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# The Utah Beacon Experience: Integrating Quality Improvement, Health Information Technology, and Practice Facilitation to Improve Diabetes Outcomes in Small Healthcare Facilities

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## Abstract

**Purpose:** The Utah Improving Care through Connectivity and Collaboration (IC<sup>3</sup>) Beacon community (2010–2013) was spearheaded by *HealthInsight*, a nonprofit, community-based organization. One of the main objectives of IC<sup>3</sup> was to improve health care provided to patients with diabetes in three Utah counties, collaborating with 21 independent smaller clinics and two large health care enterprises. This paper will focus on the use of health information technology (HIT) and practice facilitation to develop and implement new care processes to improve clinic workflow and ultimately improve patients' diabetes outcomes at 21 participating smaller, independent clinics.

**Innovation:** Early in the project, we learned that most of the 21 clinics did not have the resources needed to successfully implement quality improvement (QI) initiatives. IC<sup>3</sup> helped clinics effectively use data generated from their electronic health records (EHRs) to design and implement interventions to improve patients' diabetes outcomes. This close coupling of HIT, expert practice facilitation, and Learning Collaboratives was found to be especially valuable in clinics with limited resources.

**Findings:** Through this process we learned that (1) an extensive readiness assessment improved clinic retention, (2) clinic champions were important for a successful collaboration, and (3) current EHR systems have limited functionality to assist in QI initiatives. In general, smaller, independent clinics lack knowledge and experience with QI and have limited HIT experience to improve patient care using electronic clinical data. Additionally, future projects like IC<sup>3</sup> Beacon will be instrumental in changing clinic culture so that QI is integrated into routine workflow.

**Conclusion and Discussion:** Our efforts led to significant changes in how practice staff optimized their EHRs to manage and improve diabetes care, while establishing the framework for sustainability. Some of the IC<sup>3</sup> Beacon practices are currently smoothly transitioning to new models of care such as Patient-Centered Medical Homes. Thus, IC<sup>3</sup> Beacon has been instrumental in creating a strong community partnership among various organizations to meet the shared vision of better health and lower costs, and the experience over the last few years has helped the community prepare for the changing health care landscape.

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## Keywords

Health Information Technology, Quality Improvement, Standardized Data Collection

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**Disciplines**

Health Information Technology | Medicine and Health

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## Background

Improvements to medical science and technology over the last few decades have shifted the overall focus of health care from acute and episodic care to chronic care and disease management. However, as has been highlighted in the Institute of Medicine (IOM) reports in 1999<sup>1</sup> and 2001,<sup>2</sup> the U.S. health care system does not facilitate the delivery of safe, high-quality care. The recommendations from the IOM reports highlighted the need to redesign archaic systems of care and advance the use of health information technology (HIT) to support the needs of the health care workforce to manage patients with heart disease, diabetes, asthma, and other chronic conditions.

The IOM reports spurred a series of initiatives to facilitate quality improvement (QI) in health care using HIT. But within a few years, several studies found that HIT had limited impact on the quality of health care, and any improvement in hospital quality outcomes was seen only in academic settings.<sup>3,4</sup> The few advantages perceived by the use of HIT were ambiguous, since most improvements in quality indicators revealed care process improvements as opposed to improvements in patient care outcomes.<sup>5</sup> Thus, it became unlikely that the use of HIT would have a positive effect on patient safety and quality unless it was coupled closely with care transformation.

<sup>1</sup>HealthInsight

Following the IOM reports, the Health Information Technology for Economic and Clinical Health (HITECH) Act was passed in 2009 by the U.S. Congress to increase the widespread and effective use of HIT, with the ultimate goal of improving the U.S. health care system.<sup>6</sup> In 2010, the Office of the National Coordinator (ONC) for HIT funded 17 Beacon communities across the United States to build and strengthen HIT infrastructure and improve patient outcomes, health care quality, and cost efficiencies, while developing solutions to achieve better health and better health care at a lower cost.<sup>7</sup> Around the same time, the ONC also established 62 Regional Extension Centers (RECs) across the United States to assist primary care providers in the adoption and meaningful use of electronic health records (EHRs).<sup>8</sup>

*HealthInsight*, a private, nonprofit, community-based organization spearheaded the Improving Care through Connectivity and Collaboration (IC<sup>3</sup>) Beacon cooperative agreement in Utah, along with the RECs in Utah and Nevada. One of the main objectives of the IC<sup>3</sup> Beacon community was improving health care provided to patients with diabetes in three counties in the Salt Lake Metropolitan Statistical Area (MSA), urban Salt Lake County, and rural and frontier areas of Summit and Tooele Counties. During the period of the cooperative agreement (2010–2013), *HealthInsight* partnered with 53 primary care clinics to improve the health care provided to patients with diabetes. The IC<sup>3</sup> Beacon team focused on integrating the improvement of diabetes care practices with EHR use, a logical plan given that Beacon and Meaningful Use (MU) were rolled out simultaneously.

