribs, or pediatric bassinets that shall be continually available for the care of patients. The variable "Statistical Beds" was derived by adding the total number of beds available each day during the hospital's reporting period and dividing this figure by the total number of days in the reporting period. Short Term General Hospitals are those coded with: Length of Stay = '1', Short term; and, Type of Service = '10', General medical and surgical. These hospitals provide non-specialized care, and the majority of their patients stay for fewer than 30 days.[107]

Characteristic	Data Source	Year	Definition
Dimension: Quality of Care			
Total Mortality: ASR (Age, Sex, Race)-adjusted percent of deaths among Medicare enrollees	Dartmouth Atlas	2007	This measure is calculated using the count of beneficiaries age >= 65 on June 30, 2005 and Part A entitlement in June 2005 from the Medicare Denominator File.[108]
Discharges for ambulatory care sensitive conditions per 1,000 Medicare enrollees	Dartmouth Atlas	2006-2007	Ambulatory care–sensitive conditions (ACSCs) refer to hospitalizations that are preventable when access to primary care is adequate. ACSC discharges are identified using ICD-9-CM diagnosis codes for the following conditions: convulsions, chronic obstructive pulmonary disease, bacterial pneumonia, asthma, hypertension, angina, cellulitis, diabetes, gastroenteritis, kidney/ urinary infection, and dehydration (numerator). Eligible enrollees are counted using 100 percent of Medicare enrollees age 65-99 with full Part A entitlement and no HMO enrollment during the measurement period (denominator). Rates are adjusted for age, sex, and race using the indirect method, with the U.S. Medicare population as the standard.[109,110]
Percent Medicare enrollees readmitted within 30 days of hospital discharge	Dartmouth Atlas	2009	This measure is the proportion of Medicare beneficiaries' medical and surgical discharges (all medical and surgical DRGs) in which the individual is admitted to a hospital within 30 days. Researchers studied 100 percent of FFS Medicare beneficiaries with full Part A and Part B coverage during the study period. Hospital claims from short-term acute or critical access hospitals were identified among the study population for each cohort, with the first period of index discharges as July 1, 2003 – June 30, 2004 and the second as July 1, 2008 - June 30, 2009. Because of the way hospitals are paid under Medicare in Maryland, readmission rates for Maryland hospital referral regions were suppressed. Data were adjusted for differences in age, sex, and race.[111,112]
Percent Medicare enrollees seeing a primary care clinician within 14 days of hospital discharge	Dartmouth Atlas	2009	This measure is the proportion of Medicare beneficiaries' medical and surgical discharges (all medical and surgical DRGs) in which the individual visited a primary care physician within 14-days of discharge from the hospital. Those included in the numerator were restricted to the following CMS specialties: family medicine, general internal medicine, general practice, and geriatrics. Researchers used 100 percent of FFS Medicare beneficiaries who resided in the 306 Dartmouth Atlas hospital referral regions and had full Part A (acute care in facilities, including hospitals) and Part B (clinician services) coverage during the study period. The rates are adjusted for the age, sex and race of the underlying Medicare population using the indirect method.[113,114]
Percent Medicare enrollees having an ER (Emergency Room) visit within 30 days of hospital discharge	Dartmouth Atlas	2009	This measure is the proportion of Medicare beneficiaries' medical and surgical discharges (all medical and surgical DRGs) in which the individual visited an ER within 30 days of discharge from the hospital. The numerator includes outpatient claims: revenue center code: 0450-0459 (emergency room) and 0981 (professional fees-emergency room) and revenue center visit date not within an acute short-stay or critical access hospital claim that has emergency room payment; or hospital claims: any acute short-stay or critical access hospital claims from the MedPAR file with emergency room payment and did not have associated outpatient claims defined as above. Researchers used 100 percent of FFS Medicare beneficiaries who resided in the 306 Dartmouth Atlas hospital referral regions and had full Part A (acute care in facilities, including hospitals) and Part B (clinician services) coverage during the study period. The rates are adjusted for the age, sex, and race of the underlying Medicare population using the indirect method.[115,116]

Characteristic	Data Source	Year	Definition
Dimension: Claims-based Reimbursements			
Price-Adjusted Medicare payments per enrollee	Dartmouth Atlas	2008	We calculate this measure from the Continuous Medicare History Sample (CMHS) from CMS. The file documents reimbursements by calendar year for each component of the Medicare program. The data are from a random 5 percent sample of Medicare enrollees selected on the basis of the terminal digits in the Social Security number. This includes FFS patients enrolled in Medicare Parts A and B and excludes patients enrolled in risk-bearing health maintenance organizations (HMOs). We adjusted the rates for the age, sex, and race of the underlying Medicare population using the indirect method, as well as regional price differences.[117]
Dimension: HIE/health IT			
Average number of Surescripts e-prescribing transactions per HRR Jan-Mar 2011	Surescripts (proprietary, provided by ONC)	2011	According to the SureScripts data dictionary received from ONC,[xi] the variable 'e-prescribing transactions' indicates whether the pharmacy sent or received any electronic new Rx (prescription), refill request, or refill response messages during the measurement month.
Average percent of hospitals with an HIO in their area	AHA IT Supplement	2009	This measure represents those hospitals responding 'Yes' to the following: "Do any arrangements exist in your area to share electronic patient-level clinical data through an electronic health information exchange (HIE) or a regional health information organization (RHIO)?" (numerator) divided by all 'General medical and surgical' hospitals in the US that responded to the IT supplement (denominator).[118]
Average percent of hospitals participating in an HIO	AHA IT Supplement	2009	This measure is calculated by dividing the number of hospitals responding that they are 'Participating and actively exchanging data in at least one HIE/RHIO' to the following question, "Please indicate your level of participation in a regional health information exchange (HIE) or regional health information organization (RHIO)?" (numerator), by all 'General medical and surgical' hospitals in the US that responded to the IT supplement (denominator).[119]
Average percent of ambulatory providers that adopted an EMR as of Q4 2010	SK&A (proprietary, provided by ONC)	2010	This measure is calculated by dividing the number that responded 'Yes' to the question, 'emrsoftwar' in the data received from ONC,[xii] labeled as "The Medical Office has Adopted an EHR" (numerator), divided by the total number of ambulatory providers responding to the SK&A survey (denominator).

[xi] Not publicly available.
[xii] Not publicly available.

Characteristic	Data Source	Year	Definition
Dimension: Behavioral Risk Factor Surveillance System (BRFSS)			
Percent of population with diabetes	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following question: "Have you ever been told by a doctor or other health professional that you have pre-diabetes or borderline diabetes?" (If 'Yes' and respondent is female, they were also asked whether "this [was] only when you were pregnant?" If they responded 'Yes' to that follow-up, they are excluded from the numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[120]
Percent of population with asthma	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following questions: "Have you ever been told by a doctor, nurse, or other health professional that you had asthma?" and, "Do you still have asthma?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[121]
Percent of population that received a flu vaccine	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to either of the following questions: "A flu shot is an influenza vaccine injected into your arm. During the past 12 months, have you had a seasonal flu shot?" or, "The seasonal flu vaccine sprayed in the nose is also called FluMist™. During the past 12 months, have you had a seasonal flu vaccine that was sprayed in your nose?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[122]
Percent of population that received pneumonia vaccine	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following question: "A pneumonia shot or pneumococcal vaccine is usually given only once or twice in a person's lifetime and is different from the flu shot. Have you ever had a pneumonia shot? " (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[123]
Percent of population with cardiovascular disease	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to any of the following questions: "Has a doctor, nurse, or other health professional EVER told you that you had …" "a heart attack, also called a myocardial infarction;" "angina or coronary heart disease;" or, "a stroke?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[124]
Percent of women (age 40+) having a mammogram within the past year	BRFSS	2010	This measure is calculated by dividing the number of respondents over 40 years of age that responded 'Yes' to the following question: "A mammogram is an x-ray of each breast to look for breast cancer. Have you ever had a mammogram?" and responded 'Within the past year (anytime less than 12 months ago)' to the question, "How long has it been since you had your last mammogram?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). Only women were asked either of these questions. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[125]
Percent of women having a pap test within the past year	BRFSS	2010	This measure is calculated by dividing the number of respondents over 40 years of age that responded 'Yes' to the following question: "A Pap test is a test for cancer of the cervix. Have you ever had a Pap test?" and responded 'Within the past year (anytime less than 12 months ago)' to the question, "How long has it been since you had your last Pap test?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). Only women were asked these questions. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[126]

Characteristic	Data Source	Year	Definition
Dimension: Behavioral Risk Factor Surveillance System (BRFSS), continued			
Percent (age 50+) having a colorectal screening within the past 3 years	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following question: "Sigmoidoscopy and colonoscopy are exams in which a tube is inserted in the rectum to view the colon for signs of cancer or other health problems. Have you ever had either of these exams?," and responded 'Within the past year (anytime less than 12 months ago)' or 'Within the past 2 years (1 year but less than 2 years ago)' or 'Within the past 3 years (2 years but less than 3 years ago)' to the question, "How long has it been since you had your last sigmoidoscopy or colonoscopy?," by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). Only people 50 years of age and older were asked these questions. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[127]
Percent of population - ever smoked	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following question: "Have you smoked at least 100 cigarettes in your entire life?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[128]
Percent of population - current smokers	BRFSS	2010	This measure is calculated by dividing the number that responded 'Every day' to the following question: "Do you now smoke cigarettes every day, some days, or not at all??" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). Those responding 'Some days' were not counted as a current smoker. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[129]
Percent of population with reported health status as "good" or better	BRFSS	2010	This measure is calculated by dividing the number that responded 'Excellent' 'Very good' or 'Good' to the following question: "Would you say that in general your health is -- " (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[130]
For those who reported at least one day of poor mental health, average # of days (in past month) with poor mental health	BRFSS	2010	This measure is calculated by averaging the response values of those respondents that provided a number to the following question: "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" Those responding 0 or 'None' were not included. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[131]
For those who reported at least one day of poor physical health, average # of days (in past month) with poor physical health	BRFSS	2010	This measure is calculated by averaging the response values of those respondents that provided a number to the following question: "Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?" Those responding 0 or 'None' were not included. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[132]
Percent of population receiving a checkup within the past year	BRFSS	2010	This measure is calculated by dividing the number that responded 'Within past year (anytime less than 12 months ago)' to the following question: "About how long has it been since you last visited a doctor for a routine checkup? A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition." (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[133]

Characteristic	Data Source	Year	Definition
Dimension: Behavioral Risk Factor Surveillance System (BRFSS), continued			
Percent of population reporting exercise during the past month	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following question: "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area.[134]

We mapped each Beacon Community's catchment area to the unit of analysis for the data source of interest. Each Beacon Community application includes a section describing the geographic area where they provide services and from which we needed to analyze data. In addition, we obtained updated zip code information from a majority of the Communities in the spring 2012. We used four different methods of describing the geographic service area, based on the information in the applications:

1. The Community explicitly stated the individual zip codes representing the service area.
2. The Community listed the counties constituting the service area.
3. The Community referred to counties included in a Metropolitan Statistical Area (MSA) as defined by the U.S. Census Bureau.
4. The Community listed a Dartmouth Health Atlas Hospital Referral Region (HRR) as the service area.

In some instances, an applicant provided elements from more than one method listed above. For example, one applicant listed an HRR and included additional counties adjacent to the HRR that, when combined, constituted the service area. When a Beacon Community applicant explicitly listed zip codes defining the service area in their application, we used the zip codes. If instead, the applicant listed counties or referred to an MSA, a commercial data source[xiii] was used to collect zip codes associated with counties listed in the application. If an applicant referred to an MSA in defining their catchment area, the counties constituting the MSA were confirmed using the most recent information from the U.S. Census Bureau.[xiv] Finally, if a Beacon Community referred to an HRR as defined by the Dartmouth Atlas, data for the HRR were copied directly from the most recent data file (2007) found at the Dartmouth Health Atlas website.[xv]

For those measures not calculated at the zip code level, the evaluation team determined how well the applicant encapsulated the geographic units of the descriptive data sources, i.e., Hospital Service Areas (HSAs), HRRs, and counties. The team first mapped the zip codes within the Beacon catchment areas determined from the above methods to Zip Code Tabulation Areas (ZCTAs) using a Dartmouth Health Atlas zip code-ZCTA crosswalk, then mapped the 2008 population onto those ZCTAs, and lastly combined populations and computed each Beacon Community's share of the area population.

[xiii] See www.hometownlocator.com
[xiv] MSAs in this document were defined by the Office of Management and Budget in December 2009. See also http://www.census.gov/population/www/metroareas/lists/2009/List4.txt
[xv] See http://www.dartmouthatlas.org/downloads/geography/ZipHsaHrr07.xls

Appendix B. An Analysis of Medicare Beneficiary Experience to Measure the Impact of Beacon Community Efforts to Transform Clinical Care

Beacon Communities engaged in interventions at the provider level to improve health-care delivery, chronic disease management, and health outcomes. Many of these Communities focused on creating patient-centered medical homes or facilitating post-hospital care transitions. Communities varied in their history and maturity, implementation timelines, and spread of their interventions. Achieving and demonstrating improved care and outcomes are daunting and ambitious goals, particularly in the context of the technological reengineering that was the hallmark of Beacon Communities and within the relatively short timeframe of the 36-month Beacon program.

The tools available to assess Beacon program outcomes consistently across the 17 Communities were limited to administrative data for a single national population cohort: Medicare fee-for-service (FFS) enrollees. We recognize the partial view of every Beacon Community's performance that this data set offers. Ideally, an analysis of the impact of Beacon Community efforts to improve and redesign care delivery and population health interventions would take account of the experience of all of the patients served by providers participating in the Beacon program and all residents of the Communities' catchment areas. This chapter describes the methodological approach, including the reasoning behind our analytic choices for the impact assessment and the limitations of the assessment and of the inferences about overall impact of the Beacon Community program that can be drawn from this work, and presents the results of the analysis of Medicare claims data.

Methodology

The quantitative evaluation aimed to take a uniform approach to assessing the impact of the Beacon program on quality, efficiency, and population health outcomes across all 17 Communities. We developed the methodological approach in consultation with outside technical experts in evaluation design and measurement, and with the support of the evaluation staff in the Office of the National Coordinator (ONC). ONC provided NORC with Medicare claims data sets used by the Beacon Program technical assistance contractor, which NORC supplemented with additional years of pre-Beacon Medicare data, Medicare files for the second half of 2013, and Medicare Part D program data. This section provides a description of the methodology for the Medicare claims analysis, including a description of Medicare data sets, ancillary data files (e.g., Area Health Resource File [AHRF], Dartmouth Atlas of Health Care[xvi]), and research questions.

Data Sources

We used Medicare Chronic Condition Warehouse (CCW) claims for 100 percent of beneficiaries residing within Beacon Community catchment areas and for a 5 percent sample of beneficiaries from all other geographic locations across the nation. The data included all claims for calendar years 2010 and 2012 for

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[xvi] Previously Area Resource File (ARF).

beneficiaries participating in Medicare Parts A and B and claims for calendar years 2010 and 2012, for beneficiaries participating in Part D. Claims were not available for individuals enrolled in Medicare Advantage plans (Part C). We excluded beneficiaries enrolled in Parts A and B for less than the full calendar year. Ultimately, once data for 2013 became available, our primary analysis examined changes between 2010 and 2013; we used 2011 and 2012 data for diagnostic tests and to identify Medicare beneficiaries served by Beacon providers.

This data set allows: (1) examination of the individual Communities both cross-sectionally and over time and (2) the derivation of the needed comparison groups. The data from periods prior to Beacon implementation in 2012 establish a pre-intervention baseline for Medicare beneficiaries living within the Beacon Communities' catchment areas, for those providers within each Community distinguished by their involvement with the Beacon interventions, and for a non-Beacon national comparison sample. Although the Beacon Program launched in 2010, most clinical interventions were not operational before 2011. The baseline period thus includes all claims from 2010. Since most Beacon Communities used 2011 as a "ramp up" year, we excluded 2011 data from both the pre- and post-periods of analysis. Although the Beacon program period ends for all Communities by the end of fiscal year 2013, the post-period evaluation analyzes claims for services rendered from calendar year 2012 through 2013, allowing for a slightly longer period for the Beacon interventions to capture any effect on clinical practice and outcomes.

