Issue Brief

Evaluation Design and Technical Assistance Opportunities: Early Findings from the Beacon Community Program Evaluation Teams

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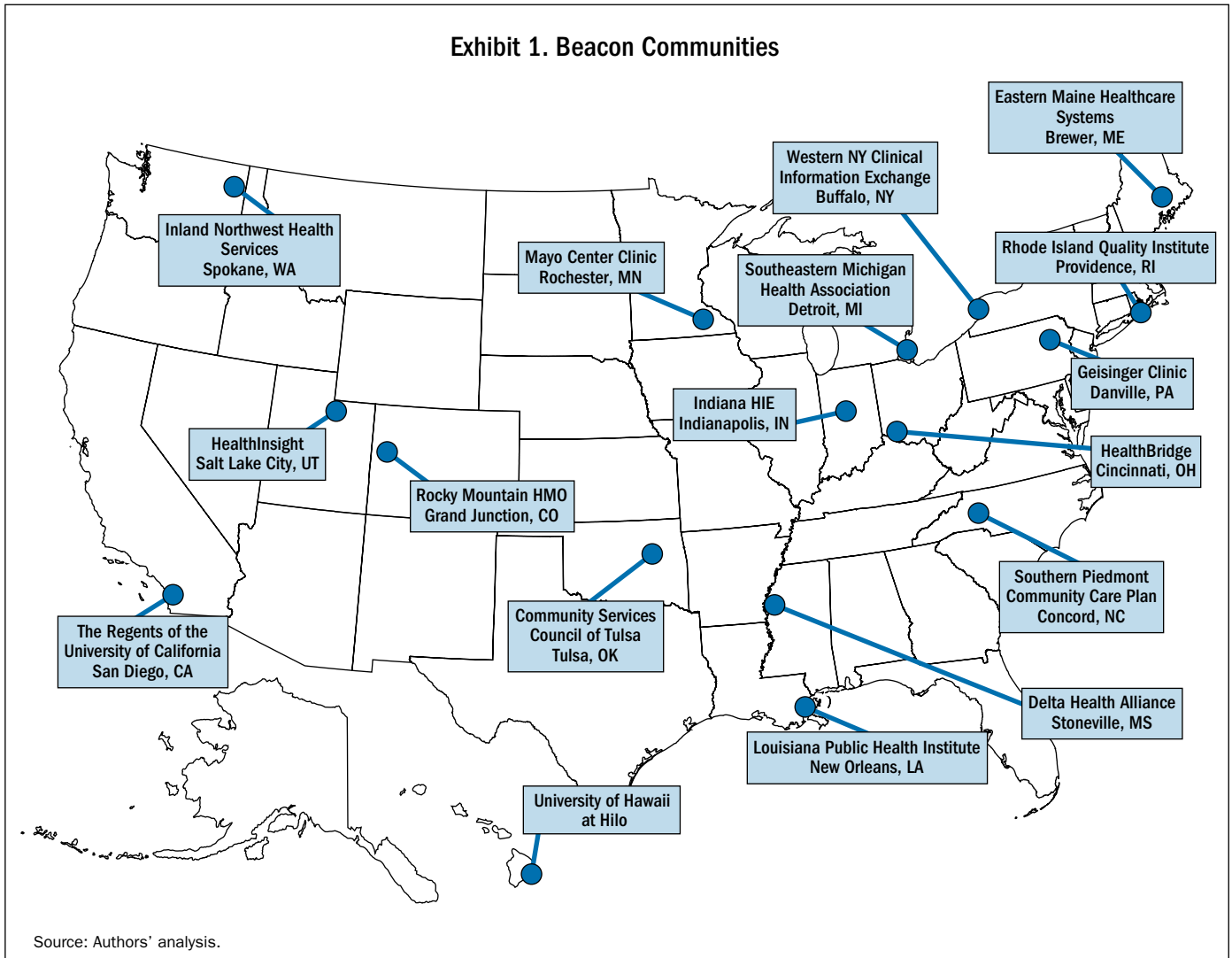
ABSTRACT: The Beacon Community Cooperative Agreement Program is funding 17 communities to build and strengthen their health information technology (IT) capabilities to enhance care coordination, improve patient and population health, and reduce or restrain costs. Based on the experiences and evidence generated by these communities, the program hopes to illustrate the possibilities of leveraging health IT to achieve desired goals. Doing so requires rigorous evaluation work, which is the subject of this issue brief. Based on semistructured interviews with representatives from each Beacon Community, the brief outlines various study designs, evaluation approaches, outcome measures, and data sources in use. It also identifies some common challenges, including establishing governance models, determining baseline measures, and assessing impact in a relatively constrained timeframe. Technical assistance in disseminating and publishing findings and assessing return on investments will be offered in the coming year.

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INTRODUCTION

Authorized under the American Recovery and Reinvestment Act (ARRA), the Beacon Community Cooperative Agreement Program has awarded financial support to 17 communities across the country to implement various strategies to enhance care coordination, improve patient and population health, and reduce or restrain costs (Exhibit 1). These efforts, along with several other policy initiatives at the state and national level, will test coordinated strategies for how best to transform health care in real-world settings.

The roughly $12 million to $15 million dollars in funding over a three-year period provided to each Beacon Community is being used to build and strengthen their health information technology (IT) infrastructures and information exchange capabilities, with the goal of improving health care quality and efficiency. By using the evidence and examples generated through these

Exhibit 1. Beacon Communities

Eastern Maine Healthcare
Systems
Brewer, ME

Western NY Clinical
Information Exchange
Buffalo, NY

Inland Northwest Health
Services
Spokane, WA

Mayo Center Clinic
Rochester, MN

Southeastern Michigan
Health Association
Detroit, MI

Rhode Island Quality Institute
Providence, RI

Indiana HIE
Indianapolis, IN

Geisinger Clinic
Danville, PA

HealthInsight
Salt Lake City, UT

HealthBridge
Cincinnati, OH

Rocky Mountain HMO
Grand Junction, CO

Southern Piedmont
Community Care Plan
Concord, NC

The Regents of the
University of California
San Diego, CA

Community Services
Council of Tulsa
Tulsa, OK

Delta Health Alliance
Stoneville, MS

Louisiana Public Health Institute
New Orleans, LA

University of Hawaii
at Hilo

Source: Authors' analysis.

communities, the program hopes to illustrate to other communities the possibilities of using health IT to achieve desired goals. Indeed, one of the primary goals of the Beacon Community Program is to test whether the community-based model of leveraging health IT can improve the quality, cost, and efficiency of care within a community.[1]

Just over a year into the program, the Beacon Communities have solidified plans and executed on many phases of their selected interventions. Many also have developed strategies for eventually evaluating the extent to which they have achieved their desired objectives. The evaluation work is the subject of this issue brief.