While the IC<sup>3</sup> team worked closely with all 53 clinics, this paper will focus on the collaboration with 21 independent (nonaffiliated), smaller health care clinics in the Salt Lake MSA. The remaining clinics were part of two large health care enterprises in Utah with access to robust QI tools and techniques. Literature reviews reveal that smaller clinics require the most motivation and resources to implement new care processes for the purpose of QI.<sup>9,10,11</sup> Therefore, we will describe IC<sup>3</sup>'s efforts to improve patients' diabetes outcomes at these 21 independent clinics.

The team used eight National Quality Forum (NQF)-endorsed process and outcome measures, which included hemoglobin A1c (screening and in-control), low-density lipoprotein cholesterol (screening and in-control), blood pressure (in-control), nephropathy screening, eye exams, and foot exams to track outcomes and measure success. Twelve of the twenty-one clinics were designated as a "robust cohort" due to their early and rapid improvements in comparison to the rest of the clinics. These robust clinics were required to set aims (described in the next section) around all eight measures, meeting at least seven of the eight measure goals.

The primary purpose of this paper is to describe the IC<sup>3</sup> team's strategic use of HIT and practice facilitation to develop and implement new care processes and philosophies to improve clinic workflow and ultimately improve patients' diabetes outcomes at the 21 independent clinics. This descriptive paper is organized

into three parts: (1) clinic assessment, (2) staff training tools and EHR optimization techniques, and (3) clinic-specific QI interventions. Each part is described in the methods section and then elaborated upon in subsequent sections.

## Methods

### Clinic Assessment

Our experience is that successful QI programs focus on patients, clinician teamwork, and data use, and require an understanding of delivery systems and key processes. The IC<sup>3</sup> Beacon team developed a clinical assessment based on best practices described in three main, evidence-based sources: the *Improving Performance in Practice* change package,<sup>12</sup> the *Institute for Healthcare Improvement* tools from their *Health Disparities Collaborative*,<sup>13</sup> and the Veteran's Administration TRIAD Study.<sup>14</sup>

The clinical assessment was used during April 2011 and October 2011 to identify existing resources, key clinical processes, and improvement opportunities at each of the 21 independent clinics. Assessments were completed at practice sites through staff self-reporting rather than direct observation and were based on four areas: practice leadership and engagement in QI, EHR use, protocols and workflows, and patient self-management.

### Staff Training Tools and Electronic Health Record (EHR) Optimization Techniques

Collaborative learning sessions provide a forum for health care professionals to share expertise, enhance their understanding of specific relevant topics with new skills to address them, and provide networking opportunities. We employed Learning and Action Networks (LANs), exemplifying this type of symposium, in our Beacon community. Clinic representatives attended sessions to learn about specific subjects and develop action plans for immediate implementation and evaluation. Three LANs were conducted in April, August, and November of 2011, and the main topics included the following: standard diabetes care, group visits, self-management, EHR use, interoperability between EHRs and the state health information exchange (HIE), measurement using the Model for Improvement's plan-do-study-act (PDSA) cycles,<sup>15</sup> use of a diabetes worksheet, delivery system design, organization of health care, and use of mobile applications for diabetes care management.

Besides dynamic learning and development of immediate action steps, LANs are also an effective method to increase innovation capability and maximize learning within health care organizations.<sup>16,17</sup> Our learning sessions also served to develop a shared learning community in which Beacon clinics established innovative networks of practice among themselves, forming EHR user groups, conducting field trips to visit each other to observe processes, and sharing information about relevant community resources. One of our most highly rated LANs was one in which our robust clinic cohort shared some of their successful best practices, which were consequently established in many other Beacon clinics.