Patient Attribution

Because Beacon Communities directly engaged ambulatory care practices and hospitals in their activities, the Communities provided us with identifying information for participating providers, but not for their patients. We identified patients by attributing Medicare FFS beneficiaries to a Beacon provider if they had one or more claims during our observation period (2010 through 2013) with a provider identified by the Community as a participant in a Beacon intervention.[xvii] These claims could be carrier claims containing the tax identification number (TIN) or national provider identifier (NPI) of a Beacon physician, or inpatient or outpatient claims containing the Part A number, organization NPI, or attending provider NPI. We refer to those Medicare patients within a Community served by a provider (physician, clinic, or hospital) as "Beaconated." Tulsa, San Diego, and Southeast Minnesota Beacon Communities' interventions extended to all providers throughout the catchment area, and consequently, to all patients. Thus, for these Communities, we conducted only a catchment area analysis.

Comparison Groups

The analysis aimed to address the extent to which health care utilization for the intervention group—Medicare beneficiaries over age 65 who saw providers that participated in Beacon Community initiatives—differed from outcomes in two comparison populations:

- **Medicare beneficiaries over 65 years of age who were within the Beacon Communities but not exposed to the intervention.** This approach aimed to isolate the effect of the Beacon interventions themselves by comparing patients of active Beacon providers and patients of non-engaged providers

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[xvii] ONC required each Beacon Community to identify participating providers, and also to report on their Meaningful Use attestation status at least once, and often twice, over the course of the Beacon program.

in the same Community, for whom geographic or other Community-based factors may have affected observed outcomes. (See comparison #1, the internal comparator, in Exhibit B.1).

- **Individuals drawn from a propensity-score-matched national sample of Medicare beneficiaries that excluded anyone in a Beacon catchment area** (matched national sample #1). This comparator allowed us to examine differences in changes over time between the intervention group and the national Medicare sample, accounting for demographic, health care risk, and contextual factors. (See comparison #2, the external comparator, in Exhibit B.1).

In addition, we made a third comparison—between **all Medicare beneficiaries in the Beacon Community catchment area and a propensity-score-matched national sample of similar Medicare beneficiaries (matched national sample #2)** —to examine more general trends in the performance of Communities relative to national trends, and to observe any spillover effects Beacon Community activities might have throughout the catchment area. (See comparison #3, Catchment Area Matched National Sample #2, Exhibit B.1.)

We used propensity score matching, because Medicare beneficiaries who see providers participating in the Beacon program may be different from those who receive care from non-participating physicians. Likewise, all Medicare beneficiaries in a Beacon catchment area are likely to be systematically different from the overall Medicare population in the rest of the country. Propensity score matching is a statistical technique that improves our ability to select appropriate comparison groups for the population we are examining, by calculating a "score" or probability of the comparator being in the group we are studying. The matching method used a statistical (logistic regression) model to predict the likelihood that a beneficiary would be in the Beacon program, had they lived in the relevant Beacon intervention area. This allowed us to select Medicare beneficiaries from the 5 percent national sample with scores closest to those served by Beacon providers, or who reside in the Beacon catchment area, depending on the comparison.

Exhibit B.1 Three Comparisons to Understand Beacon Community Impact

Comparisons:
1. The Beacon Intervention to the non-Beacon Catchment Area (Internal Comparator)
2. The Beacon Intervention to the National Sample (External Comparator)
3. The non-Beacon Catchment Area + the Beacon Intervention to the Matched National Sample
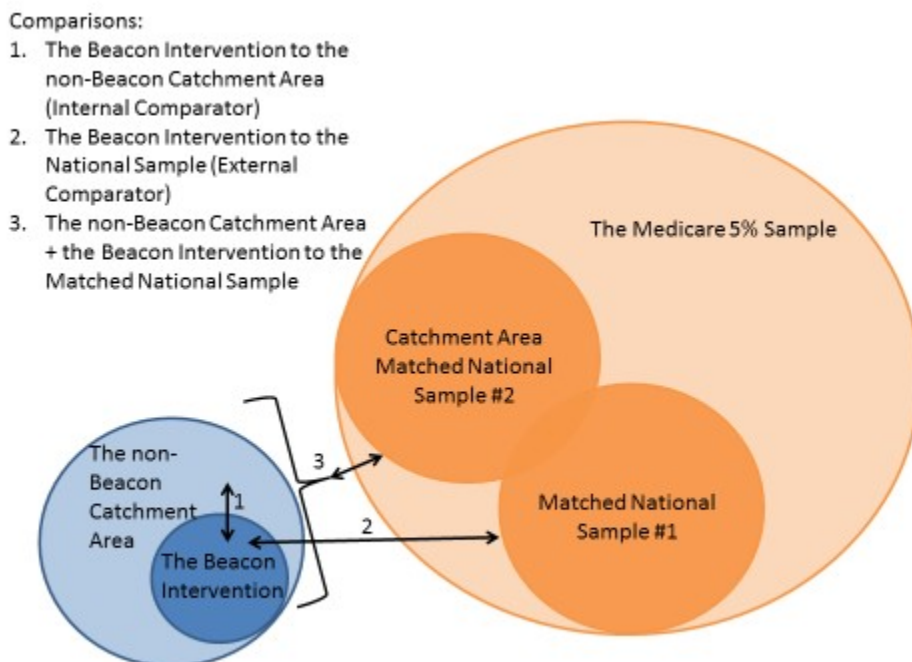
Outcome Measure Selection

Because the 17 Beacon Communities had different goals, interventions, and target populations, no single set of performance measures applies equally to every Community. Recognizing the importance of both tailoring measures to individual Communities' interventions and applying a common set of measures across all Communities, we identified a small number of measures for all Communities—including hospitalization rates and emergency department (ED) visits—as well as performance measures appropriate for the clinical conditions targeted by a particular Community. [xviii] All measures identified were from publicly available sources such as the National Committee for Quality Assurance (NCQA). We assessed each Community for the outcomes that were within the scope of their interventions. For example, some Communities planned to evaluate their intervention's impact on overall utilization as well as condition-specific outcomes (e.g., diabetes-related care), whereas other Communities planned to evaluate only condition-specific outcomes.

To select a final set of measures, we consulted with a technical expert panel (TEP) and an advisory group comprised of representatives from each of the 17 Communities. NORC held a TEP meeting on October 1, 2012, which consisted of five representatives from research universities, foundations, and non-profit institutions with expertise in quality measurement, innovative care delivery models, health IT, qualitative methods, technology adoption, clinical care, health services research, health economics, and public policy. The panel discussed the value of each measure in evaluating the Beacon program and made recommendations regarding its inclusion or revision for the evaluation. On November 8, 2012, an

[xviii] Exhibit 3.7 presents clinical focus areas by Community and Exhibit 4.4 provides an overview of interventions by Community.

advisory group consisting of one representative from each of the 17 Communities reviewed the metrics proposed by the TEP. The Communities provided perspective based on their respective interventions on which measures were appropriate.

We subsequently updated the list of measures based on this input and shared a final list of measures with the TEP and Community advisory group. Exhibit B.2 provides the measure specifications. Exhibit B.3 lists the measures relevant to each Community. Ultimately, we adjusted or dropped some of the measures due to sample size limitations. For example, if a small number of relevant events occurred (generally less than 30), then statistical tests for significant differences over time are not possible.

It is important to note that as part of the Beacon Program, each Community specified clinical quality and utilization measures to use in their own quality improvement activities, reporting to HHS, and in some cases, for evaluation activities conducted by the Communities themselves. Many Communities were able to collect these measures via EHRs, so their measures captured intermediate clinical outcomes such as laboratory results for control of diabetes or hypertension, which are not available in claims.

Exhibit B.2 Performance Measure Specification

Name	Measurement
Hospitalization	A hospitalization at a non-Federal, short stay, acute care or critical access hospital. Exclusions include admissions for the following diagnoses and services: medical treatment of cancer, primary psychiatric disease, rehab care, fitting of prostheses, and adjustment devices.
ACSC admission	Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection .
ED Visit	Admission to a hospital emergency department, excluding injury diagnoses.
Hospital observation stay	Identified on revenue center billing codes as hospital outpatient or emergency department services given to help the doctor decide if the patient needs to be admitted as an inpatient or can be discharged.
30-Day readmission	A hospital inpatient admission within 30 days of an inpatient discharge.
Diabetes admissions	An inpatient admission with a principal diagnosis of diabetes.
Uncontrolled diabetes admissions	An inpatient admission with a principal diagnosis of uncontrolled diabetes.
Eye screening	Binary measure of whether a beneficiary with diabetes received an eye screening for diabetic retinal disease annually.
Hba1c test	Binary measure of whether a patient received an Hba1c test annually.
ED visit for diabetes	A visit to an emergency department for diabetes.
Hypertension admission	An inpatient admission with a principal diagnosis of hypertension.
Beta-blocker use	Binary measure of whether a beneficiary with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge, averaged for each beneficiary's total number of discharges.
INR test	Binary measure of whether Part D beneficiaries with claims for warfarin received an International Normalized Ratio (INR) test at least every 12 weeks, on annual basis.
PDC for statin therapy	Sum of the days' supply for all claims for statin for patients with CAD divided by the total days enrolled for patients with CAD. Modeled as a binary indicator of whether annual supply reached clinical quality threshold of greater than or equal to 80%.
ACE or ARB inhibitors for CHF	A binary measure of whether a beneficiary with a hospital admission with congestive heart failure (CHF) received a prescription for an angiotensin-converting enzyme (ACE) or Angiotensin II Receptor Blockers inhibitor (ARBs) within 7 days of discharge, averaged for each beneficiary's total number of discharges.
COPD admission	An inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).
30-day mortality	Mortality within 30 days of discharge from a hospital.
90-day mortality	Mortality within 90 days of discharge from a hospital.

Exhibit B.3 List of Performance Measures by Beacon Community

Clinical Focus Area	Bangor	Central Indiana	Cincinnati	Colorado	Crescent City	Delta Blues	Hawai'i	Inland NW	Keystone	SE Michigan	SE Minnesota	Rhode Island	San Diego	Southern Piedmont	Tulsa	Utah	Western NY	TOTAL
Hospitalizations																		
Any hospitalization	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17
Any Hospitalization for ACSC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17
Any readmission within 30 days	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17
Any emergency room visit	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17
Any observation stay	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17
Diabetes																		
Hospitalization for diabetes	X	X	X	X	X	X	X	X		X	X	X		X		X	X	14
Uncontrolled diabetes admissions	X	X	X	X	X	X	X	X		X	X	X		X		X	X	14
Eye screening for diabetic retinal disease	X	X	X	X	X	X	X	X		X	X	X		X		X	X	14
HbA1C test	X	X	X	X	X	X	X	X		X	X	X		X		X	X	14
Emergency room due to diabetes	X	X	X	X	X	X	X	X		X	X	X		X		X	X	14
Cardiovascular Care																		
PDC for statin therapy for CAD	X								X					X	X			4
INR test for warfarin patients	X								X					X	X			4
Hypertension and Chronic Heart Failure																		
Hypertension Admission	X		X						X					X	X			5
HTN patient has beta-blockers within 7 days after discharge	X		X						X					X	X			5
CHF patient on ACE inhibitors or ARBs	X		X						X					X	X			5
AMI																		
30-day readmission post AMI hospitalization	X			X										X	X			4
COPD																		
COPD Admission	X								X									2
Additional Utilization and Mortality Measures																		
Any readmission within 90 days									X					X				
Any emergency room visit within 30 days									X					X				
Any emergency room visit within 90 days									X					X				
30-day mortality									X					X				
90-day mortality									X					X				
TOTAL	19	12	10	8	7	12	12	7	11	7	7	7	6	18	10	7	7	

Analytic Approach

Difference-in-differences (DiD) estimation is the primary analytic approach appropriate for comparing outcomes between two groups (intervention and comparison) while controlling for potential biases stemming from differences between both the two groups' characteristics and comparisons over time. Exhibit B.4 shows the conceptual model for the DiD design. NORC analyzed outcomes at the person-year level (except for Keystone and San Diego). We report the DiD for 2010 (pre) compared to 2013 (post). We excluded 2011, since most Communities had not fully implemented their Beacon interventions in that year. Outcome measures were modeled using multivariate logistic regression that takes into account the health and contextual characteristics of the Communities. For each outcome, we estimated: (1) the probability that the event (e.g., an ED visit, receipt of blood sugar testing by a beneficiary with diabetes) occurred; (2) the change in the probability between 2010 and 2013; and (3) the difference in the change over this period between the comparison and Beacon populations.

Exhibit B.4 Conceptual Model for DiD Design
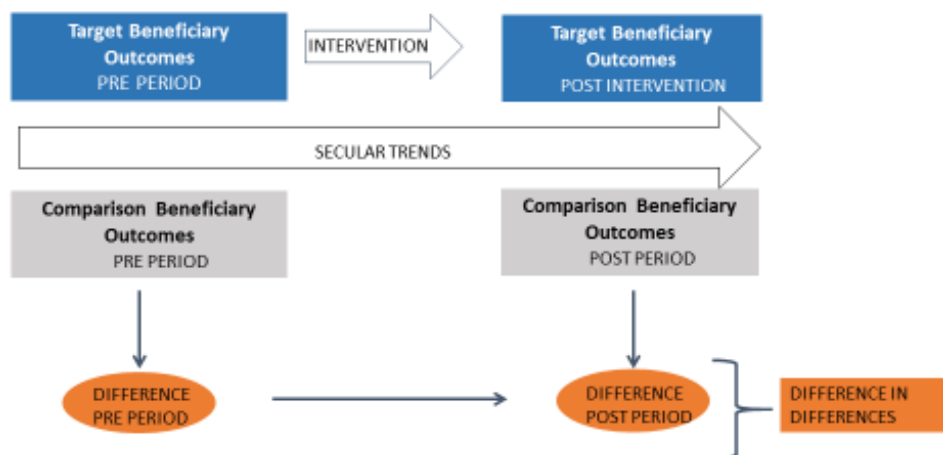
We adjusted all models for age, race/ethnicity, health status (CMS Hierarchical Condition Categories [HCC] score), reason for enrollment, dual eligibility status, months of Medicare FFS coverage, and duration of exposure to the intervention. In addition, although the propensity score matching helped reduce background differences in the national comparison sample and the Beacon populations, small but significant contextual differences remained, such as the percent of the population uninsured. Thus, our models also included three contextual variables (number of primary care doctors, population density, and percent of the population uninsured) as covariates.

Evaluation Design Challenges and Limitations

In addressing a range of design challenges, our goal throughout was to produce reliable, robust information about the likely consequences of specific interventions and implementation strategies to inform future programs. Here we describe each challenge and the methodological choices we made in order to mitigate the issue.

Imprecise Information about Exposure to Interventions across Communities. The information Beacon Communities were able to provide the evaluation on implementation timing and provider participation was often incomplete and not comparable. In addition, providers within the Beacon Communities were engaged in the Beacon interventions to varying degrees, as a function of both the time elapsed since implementation and the particular components of the program in which they are involved. In all multivariate analyses, therefore, we used the providers' dates of adopting the Beacon intervention as a control variable. This addresses any unobserved factors correlated with date of adoption, further helping us to understand the independent effects of Beacon interventions. We also conducted a supplemental analysis that aggregated information across Communities, to examine both the time following the Beacon award to launch of the clinical interventions and the penetration of the Beacon Program within each Community.

Simultaneity of other Health IT and Quality Improvement Interventions. Many regions in which Beacon Communities were established had piloted other health IT or quality improvement initiatives. This makes it difficult to isolate effects or attribute impact solely to the Beacon Communities' infrastructure developments and clinical reforms. In addition, multiple interventions occurred in various combinations and with different timelines. To account for this, we examined Communities' participation in other collaborative initiatives (specifically, Aligning Forces for Quality and Chartered Value Exchanges) in relationship to their performance in the supplemental analysis.

Patient Attribution. We could not directly identify patients affected by Beacon interventions. The analysis relied on lists of doctors, clinics, and hospitals that were involved with a Beacon Community that the Communities submitted to ONC. The evaluation attributed Medicare patients to these providers based on Medicare claims for patient evaluation and management, an inexact way to assign patients to their primary care provider.

Choice of Comparators. Choosing an appropriate comparison group is critical for estimating the effects of any intervention. The evaluation team explored several approaches, including selecting actual geographic Communities, similar to the Beacon Communities with respect to important demographic and health-related characteristics, as comparison Communities. Ultimately, we chose to use propensity score matching of the national samples for: (1) the patients of active Beacon providers and (2) the entire catchment area population. In comparing the two groups of Medicare beneficiaries (those served by providers involved with Beacon and those with other providers) within a Beacon catchment area, the analysis adjusted for differences in the demographic and health characteristics of these two groups.