The importance of the evaluation work should not be understated; through these evaluations, policy-makers and other community and national stakeholders will be able to assess the effects of the investment on the resulting infrastructures, innovations, and outcomes achieved. Not only will this knowledge influence future program design and resource allocations, but it could affect the health and well-being of millions of Americans. Thus, having robust, informative evalua-tion designs and results—and a variety of distribution channels for sharing them—is of central importance.

The lessons learned from the Beacon Community Program can inform current and future community-level interventions designed to improve care delivery. To date, Beacon Community teams have identified several issues and challenges that are not necessarily unique to their Beacon work. Their efforts to document and address these challenges, and the degree to which they are able to overcome them, will prove valuable to policymakers and other

stakeholders involved in similar health care transformation activities.

This issue brief begins with an overview of the activities and aims of the 17 Beacon Communities. It then offers a broad overview of the evaluation approaches that are planned or under way. This information is also presented in a series of logic models in Appendix B. The logic models and the characterizations of evaluation efforts reflect information gleaned to date and are based on expectations and intentions for data and other key resources; they do not account for possible challenges and changes that might introduce delays, occasion a change in direction, or even preclude achievement of goals.

Some of the challenges identified are highlighted in the subsequent section, along with solutions or workarounds employed by the communities. The final section offers the authors' assessment of potential technical assistance opportunities that could help the Beacon Communities to strengthen their evaluations and enable them to "tell their stories" more effectively. It also identifies challenges that could arise in the context of other federal initiatives and encourages stakeholders to think broadly about how the lessons learned from the Beacon Community Program can be applied to these other endeavors.

METHODS

To assess the current state of evaluation efforts in each community, AcademyHealth (with support from The Commonwealth Fund and in collaboration with the Office of the National Coordinator for Health Information Technology) conducted a series of semi-structured telephone interviews in the winter and spring of 2011 with members of each Beacon Community's evaluation team. The authors also conducted a review of available documentation produced as part of the program (e.g., initial proposals, 60-day plans) to gain additional context. By identifying challenges experienced thus far, this issue brief can help to identify potential opportunities for technical assistance that could facilitate planning, enhance rigor, and encourage dissemination. Because Beacon Community projects are in an

early phase of implementation and evaluation, other issues will likely arise—some of which may warrant technical assistance. It will be useful to have a process in place to not only provide technical assistance, but also to assess evolving needs as projects mature.

OVERVIEW OF BEACON COMMUNITY PROJECTS

The three main goals of the Beacon Community Program are to build and strengthen the infrastructure in each community, foster innovation, and leverage these activities to improve population health, achieve better quality of care, and reduce (or at least hold constant) the cost of care. Most of the Beacon Community projects under way include components of each of these goals, and all are targeting one or more chronic diseases. Diabetes is by far the most commonly emphasized, with 15 Beacon Communities designing interventions to improve the management and health of their diabetic populations. Cardiovascular care, asthma, behavioral health, chronic obstructive pulmonary disease, and obesity are also of interest to a number of communities. (See Appendix A.) Perhaps even more important than the areas of clinical focus are the approaches and common themes reflected in nearly all of the 17 communities.

Chronic illness management. Interventions to improve care for chronically ill patients typically emphasize care coordination and case management. Projects emphasizing diabetes or asthma generally look at measures of improved care, such as improvement in the measures that show whether the conditions are well controlled. For diabetes, the "D5" goals include measures of blood pressure, lipids, blood sugar, whether the patient is tobacco-free, and whether the patient takes aspirin as appropriate. For asthma, projects are looking at symptom-free days and school absences as indicators of whether the disease is in control. Beacon Communities are also looking at process measures, such as improved medication adherence or the number of patients in a care coordination program. It should be noted that most projects dealing with chronic conditions focus on adults, who account for most of the

health care costs; the asthma projects and many immunization efforts focus on children.[2]

Prevention. Many communities are working to improve immunization rates and achieve better tobacco control, along with other preventive measures. Nine communities are focusing on one or more of the following: improving immunization rates (childhood immunizations in three communities, adult influenza in four communities, and adult pneumococcal vaccinations in three communities), improving cancer screening (four communities), and reducing tobacco use (three communities).

Service utilization and associated costs. Almost all Beacon Communities indicate a desire to control the cost of care. In most cases, this translates into a focus on reducing unnecessary use of services. In particular, many are striving to reduce hospitalizations, whether they are condition-specific (11 communities) or all hospitalizations (one community), rehospitalizations (10 communities), or emergency department visits (13 communities). Six Beacon Communities are looking at costs or charges associated with care, and some are considering whether and how to estimate the costs associated with their planned interventions.

Four projects are estimating costs or charges specific to diabetes care, and one is focused on asthma. It is hoped that the value on investment (VOI) analyses undertaken by these communities will demonstrate the value of the interventions and provide guidance for others undertaking similar efforts. Communities—like the one in Cincinnati—are thinking broadly about their VOI work, and attempting to determine the costs associated with building an infrastructure that can be used to support multiple subsequent interventions. As such, they also are looking at the costs of scaling the infrastructure and applying efforts to additional disease states and populations.

Disparities reduction. Two communities (Crescent City and Southeastern Minnesota) have identified the reduction of disparities as an explicit goal. In some cases, the intervention seeks to reduce disparities in access to care that are related to geography (e.g., rural or urban areas) or provider and insurance market characteristics. Other communities, such as Western New York, have committed to building a better information infrastructure so that they will be able to monitor key population health measures by race, ethnicity, and language.

Meaningful use. While the program requires each Beacon Community to demonstrate 60 percent or greater adoption of certified electronic health records (EHRs), seven Beacon Communities (Colorado, Western New York, Greater Cincinnati, Hawaii County, Delta BLUES, Bangor, and Central Indiana) are targeting one or more specific meaningful-use objectives as part of their evaluation plan.[3] In some cases, the same entity leads the Beacon Community Program and manages the meaningful-use funding from the U.S. Department of Health and Human Services. Community metrics for achieving meaningful use include the development and penetration of electronic health records, patient registries, and provider communication platforms within the catchment area.