### Clinic-Specific Quality Improvement Interventions

One of the primary strategies employed by the IC<sup>3</sup> Beacon team to provide support to Beacon clinics was the use of multifaceted practice facilitation, a highly successful approach in primary care redesign.<sup>18,19</sup> Practice Facilitators (PFs) possess previous significant experience in health care, project management, use of evidence-based guidelines, and HIT. Since *HealthInsight* is the Quality Improvement Organization (QIO) in Utah, Nevada, and New Mexico, with a long history of physician office work, PFs received internal training in effective facilitation processes, including QI and change management, the chronic care model (with specific focus on diabetes), and EHR optimization.

PFs also received training from *HealthInsight's* Medical Director (SW), regarding the medical aspects of diabetes care, such as proper blood pressure measurement techniques; types of medications used to treat diabetes, such as insulin and antihypertensives; tobacco cessation; behavior change; and the importance of proper nutrition and exercise to control hyperlipidemia. PFs also received ongoing education and training internally, as well as at national ONC conferences to learn about Beacon and REC best practices to share with their clinics. PFs met weekly to share information about topics such as new patient self-management tools, to discuss how to keep staff and providers motivated, and to learn more about MU.

Practice facilitation occurred as on-site clinic meetings with QI teams to review PDSA aim progress. The frequency and length of these meetings varied based on PF's and clinics' needs and experience. The visits, initially, were more frequent, typically weekly, or bi-monthly, as PFs helped staffs develop their internal capacity to embrace QI and practice redesign.<sup>20</sup>

PFs assisted the clinics in developing organized Beacon clinic teams that included a provider champion, a clinic champion, someone with EHR experience, and operational staff (e.g., medical assistants (MAs) interested in QI). The importance of an enthusiastic clinic champion to influence participation and change<sup>21</sup> was recognized early on; this individual often became the main source of contact for PFs.

During Beacon recruitment efforts, we incentivized clinics to participate with offers of reimbursement for HIE interface-building expenses and subscription fees. Some of our Beacon PFs were also REC staff, allowing them to provide dual assistance in QI and EHR work and help providers attain MU and Beacon goals at the same time. Main areas of EHR focus included clinical decision support, data extraction for diabetes measure reports, and data management and analysis for improvement.

In addition, teams focused on system analysis and workflow, process redesign, enhancing organizational performance, improving use of EHRs, and use of the Model for Improvement's PDSA cycles, now a standard QI method in health care. Beacon teams, using their assessment feedback, developed and initiated a series

of PDSA cycles focused on specific aims. These clinic-specific aims were recorded and monitored using the Microsoft Dynamics customer relationship management (CRM) system.<sup>22</sup> Aims were listed with beginning and end dates and varied by clinics' specific needs. Examples include, "Set self-management goals with at least 75 percent of patients," "Increase the percentage of patients with controlled blood pressure," "Increase the percentage of foot exams and subsequent EHR documentation," and "Increase the percentage of microalbumin tests by 5 percent in three months."

Educational efforts associated with aims mostly centered on process change and EHR use, with expectation of consequent clinical measure improvement. Teams received individualized coaching and training in topics such as use of huddles for pre-visit planning, running and using EHR registry reports to identify and contact patients overdue for diabetes screening tests, and the importance of training patients in self-care activities like daily foot exams. PFs provided "lunch and learns" in the clinics to ensure staff could attend, as well as minitrainings during site visits. Beacon teams also received educational resources associated with aims or diabetes care processes, i.e., proper blood pressure measurement techniques for nursing staff.

## Findings

### Clinic Assessment

The assessments conducted initially and quarterly identified process gaps in the 21 participating independent clinics. A summary of these assessments is shown in Table 1. One of the critical findings of the assessment was the realization that the participating smaller and independent clinics had limited experience blending HIT tools and care transformation to improve the quality of health care provided to patients with diabetes. For example, we found that the EHRs at 6 of the 21 clinics provided clinical decision support such as reminders or alerts. However, MAs and providers at 2 of the 6 clinics did not actually review these alerts as part of their routine workflow. A critical aspect of QI is the ability to track performance at the clinic level. While EHRs at 9 of the clinics supported the generation of QI reports, providers reviewed the reports at only 6 clinics.