Multi-faceted Interventions. Among the challenges of attempting to quantify the impact of programs such as Beacon is isolating the specific components of the intervention. All of the Beacon Communities implemented multiple strategies, such as developing new data exchange capacity and coaching ambulatory care practice staff in the use of their EHR population management tools. Even where Communities used a similar strategy—such as use of care managers—the approach, tools, and implementation of these strategies varied across Communities. Interviews and site visits with Communities have informed our interpretation of the quantified findings with respect to these activities.

Use of Medicare Claims Data. While Communities all collected data on clinical quality measures, our quantitative analysis is limited to Medicare claims. Some interventions—such as public health

immunization screening and follow up, or electronic physician orders for life sustaining treatment (ePOLST)—are not measurable in claims data; the impact analysis does not capture outcomes of these interventions. This Medicare claims analysis also does not capture the experiences of those not enrolled in Medicare; nor does it fully reflect the performance of Communities that targeted services primarily to non-Medicare populations. For example, Cincinnati and Southeast Minnesota had substantial childhood asthma interventions, whereas Crescent City, Delta BLUES, and Southeastern Michigan targeted outreach efforts on non-elderly Medicaid beneficiaries. Qualitative data are thus critical to answer questions for which Medicare data are unsuited, helping to tease apart the relative roles of the interventions and other dynamics at play, and highlighting the importance of Communities' circumstances and particular mechanisms at work.

Timeline of Evaluation. Because many Communities made substantial up-front investments and did not launch their clinical interventions until 2012 or even 2013, and the evaluation did not have data after 2013, the analysis captures only the initial period of Beacon implementation. Following the Beacon population for a longer time could show more definitive impact than we are able to see looking at 2013 outcomes. The limitations on original data collection, timing, and resource constraints of evaluations such as that for Beacon tend to preclude assessment of longer-term effects such as realization of returns on investment and program sustainability. In addition, programs designed to test new and innovative delivery system models may see rates of change that vary across different aspects of the complex model or intervention. This is an inherent limitation of the evaluation, making it unlikely that we will capture all effects within three or four years, the evaluation "window" for the Beacon Community Program.

Results

As described above, we performed three comparative analyses for each outcome measure in each Community. We report the unadjusted estimates (i.e., not based on models that adjust for covariates) for each measure for 2010 for the Community's Beacon Program beneficiaries compared with their matched national comparators (see Appendix C). Below we report the following difference-in-differences results for measures of hospital-based service use and for selected condition-specific outcomes for these three analyses:[xix]

- For Medicare beneficiaries served by providers participating in the Beacon Program and the national comparator (Exhibits B.5 and B.6);
- For Medicare beneficiaries served by providers participating in the Beacon Program compared to beneficiaries in the Community served by non-Beacon providers (Exhibits B.7 and B.8); and
- For all Medicare beneficiaries in the Beacon catchment area sample and the national comparator (Exhibits B.9 and B.10).

For each of the exhibits below, we report:

[xix]We report the model-based results for each measure, and the difference-in-differences, for each Community, in 2010 and 2013 in Appendix C. The following outcomes occurred too infrequently for estimation: short-term complications from diabetes, diabetic ketoacidosis, and AMI hospitalization.

- the number of Communities for which there was a greater (statistically significantly at p<.05) improvement in the Beacon group of interest relative to its comparison group;

- the number for which there was a greater improvement in the comparison group relative to the Beacon Community group; and

- the number of Communities for which we found no statistically significant difference between the two groups.

Since it is possible that either or both the Beacon group of interest and the relevant comparison group experienced improvements or declines in the outcome measure between 2010 and 2013, we also report which group performed statistically significantly better relative to the other. Exhibits B.6, B.8, and B.10 depict and summarize selected findings from the table preceding each.

Medicare Beneficiaries seen by a Beacon Provider Compared with a Matched National Sample

The experience of Medicare beneficiaries within a Beacon Community whose provider participated in Beacon interventions, relative to that of a matched national comparison group, is the primary comparison of interest. We hypothesized that the impact of Beacon-generated improvements in service delivery and quality of care would be concentrated within this group. In addition, the propensity-score-matched national comparator can better adjust for individual differences among beneficiaries than can the within-Community (Beaconated versus non-Beaconated) comparison. Exhibit B.5 summarizes the performance across the Communities for Beaconated beneficiaries relative to their national comparator (we present individual results for each Community in Appendix C).

Overall, with respect to hospital-based services, the Beacon Program appears to be most effective in reducing ED visits; we did not observe relatively greater reductions by Beacon Communities in overall hospitalization compared to the matched national sample. The size of the improvements was modest (shown for each measure, for each Community, in Appendix C), with the largest being a 6.7 percent improvement in ED visits in Hawaii, and Communities varied widely, with no consistent patterns, in outcomes for hospital observation stays, ambulatory care sensitive admissions, and overall 30-day hospital readmissions. Three Communities performed better than the comparison group on one or two outcomes, but did not differ from the comparison group on the other measures. In two other Communities, the comparison group performed better on most measures. In two Communities there was no difference in performance on any measure. Performance in the remaining five Communities was mixed across the measures.

Outcomes related to the Communities' targeted clinical conditions are also mixed. The majority of Communities focused on diabetes care management. Four Beacon Communities showed improvements (reductions) in ED visits for diabetes; results for the remaining eight Communities were not significantly different from those of their comparators. Communities' performance varied across the other measures of use and care quality for diabetes, with improvements on some measures but not others. Two Communities saw no difference in performance for any measure; but most had mixed results, and in no Community was performance consistently notable. Beacon Communities that tended to perform well on the overall hospital use measures also tended to have either better performance relative to the comparator, or no difference in performance, on the diabetes measures.

For the smaller set of Communities that addressed cardiovascular care, we found mixed performance on these measures as well. Five Beacon Communities showed improvement on at least one measure relative to their comparator, while for four other Communities, the comparison group performed better. For chronic obstructive pulmonary disease (COPD), no Communities showed significant reductions in admissions relative to the comparator. For the Keystone Beacon Community, whose interventions were predominantly improving care transitions and management for hospitalized patients with congestive heart failure (CHF) or COPD, we also examined mortality 30 and 90 days following discharge, and found no significant improvement relative to the comparator. The Keystone Beacon Community, for which we analyzed outcomes among beneficiaries discharged from participating hospitals compared to a matched sample of discharges, the Beaconated beneficiaries had fewer ED visits 30- and 90-days post-discharge and greater use of beta-blockers. We observed no other differences in performance for the other measures.

Exhibit B.5 Summary of Difference-in-Differences in Outcomes between 2010 and 2013 for Medicare Beneficiaries Attributed to a Provider Who Participated in Beacon and a Matched National Comparison Group

Measure	Greater Improvement in Comparison Beneficiaries	No Statistically Significant Difference	Greater Improvement in Beaconated Beneficiaries	Number of Communities
Overall Utilization	N	N	N	N
Hospital admission	6	5	2	13
Hospital observation stay	3	6	5	14
ACSC admission	1	12	0	13
30 day re-admission	4	10	0	14
ED visit	2	4	8	14
Diabetes Measures				
Diabetes admission	6	5	2	13
Uncontrolled diabetes admission	2	8	2	12
Eye exam for retinal disease	6	6	1	13
Hba1c test	3	6	4	13
ED visit for diabetes	0	8	4	12
Hypertension, Heart Disease, COPD and Mortality				
Hypertension admission	3	3	0	6
INR testing	2	5	0	7
PDC covered for statins	1	5	2	8
Beta-blocker prescribed	1	6	1	8
ACE/ARB inhibitor prescribed	2	5	2	9
COPD admission	1	3	0	4
30-day Mortality	0	1	0	1
90-day Mortality	0	1	0	1

Notes: N= Number of Communities. We indicate significance in the difference-in-differences at p≤0.05

Diabetes outcomes assessed for all Communities except Keystone, Tulsa, and San Diego. Hypertension outcomes assessed for Bangor, Crescent City, Colorado, Indiana, Hawaii, Keystone, and Piedmont. Heart Disease measures assessed for Bangor,

Cincinnati, Crescent City, Colorado, Indiana, Hawaii, Delta Blues, Keystone, and Piedmont. COPD admission assessed for Bangor, Hawaii, Indiana, and Piedmont. Mortality examined for Keystone beneficiaries discharged from a hospital with CHF or COPD.

In Exhibit B.6, we depict selected performance measures we assessed for the majority of Communities. We selected these to illustrate the very mixed findings across measures and variation in performance among the Communities.

Exhibit B.6 Summary of Beacon and Matched National Sample, Differences in Selected Performance Measures, 2010-2013
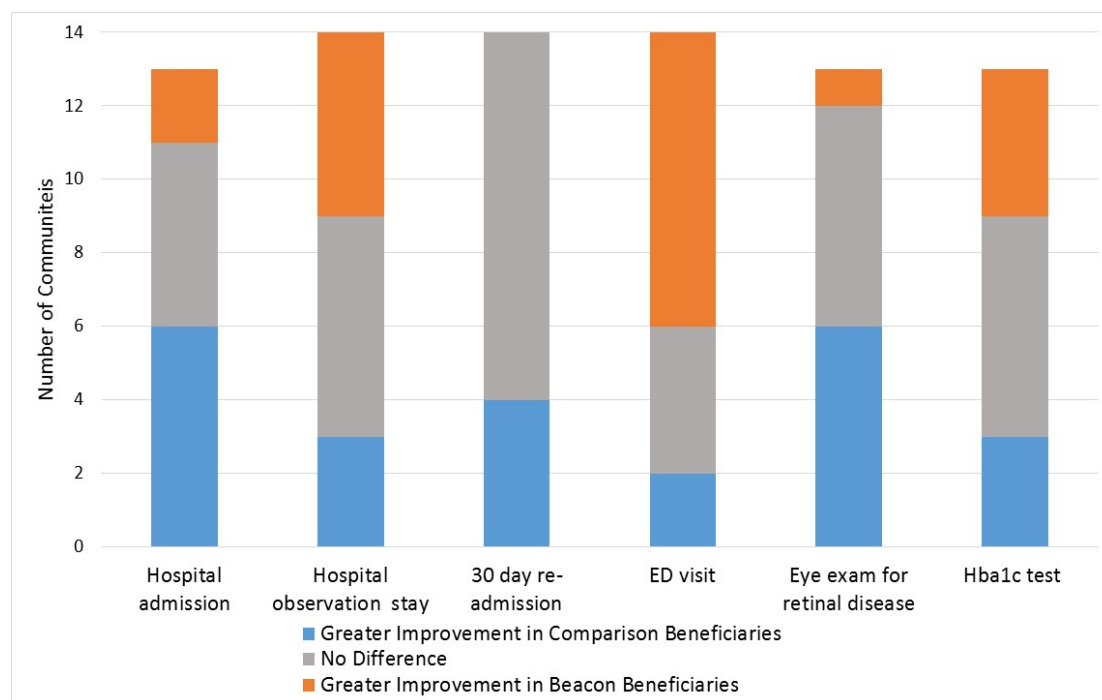
Note: Fourteen of seventeen Communities had comparisons for the Beaconated compared to the National sample (Southeast Minnesota, Tulsa and San Diego had only catchment-wide comparisons). Hospital admission and diabetes measures were reported for all Communities except Keystone.

Beneficiaries Seen by Beacon Providers Compared to those Seen by non-Beacon Providers within the Catchment Area

Within Beacon catchment areas, between 2010 and 2013, the change in measured outcomes for beneficiaries whose care could be attributed to a Beacon provider was no better than the changes for beneficiaries residing in the Community catchment area who did not see a Beacon provider (Exhibit B.7). Results for overall hospitalization, ED visits, and readmission indicated better performance among the non-Beaconated beneficiaries relative to the Beaconated beneficiaries. There were few differences on performance for ambulatory care-sensitive conditions (ACSC) or hospital observation stays. For all but two Communities, the non-Beaconated beneficiaries experienced either better results on some measures, or no difference in performance, relative to the Beaconated beneficiaries. In the remaining two Communities, the Beaconated beneficiaries experienced better performance on some measures, or no difference in performance, relative to non-Beaconated beneficiaries.

The number of significant differences in either direction was more modest among the condition-specific measures. Notable is the better performance on hemoglobin A1c (HbA1c) testing among the Beaconated beneficiaries. As with overall hospitalizations, diabetes admissions were relatively higher among the Beaconated beneficiaries in most Communities. However, there were few differences for eye-examinations for retinal disease, ED visits for diabetes, or uncontrolled diabetes admissions. In three Communities, there was either no difference in or better performance for the non-Beaconated beneficiaries. Four Communities saw mixed results, with better performance among the Beaconated beneficiaries, on at least one measure. In three other Communities, there was either no difference in or better performance for the Beaconated. In the remaining three Communities, there was no difference in performance across all measures. Cardiovascular care measures also suggested better performance among the non-Beaconated beneficiaries, though not consistently across measures. In other words, in each Community for which we assessed these outcomes, results were mixed. For Keystone, the Beaconated beneficiaries discharged from hospitals had fewer 30- and 90-day observation stays and greater use of beta-blockers. We found no difference for the other performance measures.

Exhibit B.7 Summary of Difference-in-Differences in Outcomes between 2010 and 2013 for Medicare Beneficiaries Attributed to a Provider Who Participated in Beacon and Beneficiaries in the Beacon Catchment Area who did not see a Beacon Provider

Measure	Greater Improvement in non-Beacon Community Beneficiaries	No Statistically Significant Difference	Greater Improvement in Beacon Beneficiaries	Number of Communities
Overall Utilization	N	N	N	N
Hospital admission	9	1	3	13
Hospital observation stay	4	8	2	14
ACSC admission	2	10	0	12
30 day re-admission	7	7	0	14
ED visit	8	4	2	14
Diabetes Measures				
Diabetes admission	6	6	1	13
Un-controlled diabetes admission	2	10	0	12
Eye exam for retinal disease	2	11	0	13
Hba1c test	1	6	6	13
ED visit for diabetes	2	8	1	11
Hypertension, Heart Disease, COPD and Mortality				
Hypertension admission	3	2	1	6
INR testing	4	4	0	8
PDC covered for statins	4	4	0	8
Beta-blocker prescribed	0	6	2	8
ACE/ARB inhibitor prescribed	4	5	0	9
COPD admission	2	0	1	3
30-day mortality	0	1	0	1
90-day mortality	0	1	0	1

Notes: N= Number of Communities. We indicate significance in the difference-in-differences at p≤.05.

Diabetes outcomes assessed for all Communities except Keystone, Tulsa and San Diego. Hypertension outcomes assessed for Bangor, Crescent City, Colorado, Indiana, Hawai'i, Delta Blues, and Southern Piedmont. Heart Disease measures assessed for Bangor, Cincinnati, Crescent City, Colorado, Indiana, Hawai'i, Delta Blues, Keystone, and Southern Piedmont. COPD admission assessed for Bangor, Indiana, and Piedmont. Mortality examined for Keystone beneficiaries discharged from a hospital with CHF or COPD.

Exhibit B.8 depicts selected performance measures and demonstrates that performance among non-Beaconated beneficiaries was better on several measures, but for many measures, there was little difference.