Evaluation Approaches

Given the unique characteristics and resources of each Beacon Community, it is not surprising that we found significant variety in evaluation approaches. There is also variety across communities in terms of the data inputs available (and timing for gaining access to these inputs) to address the various evaluation questions. This section highlights some of the variation in evaluation characteristics, including evaluation approaches, the use of comparison options, available data sources, and team composition. It largely emphasizes the evaluation work that is planned; complicating factors (e.g., changes in data availability) are presented in the subsequent section.

Study designs and evaluation approaches. Most, but not all, Beacon Communities have evaluation plans in place at this stage. These plans generally include the measurement and assessment of changes to one or more selected outcome measures. However, while many evaluations are outcome-oriented and seek to demonstrate change to an overall measure over time (e.g., reduction in avoidable hospitalizations) using traditional

evaluation and statistical methods, a few emphasize quality improvement (QI). These projects use traditional QI methodologies, such as rapid PDSA or "Plan-Do-Study-Act" cycles, to bring about improvement.[4]

The Utah Beacon Community, for example, views Beacon as a broad-scale community QI project, not a research project. Therefore its evaluation does not include a formal control group. It does, however, intend to develop comparisons of the Salt Lake Metropolitan Statistical Area (the primary catchment) with the rest of the state. Many Beacon Communities are also designated quality improvement organizations or regional extension centers. It will be interesting to see whether these designations help to target and influence the Beacon Community objectives and relate to the application of QI methodologies.

The measurement efforts of Beacon Communities employing outcome-oriented evaluation designs, or quasi-experimental designs, can be broken out into three major categories. The first category is the achievement of specified targets. For example, if a community sets a goal of "reducing inpatient admissions for diabetes by 5 percent," then it would assess the extent to which it had achieved the desired reduction within the specified time frame.

The second is measuring the change from baseline to determine how much improvement has been realized within the specified time frame. These communities might measure, for example, the number of appropriately immunized patients in the catchment area both before and after an intervention. The Office of the National Coordinator (ONC) asks for this sort of monitoring in its reporting templates, and thus all communities will have some level of this kind of information. In a few cases, Beacon Communities are conducting more formal quasi-experimental pre- and post-analyses on pertinent outcomes and assessing whether the change observed is statistically significant between baseline and follow-up.

The third category measures any change in intervention population relative to a comparison group.[5] Generally, designs using comparison groups are preferable to pre- and post-analysis designs, and

the strongest designs involve randomizing practices or hospitals to a control or intervention arm, but no communities are doing this for the assessment of impact on hospitalization or emergency department visit rates.

It should be noted that these categories are not mutually exclusive, as all the Beacon Communities are working to achieve multiple objectives simultaneously.

While all Beacon communities are measuring against key indicators and producing quarterly reports on a selected group of measures, as defined by each community, not every community has a formal evaluation plan in place at this time. At least two communities are collecting data that could be used to support an evaluation, but at the time of our interviews, they did not yet have explicit plans for how those data would be analyzed as part of a formal evaluation. Furthermore, even some communities that have thoughtfully prepared evaluation plans have run into difficulties executing them. As will be discussed later in this brief, many of the communities have encountered challenges that have required them to focus primarily on initiating data flows or implementing planned interventions—leaving evaluation as the next step.

Comparison group choices. The Beacon Communities that are comparing effects of the intervention in one population relative to a control are often using "everyone else" as the comparison group (Exhibit 2). So, rather than selecting two "matched" populations, most are looking more broadly at all possible units of analysis (e.g., patients or providers) that are not receiving the intervention. In fact, one community referred to its comparison group as "the melting pot" in reference to the diversity of locations and types of patients included.

Some Beacon Communities, however, are trying to construct comparison groups with more intent, with subsequent data analysis that acknowledges this design. For example, the Southern Piedmont Beacon Community has matched three intervention hospitals with three similar comparison hospitals outside the region and is employing a time-series design to assess impact. Another community, Inland Northwest, is employing a cluster trial design and is comparing

Exhibit 2. Beacon Community Comparison Group Choices

Beacon Community (lead organization)	Comparison with "everyone else"[a]	Comparison with a specific group[b]	Quality improvement assessments[c]	Final comparison to be determined
Bangor Beacon Community (EMHS)	X			
Central Indiana Beacon Community (IHI)		X	X	
Colorado Beacon Community (Rocky Mountain HMO)			X	
Crescent City Beacon Community (LPHI)	X			
Delta BLUES Beacon Community (DHA)				X
Greater Cincinnati Beacon Community (HealthBridge)	X	X		
Greater Tulsa Beacon Community (GTHAN)	X	X		
Hawaii County Beacon Community (U of H, Hilo)				X
Utah Beacon Community (IC3)	X		X	
Inland Northwest Beacon Community (INHS)		X		
Keystone Beacon Community (Geisinger)		X		
Rhode Island Beacon Community (RIQI)				X
San Diego Beacon Community (UCSD)		X		
Southeastern Minnesota Beacon Community (Mayo)		X[d]		
Southeast Michigan Beacon Community (SEMHIE)	X			
Southern Piedmont Beacon Community (SPCCP)		X		
Western NY Beacon Community (WNYCIE)	X			
Totals	7	8	3	3

[a] In these projects, the intervention population is compared with "everyone else"—that is, patients or providers who are not receiving the intervention.
[b] In these projects, the intervention group might be compared, for example, with patients in similar comparison hospitals or provider practices.
[c] Projects classified as using quality improvement methodology generally continually assess effectiveness of the interventions in improving quality through rapid assessment cycles (plan-do-study-act cycles) and make modifications in the intervention as necessary to affect improvement. These sites generally are using improvement science methodology (e.g., run charts) to assess whether improvement has occurred.
[d] Comparison group to receive intervention at later date.
Source: Authors' analysis.

nonintervention clinics from immediately contiguous hospital referral regions (Yakima, Portland, Boise, Missoula) to serve as comparisons to the intervention clinics within the catchment area (i.e., the Spokane Hospital Referral Region). Patients will be the unit of analysis in the intervention and comparison clinics—and outcomes will be measured on the patients—but the statistical analysis will account for the cluster design.

As previously noted, some Beacon Communities are addressing this issue by comparing patients in their Beacon Community with "everyone else" in the state (on hospital admission rates, for example) or are picking areas outside the Beacon Community catchment area. In other cases, Beacon Communities intend to spread their interventions to all practices or

hospitals in the catchment area. While this is ideal in terms of providing equitable access to health care innovations, it presents a problem for selecting comparison groups. However, a few communities are accounting for this issue in their evaluation designs. For example, the Western New York Beacon Community (one of the communities applying its Beacon interventions to all practices) is planning an analysis that builds a "time in intervention" variable into the model. Introduction of this variable will allow the community to assess effects of longer vs. shorter time exposure to the intervention on outcomes, like hospital admission rates for diabetes. This is a very robust design and a creative solution to a common problem and could potentially be a model for other communities.