Early in the process, it became evident that not all clinics had the capacity to derive reliable and useful performance measurement data from their EHRs. To address this gap and to meet the needs of the Beacon cooperative agreement, *HealthInsight* developed a software system to extract data directly from the EHRs used by these clinics. The primary goal of this system was to assist those Beacon independent clinics with limited capability to generate reports from their EHRs. The system was developed at *HealthInsight* and used a client-server architecture model, wherein the main server was housed on the Amazon Web Server and each clinic connected to the system with a locally installed application.

**Table 1. Summary of the Initial Self-Assessment Conducted April–October 2011**

Best Practices and Resources Needed for Effective Diabetes Care	Number (and %) of Clinics Supporting the Best Practice and Resource at Initial Assessment (n=21)
<b>Electronic Health Record (EHR) Templates and Data Capture</b>	
Maintenance of patient problem lists	15 (71%)
Generation of patient-lists by condition	15 (71%)
Clinical decision support (alerts or reminders)	6 (29%)
<b>Practice Leadership and Engagement in Diabetes Quality Improvement (QI)</b>	
Regular meetings for the purpose of QI (or covered in staff meetings)	6 (29%)
Generation of quality reports	9 (43%)
Discussions pertaining to patient schedule (pre-visit chart review, huddle)	10 (48%)
Use of diabetes educators	17 (81%)
Use of health educators	7 (33%)
Use of pharmacy educators	2 (10%)
Use of insulin-administration educators	4 (19%)
Use of patient care managers	1 (5%)
<b>Protocol and Workflow</b>	
Protocol for insulin titration	7 (33%)
Protocol for foot exam by medical assistants (MAs)	7 (33%)
Protocol for blood pressure follow-up	5 (24%)
<b>Patient Self-Management</b>	
Setting of self-management goals at each clinic visit	3 (14%)
Email communication with patients	1 (5%)

The underlying structure of the server application was designed using a MySQL database and used Amazon Relational Database services to store metadata and quality measure results from the clinics. The client installation at each clinic comprised: (1) a service application that, once installed, queried the server periodically for tasks to be executed and launched a processor if new tasks were identified; (2) a processor that executed tasks and pushed aggregated and de-identified data to the server; and (3) a client mini repository that stored all the translated data from the EHR. The software system included processes to select specific tables and fields in the EHR databases to extract the required data to calculate the eight Beacon measures. The mappings were developed using input from IT staff and providers at every clinic using the software system.

### Staff Resource Development and Diabetes Wellness Fairs

The IC<sup>3</sup> Beacon team discovered that the majority of small, unaffiliated practices lacked comprehensive educational resources, particularly for uninsured or underinsured patients. We assisted practice staff in identifying educational and referral resources for their patient populations and loaded these into their EHRs. We also developed educational tools for practices and patients: for clinicians, how to use evidence-based guidelines; and for patients, how

to provide self-care for diabetes-related problems. Clinics were also able to develop local contacts and resource lists of local organizations providing free or low-cost, culturally relevant diabetes-related services and tools for their particular patient populations.

In addition, PFs assisted clinics to hold Healthier Living Days, where patients could walk in to receive all diabetes testing without making appointments. EHR registries were used to identify patients overdue for tests, who then received letters inviting them to appear at clinics at specified times. This proved an effective approach to get large numbers of patients tested to meet requirements for hypertension, cholesterol, microalbumin, A1C, eye, and foot screenings. Patients identified with out of control results were immediately scheduled for follow-up appointments with their providers. Patients also received educational materials to improve understanding of healthy nutrition, the need to exercise, and perform other self-care management. Providers and dietitians were available to answer patients' questions.

### EHR Optimization Techniques

PFs spent significant amounts of time assisting clinics to gain greater understanding and skills in EHR functionality. Besides the immediate discovery of the EHR's inability to extract and provide accurate data, we discovered clinics were documenting test results in a variety of locations, often using free text (e.g., "DM eye exam" and "DM foot exam"), making it challenging to accurately track patient outcomes for the clinic. An example of this prevalent issue was found in one of our robust clinics that provides health care for homeless individuals. The clinic employs a large number of volunteer community providers who visit the clinic once a month. The large number of providers seeing patients made it difficult to train them on where to document test results in a centralized location in the EHR, particularly eye and foot exam results. The PF and Beacon data analyst helped clinic staff locate the optimal place to record results and how to run reports. All staff was trained to capture foot exam test results in the same location in the EHR so our analysts knew from where to gather the data, rather than trying to find the results in unstructured fields. This relatively easy task resulted in a dramatic increase in the number of foot exams being recorded.