Exhibit B.8 Summary of Medicare Beneficiaries Attributed to a Provider Who Participated in Beacon and Beneficiaries in the Beacon Catchment Area who did not see a Beacon Provider
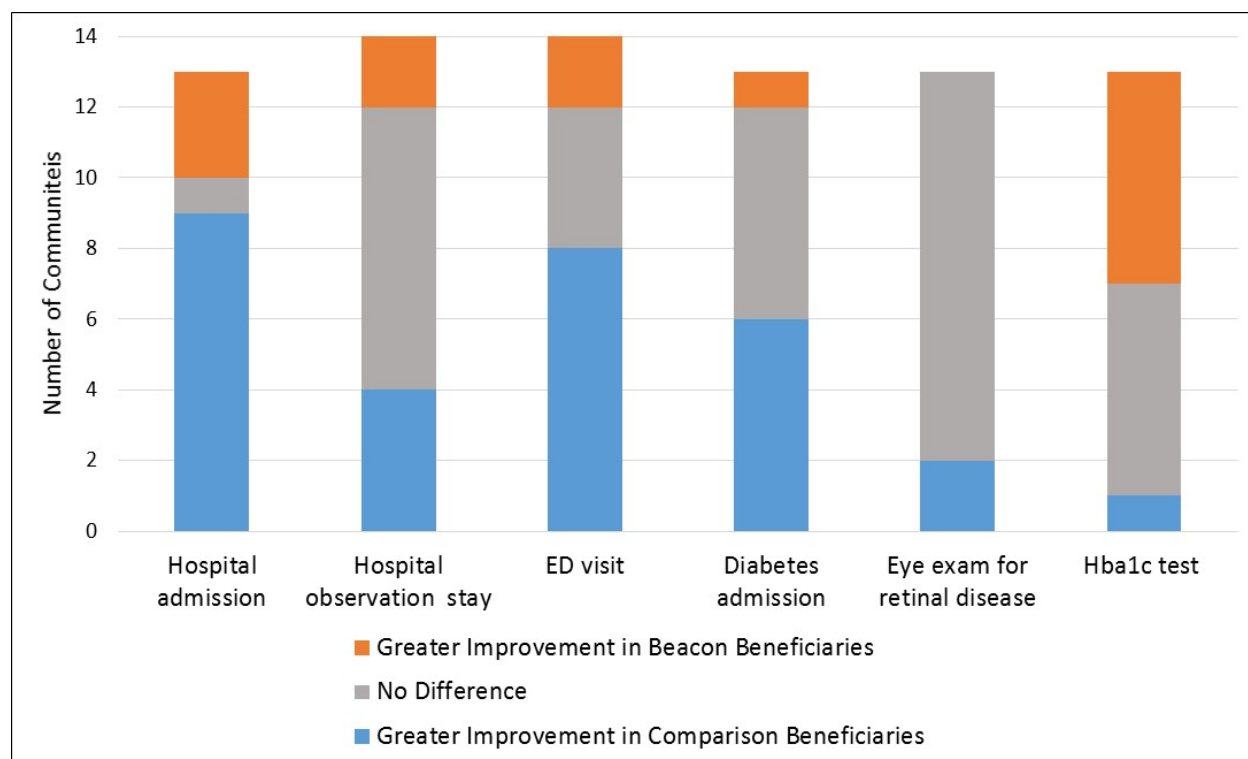
We can speculate, but have no evidence, on several possible reasons for these unexpected results. First, unmeasured differences might be part of the explanation. Although we attempted (in the models estimating the likelihood of a given outcome for the Beaconated and non-Beaconated beneficiaries) to account for differences between the two groups in demographics and health status by including these characteristics as covariates, these adjustments are not as extensive as with the propensity score matching we conducted for the analyses involving a national comparison group. In addition, there may be unmeasured systematic differences between the two groups related to differences in the patient populations seen by Beacon providers and other local providers, with the Beaconated population at higher risk for hospital-based service use. We lacked sufficient information to examine the assumption (necessary for difference-in-differences analysis) that the populations compared had parallel trends prior to the intervention.

The second possible reason is that, if the providers choosing to participate in the Beacon Program were the same group of local providers who participated in previous quality improvement initiatives, their performance in 2010 may have already reflected positive change in the utilization and quality indicators, with less "room" to continue making progress than the non-participating local providers had. Finally, we note again that many Communities were the sites of concurrent, unrelated service delivery and payment initiatives, whose participants may have included providers that were not participating in Beacon interventions. The effects of concurrent local initiatives cannot be isolated from Beacon impacts.

All Medicare Beneficiaries within a Beacon Catchment Area Compared with a Matched National Sample

Our third comparison examined the performance of each Beacon catchment area relative to a matched national sample of Medicare beneficiaries over the period 2010 through 2013 (Exhibit B.9). This analysis seeks to understand any spillover effects the local Beacon activities may have had, beyond Beacon-participating providers who explicitly participated in them to other providers across the catchment area.

The Beacon catchment areas generally performed better on most overall utilization measures, relative to their matched national comparison group. All Beacon Communities performed better on ED visits. Most Communities performed better on hospitalizations (12) and observation stays (11). There were few differences in ACSC hospitalizations or hospital observation stays.

Results were mixed for the condition-specific outcomes, though the Beacon Communities tended to have better performance. Five Beacon Communities experienced better performance or no difference in performance relative to their comparator for outcomes related to diabetes care. Two Beacon Communities had a mixture of no difference or poorer performance on their diabetes outcomes. Beneficiaries in five other Communities had a mixture of better performance on some measures and poorer performance on other measures, relative to their comparator. Two Communities had no statistically significant differences from their comparator in any diabetes care measures. Results were likewise mixed or statistically insignificant for the cardiovascular care measures, though the Beacon Community results were somewhat better than were those of their comparison groups. Four Communities experienced better performance or no difference in performance relative to their comparison group. Five Communities had a mixture of better performance on some measures and poorer performance on other measures, relative to the matched sample. One Beacon Community had a mixture of no difference or poorer performance on cardiovascular outcomes, relative to the matched sample. The Tulsa catchment area saw a reduction in COPD admissions, while there was no difference in performance for COPD admissions in Keystone, between the Beacon catchment areas and the matched sample. The Keystone Beacon catchment area followed a somewhat different pattern from the other Communities, as there were no differences on most outcomes and the Beacon catchment area did not perform as the matched sample for 30- and 90-day post-discharge observation stays. However, the Beacon catchment area had greater reduction in 30-day post-discharge mortality.

Exhibit B.9 Summary of Difference-in-Differences in Outcomes between 2010 and 2013 for all Medicare Beneficiaries in the Beacon Catchment Area and a Matched National Comparison Group.

Measure	Greater Improvement in Comparison Beneficiaries	No Statistically Significant Difference	Greater Improvement in Beacon Catchment Area Beneficiaries	Number of Communities
Overall Utilization	N	N	N	N
Hospital admission	2	2	12	16
Hospital observation stay	3	3	11	17
ACSC admission	1	14	1	16
30 day re-admission	1	14	2	17
ED visit	0	1	16	17
Diabetes Measures				
Diabetes admission	3	9	2	14
Un-controlled diabetes admission	0	10	4	14
Eye exam for retinal disease	3	10	1	14
Hba1c test	3	6	5	14
ED visit for diabetes	0	7	7	14
Hypertension, Heart Disease, COPD and Mortality				
Hypertension admission	2	4	1	7
INR testing	2	3	4	9
PDC covered for statins	0	5	4	9
Beta-blocker prescribed	1	8	1	10
ACE/ARB inhibitor prescribed	0	2	8	10
COPD admission	0	4	1	5
30-day mortality	0	1	1	2
90-day mortality	0	2	0	2

Notes: N= Number of Communities. We indicate significance in the difference-in-differences at p≤.05.

Diabetes outcomes assessed for all Communities except Keystone, Tulsa and San Diego. Hypertension outcomes assessed for Bangor, Crescent City, Colorado, Indiana, Hawai'i, Delta Blues, Keystone, and Southern Piedmont, and Tulsa. Heart Disease measures assessed for Bangor, Cincinnati, Crescent City, Colorado, Indiana, Hawai'i, Delta Blues, Keystone, Southern Piedmont and Tulsa. COPD admission assessed for Bangor, Hawai'i, Indiana, and Southern Piedmont and Tulsa. Mortality examined for Keystone beneficiaries discharged from a hospital with CHF or COPD and San Diego beneficiaries who had an ambulance ride.

The relatively positive Beacon catchment area results, as compared with those for the Beaconated population only, may be a consequence of the evaluation's incomplete capture of Medicare beneficiaries affected by Beacon interventions. As already mentioned, we attributed beneficiaries to the providers that Communities themselves identified as participating in Beacon interventions. If this list missed participating providers, our analysis would have missed their patients among the Beaconated beneficiaries.

Exhibit B.10 illustrates the better performance of the Beacon catchment areas relative to the national sample.

Exhibit B.10 Summary of Difference-in-Differences in Outcomes between 2010 and 2013 for all Medicare Beneficiaries in the Beacon Catchment Area and a Matched National Sample
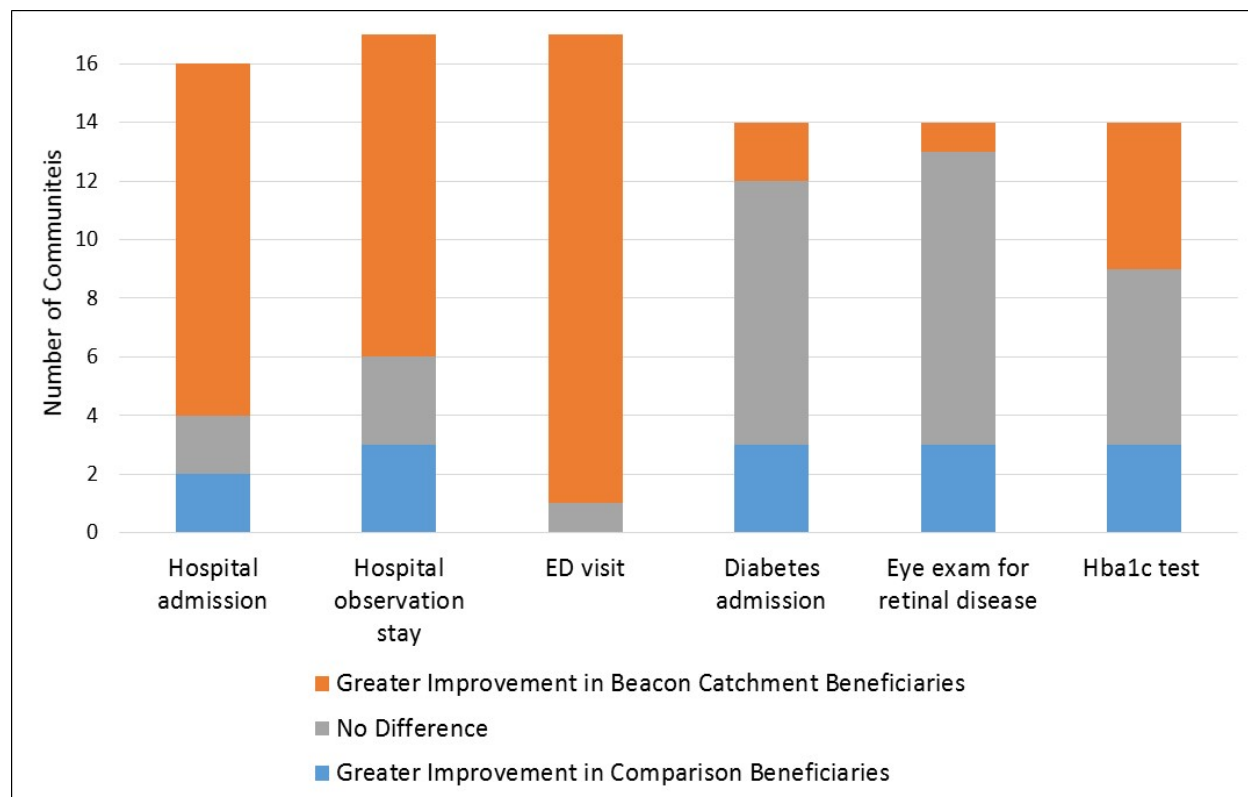
Supplementary Analyses

For two Communities—Southern Piedmont and San Diego—we conducted additional analyses to address patient sub-populations targeted by the Communities. For Southern Piedmont, we examined hospitalizations, ED visits, and hospital observation stays for beneficiaries with COPD. Results indicated some differences indicating better performance among the Beacon populations. There were fewer ED visits for the Beaconated beneficiaries relative to the national comparator, and the Beacon catchment beneficiaries had few ED visits and observation stays, relative to the national comparator. In San Diego, the largest clinical intervention involved transmitting diagnostic information electronically to the receiving ED during ambulance transit, for patients with suspected cardiac disease. Therefore, for San Diego we examined inpatient admissions, observation stays, 30- and 90- day mortality, 30- and 90-day readmissions, and 30- and 90-day ED visits for the same diagnosis, beneficiaries transported by ambulance with any heart disease, AMI, or stroke. We found that there was a decline in both observation stays and in-patient admissions relative to beneficiaries residing outside the intervention area, though no change in ED visits, readmissions or mortality.

In addition, we pooled the Beacon beneficiary data and used logistic regression models to examine additional Community-level factors we hypothesized might have some effect on performance improvement. These include:

- whether the Community used Beacon funding to build its IT capacity versus to strengthen existing IT infrastructure (a binary measure);
- whether it had any prior collaboration with a quality improvement initiative, either Aligning Forces for Quality (AF4Q)[xx] or Chartered Value Exchange[xxi] or both;
- the lead time from the Beacon award to the start of the intervention; and
- the extent of the local provider Community involved with Beacon (measured as the proportion of Medicare beneficiaries in the catchment area attributed to Beacon providers).

Compared to beneficiaries in Communities that had only one or no such prior collaboration, prior collaboration with two quality improvement initiatives was significantly related to success in reducing hospitalizations for ambulatory care sensitive conditions and diabetes, and in increasing eye exams for beneficiaries with diabetes.

Summary

No simple statement can summarize the impact of Beacon Program interventions as measured with the Medicare data available for this evaluation. Our findings show little effect or smaller improvements in hospitalization, diabetes, and cardiovascular performances measures relative to beneficiaries of non-Beacon providers. One possible reason is that we may not have fully captured the program's impact due to the short time period of the evaluation. If so, examining the impact of the interventions over a longer period of time might reveal a more positive impact on outcomes than reported here. For a few Beacon Communities, 2013 represents the first full year of the program operations, although most launched their interventions late in 2011 or in 2012. Programs also varied in their capacity to become fully operational during the study period, and many IT interventions, being difficult to integrate into practice, have steep learning curves. In addition, many Communities also had concurrent clinical transformation efforts ongoing during the Beacon funding period. Finally, perhaps the greatest limitation of the evaluation's claims-based analyses is that it includes only the Medicare FFS population age 65 and older, whereas many Communities also developed concurrent interventions aimed at non-elderly adults with Medicaid coverage and children. The claims analysis is silent as to the impact of Beacon interventions on these groups.

Lastly, it is difficult to compare our results with the Communities' own reports of program impact, as most Communities with clinical and process outcomes results relied on EHRs, which included all Beacon Program participants, not only the Medicare beneficiaries we studied.[xxii] In summary, the scope of this analysis by itself allows for limited inferences about the overall success of the Beacon Community

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[xx] For more information on Aligning Forces for Quality (AF4Q), see http://forces4quality.org/
[xxi] For more information on the Chartered Value Exchange, see
http://archive.hhs.gov/valuedriven/Communities/valueexchanges/exchanges.html
[xxii]The Beacon Communities' 2013 annual (final) reports are a source for their own impact analyses.

Program. Rather, this component of the evaluation suggests some possible relationships between program and outcomes, and offers a framework for a longer term, albeit partial, impact analysis of a complex regional initiative. The results reported in this section must also be placed within the context of the evaluation's qualitative findings.