One dimension of the Southeastern Minnesota Beacon Community offers another example of a way to create a control group when all practices are part of the intervention. The asthma portion of this community's efforts targets improvement in asthma management and reduction in school absenteeism. To assess the impact of the intervention, the community is bringing cohorts of schools into the process in waves—one cohort in the first year and another in the following year. The expectation is to compare outcomes between the two groups of schools during the first year, while at the same time eventually spreading the intervention to all schools in the community that are interested in participating.

The Southeastern Minnesota team noted, however, that the group of schools included in the control group is systematically different (i.e., less urban) from the schools applying the intervention in the first year. This illustrates the importance of accounting for systematic differences in the analysis design. It is to be expected that the comparison group will often be systematically different from the intervention, especially when the comparison group consists of "everyone else." The groups may differ on a variety of variables; one group may have a larger proportion of Medicaid patients and another of private patients. They may also differ in terms of demographic characteristics, such as age or race. In addition to patient-level differences, aspects of the hospital, practices, or schools may be different. Because these attributes may be associated with the outcome, accounting for differences in the analytic plan is advisable. At this juncture, the extent to which these differences have been considered and accounted for by many of the Beacon Community teams is unclear. This represents an area for potential technical assistance moving forward.

Evaluation data sources. The data sources assembled by the Beacon Community teams to support their evaluation work are varied. Some of this is a function of the discrete evaluation objectives (e.g., a focus on diabetes versus asthma-related outcomes). In other cases, the outcome of interest may be the same for two Beacon Communities, but the type of data

available to support evaluation efforts may be very different. For example, though most communities identified reducing inpatient hospitalizations or readmissions as an objective, the hospital discharge data needed to evaluate achievement of these objectives may flow through a variety of channels. In some communities, the data pass directly from participating hospitals to the health information exchange (HIE). Other communities are relying on claims data from specific sources (e.g., an insurer), from a data warehousing firm (e.g., Thompson Reuters), or from a state-level all-payer claims database.

The comprehensiveness, sophistication, and even existence of HIEs in the Beacon Communities are also highly variable, and there are important differences in technical architecture as well. In some Beacon Communities, the HIE is designed to include a comprehensive repository of data (or a "hub") that facilitates the sharing of information from hospitals, provider practices, pharmacies, laboratories, and more. In these communities, it is anticipated that the HIE will serve as a rich source of data for the impending evaluation work. In other communities, the HIE acts as more of a switching station, allowing authorized end users to query the system to find the requested data. In this scenario, a master patient index is used to point to a particular patient's data in other locations. A few communities do not yet, or do not plan to, have a formal HIE established during the Beacon Community Program time frame; in these cases, the communities are typically using registries or spreadsheets to track and share relevant patient information. Communities deploying this tactic are primarily emphasizing quality improvement at the local level, and thus are using the information to provide individual providers and practices with some feedback mechanism.

EHRs represent another commonly cited data source for assessing outcome achievement. In most cases, the intent is to use patient-level data on specific conditions to assess the extent to which targeted chronic conditions are in control. For example, for diabetes, this often involves using the D5 measures.[6] Some communities have indicated that records of preventive screenings

(and in some cases immunizations) can come from practice-level EHRs. However, local immunization registry data are often used to evaluate progress toward immunization goals, especially for children. It is also worth noting that in some Beacon Communities, data from EHRs will be fed into the HIE, while in others data will be extracted directly from the provider's EHR.

Some potential obstacles to extracting measurement data from EHRs for purposes of quality benchmarking and improvement already have been raised by a handful of communities. Not surprisingly, not all of the EHR systems in use in a given community's catchment area are certified (based on Phase 1 meaningful-use requirements), and even those that are certified need only have the capacity to produce a subset of measures. These measures may or may not align with those required by a given community to assess progress against desired outcomes. Furthermore, there is some concern regarding the capacity of even certified EHRs to accurately and appropriately calculate these measures. Given these early experiences, it is likely that other communities who are planning on using EHRs to support quality measurement may run into similar issues. This may represent an opportunity for cross-community sharing of best practices and workaround solutions.

Finally, many communities indicated in conversations that they plan to rely on surveys, interviews, and focus groups with both patients and providers to elicit information in support of their evaluations. In many cases, the intention is to conduct a pre- and post-assessment. This many include evaluating the level of satisfaction with the interventions, eliciting information about problems, and gaining perspective on other process and outcome measures of interest (e.g., patient engagement).

Measuring costs. Many Beacon Communities noted their desire to measure the impact of their program on costs—both for their own edification, but also to inform the decisions of other communities wishing to replicate efforts. In addition, cost questions surface in a number of community objectives, such as the

potential costs savings associated with reducing hospital readmissions or other health improvements.

While many communities believe they will be able to obtain cost information from claims data or EHRs, there appears to be no uniformity in how such data are calculated, aggregated, or analyzed. Others admitted they may have to obtain cost information in a less structured manner, such as by manually obtaining information from various participants. As such, most communities do not have a clear sense of how to best determine costs associated with both inputs and outcomes, which would yield the desired VOI.

In some cases, the lack of data that can reliably be used to estimate costs represents the biggest challenge. Some communities have successfully cross-walked data sources to meaningful ends. The Western New York Beacon Community, for example, has access to claims data from three payers (representing roughly 60% of the covered population), as well as data from the Statewide Planning and Research Cooperative System (SPARCS). The SPARCS data include actual costs at the county level, but do not enable patient- or practice-level identification. Data from the payer claims are attributable at the practice level. By combining these sources, the community will be able to derive cost estimates from the SPARCS data and apply them to the claims data for reasonable track-back on progress at the practice level.

Though many Beacon Community teams indicated having access to a health economist, several referred to plans to use external experts or data sources, as well. The Inland Northwest Beacon Community, which does include a health economist as part of its evaluation team, plans to extract benefit payment information from its data warehouse provider (i.e., Milliman). It also plans to create relative value units for specific procedures and procedure codes that can be used to contrast volume of service between intervention and comparison hospitals from a similar economic and geographic area.

Composition of the evaluation teams. Most of the Beacon Community teams have some level of staff dedicated to the evaluation of their planned

interventions. The composition of these teams, however, varies considerably both in size and expertise. All evaluation teams have included experts in content areas relevant to the target interventions and most have experts in evaluation design or statistics. At least four communities (Utah, San Diego, Cincinnati, and Inland Northwest) have a designated economist on the team, and several are planning to conduct cost or return-on-investment analyses. In most cases, team members have strong experience and track records in producing publications for scholarly journals. Many indicated, however, that some level of strategic assistance in this area could be useful given the range of options possible for dissemination.