### Clinic-Specific Quality Improvement (QI) Interventions

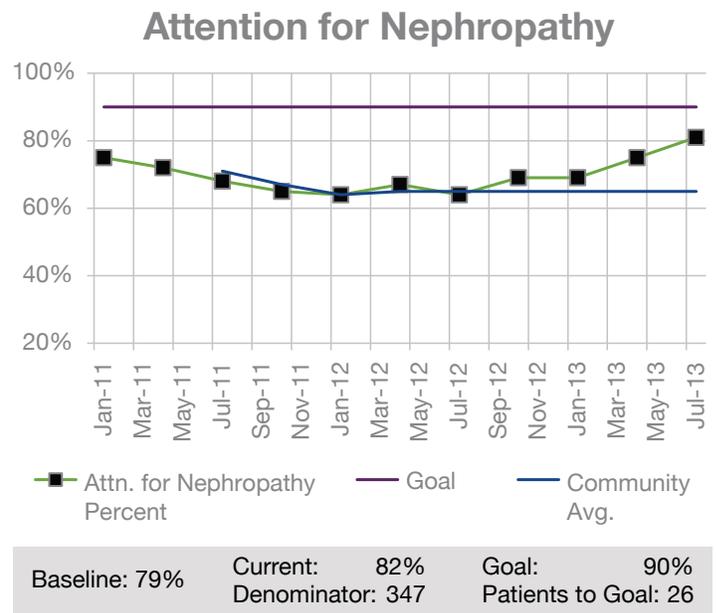
To help the PF and clinic staff track the performance of the Beacon clinics, the *HealthInsight* Beacon team also collected data from all participating clinics, either directly from the EHRs or using *HealthInsight's* software system on a regular basis. The team created graphs for each clinic showing the changing trends for the eight measures. The graphs included line indicators to represent the QI goal and the clinic's current performance and trend over time. Improvement was measured in two ways: (1) actual point difference between the most recent outcome score and the baseline outcome score for each of the eight diabetes measures; and (2) the reduction in failure rate for the outcome score for each of the eight diabetes measures. Of particular interest to clinics was the identification of the number of patients needed to be screened or be in control in order to achieve the goal. The graphs also

included comparisons of performance with the community for each of the eight measures. The PFs used the graphs to provide feedback and consultation and to evaluate the success of the PDSA cycles that were conducted in collaboration with the clinic staff. Figure 1 is an example of the graphs presented regularly to the clinics. The graphs helped clinics determine if their PDSA cycles were creating successful results or if a new approach to a particular measure was needed by observing the direction of the performance line versus the clinic's goal. In addition, clinic staff was notified of the number of patients needed to achieve their clinic's goal for a particular measure.

In addition to the initial assessment, PFs assessed the clinics every quarter from the fourth quarter of 2010 to the third quarter of 2013 to identify if the resources supported by the clinics had changed. An assessment conducted at the end of Beacon found that several of the clinics improved their capacity to support some of the best practices and resources needed for effective diabetes care. A few of the noteworthy changes in the resources supported at the 21 clinics based on the final assessment is available in Table 2. As we can see in Table 2, based on a chi-square test calculation, there was a significant increase in the proportion of clinics supporting decision support alerts and reminders, regular QI meetings, generation of QI reports, discussion pertaining to patient schedule, and protocols for foot exam and blood pressure follow-up. These findings are reflective of the IC<sup>3</sup> Beacon team's emphasis on improving clinics' capacity for QI and HIT.

The assessment conducted at the clinics was based on a combination of studied best practices; hence we are unable to determine a clear data comparison with these specific tools. However, the assessment was found to be very useful for our needs at the initial stages of Beacon. Assessments were conducted quarterly and finally were refined over time based on lessons learned in previous

**Figure 1. Example of Graphical Feedback Presented to the Clinics**



assessments, making it difficult to make summative conclusions on the change in proportion of resources supported by the clinics initially and at the end. Analysis conducted post-Beacon found that the use of clinical decision support tools, alerts and reminders, and discussion of patient schedule correlated with improvements achieved by the robust clinics. These associations were most noticeably found with the increase in nephropathy screenings, but were also associated with blood pressure control and eye exams. While not significant, foot exams and LDL cholesterol control were also somewhat associated with these factors. Future study of these factors may be warranted based on these results.