Appendix C. Complete Results for Impact Analysis, by Community

Bangor Beacon Community

Exhibit C.1 Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Bangor

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	2935	13.0	2213	19.3	*
ACSC Admission	341	11.6	261	11.8	
ED Visit	6290	27.8	4547	39.6	*
Hospital Observation Stay	2269	10.0	1236	10.8	
30-Day Readmission	481	16.4	376	17.0	
Diabetes Measures					
Diabetes Admissions	792	14.6	621	18.0	*
Uncontrolled Diabetes Admissions	34	0.6	24	0.7	
Eye screening	2818	51.8	2426	70.4	*
Hba1c test	2257	41.5	2100	60.9	*
ED Visit for Diabetes	92	1.7	52	1.5	
Hypertension and Heart Disease					
Hypertension Admission	1408	13.3	950	13.9	
Beta-Blocker Use	278	39.9	224	39.8	
INR Test	843	67.9	538	70.1	
PDC for Statin Therapy	1756	44.4	1124	46.0	
ACE or ARB inhibitors for CHF	1210	69.9	712	66.6	
COPD Admission	733	19.3	655	26.0	*

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis was hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Exhibit C.2 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Bangor

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	14.7	13.7	19.1	16.9	-1.2
	Hospital observation stay	10.9	12.1	12.6	11.0	-2.7*†
	ED visit	28.9	31.0	44.1	40.4	-5.9*†
	30-day readmission	17.9	16.9	15.4	13.8	0.6
	ACSC hospitalization	14.0	13.5	9.7	8.2	-1.0
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	6.9	9.3	20.0	17.7	-4.7*†
	Hospital observation stay	4.6	7.2	10.4	9.2	-3.8*†
	ED visit	22.4	25.5	38.9	35.6	-6.4*†
	30-day readmission	10.4	11.8	17.8	16.6	-2.6
	ACSC hospitalization	11.0	9.5	12.3	10.7	0.0
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	13.8	13.0	15.2	14.5	0.0
	Hospital observation stay	9.8	10.9	8.3	8.3	-1.0*†
	ED visit	30.0	31.9	33.0	31.3	-3.6*†
	30-day readmission	15.5	14.4	16.4	14.7	-0.6
	ACSC hospitalization	11.6	10.3	12.2	9.9	-1.0

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.3 Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Bangor

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	17.1	15.9	21.9	21.0	0.4
	Uncontrolled diabetes admission	0.6	1.2	0.8	1.7	0.2
	ED visit for diabetes	1.2	1.0	2.8	1.7	-0.9
	Eye screening for diabetic retinal disease	57.4	64.3	74.7	80.0	-1.6
	HbA1C test	39.3	37.0	61.5	58.7	-0.5
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	10.2	13.3	18.3	20.8	-0.6
	Uncontrolled diabetes admission	0.7	1.7	0.6	1.2	-0.4
	ED visit for diabetes	0.6	0.5	2.2	1.5	-0.6
	Eye screening for diabetic retinal disease	65.0	66.5	67.8	68.2	-1.1
	HbA1C test	58.6	57.1	56.3	52.5	-2.3
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	14.9	15.5	16.5	18.6	1.5
	Uncontrolled diabetes admission	0.7	1.3	0.6	1.3	0.0
	ED visit for diabetes	1.5	1.2	1.5	0.9	-0.2
	Eye screening for diabetic retinal disease	50.9	50.9	65.4	67.1	1.7
	HbA1C test	40.3	37.3	56.1	54.2	1.1

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.4 Cardiovascular Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Bangor

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hypertension admission	11.3	12.8	18.2	22.4	2.6*
	INR test	72.7	76.5	62.2	66.5	0.4
	Statin therapy	39.1	48.2	55.0	65.6	1.4
	Beta blocker	40.1	36.7	40.4	38.0	1.1
	ACE inhibitor	57.1	62.7	79.9	85.8	0.3
	COPD admission	20.5	20.8	22.4	21.7	-1.0
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hypertension admission	9.7	15.8	13.7	17.5	-2.3*
	INR test	71.8	72.4	69.4	68.6	-1.4
	Statin therapy	47.2	55.9	43.7	55.1	2.6
	Beta blocker	45.9	39.0	39.4	37.5	5.0
	ACE inhibitor	67.4	76.4	64.0	73.9	1.0
	COPD admission	14.1	19.1	26.6	26.3	-5.3*†
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hypertension admission	13.1	11.4	12.9	12.7	1.5*
	INR test	68.5	74.2	68.5	74.5	-3.9
	Statin therapy	44.5	53.4	43.8	54.6	1.9
	Beta blocker	38.8	35.7	38.2	35.9	0.8
	ACE inhibitor	70.2	74.8	65.2	74.8	5.1*†
	COPD admission	17.5	17.7	22.8	23.3	0.3

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries in the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) who received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Central Indiana Beacon Community

Exhibit C.5 Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Central Indiana

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	37202	12.6	16610	11.3	*
ACSC Admission	4043	10.9	1807	10.9	
ED Visit	78777	26.6	43418	29.4	*
Hospital Observation Stay	19342	6.5	17353	11.8	*
30-Day Readmission	5446	14.6	2007	12.1	*
Diabetes Measures					
Diabetes Admissions	9959	11.6	4964	11.8	
Uncontrolled Diabetes Admissions	774	0.9	391	0.9	
Eye screening	41666	48.7	18716	44.4	*
Hba1c test	46665	54.4	23715	56.2	*
ED Visit for Diabetes	710	0.8	509	1.2	*
Hypertension and Heart Disease					
Hypertension Admission	20520	12.9	8659	10.7	*
Beta-Blocker Use	2670	33.2	1246	33.9	
INR Test	291130	98.5	145333	98.5	
PDC for Statin Therapy	20399	44.9	11545	51	*
ACE or ARB inhibitors for CHF	12679	72.7	6156	77.2	*
COPD Admission	8355	16.9	3704	15.9	*

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis was hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Exhibit C.6 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Central Indiana

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	12.3	12.6	12.4	13.8	1.1*
	Hospital observation stay	50.9	51.4	40.5	39.8	-1.2*†
	ED visit	26.6	29.6	30.6	32.4	-1.2*†
	30-day readmission	14.4	14.1	12.4	14.5	2.4*
	ACSC hospitalization	11.0	9.6	10.6	9.8	0.6
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	12.1	7.4	12.7	10.2	2.1*
	Hospital observation stay	12.1	7.4	12.7	10.2	2.1*
	ED visit	32.2	29.4	32.5	34.1	4.5*
	30-day readmission	15.6	12.2	13.7	15.0	4.8*
	ACSC hospitalization	11.9	9.9	10.9	10.1	1.2*
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	14.1	13.6	14.5	13.3	-0.7*†
	Hospital observation stay	6.7	7.8	12.3	8.8	-4.7*†
	ED visit	28.0	30.7	32.3	31.6	-3.4*†
	30-day readmission	15.6	14.6	14.7	13.6	-0.2
	ACSC hospitalization	11.1	9.3	11.4	9.8	0.1

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Exhibit C.7 Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Central Indiana

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	11.1	12.1	12.8	15.5	1.6*
	Uncontrolled diabetes admission	0.9	1.1	1.0	1.6	0.3*
	ED visit for diabetes	0.8	0.9	1.3	1.1	-0.3*†
	Eye screening for diabetic	51.0	51.4	40.4	39.7	-1.2*
	HbA1C test	57.8	55.2	48.8	46.0	-0.2
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	13.2	12.4	14.1	16.2	2.9*
	Uncontrolled diabetes admission	1.2	1.3	1.1	1.6	0.5*
	ED visit for diabetes	1.4	0.9	1.4	1.2	0.3*
	Eye screening for diabetic retinal disease	41.5	43.8	41.0	41.3	-2.0*
	HbA1C test	55.8	48.8	48.7	46.9	5.2*†
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	13.1	13.4	14.0	14.7	0.5*
	Uncontrolled diabetes admission	1.0	1.3	1.2	1.5	0.1
	ED visit for diabetes	0.9	0.9	1.4	1.0	-0.4*†
	Eye screening for diabetic retinal disease	48.0	49.4	41.1	42.2	-0.3
	HbA1C test	53.4	51.4	51.9	47.7	-2.3*

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.8 Cardiovascular Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Central Indiana

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hypertension Admission	12.3	13.2	11.9	14.0	1.3*
	INR test	98.4	99.2	98.6	99.2	-0.2*
	Statin therapy	46.3	53.9	48.2	53.6	-0.2*
	Beta blocker	33.6	33.5	33.3	32.4	-0.8
	ACE inhibitor	73.6	75.0	75.2	74.2	-2.4*
	COPD admission	17.2	15.5	22.8	27.1	5.9*
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hypertension Admission	12.5	12.7	11.5	13.6	1.9*
	INR test	98.1	99.1	98.4	99.1	-0.3*
	Statin therapy	42.4	54.2	47.1	54.4	-4.5*
	Beta blocker	32.6	34.6	32.7	32.5	-2.2
	ACE inhibitor	63.1	72.5	73.8	74.9	-8.3*
	COPD admission	19.0	16.9	16.9	18.2	3.4*
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hypertension Admission	1.2	1.1	11.6	12.7	1.1*
	INR test	98.8	99.3	98.4	99.2	0.3*†
	Statin therapy	42.4	51.3	45.2	54.4	0.3
	Beta blocker	32.0	34.1	32.7	33.3	-1.4
	ACE inhibitor	69.2	73.1	67.5	74.2	2.8*†
	COPD admission	1.7	1.3	17.5	16.6	-0.4

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries in the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) who received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Colorado Beacon Community

Exhibit C.9 Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Colorado

	Matched Sample		Beacon		p<.05
Measure	No.	%	No.	%	
Overall Utilization					
Hospitalizations	2219	8.5	1108	8.6	
ACSC Admission	217	9.8	91	8.2	
ED Visit	5591	21.5	3078	23.8	*
Hospital Observation Stay	1486	5.7	687	5.3	
30-Day Readmission	283	12.8	94	8.5	*
Diabetes Measures					
Diabetes Admissions	466	10.6	226	10.2	
Uncontrolled Diabetes Admissions	34	0.8	8	0.4	*
Eye screening	1997	45.4	1221	55.4	*
Hba1c test	1949	44.1	1345	60.9	*
ED Visit for Diabetes	62	1.4	19	0.9	
Hypertension and Heart Disease					
Hypertension Admission	1172	12.2	574	11.9	
Beta-Blocker Use	149	28.9	90	39.1	*
INR Test	25639	98.7	12789	98.9	
PDC for Statin Therapy	1177	43	565	45.7	
ACE or ARB inhibitors for CHF	749	71.2	304	69.7	
COPD Admission	486	15.5	224	13.6	

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis was hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Exhibit C.10 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Colorado

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	8.6	9.1	9.9	10.2	-0.1
	Hospital observation stay	5.9	6.7	6.7	7.8	0.3
	ED visit	22.8	25.3	25.4	27.8	-0.2
	30-day readmission	11.8	11.5	8.8	10.5	2.0
	ACSC hospitalization	9.7	8.0	8.2	8.2	1.8
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	16.7	6.8	10.6	9.9	9.3*
	Hospital observation stay	5.9	4.7	6.0	6.9	2.2*
	ED visit	37.2	22.5	25.9	26.4	15.2*
	30-day readmission	14.8	6.2	9.3	10.6	9.9*
	ACSC hospitalization	10.5	6.9	8.3	8.2	3.3
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	10.4	10.0	10.7	9.1	-1.2*†
	Hospital observation stay	6.7	7.4	5.7	6.1	-0.3
	ED visit	24.8	26.9	25.5	25.8	-1.8*†
	30-day readmission	13.2	11.3	11.1	9.2	0.0
	ACSC hospitalization	10.0	8.3	9.5	7.6	-0.2

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.11 Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Colorado

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	9.2	10.1	12.5	14.7	1.2
	Uncontrolled diabetes admission	0.9	1.0	0.3	0.5	0.2
	ED visit for diabetes	0.9	0.8	2.1	2.7	0.7
	Eye screening for diabetic retinal disease	50.9	50.2	48.9	47.5	-0.7
	HbA1C test	55.2	52.7	38.2	39.1	3.5*†
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	13.8	9.3	11.9	13.5	6.1*
	Uncontrolled diabetes admission	0.9	0.3	0.4	0.5	0.8
	ED visit for diabetes	0.3	0.5	1.3	2.1	0.6
	Eye screening for diabetic retinal disease	50.5	53.1	51.6	51.1	-3.1
	HbA1C test	68.9	55.2	53.1	48.2	8.8*†
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	11.8	11.1	12.7	12.0	0.1
	Uncontrolled diabetes admission	0.9	0.8	0.4	0.5	0.2
	ED visit for diabetes	1.2	1.0	1.1	1.0	0.1
	Eye screening for diabetic retinal disease	47.3	48.2	49.8	52.3	1.6
	HbA1C test	44.3	41.5	48.6	50.2	4.5*†

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.12 Cardiovascular Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Colorado

Group	Outcome	Comparison		Beacon		D-i-D¥ %
		2010 %	2013 %	2010 %	2013 %	
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hypertension admission	10.5	11.8	16.9	18.7	0.5
	INR test	98.5	99.2	98.9	99.3	-0.3
	Statin therapy	45.0	51.9	42.4	49.0	-0.3
	Beta blocker	29.7	33.2	36.9	28.0	-12.5*
	ACE inhibitor	72.0	74.1	67.8	72.0	2.1
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hypertension admission	19.5	15.0	13.3	14.4	5.5*
	INR test	97.6	99.3	98.8	99.3	-1.2*
	Statin therapy	31.7	51.2	42.6	50.4	-11.7*
	Beta blocker	38.6	36.2	36.5	28.5	-5.5
	ACE inhibitor	51.6	72.2	64.2	72.7	-12.0*
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hypertension admission	12.3	13.1	15.5	15.1	-1.1
	INR test	97.4	98.8	97.9	99.0	-0.4
	Statin therapy	42.7	51.2	39.9	49.8	1.4
	Beta blocker	29.5	33.6	38.5	31.9	-10.7*
	ACE inhibitor	70.2	74.1	62.7	72.2	5.6

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries in the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) who received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Crescent City Beacon Community

Exhibit C.13 Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Crescent City

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	70	6.9	33	6.6	
ACSC Admission	8	11.4	5	15.2	
ED Visit	141	14	144	28.7	*
Hospital Observation Stay	32	3.2	34	6.8	*
30-Day Readmission	8	11.4	2	6.1	
Diabetes Measures					
Diabetes Admissions	26	16.1	12	6	*
Uncontrolled Diabetes Admissions	1	0.6	3	1.5	
Eye screening	61	38.1	82	40.8	
Hba1c test	79	49.1	121	60.2	*
ED Visit for Diabetes	5	3.1	4	2	
Hypertension and Heart Disease					
Hypertension Admission	35	13.2	19	5.8	*
Beta-Blocker Use	1	14.3	7	41.2	
INR Test	1002	99.3	497	99.2	
PDC for Statin Therapy	20	30.8	47	56.6	*
ACE or ARB inhibitors for CHF	25	78.1	22	81.5	
COPD Admission	8	15.1	6	9.5	

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis was hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Exhibit C.14   Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Crescent City

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	5.8	9.4	8.3	12.1	0.2
	Hospital observation stay	9.2	7.7	8.4	11.4	4.5
	ED visit	23.7	32.4	28.4	31.3	-5.8
	30-day readmission	11.5	16.8	11.7	10.5	-6.5
	ACSC hospitalization	21.8	22.2	19.3	15.3	-4.4
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	16.6	13.5	15.0	19.4	7.6*
	Hospital observation stay	12.1	14.4	9.6	13.3	1.4
	ED visit	33.1	31.6	27.9	32.0	5.6*
	30-day readmission	18.1	16.6	7.3	8.9	3.2
	ACSC hospitalization	Insufficient Sample				NA
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	15.0	13.8	16.5	13.3	-2.1*†
	Hospital observation stay	6.6	7.4	11.5	13.8	1.4*
	ED visit	28.4	30.8	32.7	31.1	-4.0*†
	30-day readmission	17.3	16.2	18.0	16.2	-0.7
	ACSC hospitalization	11.5	10.3	13.3	10.3	-1.8* †

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.15 Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Crescent City

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	6.4	5.7	8.6	15.4	7.5
	Uncontrolled diabetes admission	Insufficient Sample				NA
	ED visit for diabetes	Insufficient Sample				NA
	Eye screening for diabetic retinal disease	40.7	45.9	41.1	28.5	-17.8
	HbA1C test	50.6	52.5	57.3	59.5	0.2
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	14.1	14.1	18.1	26.4	8.2
	Uncontrolled diabetes admission	1.2	1.3	2.4	1.4	-1.1
	ED visit for diabetes	1.7	1.5	5.6	9.2	3.8
	Eye screening for diabetic retinal disease	51.4	51.4	33.5	24.6	-8.9*
	HbA1C test	50.3	50.9	38.2	42.9	4.1
National Sample:Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	13.8	13.4	13.8	13.7	0.3
	Uncontrolled diabetes admission	1.4	1.6	1.2	1.3	-0.2
	ED visit for diabetes	1.0	1.2	1.7	1.6	-0.3
	Eye screening for diabetic retinal disease	44.1	45.1	50.1	49.3	-1.9*
	HbA1C test	57.6	57.0	50.0	50.7	1.2

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.16 Cardiovascular Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Crescent City

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hypertension Admission	5.4	7.4	8.1	11.7	1.6
	INR test	Insufficient Sample				NA
	Statin therapy	48.0	62.5	51.8	59.3	-7.0
	Beta blocker					NA
	ACE inhibitor	95.0	92.3	55.0	65.2	12.8*†
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hypertension Admission	12.1	11.4	18.2	22.2	4.7
	INR test	Insufficient Sample				NA
	Statin therapy	41.9	54.1	35.4	46.9	-0.7
	Beta blocker	Insufficient Sample				NA
	ACE inhibitor	68.6	77.1	72.6	80.8	-0.3
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hypertension Admission	14.2	13.9	11.9	11.3	-0.4
	INR test	Insufficient Sample				NA
	Statin therapy	40.8	51.7	42.1	54.0	1.0
	Beta blocker	27.3	28.0	28.1	29.0	0.2
	ACE inhibitor	72.5	77.9	68.8	77.3	3.0*†

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries in the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) who received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Delta Blues Beacon Community

Exhibit C.17   Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Delta Blues

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	1451	11.7	1114	18	*
ACSC Admission	235	16.2	169	15.2	
ED Visit	2928	23.6	2283	36.9	*
Hospital Observation Stay	795	6.4	680	11	*
30-Day Readmission	234	16.1	209	18.8	
Diabetes Measures					
Diabetes Admissions	500	15	432	18.4	*
Uncontrolled Diabetes Admissions	51	1.5	73	3.1	*
Eye screening	1347	40.5	1027	43.7	*
Hba1c test	1705	51.1	1274	54.2	*
ED Visit for Diabetes	73	2.2	84	3.6	*
Hypertension and Heart Disease					
Hypertension Admission	785	13.5	668	17.6	*
Beta-Blocker Use	100	27.6	87	24.9	
INR Test	12197	98.4	5989	96.7	*
PDC for Statin Therapy	837	42.3	619	35.5	*
ACE or ARB inhibitors for CHF	780	75.9	713	75	
COPD Admission	303	17.5	206	17.9	