In many cases, members of the evaluation team serve part-time on the Beacon Community project. Some sites mentioned explicitly being understaffed on their evaluation work or lacking sufficient internal support to hire evaluation staff. Very few of the evaluation teams have access to an advisory group or other body that could offer guidance and shape the evaluation design. However, evaluation team members in many Beacon Communities serve on the larger steering committees and can solicit feedback through those channels.

While most evaluation team members are part of a broader Beacon Community team, in some cases an independent evaluator is engaged under contract. In addition, there are a few Beacon Communities that do not yet have a formal team in place.

CHALLENGES AND OPPORTUNITIES

As would be expected, nearly all Beacon Community evaluation teams described challenges that they have already or likely will encounter as they move from planning to implementation. Many cited issues related to data governance, such as getting data-use agreements (DUAs) in place and delays or confusion over Institutional Review Board (IRB) approvals. Of particular note are the challenges of initiating data feeds from hospitals and ambulatory practice sites into HIEs. These challenges are translating into either delayed implementation or the use of workaround solutions to support intermediate data flows until the HIE is fully operational. Other topics identified include baseline calculations and race, ethnicity, and language documentation. These all represent possible opportunities for further cross-community discussion or technical assistance.

Data governance. In the current regulatory environment, an essential step in developing the relationships necessary to support information exchange is the development of legal DUAs. These agreements—executed between the legal HIE authority and participating data contributors—are crucially important in that they articulate the principles of data security, establish privacy protections, and describe the conditions under which data can be accessed and used. Not surprisingly, there have been delays in putting these agreements in place. In some Beacon Communities, data are flowing into the HIE, but cannot be used until the DUAs are signed. In the case of the Greater Cincinnati Beacon Community, this delay is affecting the completeness of data available for evaluation purposes. As a result, hospital admissions, readmissions, and emergency department visits can be reported at this juncture only from those institutions with signed agreements. Eventually, the requisite data will be available from all contributors, but the evaluation team reported that baseline calculations will need to be redone to account for the full complement of data. In other Beacon Communities, no data can flow until all DUAs are signed. In these cases, communities have reported that additional time will be required to upload and ready data for analysis.

A number of Beacon Communities have encountered the need to obtain approval for data use (including for evaluation purposes) from one or more IRBs. This can require the involvement and coordination of IRBs from multiple institutions, like hospitals or universities. There is considerable confusion in some communities regarding the conditions under which IRB approval is required—for example, for quality improvement versus public health research projects. A few communities expressed a desire for guidance on how best to navigate these issues, and access to best practices for writing IRB submissions.

This may be a particularly important area for technical assistance given the interest in generating peer-review publications.

Data availability. Some Beacon Communities enjoy the advantage of having already established (through prior projects and grants) functional HIEs. These communities include: Bangor, Cincinnati, Colorado, Utah,[7] Central Indiana, Inland Northwest, Keystone, and Western New York.

This means that they have already cultivated relationships with contributing data partners, developed a technical architecture, applied a policy framework, and, in some cases, devised a business model to support the endeavor. These are all elements of community collaboration that are essential to health IT-enabled transformation. The Central Indiana Beacon Community, for example, boasts one of the nation's oldest HIEs, and already has a high level of provider participation and data throughput.[8] Other communities are in the early stages of building or expanding HIEs and are encountering challenges that affect data availability.

One issue that has surfaced in at least three communities with competitive health care markets is the reluctance of competing hospital systems to share data. In the case of the San Diego Beacon Community, market competition has not impeded the participation of provider institutions in the catchment area, but it has had implications for the architecture of the system and the data types available via the HIE. As a reflection of the different layers of information that will be made available by provider institutions, the HIE architecture is designed as a query-based system. The HIE will not actually store any clinical information. The information that will be stored in the HIE will be the master patient index (MPI), and admission, discharge, transfer (ADT) information. The current evaluation plan is to get this MPI and ADT information from participating providers through the query system, and then combine it with the available clinical information for analysis in an environment distinct from the HIE.

In another case, the Southern Piedmont Beacon Community has secured the participation of a larger hospital system, but lacks data from another smaller system. As a result, evaluators will know how many times a given patient was admitted and to which hospital, but they will not have access to specific clinical data from admissions to the smaller system. As a workaround, the evaluation team plans to build a supplemental database of clinical information they can acquire through queries to the provider institutions willing to share. These data will be stored for evaluation purposes in an environment distinct from the HIE.

Even those communities with active HIEs do not always enjoy the participation of all health care systems. In the Keystone Beacon Community, two hospitals within the catchment area are not part of the HIE and are not expected to join. However, Keystone has been able to differentiate numerous comparable populations within its referral area by parsing Medicare, county, HIE, insurer, hospital, and other data. For instance, using HIE and Medicare data, Keystone will be able to compare HIE hospital vs. non-HIE hospital admissions, readmissions, and emergency department use among patients with congestive heart failure and chronic obstructive pulmonary disease.

The Beacon Community in Southeast Michigan originally planned to have its HIE up and running by July 2011, with a large cohort of providers connected to the HIE and receiving comprehensive patient information. Given some delays, the Southeast Michigan Beacon elected to pursue a different course of action: to abandon the efforts to design the HIE from the ground up and either buy an off-the-shelf system or settle for a registry approach. Through a community-wide process, the community ultimately decided to proceed with a traditional HIE vendor and to supplement the exchange functionality with a population health analysis engine.

Communities are also taking a variety of approaches to addressing gaps in data. One method deployed by several involves soliciting the desired data from providers, payers, or other sources. Colorado, for example, is setting up registries at the practice level and hopes to obtain separate pharmacy-level data to supplement the information in its HIE. The Southeast Michigan Beacon is requiring

practices as a condition of participating in the Beacon Community efforts to have an EMR from which they can obtain necessary data. Still another approach is to rely on claims data rather than clinical data from hospitals or ambulatory practices.

It is important to note that while some workarounds are feasible (e.g. sourcing data directly), in some cases there appear to be no viable solutions. Having a functional HIE is perceived as fundamental to the evaluation process in many communities. One evaluation team member indicated that they were "so focused on building their HIE and other initiatives that there was less emphasis on evaluation."

Measurement. Several Beacon Communities stressed the challenges experienced in establishing their baseline measurements. Some communities noted the lack of adequate data available to calculate a baseline measure. This was particularly evident in communities without—or with very new—HIEs. Even in cases where several years of data are available, many communities noted issues with quality (i.e., completeness and volume) of data for their baseline calculations. In some instances, this was the result of data partners being added after the initiation of the Beacon program—making a pre- and post-analysis more difficult.

The partial data that many communities have had available for baseline calculations has implications for the completeness and accuracy of baseline measures. The experience of the Tulsa Beacon Community is typical. It will have at least two years of historical data which will be available once the HIE is loaded. In the interim, it was able to estimate the community's baseline using reports provided by the Oklahoma State Department of Health Immunization Registry, Oklahoma's two largest private payer groups, the Oklahoma Health Care Authority, one large university health system, Oklahoma State Department of Health Hospital Discharge Data, and one of the region's largest laboratories. When the HIE is fully operational the community will be able to recalculate the baseline, making use of the full data set.

Some issues with baseline data are especially pertinent to the 15 communities targeting diabetes. Standards for some of the D5 measures have changed since baseline calculations were performed. For example, at the time of baseline calculations, the standard for blood pressure in control was 130/80; it is now 140/90. This means that more patients will now have blood pressure within guidelines than at the time the baselines were calculated. Standards for low-density lipoprotein (LDL) and hemoglobin A1c were similarly changed in ways that mean more patients will be meeting these guidelines.

Many existing efficiency measures were not designed in a way that is compatible or practical for use by the Beacon Communities. To address this issue, in April 2011, RAND released a paper titled "Developing an Efficiency Measurement Approach to Assess Hospital Readmissions, Ambulatory Care Sensitive Admissions, and Preventable Emergency Department Visits: A Resource Guide for Beacon Communities and Other Community Collaboratives."[9] RAND developed the guide at the request of ONC to help the Beacon Communities select measures to gauge the impact of their interventions. The guide focuses on three frequently used efficiency measures: hospital readmissions, ambulatory care–sensitive admissions (i.e., preventable admissions), and preventable visits to emergency departments.[10]

Tracking race, ethnicity, and language. Although all communities are aware of the significance of tracking racial and ethnic disparities—and virtually all are making some effort to collect such data—respondents generally acknowledged difficulties in generating accurate and complete information. Few, if any, of the communities are collecting information on primary language use by patients. In addition, problems with completeness and accuracy of race and ethnicity data exist in almost all data sources, including hospital discharge data and data from EHRs.

In some Beacon Communities, race and ethnicity data are available from some data sources, but not others. One community reported that its hospital discharge database does not include race and ethnicity

information, while another indicated that such information was not typically captured from either hospitals or community practices. More frequently, the issue is that while the fields for race, ethnicity, and language exist, they are not being completed consistently or accurately by providers or office staff. This is generally identified as a workflow issue; either such information is not deemed essential enough to record at all or it is recorded based on assumption (i.e., the provider does not ask, but merely assumes based on appearance). As one respondent told us, the "data field will capture [race, ethnicity, language] if providers are bothering to ask the question."

Despite the priority placed on tracking disparities at the federal level, relatively few of the Beacon Communities noted explicit plans to improve the quality of data captured on race and ethnicity. There are at least three exceptions to this general rule. Cincinnati has instituted a program to improve the completeness and accuracy of race and ethnicity, but not language, data in the hospital setting. This effort has required an intensive training program targeted at key staff around the need to collect such information consistently and in a manner that directly engages families in the discussion, rather than relying on admissions staff to make assumptions. As a consequence, this community will likely be better able to monitor disparities in hospitalization and emergency department admission rates moving forward.

The Western New York Beacon Community is working to provide assistance at the primary care level to ensure that it is collecting race and ethnicity data systematically through EHRs; the Bangor Beacon Community is attempting to boost data quality by bypassing the registration process and doing primary data collection of race and ethnicity information through care managers. The Bangor community—noting that it has observed discrepancies between race and ethnicity information obtained from care managers versus the registration process—now plans to institute a process for reconciliation.

PRIORITY AREAS FOR TECHNICAL ASSISTANCE

Both the Office of the National Coordinator for Health Information Technology and the Beacon Communities are focused on successfully disseminating their experiences and findings to a broader audience. The effective spread of this knowledge is critical to maintaining and building on the progress that has been made and to communicating such gains with key decision-makers. Publication is one important vehicle and represents an opportunity for strategic technical assistance.

While a handful of Beacon Communities expressed confidence in the robustness of their evaluation designs and analyses and in their ability to generate publications, most indicated that some level of technical assistance would be useful. The nature and timing of the assistance options requested is somewhat variable, and reflects the particular outcomes, the composition of each team, the status of implementation efforts, and data availability (Exhibit 3). Moving forward, ONC will coordinate with its contractors and collaborators to assess the technical assistance needs of the Beacon Communities, consider potential approaches for responding, determine the most appropriate vehicles, and organize opportunities.

Dissemination and publication. Some evaluation teams include members who are well published and know the ropes of the peer-review process and expectations. The Inland Northwest Beacon Community, for example, has already submitted one paper and is working on abstracts for several others. In some cases, the desire to publish and the volume of possible paper ideas outstrips staff capacity to write them. Many other Beacon Communities, however, lack the level of expertise needed to execute on evaluation publications—particularly in the health IT field. As a result, some have expressed a need for assistance in preparing evaluation results for publication in scholarly journals. Some communities also requested assistance in identifying potential target journals and in thinking strategically about collaborating with other Beacon Community teams.