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis was hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Exhibit C.18 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Delta Blues

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	14.0	13.7	20.0	16.8	-2.9*†
	Hospital observation stay	9.0	9.3	10.8	12.6	1.5*
	ED visit	27.6	31.5	40.4	40.9	-3.4*†
	30-day readmission	15.0	16.9	20.1	19.8	-2.2
	ACSC hospitalization	18.2	14.3	13.8	11.6	1.6
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	14.6	13.0	21.8	17.6	-2.6*†
	Hospital observation stay	7.3	7.8	10.5	11.8	0.9
	ED visit	31.6	30.3	40.5	40.1	0.9
	30-day readmission	15.2	13.7	22.4	21.8	0.9
	ACSC hospitalization	15.5	12.3	14.0	11.9	1.0
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	14.8	13.8	15.7	13.5	-1.2*†
	Hospital observation stay	8.3	9.1	7.8	8.4	-0.1
	ED visit	29.9	33.0	32.2	31.0	-4.4*†
	30-day readmission	16.9	15.5	16.0	14.6	0.1
	ACSC hospitalization	13.6	11.5	14.7	11.7	-1.0

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.19 Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Delta Blues

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	14.6	13.7	20.2	18.0	-1.3
	Uncontrolled diabetes admission	1.5	1.6	3.6	2.7	-1.0
	ED visit for diabetes	1.8	1.4	4.4	2.3	-1.7*†
	Eye screening for diabetic retinal disease	41.2	43.9	44.0	43.4	-3.3*
	HbA1C test	48.5	49.2	57.0	54.4	-3.3*
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	14.6	14.1	22.8	20.2	-2.1
	Uncontrolled diabetes admission	1.5	1.4	3.4	2.6	-0.6
	ED visit for diabetes	2.1	1.6	4.6	2.3	-1.8*†
	Eye screening for diabetic retinal disease	41.7	42.5	44.3	44.0	-1.0
	HbA1C test	56.7	56.7	59.9	57.6	-2.3
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	14.7	13.9	16.0	14.8	-0.5
	Uncontrolled diabetes admission	1.2	1.5	1.8	1.6	-0.6†*
	ED visit for diabetes	1.6	1.4	2.1	1.4	-0.5*†
	Eye screening for diabetic retinal disease	42.5	44.2	42.8	43.8	-0.7
	HbA1C test	52.7	52.7	56.4	56.1	-0.2

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.20 Cardiovascular Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Delta Blues

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	INR test	67.1	63.3	68.5	63.6	-1.2
	Statin therapy	44.1	53.5	34.1	47.5	4.0*†
	Beta blocker	27.1	25.6	25.1	31.0	7.4
	ACE inhibitor	78.0	81.0	72.7	80.0	4.4*†
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	INR test	51.3	42.1	50.0	42.1	1.2
	Statin therapy	34.4	48.9	32.2	47.9	1.1
	Beta blocker	23.3	21.4	26.3	32.8	8.4*†
	ACE inhibitor	66.8	75.5	71.1	79.7	-0.1
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	INR test	56.0	54.5	52.7	44.2	-7.0*
	Statin therapy	41.7	52.6	34.0	47.7	2.8*†
	Beta blocker	29.2	27.5	24.2	24.2	1.6
	ACE inhibitor	73.2	77.9	65.9	75.1	4.5*†

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries in the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) who received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

Greater Cincinnati Beacon Community

Exhibit C.21   Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Greater Cincinnati

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	3267	15.6	1864	17.8	*
ACSC Admission	447	13.7	185	9.9	*
ED Visit	6032	28.7	3527	33.7	*
Hospital Observation Stay	1423	6.8	395	3.8	*
30-Day Readmission	554	17	290	15.6	
Diabetes Measures					
Diabetes Admissions	1366	13.3	735	12.9	
Uncontrolled Diabetes Admissions	114	1.1	62	1.1	
Eye screening	4932	48.3	2850	50.4	*
Hba1c test	5453	53.1	3637	64	*
ED Visit for Diabetes	112	1.1	83	1.5	*
Hypertension and Heart Disease					
Hypertension Admission	1753	14.9	879	12	*
Beta-Blocker Use	277	36.9	127	31.5	
INR Test	711	68.4	434	69.1	
PDC for Statin Therapy	1785	47.8	1069	50.3	
ACE or ARB inhibitors for CHF	1339	73.7	690	81.1	*
COPD Admission	735	19.7	319	16.8	*

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis was hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Exhibit C.22 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Greater Cincinnati

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	15.0	14.3	25.8	28.5	3.4*
	Hospital observation stay	6.9	8.0	5.3	6.8	0.4
	ED visit	29.1	32.3	41.6	47.0	2.3*
	30-day readmission	14.8	15.0	20.6	24.0	3.1
	ACSC hospitalization	13.0	10.9	11.5	10.5	1.1
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	16.7	14.4	28.4	28.0	1.9*
	Hospital observation stay	4.1	4.4	6.3	7.3	0.7
	ED visit	32.2	29.4	32.5	34.1	4.5*
	30-day readmission	18.0	15.1	23.6	25.1	4.3*
	ACSC hospitalization	10.3	8.5	11.7	10.5	0.6
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	15.1	13.3	17.2	14.2	-1.2*†
	Hospital observation stay	6.6	7.3	4.2	4.3	-0.6*†
	ED visit	28.8	29.7	32.7	30.8	2.8*†
	30-day readmission	16.2	15.0	18.0	15.7	-1.1*†
	ACSC hospitalization	11.4	9.6	10.1	8.5	0.3

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED).

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.23 Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Greater Cincinnati

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	11.6	12.1	17.1	22.0	4.5
	Uncontrolled diabetes admission	0.9	1.2	1.6	2.9	1.1
	ED visit for diabetes	0.9	1.0	1.8	1.1	-0.8*†
	Eye screening for diabetic retinal disease	51.5	51.7	46.4	48.9	1.5
	HbA1C test	54.9	53.0	60.8	53.1	-5.8*
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	14.1	15.1	19.9	24.5	3.6*
	Uncontrolled diabetes admission	1.1	1.7	1.7	3.0	0.7
	ED visit for diabetes	1.3	1.0	1.9	1.1	-0.5
	Eye screening for diabetic retinal disease	45.3	47.1	43.6	46.3	0.9
	HbA1C test	54.7	51.2	55.8	50.1	-2.3*†
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	13.0	13.0	14.1	15.3	1.1*
	Uncontrolled diabetes admission	1.0	1.3	1.1	1.7	0.4*
	ED visit for diabetes	0.8	0.9	1.4	1.0	-0.5*†
	Eye screening for diabetic retinal disease	47.0	49.0	45.0	46.9	0.0
	HbA1C test	51.4	50.3	54.4	51.3	-2.1*†

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.24 Cardiovascular Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Greater Cincinnati

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	INR test	67.4	71.9	71.3	70.1	-5.6
	Statin therapy	50.2	57.6	47.1	57.7	3.2*†
	Beta blocker	38.5	37.9	29.1	30.8	2.3
	ACE inhibitor	74.4	75.7	80.1	79.1	-2.3
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	INR test	98.3	99.1	98.6	99.2	-0.2
	Statin therapy	42.4	54.2	47.1	54.4	-4.5*
	Beta blocker	30.0	30.2	27.6	30.2	2.5
	ACE inhibitor	63.1	72.5	73.8	74.9	-8.3*
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	INR test	98.4	98.8	98.3	99.2	0.4*
	Statin therapy	42.4	51.3	41.7	53.8	3.3*†
	Beta blocker	34.1	34.5	29.9	30.2	-0.1
	ACE inhibitor	68.6	73.1	64.2	74.0	5.2*†

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries in the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) who received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

Hawaii Beacon Community

Exhibit C.25 Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Hawaii

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	2134	10.9	930	9.5	*
ACSC Admission	266	12.5	109	11.7	
ED Visit	4482	22.9	2520	25.8	*
Hospital Observation Stay	1183	6	276	2.8	*
30-Day Readmission	350	16.4	114	12.3	*
Diabetes Measures					
Diabetes Admissions	553	13.5	218	7.9	*
Uncontrolled Diabetes Admissions	38	0.9	15	0.5	
Eye screening	1833	44.8	1466	52.8	*
Hba1c test	1988	48.4	2262	81.5	*
ED Visit for Diabetes	67	1.6	34	1.2	
Hypertension and Heart Disease					
Hypertension Admission	1094	13.8	386	7	*
Beta-Blocker Use	160	30.9	82	29.8	
INR Test	19283	98.5	9597	98.4	
PDC for Statin Therapy	1021	40.9	709	43.5	
ACE or ARB inhibitors for CHF	919	70.6	499	71.9	
COPD Admission	457	19.2	132	11.7	*

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis was hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Exhibit C.26   Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Hawaii

Group	Outcome	Comparison		Beacon		D-i-D¥ %
		2010 %	2013 %	2010 %	2013 %	
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	10.4	9.3	14.3	14.5	1.2
	Hospital observation stay	6.4	6.4	3.6	3.0	-0.6
	ED visit	81.4	88.6	96.9	97.5	-6.7*†
	30-day readmission	15.5	12.1	14.0	12.9	2.3
	ACSC hospitalization	13.7	11.9	10.2	9.8	1.4
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	5.2	4.5	10.7	10.8	0.7
	Hospital observation stay	1.7	1.4	2.8	2.3	-0.2
	ED visit	15.6	14.6	26.8	27.3	1.6
	30-day readmission	10.5	10.3	12.9	11.6	-1.1
	ACSC hospitalization	6.1	10.8	11.6	11.1	-5.2
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	11.1	10.2	10.6	10.7	0.9
	Hospital observation stay	6.7	6.9	2.7	2.2	-0.7*†
	ED visit	26.0	28.3	22.5	23.0	-1.8*†
	30-day readmission	15.4	13.2	12.6	11.4	1.0
	ACSC hospitalization	11.4	10.2	10.8	10.9	1.3

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.27 Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Hawaii

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	11.4	11.0	10.4	11.3	1.3
	Uncontrolled diabetes admission	0.7	1.0	1.0	0.9	-0.4
	ED visit for diabetes	1.0	0.7	2.9	2.2	-0.4
	Eye screening for diabetic retinal disease	56.9	58.1	39.5	46.4	5.7*†
	HbA1C test	61.0	57.5	65.6	63.7	1.6
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	6.3	6.9	8.4	9.1	0.2
	Uncontrolled diabetes admission	Insufficient Sample				NA
	ED visit for diabetes	Insufficient Sample				NA
	Eye screening for diabetic retinal disease	60.1	67.0	50.6	58.2	0.7
	HbA1C test	74.1	75.2	78.6	77.7	-2.1
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	12.8	11.7	9.2	9.8	1.8
	Uncontrolled diabetes admission	0.9	1.2	0.7	0.6	-0.3
	ED visit for diabetes	1.2	0.8	1.4	1.1	0.1
	Eye screening for diabetic retinal disease	48.8	50.5	48.1	55.7	5.8*†
	HbA1C test	50.3	47.2	76.1	75.7	2.7*†

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.28 Cardiovascular Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Hawaii

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hypertension Admission	11.6	11.6	9.8	10.9	1.2
	INR test	67.1	70.1	64.2	64.8	0.0
	Statin therapy	45.8	56.3	36.8	45.4	-1.9
	Beta blocker	36.2	41.0	22.7	23.1	-4.4
	ACE inhibitor	41.1	38.1	48.2	51.6	6.4
	COPD admission	19.7	16.1	11.0	8.6	1.2
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hypertension Admission	10.7	10.1	7.1	8.1	1.5
	INR test	55.6	67.5	58.9	63.9	-6.9
	Statin therapy	39.1	53.4	41.9	51.9	-4.3
	Beta blocker	30.0	37.8	28.3	29.5	-6.7
	ACE inhibitor	67.9	79.8	70.0	78.6	-3.4
	COPD admission	Insufficient Sample				NA
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hypertension Admission	12.6	12.7	8.7	9.5	0.7
	INR test	66.1	61.6	56.3	60.7	8.9*
	Statin therapy	43.2	53.1	39.3	49.4	0.3
	Beta blocker	32.4	35.7	27.8	29.7	-1.3
	ACE inhibitor	71.8	76.5	67.4	77.2	5.1*†
	COPD admission	18.0	14.5	13.0	10.2	0.7

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries in the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) who received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Inland Northwest Beacon Community

Exhibit C.29 Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Inland Northwest

Measure	Matched Sample		Beacon		
	No.	%	No.	%	p<.05
Overall Utilization					
Hospitalizations	9791	11.7	4129	9.9	*
ACSC Admission	1123	11.5	369	8.9	*
ED Visit	21827	26	12346	29.5	*
Hospital Observation Stay	5722	6.8	3202	7.7	*
30-Day Readmission	1360	13.9	428	10.4	*
Diabetes Measures					
Diabetes Admissions	2507	11.5	1124	10.7	*
Uncontrolled Diabetes Admissions	166	0.8	94	0.9	
Eye screening	9839	45.2	5137	48.9	*
Hba1c test	10856	49.6	7483	71	*
ED Visit for Diabetes	207	0.9	154	1.5	*

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.30 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Inland Northwest

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	10.6	11.2	13.5	16.0	1.9*
	Hospital observation stay	6.9	7.8	8.2	15.6	6.5*
	ED visit	24.9	28.6	34.5	39.2	1.0*
	30-day readmission	13.1	12.9	11.9	15.1	3.3*
	ACSC hospitalization	12.1	10.4	7.8	6.7	0.7
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	10.4	7.6	14.9	15.3	3.3*
	Hospital observation stay	10.4	13.9	8.2	15.3	3.5*
	ED visit	27.3	23.1	35.5	38.0	6.7*
	30-day readmission	12.6	9.0	13.0	14.8	5.4*
	ACSC hospitalization	9.9	8.4	7.7	6.7	0.5
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	12.2	11.9	11.1	10.0	-0.8*†
	Hospital observation stay	6.5	7.5	9.9	14.4	3.6*
	ED visit	26.7	29.4	29.4	28.4	-3.6*†
	30-day readmission	13.8	13.2	12.2	11.4	-0.1
	ACSC hospitalization	10.4	8.9	9.2	7.5	-0.2

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. **¥ =** Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.31   Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Inland Northwest

Group	Outcome	Comparison		Beacon		D-i-D¥ %
		2010 %	2013 %	2010 %	2013 %	
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	10.4	11.5	13.4	16.3	1.8*
	Uncontrolled diabetes admission	0.7	1.1	1.0	0.8	-0.6*†
	ED visit for diabetes	0.9	1.0	1.3	1.3	-0.1
	Eye screening for diabetic retinal disease	47.5	47.9	44.7	43.8	-1.3
	HbA1C test	51.6	47.5	67.0	59.5	-3.4*
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	10.2	8.9	14.7	16.1	2.6*
	Uncontrolled diabetes admission	0.8	0.6	1.1	0.7	-0.1
	ED visit for diabetes	1.4	0.7	1.4	1.3	0.6*
	Eye screening for diabetic retinal disease	46.8	48.7	43.9	44.7	-1.2
	HbA1C test	67.8	67.5	66.2	60.3	-5.7*
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	50.1	47.8	66.7	64.1	-0.3
	Uncontrolled diabetes admission	0.8	1.1	0.8	0.6	-0.5*†
	ED visit for diabetes	0.9	0.9	1.4	1.0	-0.4*†
	Eye screening for diabetic retinal disease	45.7	47.1	45.7	47.1	0.1
	HbA1C test	50.1	47.8	66.7	64.1	-0.3

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Keystone Beacon Community

Exhibit C.32   Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Keystone

Measure	Matched Sample		Beacon		
	No.	%	No.	%	p<.05
Discharge-level outcomes					
30-day Readmission	7539	18.1	3636	17.5	*
90-day Readmission	14136	34	6749	32.5	*
Beta blocker	29084	69.9	15655	75.3	*
ACE inhibitor	37997	91.4	18467	88.8	*
30-day ED-visit	4650	11.2	2656	12.8	
90-day ED-visit	8914	21.4	4897	23.6	
30-day Hospital Obs Stay	1504	3.6	472	2.3	*
90-day Hospital Obs Stay	3154	7.6	936	4.5	*
30-day Mortality	2663	6.5	1455	7.1	*
90-day Mortality	4995	12.7	2624	13.3	*

NOTES: For full specification of each measure, see Appendix B. Results are for post-discharge outcomes.

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge

90-Day re-admission: Percent of beneficiaries with a readmission within 90 days of inpatient discharge.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received aon angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

30-day Hospital Obs Stay: A hospital observation stay 30 days post-discharge

90-day Hospital Obs Stay: A hospital observation stay 90 days post-discharge

30-day mortality: Death within 30 days post-discharge

90-day mortality: Death within 90 days post-discharge

Exhibit C.33   Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Keystone

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	30-day Readmission	17.1	18.4	17.5	17.6	-1.1
	90-day Readmission	31.2	34.9	30.5	33.5	-0.7
	Beta blocker	74.5	68.9	76.3	73.7	2.9*
	ACE inhibitor	41.7	42.2	36.2	36.1	-0.5
	30-day ED-visit	2.4	2.3	2.7	1.9	-0.7*
	90-day ED-visit	5.0	4.9	5.7	4.4	-1.2*
	30-day Hospital Obs Stay	3.3	3.9	1.8	2.3	0.0
	90-day Hospital Obs Stay	7.5	7.8	4.1	4.4	0.0
	30-day Mortality	6.5	6.6	6.7	7.0	0.2
	90-day Mortality	12.7	12.9	13.2	13.0	-0.2
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	30-day Readmission	17.4	16.7	17.3	17.8	1.3
	90-day Readmission	30.2	33.2	30.7	33.5	-0.2
	Beta blocker	72.3	66.9	75.7	74.0	3.7*
	ACE inhibitor	37.0	38.5	34.0	35.9	0.4
	30-day ED-visit	2.9	2.6	3.0	1.8	-0.8
	90-day ED-visit	6.2	5.4	6.1	4.6	-0.6
	30-day Hospital Obs Stay	0.8	2.4	1.9	2.1	-1.3*
	90-day Hospital Obs Stay	2.7	5.1	4.3	4.1	-2.6
	30-day Mortality	7.4	8.1	7.2	9.6	1.7
	90-day Mortality	14.2	14.3	13.3	13.5	0.2
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	30-day Readmission	16.8	17.7	17.4	16.6	-1.6
	90-day Readmission	30.5	32.4	29.8	32.9	1.2
	Beta blocker	72.0	68.5	71.6	66.4	-1.7
	ACE inhibitor	42.2	43.5	38.2	38.3	-1.2
	30-day ED-visit	3.1	3.0	2.8	2.6	-0.2
	90-day ED-visit	7.0	6.6	6.0	5.3	-0.3
	30-day Hospital Obs Stay	4.3	4.6	0.8	2.4	1.3*
	90-day Hospital Obs Stay	9.4	9.5	2.5	4.9	2.3*
	30-day Mortality	5.9	7.3	7.5	6.7	-2.1*
	90-day Mortality	12.6	13.1	14.4	13.4	-1.5

NOTES: For full specification of each measure, see Appendix B. Results are for post-discharge outcomes.

30 (90)-Day re-admission: Percent of beneficiaries with a readmission within 30 (90) days of inpatient discharge

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

30 (90)-day Hospital Obs Stay: A hospital observation stay 30 (90) days post-discharge

30 (90)-day mortality: Death within 30 (90) days post-discharge

Rhode Island Beacon Community

Exhibit C.34 Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Rhode Island

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	7019	14.2	3445	14	
ACSC Admission	747	10.6	374	10.9	
ED Visit	13725	27.8	7522	30.6	*
Hospital Observation Stay	3427	6.9	1968	8	*
30-Day Readmission	1093	15.6	530	15.4	
Diabetes Measures					
Diabetes Admissions	1583	11.3	675	10.3	*
Uncontrolled Diabetes Admissions	101	0.7	19	0.3	*
Eye screening	6670	47.7	4295	65.7	*
Hba1c test	7042	50.2	3917	59.8	*
ED Visit for Diabetes	105	0.7	91	1.4	*

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.35 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Rhode Island

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	13.3	13.3	18.6	18.9	0.3
	Hospital observation stay	7.1	8.3	8.9	9.5	-0.7*†
	ED visit	27.0	30.5	36.1	38.2	-1.5*†
	30-day readmission	14.9	14.8	16.4	18.7	2.4*
	ACSC hospitalization	10.4	9.3	11.0	10.3	0.4
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	14.4	11.5	19.8	18.6	1.7*
	Hospital observation stay	3.2	4.1	4.9	5.9	0.1
	ED visit	29.3	27.6	36.9	37.7	2.5*
	30-day readmission	17.7	13.8	18.1	18.9	4.8*
	ACSC hospitalization	11.1	8.3	11.3	10.2	1.6
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	15.0	14.1	15.7	13.6	-1.3*†
	Hospital observation stay	6.8	7.9	7.3	7.1	-1.3*†
	ED visit	28.9	31.4	31.5	30.9	-3.2*†
	30-day readmission	16.1	14.7	17.3	15.5	-0.4
	ACSC hospitalization	10.3	9.0	10.8	8.8	-0.8

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.36 Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Rhode Island

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	10.5	12.2	11.8	10.9	-2.5*†
	Uncontrolled diabetes admission	0.8	1.5	0.2	0.4	-0.6*†
	ED visit for diabetes	0.6	0.7	1.7	2.0	0.1
	Eye screening for diabetic retinal disease	49.6	49.9	63.6	60.5	-3.4*
	HbA1C test	56.9	54.3	43.8	47.7	6.4*†
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	10.1	9.3	13.2	11.6	-0.7
	Uncontrolled diabetes admission	0.4	0.4	0.2	0.4	0.1
	ED visit for diabetes	1.0	0.9	1.8	2.0	0.3
	Eye screening for diabetic retinal disease	59.8	60.1	61.2	60.2	-1.3
	HbA1C test	53.3	51.1	42.9	47.2	6.6*†
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	12.4	12.5	10.6	9.5	-1.2*†
	Uncontrolled diabetes admission	0.9	1.2	0.3	0.4	-2.2*†
	ED visit for diabetes	0.7	0.7	1.1	1.2	0.1
	Eye screening for diabetic retinal disease	47.2	49.1	60.3	60.2	-1.9*
	HbA1C test	50.7	48.9	50.1	49.9	1.6*†

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

San Diego Beacon Community

Exhibit C.37   Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, San Diego

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	41431	12.9	20031	12.5	*
ACSC Admission	4444	10.7	1989	9.9	*
ED Visit	82966	25.9	39699	24.8	*
Hospital Observation Stay	18001	5.6	6345	4	*
30-Day Readmission	6383	15.4	3270	16.3	*

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Exhibit C.38 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, San Diego

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Inpatient admission	12.6	10.0	13.4	12.6	1.8*
	Hospital observation stay	5.4	5.2	4.5	3.7	-0.6*
	ED visit	25.2	24.1	26.5	20.9	-4.5*
	30-day readmission	15.2	13.5	16.7	16.4	1.3*
	ACSC hospitalization	10.5	8.4	10.3	9.7	1.5*
National Sample: Compared to all Beneficiaries in Beacon Catchment Area for Beneficiaries Who Had an Ambulance Ride for an AMI or chest pain	30-day mortality	15.5	14.9	15.1	14.9	0.4
	90-day mortality	21.5	20.0	21.6	20.8	0.8
	30-day readmission for same DX	4.0	3.4	10.7	10.0	-1.8
	90-day readmission for same DX	7.4	6.0	14.2	12.8	-0.1
	30-day observation stay	12.5	12.6	7.6	7.5	-0.1
	90-day observation stay	2.3	2.2	8.4	8.1	-0.2
	30-day ED visit for same DX	5.4	5.0	11.9	12.0	0.5
	90-day ED visit for same DX	9.6	8.9	16.4	15.7	0.0
	Observation stay	14.8	17.1	13.0	10.4	-5.0*
	Inpatient admission	63.4	60.1	61.3	55.1	-2.9*

NOTES: For full specification of each measure, see Appendix B.

Inpatient admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-& 90 day mortality: Mortality 30/90 days post-discharge from a non-federal acute care hospitals (all cause)

30 & 90 day readmission for same diagnosis (DX): Percent of beneficiaries readmitted 30 / 90 days after discharge with heart disease, AMI, or stroke.

30-day ED visit for same DX: Percent of beneficiaries with a visit to the ED 30 / 90 days after discharge with heart disease, AMI, or stroke.

Southeast Michigan Beacon Community

Exhibit C.39   Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Southeast Michigan

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	1352	13.5	947	19	*
ACSC Admission	225	16.6	166	17.5	
ED Visit	2429	24.3	1876	37.6	*
Hospital Observation Stay	531	5.3	509	10.2	*
30-Day Readmission	258	19.1	186	19.6	
Diabetes Measures					
Diabetes Admissions	530	16.1	383	16.4	
Uncontrolled Diabetes Admissions	58	1.8	35	1.5	
Eye screening	1386	42.1	1000	42.9	
Hba1c test	1804	54.7	1246	53.4	
ED Visit for Diabetes	56	1.7	46	2	

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.40 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Southeast Michigan

Group	Outcome	Comparison		Beacon		D-i-D¥ %
		2010 %	2013 %	2010 %	2013 %	
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	17.8	17.0	21.6	26.4	5.6*
	Hospital observation stay	9.0	9.3	10.8	12.6	1.6*
	ED visit	27.7	31.5	40.3	40.8	-3.4*†
	30-day readmission	18.4	19.5	21.6	24.0	1.3
	ACSC hospitalization	16.4	15.1	19.6	14.9	-3.4
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	21.3	19.3	26.1	28.9	4.8*
	Hospital observation stay	8.7	9.4	12.4	14.0	0.9
	ED visit	37.4	36.8	45.9	49.3	3.9*
	30-day readmission	23.6	20.9	25.1	25.9	3.5
	ACSC hospitalization	14.6	12.8	19.8	15.6	-2.4
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	17.4	16.6	20.9	17.9	-2.2*†
	Hospital observation stay	6.3	7.6	8.7	9.0	-1.0*†
	ED visit	30.6	33.9	36.3	34.5	-5.2*†
	30-day readmission	18.8	17.6	22.9	19.8	-1.9*†
	ACSC hospitalization	13.7	12.0	14.1	11.9	-0.4

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Southeast Michigan Beacon Community

Exhibit C.41   Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Southeast Michigan

Group	Outcome	Comparison		Beacon		
		2010 %	2013 %	2010 %	2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	15.8	15.1	18.1	24.2	6.7*
	Uncontrolled diabetes admission	1.4	1.6	2.8	5.0	2.0*
	ED visit for diabetes	1.8	2.1	1.7	1.5	-0.6
	Eye screening for diabetic retinal disease	48.3	49.5	37.2	39.0	0.7
	HbA1C test	56.0	55.8	52.9	51.4	-1.4
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	17.2	17.3	21.3	26.7	5.3*
	Uncontrolled diabetes admission	1.5	1.8	2.8	4.8	1.8*
	ED visit for diabetes	1.9	1.5	1.3	1.1	0.2
	Eye screening for diabetic retinal disease	Insufficient Sample				NA
	HbA1C test	50.7	47.6	50.8	50.2	2.5*†
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	14.9	14.4	16.6	15.9	-0.2
	Uncontrolled diabetes admission	1.5	1.6	1.5	1.8	0.1
	ED visit for diabetes	1.2	1.2	1.5	1.2	-0.4*†
	Eye screening for diabetic retinal disease	46.3	48.1	40.3	42.9	0.8
	HbA1C test	58.4	57.7	51.0	48.1	-2.2*

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Southeast Minnesota Beacon Community

Exhibit C.42 Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Southeast Minnesota

Measure	Matched Sample		Beacon		
	No.	%	No.	%	p<.05
Overall Utilization					
Hospitalizations	9991	12.2	5239	12.9	*
ACSC Admission	996	10	546	10.4	
ED Visit	21864	26.7	12204	30	*
Hospital Observation Stay	5747	7	2678	6.6	*
30-Day Readmission	1436	14.4	756	14.4	
Diabetes Measures					
Diabetes Admissions	2253	13	1286	15.1	*
Uncontrolled Diabetes Admissions	135	0.8	88	1	*
Eye screening	8564	51.4	4251	53.3	*
Hba1c test	7571	45.1	3997	47.8	*
ED Visit for Diabetes	198	1.1	119	1.4	

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED).

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.43   Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Southeast Minnesota

Group	Outcome	Comparison		Beacon		D-i-D¥ %
		2010 %	2013 %	2010 %	2013 %	
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	12.5	11.5	13.1	11.1	-1.0*†
	Hospital observation stay	7.9	7.3	7.6	5.0	-1.9*†
	ED visit	29.1	28.3	32.3	29.6	-2.0*†
	30-day readmission	14.2	12.3	14.6	13.2	0.6
	ACSC hospitalization	9.8	8.3	10.7	8.5	-0.7

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at $p<.05$. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission.

Hospital observation: A hospital observation stay.

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge.

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Exhibit C.44 Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Southeast Minnesota

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	12.9	13.2	15.3	14.6	-0.9
	Uncontrolled diabetes admission	0.7	1.0	1.1	1.6	0.3
	ED visit for diabetes	1.1	1.0	1.5	1.2	-0.2
	Eye screening for diabetic retinal disease	51.9	52.6	52.5	53.1	-0.0
	HbA1C test	45.6	43.4	45.6	42.8	-0.6

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. **¥ =** Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes.

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

South Piedmont Beacon Community

Exhibit C.45   Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, South Piedmont

Measure	Matched Sample No.	%	Beacon No.	%	p<.05
Overall Utilization					
Overall Utilization Hospitalizations	4937	11.5	2614	12.1	*
Overall Utilization ACSC Admission	557	11.3	204	7.8	*
Overall Utilization ED Visit	10966	25.5	5968	27.7	*
Overall Utilization Hospital Observation Stay	2885	6.7	951	4.4	*
Overall Utilization 30-Day Readmission	699	14.2	317	12.1	*
Diabetes Measures					
Diabetes Admissions	1432	11.2	641	9.1	*
Uncontrolled Diabetes Admissions	110	0.9	31	0.4	*
Eye screening	5947	46.8	4251	60.9	*
Hba1c test	6641	52.1	5372	76.5	*
ED Visit for Diabetes	141	1.1	58	0.8	
Hypertension and Heart Disease					
Hypertension Admission	2686	12.1	1102	8.9	*
Beta-Blocker Use	397	33.4	217	31.3	
INR Test	1296	64.6	978	73.4	*
PDC for Statin Therapy	3049	45.2	1633	49.5	*
ACE or ARB inhibitors for CHF	1846	74.2	963	78.5	*
COPD Admission	1082	16	438	12.3	*

NOTES: For full specification of each measure, see Appendix B.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis was hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period.

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%.

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD).