Exhibit 3. Technical Assistance Topics Requested by Beacon Communities

Beacon Community	Topic requested	Components
Bangor Beacon Community	Publication	Abstract submission
	Data and methods	Identifying control group base
San Diego Beacon Community	Collaboration with other Beacons	Interested in discussions and potential publications
	Data and methods	Drawing conclusions from data Identifying subgroups Identifying comparison groups
Utah Beacon Community	Publication	Identifying topics and targets
	Collaboration with other Beacons	Interested in discussions and potential publications
Central Indiana Beacon Community	Data and methods	Biostatistics
Greater Cincinnati Beacon Community	Data and methods	Economic analysis Diabetes readmission definition
Keystone Beacon Community	Collaboration with other Beacons	Publication
	Data and methods	Access to claims data
Southeast Michigan Beacon Community	Data and methods	Selecting variables that can show change in short time frame
	Publication	Economic-focused abstract topics Peer-review level writing
Crescent City Beacon Community	Data and methods	Linking organization climate, innovation, and outcomes Measures and definitions, preferably already validated Cost–benefit analysis
Southern Piedmont Beacon Community	Data and methods	Data storage and management EHR implementation IRB approach Implementing care managers: increasing efficiency and quantifying outcomes
	Collaboration with other Beacons	Interested in discussions and potential publications
Rhode Island Beacon Community	Data and methods	General evaluation support Collecting race, ethnicity, and language data
Western NY Beacon Community	Publication	Identifying target journals
	Collaboration with other Beacons	Interested in discussions and potential publications
Colorado Beacon Community	Data and methods	Data collection Drawing conclusions from data General evaluation support Identifying subgroups
Hawaii County Beacon Community	Data and methods	Intervention measures Data collection and management General evaluation support
Greater Tulsa Beacon Community	Data and methods	Economic analysis Cross-walking multiple data sets Measuring care coordination Sustainability models Patient attribution models
	Collaboration with other Beacons	Interested in discussions and potential publications
Southeastern Minnesota Beacon Community	Collaboration with other Beacons	Interested in discussions and potential publications
Delta Blues Beacon Community	Publication	Identifying topics Identifying target journals Peer-review level writing
	Collaboration with other Beacons	Data collection and evaluation

Note: The Inland Northwest Beacon Community did not identify any specific areas of technical assistance at this time.

Source: Authors' analysis.

Economic analyses and value on investment calculations. Virtually all Beacon Community teams are clear about the value of being able to describe the economic impact of their interventions on cost—both to their respective communities and to policymakers. Only a few communities, however, indicated that they have the staff and other resources necessary to design and conduct such analyses. Because of the widely recognized need to describe the cost and cost-savings associated with their interventions, many requested technical assistance around conducting economic analyses.

This is not to say that costs calculations are not under way or under development. Several communities are planning to assign dollar values to the impact of their interventions—typically through reduced resource utilization. A few teams have access to economists to assist with such efforts, whereas others acknowledged that external expertise would be required. Almost all teams considering cost analyses plan to focus on savings generated through reduced rates of preventable hospitalizations, rehospitalizations, and emergency department use.

Because the front-end costs of implementing community-wide health IT projects—as well as other interventions—are so high and varied, many communities acknowledged that there are important choices to be made in determining how to construct a return-on-investment analysis. If some level of standardization could be applied to these analyses across communities, it likely would strengthen the ability of the Beacon Community Program to make overall statements about the anticipated costs and cost-savings associated with various efforts. Additionally, statements could be made about what investments are needed and where they should be directed.

On a related note, a number of Beacon Communities noted their sense of responsibility to the next wave of communities. They acknowledged that by providing some level of information about the costs and returns associated with one intervention versus another, they would be able to help other communities appreciate the level of investment required to make

progress. At this juncture, only a very few appear to be tracking these costs.

Design, analysis, and power calculations. Many Beacon Communities have already fully planned and designed their evaluations, but a few have not. Thus, a few communities could benefit from some level of assistance in designing their evaluations, outlining data collection approaches, and planning subsequent analyses.

Another group of Beacon Communities has already established basic designs for their evaluations, but indicated a desire for extra statistical help with identifying comparison groups, specifying analytic approaches, and performing power calculations. This technical assistance could greatly strengthen the designs and could better position the communities for publication.

Several Beacon Communities requested help in selecting a comparison group that could be matched to their intervention group. It was suggested that the technical assistance here could also include support in identifying control variables for the analysis. There is also a potential for developing creative ways to construct a control group for a community involving, for example, the use of propensity scores to match control individuals to the individuals in the intervention groups or in creating a "synthetic" control group of like individuals.

Use of comparable measures across the Beacons. Thus far, Beacon Communities have been free to select their own measures, and consequently, there is some lack of consistency. While this allows for customization and flexibility at the discrete community level, results will not be perfectly comparable across sites. In some cases, sites have adopted nonstandard definitions consciously and for pertinent reasons at the local level, but in many cases, technical assistance around definitions could make the outcome data from the Beacon Communities more comparable. Several Beacon Communities expressed concern about the lack of availability of a single, trusted definition for measuring diabetes-related hospitalizations.

Recalculating the baseline. As noted earlier, many Beacon Communities will need to recalculate their baselines in the next several months. This represents a possible opportunity for broader technical assistance to strengthen several designs.

Measuring disparities and tracking vulnerable populations. Technical assistance around improving the collection of race, ethnicity, and language data is needed. A few of the Beacon Communities have initiatives under way to improve the quality and volume of these data and could be used as models for other communities.

Methods for receiving technical assistance. Beacon Communities offered a number of suggestions for how they would like to receive technical assistance. Several expressed great curiosity about the work of their peers in other communities, and suggested that more opportunities for cross-community discussion and assistance would be welcome. A related suggestion was to have AcademyHealth staff identify people in other communities working on similar issues and establish virtual or in-person meetings to share experiences and learn from each other. Leaders in a particular area could serve as assets for other Beacon Communities that might be struggling. Most communities expressed interest in convening a one-day meeting at which they could share and compare their approaches and experiences thus far.

IMPLICATIONS AND RECOMMENDATIONS

Based on our discussions with Beacon Community evaluation team members, it appears that some level of support could help to bolster existing evaluation designs, analyses, and data collection strategies. These conversations also identified key challenges that are likely to surface in other community-based interventions and raised questions that decision-makers and community stakeholders may encounter.

Accountable care organizations. Data-sharing hurdles (the result of a variety of factors like market competition) and data acquisition and aggregation challenges could have an effect on the development of accountable care organizations (ACOs), which are dependent on near-complete sharing of data for accountability. The Beacon Communities will serve as early testing grounds for such models and will need to realistically examine the issues, including the completeness of existing data flows, their ability to enter into data-use agreements with potential partners, and the accuracy of the data being generated. They will also need to determine what levels of data are sufficient to support their evaluation designs and adjust their design plans as needed.

Some communities may determine that aggregated data are sufficient to address their needs. Conversely, others may need to pursue strategies for obtaining patient-level data as a way to answer particular questions of interest to policymakers and other stakeholders. An assessment of data needs and data availability will be necessary to support the development of ACOs, as these organizations will rely on information-sharing for accountability and for determination of provider payments.

Sustainability. As Beacon Communities progress through the implementation of their initiatives, they are acutely aware of the need to sustain their efforts beyond the three-year program time frame. Many are working to ensure that their evaluation efforts consider information that will be of interest to both public and private sector stakeholders. Many of these stakeholders are interested in the clinical and economic outcomes of the innovative care delivery models pursued by the Beacon Communities, and the potential for a realignment of incentives or payment mechanisms. Anticipating interest, some communities are exploring how to assess the full value on investment of their efforts. This will require consideration not only of the infrastructure created or strengthened to support the program interventions, but also the specific initiatives. Undoubtedly, assessments of this nature will be of interest to stakeholders noted above, as well as those planning similar efforts outside the Beacon Community Program.