Exhibit C.46 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, South Piedmont

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	10.6	11.6	15.9	18.3	1.6*
	Hospital observation stay	6.5	7.8	5.7	6.3	-0.7*†
	ED visit	25.1	29.2	31.9	36.3	0.3
	30-day readmission	12.8	13.5	14.3	16.9	2.1
	ACSC hospitalization	11.4	10.0	7.5	8.3	2.1*
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	15.1	9.1	16.7	16.9	6.0*
	Hospital observation stay	6.5	7.8	5.7	6.3	0.8*
	ED visit	29.9	23.4	32.2	34.5	8.7*
	30-day readmission	16.2	10.6	16.4	16.6	5.9*
	ACSC hospitalization	8.7	6.1	7.4	8.3	3.5
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	13.3	12.5	15.5	13.5	-1.1*†
	Hospital observation stay	6.9	7.6	4.3	4.5	-0.5*†
	ED visit	27.7	29.7	30.8	29.8	-3.0*†
	30-day readmission	15.0	13.9	15.9	14.9	0.1
	ACSC hospitalization	10.8	9.6	8.1	7.8	0.8

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission

Hospital observation: A hospital observation stay

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.47   Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, South Piedmont

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D$^¥$ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	10.7	12.3	10.3	13.2	1.4*
	Uncontrolled diabetes admission	0.6	1.0	0.8	1.3	0.1
	ED visit for diabetes	10.7	12.4	0.7	0.8	-0.1
	Eye exam	50.4	50.1	55.8	51.0	-4.4*
	HbA1C test	60.1	58.0	60.7	58.3	0.4
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	10.2	6.8	11.7	13.1	4.7*
	Uncontrolled diabetes admission	0.5	0.3	0.9	1.1	0.3
	ED visit for diabetes	13.5	10.4	0.8	0.8	0.4
	Eye exam	58.8	58.9	55.8	53.5	-2.3
	HbA1C test	72.6	70.4	64.2	66.2	4.3*†
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	12.3	12.6	10.6	11.0	0.1
	Uncontrolled diabetes admission	0.9	1.3	0.6	0.8	-0.2
	ED visit for diabetes	1.0	1.0	1.0	0.9	-0.2
	Eye exam	46.9	48.3	56.3	54.5	-3.2*
	HbA1C test	53.5	51.9	69.1	68.0	0.6

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.48 Cardiovascular Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, South Piedmont

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	HTN Admission	11.5	13.0	9.9	12.5	1.1*
	INR Test	67.1	64.3	70.8	63.9	-4.1*
	Statin therapy	43.8	51.8	52.6	59.7	-0.9
	Beta blocker	32.7	32.5	32.5	31.4	-0.9
	ACE inhibitor	73.0	74.3	80.4	78.3	-3.3*
	COPD admission	16.0	16.7	11.9	13.7	1.1
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	HTN Admission	12.2	9.5	9.6	11.5	4.6*
	INR Test	97.0	98.8	98.7	99.2	-1.2*
	Statin therapy	37.9	49.1	49.6	57.7	-3.1*
	Beta blocker	29.3	29.5	30.1	29.5	-0.7
	ACE inhibitor	57.2	65.8	78.8	77.1	-10.3*
	COPD admission	18.6	11.2	12.8	14.2	8.7*
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	HTN Admission	12.8	13.4	10.4	10.9	-0.2
	INR	98.3	99.2	98.3	99.2	0.0
	Statin therapy	43.7	52.8	44.3	55.2	1.7*†
	Beta blocker	32.6	31.0	29.4	29.4	1.6
	ACE inhibitor	71.4	75.8	68.2	75.5	2.9*†
	COPD admission	17.4	15.9	14.8	13.0	-0.2

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries in the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of hypertension

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) who received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD)

Exhibit C.49 Health Care Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, South Piedmont for Beneficiaries with COPD

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	24.8	24.4	36.0	38.1	2.4*
	ED Visits	41.8	53.6	47.0	57.4	-1.4
	Hospital observation stay	12.1	13.9	11.4	11.0	-2.2*
	COPD Admission	16.0	16.7	11.9	13.7	1.1
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	32.8	19.4	37.2	34.4	10.5*
	ED Visits	50.4	37.8	54.2	54.5	12.9*
	Hospital observation stay	7.0	4.7	11.5	10.1	0.9
	COPD Admission	16.8	8.9	14.1	14.9	8.6*
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	31.3	27.8	35.5	30.3	-0.7
	ED Visits	47.9	50.0	52.1	50.4	-3.9*
	Hospital observation stay	13.0	14.1	8.8	8.5	-1.4*
	COPD Admission	17.4	15.9	14.8	13.0	-0.2

*Results are for beneficiaries with COPD.

Hospitalization: Percent of beneficiaries with COPD with an inpatient admission

Hospital observation stay: A hospital observation stay for beneficiaries with COPD.

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED) for beneficiaries with COPD.

COPD Admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD), for beneficiaries with COPD.

Tulsa Beacon Community

Exhibit C.50   Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Tulsa

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	9992	12.2	14263	14.3	*
ACSC Admission	997	10	1427	10	
ED Visit	21864	26.7	28823	28.8	*
Hospital Observation Stay	5747	7	9018	9	*
30-Day Readmission	1436	14.4	2243	15.7	*
Hypertension and Heart Disease					
Hypertension Admission	4972	13.2	8342	15.4	*
Beta-Blocker Use	840	37.3	949	31	*
INR Test	3242	69.9	141	44.2	*
PDC for Statin Therapy	5129	42.9	6775	41.3	*
ACE or ARB inhibitor for CHF	3663	69.7	5056	67.7	*
COPD Admission	1511	15.8	3276	19.2	*

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED)

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis was hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD)

Exhibit C.51 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Tulsa

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	12.0	11.7	14.8	13.2	-1.4*†
	Hospital observation stay	26.1	28.7	31.4	31.2	-2.7*†
	ED visit	25.5	27.9	30.5	29.4	-3.5*†
	30-day readmission	14.2	12.5	15.8	14.9	0.7
	ACSC hospitalization	9.9	8.5	10.0	9.5	0.9

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission

Hospital observation: A hospital observation stay

ED visit: A visit to the emergency department (ED)

30-Day readmission: Readmission within 30 days of inpatient discharge

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.52 Cardiovascular Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Tulsa

Group	Outcome	Comparison		Beacon		D-i-D¥ %
		2010 %	2013 %	2010 %	2013 %	
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hypertension Admission	12.9	14.0	15.7	16.0	-0.8*†
	INR test	69.6	77.5	52.2	71.3	11.2*†
	Statin therapy	41.7	50.4	42.1	54.6	3.9*†
	Beta blocker	34.0	32.8	33.5	34.9	2.5
	ACE inhibitor	70.2	73.9	67.3	77.0	6.0*†
	COPD admission	14.7	15.2	20.0	18.9	-1.5*†

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries in the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of hypertension

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) who received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD)

Utah Beacon Community

Exhibit C.53 Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Utah

Measure	Matched Sample		Beacon		p<.05
	No.	%	No.	%	
Overall Utilization					
Hospitalizations	5081	11.1	2210	9.7	*
ACSC Admission	491	9.7	177	8	*
ED Visit	11032	24.1	6071	26.8	*
Hospital Observation Stay	2585	5.7	586	2.6	*
30-Day Readmission	701	13.8	206	9.3	*
Diabetes Measures					
Diabetes Admissions	1312	10.8	629	10.5	
Uncontrolled Diabetes Admissions	82	0.7	14	0.2	*
Eye screening	5772	47.8	3391	56.9	*
Hba1c test	6886	56.8	3948	66.1	*
ED Visit for Diabetes	86	0.7	59	1	*
Hypertension and Heart Disease					
Hypertension Admission	4972	13.2	8342	15.4	*
Beta-Blocker Use	840	37.3	949	31	*
INR Test	3242	69.9	141	44.2	*
PDC for Statin Therapy	5129	42.9	6775	41.3	*
ACE or ARB inhibitor for CHF	3663	69.7	5056	67.7	*
COPD Admission	1511	15.8	3276	19.2	*

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED)

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Hypertension admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis was hypertension.

Beta-Blocker use: Percent of beneficiaries with hypertension, an acute myocardial infarction (AMI), cardiovascular disease (CAD), or congestive heart failure (CHF) received a prescription for a beta-blocker within 7 days after discharge.

INR test: Percent of Part D beneficiaries with a claim for warfarin that received an International Normalized Ratio (INR) within clinical guidelines of every 12 weeks during an annual period

PDC for statin therapy: Percent of beneficiaries for whom the days' supply of statins for individuals with coronary artery disease (CAD) reached the clinical quality threshold of 80%

ACE or ARBs inhibitors for CHF: Percentage of beneficiaries with congestive heart failure (CHF) who received an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blocker (ARBs) seven days post-discharge.

COPD admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of chronic obstructive pulmonary disease (COPD)

Exhibit C.54 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Utah

Group	Outcome	Comparison		Beacon		D-i-D¥ %
		2010 %	2013 %	2010 %	2013 %	
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	11.3	11.3	10.7	12.7	2.1*
	Hospital observation stay	6.1	6.9	2.6	2.4	-1.1*†
	ED visit	24.9	27.0	28.3	30.3	-0.2
	30-day readmission	13.5	12.8	9.3	13.2	4.6*
	ACSC hospitalization	9.9	8.4	7.3	6.3	0.5
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	11.6	9.3	12.0	13.0	3.4*
	Hospital observation stay	2.4	1.8	2.6	2.3	0.3
	ED visit	26.6	22.6	29.5	30.1	4.7*
	30-day readmission	11.8	11.7	9.9	13.2	3.3*
	ACSC hospitalization	8.3	6.7	7.7	6.4	0.4
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	12.6	11.8	11.5	11.2	0.4
	Hospital observation stay	6.1	6.8	2.5	2.1	-1.1*†
	ED visit	25.9	27.9	27.6	26.9	-2.6*†
	30-day readmission	14.9	13.1	10.8	12.4	3.3*
	ACSC hospitalization	9.8	7.5	8.0	6.4	0.7

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission

Hospital observation: A hospital observation stay

ED visit: A visit to the emergency department (ED)

30-day readmission: Readmission within 30 days of inpatient discharge

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.55   Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Utah

Group	Outcome	Comparison		Beacon		D-i-D¥ %
		2010 %	2013 %	2010 %	2013 %	
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	10.7	11.4	10.6	13.8	2.5*
	Uncontrolled diabetes admission	0.9	1.3	0.1	0.3	-0.2
	ED visit for diabetes	0.9	1.3	0.1	0.3	-0.2
	Eye screening for diabetic retinal disease	51.6	52.6	50.9	48.9	-3.0*
	HbA1C test	62.3	58.4	55.4	53.2	1.7*†
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	10.9	11.8	12.0	14.4	1.6
	Uncontrolled diabetes admission	0.5	1.0	0.2	0.4	-0.2
	ED visit for diabetes	0.9	0.5	0.9	0.6	0.1
	Eye screening for diabetic retinal disease	48.4	49.5	51.5	50.8	-1.8
	HbA1C test	61.5	59.9	56.3	56.4	1.7
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	11.2	11.3	11.0	12.9	1.8*
	Uncontrolled diabetes admission	0.7	1.1	0.3	0.5	-0.1
	ED visit for diabetes	0.8	0.9	0.9	0.5	-0.5*†
	Eye screening for diabetic retinal disease	48.3	50.2	49.9	50.9	-1.0
	HbA1C test	56.9	58.6	53.9	57.7	2.1*†

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Western New York Beacon Community

Exhibit C.56 Performance Measures, Beacon Beneficiaries and Propensity Score Matched Comparison, 2010, Western New York

Measure	Matched Sample		Beacon		p<.05
	No.	**%**	**No.**	**%**	
Overall Utilization					
Hospitalizations	11933	15.5	6512	16.9	*
ACSC Admission	1388	11.6	806	12.4	
ED Visit	22878	29.7	12666	32.9	*
Hospital Observation Stay	5768	7.5	1656	4.3	*
30-Day Readmission	1977	16.6	1091	16.8	
Diabetes Measures					
Diabetes Admissions	3235	13.6	1807	15.3	*
Uncontrolled Diabetes Admissions	280	1.2	202	1.7	*
Eye screening	11434	48.2	6813	57.6	*
Hba1c test	11369	47.7	5355	45.2	*
ED Visit for Diabetes	241	1	181	1.5	*

NOTES: For full specification of each measure, see Appendix B.

Hospital admission: Percent of beneficiaries with an inpatient admission

ACSC admission: Percent of beneficiaries with a hospitalization for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection

Hospital observation stay: A hospital observation stay

ED Visit: Percent of beneficiaries with a visit to the emergency department (ED)

30-Day re-admission: Percent of beneficiaries with a readmission within 30 days of inpatient discharge

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually.

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually.

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes.

Exhibit C.57 Overall Utilization Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Western New York

Group	Outcome	Comparison		Beacon		D-i-D¥
		2010 %	2013 %	2010 %	2013 %	%
National Sample: Compared to Beneficiaries Served by Beacon Providers	Hospitalization	14.3	13.5	22.4	19.3	-2.3*†
	Hospital observation stay	7.4	8.3	5.0	6.1	0.3
	ED visit	28.3	31.0	39.2	37.2	-4.7*†
	30-day readmission	14.7	13.8	21.5	19.9	-0.7
	ACSC hospitalization	10.9	9.7	14.1	11.7	-1.2
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Hospitalization	12.5	10.3	22.6	18.3	-2.0*†
	Hospital observation stay	3.2	4.0	5.0	6.1	0.2
	ED visit	25.7	24.0	38.8	35.8	-1.3*†
	30-day readmission	13.4	11.1	21.9	19.2	-0.4
	ACSC hospitalization	10.1	8.6	13.7	11.1	-1.1
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Hospitalization	15.2	14.2	15.6	13.1	-1.5*†
	Hospital observation stay	7.4	8.6	3.7	4.8	-0.1
	ED visit	29.3	31.7	30.6	28.8	-4.1*†
	30-day readmission	16.5	15.0	16.1	14.4	-0.2
	ACSC hospitalization	11.1	9.6	11.6	9.8	-0.2

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Hospital admission: An inpatient admission

Hospital observation: A hospital observation stay

ED visit: A visit to the emergency department (ED)

30-day readmission: Readmission within 30 days of inpatient discharge

ACSC hospitalization: Hospitalizations for a standard set of ambulatory care-sensitive conditions: asthma/COPD; congestive heart failure; diabetes mellitus; hypertension; influenza; urinary tract infection.

Exhibit C.58 Diabetes Care Outcomes for Beacon Medicare Beneficiaries vs. Comparison Groups, Western New York

Group	Outcome	Comparison 2010 %	Comparison 2013 %	Beacon 2010 %	Beacon 2013 %	D-i-D¥ %
National Sample: Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	12.1	12.9	19.7	16.4	-4.0*†
	Uncontrolled diabetes admission	1.0	1.1	2.5	2.3	-0.3
	ED visit for diabetes	0.9	1.0	1.9	1.3	-0.7*†
	Eye screening for diabetic retinal disease	52.5	53.2	49.9	48.9	-1.6*
	HbA1C test	52.3	50.6	35.7	39.1	5.2*†
Beneficiaries in Catchment Area Served by Non-Beacon Providers Compared to Beneficiaries Served by Beacon Providers	Diabetes admission	11.3	9.2	19.8	16.1	-1.6*†
	Uncontrolled diabetes admission	1.1	1.0	2.4	2.0	-0.2
	ED visit for diabetes	1.0	0.8	1.9	1.3	-0.3
	Eye screening for diabetic retinal disease	54.3	55.9	51.9	52.2	-1.4
	HbA1C test	35.7	42.3	37.0	41.3	-2.3*
National Sample: Compared to all Beneficiaries in Beacon Catchment Area	Diabetes admission	13.4	13.8	14.4	11.8	-2.9*†
	Uncontrolled diabetes admission	1.0	1.1	1.7	1.5	-0.3*†
	ED visit for diabetes	0.9	0.9	1.4	1.0	-0.4*†
	Eye screening for diabetic retinal disease	48.6	50.2	52.6	53.8	-0.4
	HbA1C test	47.3	45.9	36.1	41.5	6.8*†

NOTES: Percent reflects the proportion of beneficiaries who experienced the health care measure in the previous year. For full specification of each measure, see Appendix B. ¥ = Adjusted differences-in-differences are from logistic regression models that included patient demographic and Community contextual characteristics. The column D-i-D is the difference in the increase or decline in the probability of the outcome for persons seen by a Beacon provider compared to the relevant comparison group. Catchment Area refers to the Beacon Intervention Area, and the comparison made is between all beneficiaries on the catchment area to the matched national sample. *= Difference between the Comparison and Beacon group is significantly different at p<.05. †Results in grey boxes indicate improvements in the outcome relative to the comparison group.

Diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of diabetes

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes

Uncontrolled diabetes admission: Percent of beneficiaries with an inpatient admission with a principal diagnosis of uncontrolled diabetes

Eye screening: Percent of beneficiaries with diabetes received an eye screening for diabetic retinal disease annually

Hba1c test: Percent of beneficiaries receiving Hba1c tests at least annually

ED visit for diabetes: Percent of beneficiaries with an admission to an ED with a principal diagnosis of diabetes

Appendix D. Previously Submitted or Published NORC Evaluation Reports and Articles

- *Characterizing the Beacon Communities*. March 2013. Available at: http://www.healthit.gov/sites/default/files/norc_beaconevalcharacterizingCommunities_march_2013.pdf

- *Data Sharing to Enable Clinical Transformation at the Community Level*. May 2014. Available at: http://www.healthit.gov/sites/default/files/beacondatasharingbrief062014.pdf

- Torres, Gretchen; Swietek, Karen; Ubri, Petry S.; Singer, Rachel; Lowell, Kristina; and Miller, Wilhelmine (2014) "Building and Strengthening Infrastructure for Data Exchange: Lessons from the Beacon Communities," *eGEMs (Generating Evidence & Methods to improve patient outcomes)*: Vol. 2: Iss. 3, Article 9. Available at: http://repository.academyhealth.org/egems/vol2/iss3/9

- *Clinical Transformation in the Beacon Communities*. June 2015. Available at: http://healthit.gov/sites/default/files/reports/norc_beacon_evaluation_clinicaltransformation_508.pdf

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