Generalizability. Outside of specific evaluation plans and methods, each community has faced its own challenges in implementing and facilitating

planned interventions. In at least one case, simply integrating the research teams associated with different organizations (and their designated projects) has been a challenge. Additionally, several communities have not been able to complete data-use agreements according to schedule. Without anticipated data, communities have been forced to delay implementation of interventions or create contingency evaluation plans. It might be valuable to further analyze the experience of each Beacon Community in creating community coalitions and to note the political, economic, and administrative setbacks each has faced. The experiences of the Beacon Communities could be instructive to other regional or community efforts planned or under way.

Notes

1   A. McKethan, C. Brammer, P. Fatemi et al., "An Early Status Report on the Beacon Communities' Plans for Transformation via Health Information Technology," *Health Affairs*, April 2011 30(4): 782–88.

2   C. Vogeli, A. E. Shields, T. A. Lee et al., "Multiple Chronic Conditions: Prevalence, Health Consequences, and Implications for Quality, Care Management, and Costs," *Journal of General Internal Medicine,* Dec. 2007 22(Suppl. 3):391–95.

3   As defined by the Office of the National Coordinator, "meaningful use" is a shorthand for three things: an incentive program, rewarding not only deployment of EHRs but also their effective use for patient benefit; a new national infrastructure to support deployment and beneficial use of EHRs; and a vision for the evolving, dynamic and optimal uses of information to support health and health care improvement; see http://healthit.hhs.gov/portal/server.pt?open=512&mode=2&objID=3541.

4   E. H. Wagner, R. E. Glasgow, C. Davis et al., "Quality Improvement in Chronic Illness Care: A Collaborative Approach," *Joint Commission Journal on Quality Improvement*, Feb. 2001 27(2):63–80.

5   These sites may also be conducting pre- and post-analyses to determine change from baseline.

6   A. M. Snowden, *MN Community Measurement: 2009 Health Care Quality Report* (Minneapolis: MN Community Measurement, Dec. 2009), http://mncm.org/site/upload/files/Final_2009_Health_Care_Quality_Report_12.9.09.pdf.

7   The Utah Health Information Network includes a fully functional administrative data exchange and is implementing a clinical health information exchange.

8   In its 2010 Beacon Community Program proposal to the Office of the National Coordinator, the Central Indiana Beacon Community said that 28 percent of providers in the Hospital Referral Region were using an EHR. Of the 57 hospitals in the HRR, 38 were connected to the health information exchange with some level of data flow. Of the approximately 1,200 primary care physicians in the Central Indiana Beacon Community, 915 were contributing data to the data repository. Not all were doing so through EHRs; some were faxing information to be uploaded to the repository. For more information, see Indiana Health Information Exchange Beacon Community Agreement Program Proposal, http://www.ihie.com/pdfs/IHIE%20Beacon%20Proposal.pdf.

9   RAND, "Developing an Efficiency Measurement Approach to Assess Hospital Readmissions, Ambulatory Care Sensitive Admissions, and Preventable Emergency Department Visits: A Resource Guide for Beacon Communities and Other Community Collaboratives," (Santa Monica, Calif.: RAND, April 30, 2011).

10   Ibid.

Appendix A1. Clinical Focus Areas by Beacon Community

Beacon Community (lead organization)	Diabetes	Cardiovascular care	Asthma	Behavioral health	COPD	Obesity	Low back pain	End-of-life care	Other preventive inititiaves*
Bangor Beacon Community (EMHS)	X	X	X		X				X
Central Indiana Beacon Community (IHI)	X	X			X				X
Colorado Beacon Community (Rocky Mountain HMO)	X	X	X	X		X			X
Crescent City Beacon Community (LPHI)	X	X							
Delta Blues Beacon Community (DHA)	X								
Greater Cincinnati Beacon Community (HealthBridge)	X		X						
Greater Tulsa Beacon Community (GTHAN)	X						X		X
Hawaii County Beacon Community (U of H, Hilo)	X	X							X
Utah Beacon Community (IC3)	X							X	
Inland Northwest Beacon Community (INHS)	X								
Keystone Beacon Community (Geisinger)		X			X				X
Rhode Island Beacon Community (RIQI)	X			X					X
San Diego Beacon Community (UCSD)		X							X
Southeastern Minnesota Beacon Community (Mayo)	X		X						X
Southeast Michigan Beacon Community (SMHIE)	X								
Southern Piedmont Beacon Community (SPCCP)	X	X							
Western NY Beacon Community (WNYCIE)	X								X
Totals	15	8	4	2	3	1	1	1	10

Note: COPD = chronic obstructive pulmonary disease.

* Includes activities such as immunizations/vaccinations, cancer screening, and measuring tobacco usage.

Source: Authors' analysis.

Appendix A2. Nonclinical Focus Areas by Beacon Community

Beacon Community (lead organization)	Utilization (hospital admissions/ readmissions, emergency department visits)	Cost (for certain illness, facility charges)	Access/ Referrals	Patient-reported measurement	Disparities	Safety
Bangor Beacon Community (EMHS)	X			X	X	X
Central Indiana Beacon Community (IHI)	X	X		X		
Colorado Beacon Community (Rocky Mountain HMO)	X					
Crescent City Beacon Community (LPHI)	X					
Delta Blues Beacon Community (DHA)	X	X				
Greater Cincinnati Beacon Community (HealthBridge)	X	X			X	
Greater Tulsa Beacon Community (GTHAN)	X		X			
Hawaii County Beacon Community (U of H, Hilo)	X		X			
Utah Beacon Community (IC3)	X					
Inland Northwest Beacon Community (INHS)	X	X				
Keystone Beacon Community (Geisinger)	X			X		
Rhode Island Beacon Community (RIQI)	X					
San Diego Beacon Community (UCSD)	X	X				
Southeastern Minnesota Beacon Community (Mayo)	X	X	X	X	X	
Southeast Michigan Beacon Community (SMHIE)	X					
Southern Piedmont Beacon Community (SPCCP)	X					
Western NY Beacon Community (WNYCIE)	X	X			X*	
Totals	**17**	**7**	**3**	**4**	**4**	**1**

* The Western New York Beacon Community's efforts in this regard stems from work initiated under the Aligning Forces for Quality program.

Source: Authors' analysis.

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