**Table 2. Summary of Changes in Resources Supported at the 21 Clinics from the Initial (April–October, 2011) and Final (April–August, 2013) Self-Assessments**

Selected Best Practices and Resources Needed for Effective Diabetes Care	Number (and %) of Clinics Supporting the Best Practice and Resource (n=21)		
	Initial Assessment	Final Assessment	Chi-square p-value
<b>Electronic Health Record (EHR) Templates and Data Capture</b>			
Clinical decision support (alerts or reminders)	6 (29%)	16 (76%)	0.00
<b>Practice Leadership and Engagement in Diabetes Quality Improvement (QI)</b>			
Regular meetings for the purpose of QI (or covered in staff meetings)	6 (29%)	15 (71%)	0.00
Generation of quality reports	9 (43%)	16 (76%)	0.00
Discussions pertaining to patient schedule (pre-visit chart review, huddle)	10 (48%)	16 (76%)	0.00
Use of patient care managers	1 (5%)	10 (48%)	*
<b>Protocol and Workflow</b>			
Protocol for insulin titration	7 (33%)	11 (52%)	0.08
Protocol for foot exam by medical assistants (MAs)	7 (33%)	13 (62%)	0.01
Protocol for blood pressure follow-up	5 (24%)	12 (57%)	0.00
<b>Patient Self-Management</b>			
Setting of self-management goals at each clinic visit	3 (14%)	14 (67%)	*

Note: \*Chi-Square inappropriate due to <5 cell count.

All clinics improved in all eight Beacon measures from 2010 to 2013 but, as seen in Table 3, a paired t-test comparison shows that the robust clinics significantly improved in seven of the eight Beacon quality measures. Whereas, improvements for all eight Beacon quality measures for the nonrobust clinics were not significant.

However, given the size of the denominator for the IC<sup>3</sup> Beacon community, each percentage point increase represents a large number of patients with diabetes who are now in control or getting screened for specific diabetes measures.

At the beginning of the IC<sup>3</sup> Beacon project, there was no single composite measure available to determine improvement in overall care. Since then the NQF has endorsed a diabetes composite measure, NQF-0729, but it has never been included in the MU measure lists and is therefore not commonly available to most practices. It is a Physician Quality Reporting System measure, but only clinics using the Group Practice Reporting Option report it and for six-month or one-year periods, not frequently enough to be useful for a QI project.

### Discussion

The Beacon cooperative agreement was awarded at a time when the meaningful use of HIT was still in its infancy in most health care facilities in Utah. The Beacon experience helped introduce the concepts of QI and care transformation in the participating clinics in Salt Lake, Tooele, and Summit counties. Working with MAs and providers at 21 independent clinics, the IC<sup>3</sup> Beacon team helped improve the health care provided to 12,000 patients with diabetes.

Our involvement in the Beacon Project provided significant, invaluable learning opportunities, particularly in the areas of practice transformation, EHRs, and analytics. Studies of these topics have increased substantially since the end of the Beacon cooperative agreement, with national organizations now provid-

ing conferences and publications to increase understanding and awareness. National lessons learned are similarly reflected in the knowledge we gained through Beacon.

### Robust Clinic Outcomes

Robust clinics received intensive hands-on technical assistance in comparison to nonrobust clinics. They received a more comprehensive range of services, educational opportunities, in-person meetings, and feedback, resulting in their greater rates of rapid improvement. One reason for this was the ability of the smaller, independent practices to implement changes faster than system-affiliated practices, which often require months of executive review and approval prior to application. We also found it somewhat easier to schedule appointments and meet with smaller practices than larger ones. This situation may be due to the absence of QI staff in smaller practices, making them more eager for assistance.

The robust clinics, as a cohort, had more interaction between themselves than with nonrobust clinics. They often called each other for assistance, particularly with EHRs; the more experienced users were glad to teach their peers, and did so often. Clinics with similar patient populations and provider numbers also bonded during group training sessions, likely due to their feeling less intimidated than they might with larger systems with greater resources and recognition.

Many of the robust clinics that worked closely together during the Beacon project continue to do so after its conclusion. We often hear about practices contacting each other with continued needs, such as community resources and tools each clinic had developed and shared with others. One clinic, for example, continues to provide others with tools such as their “Provider-MA teamlet” business cards. These cards, for empaneled patients, show their team’s photos, the hours they can be contacted for questions and medication refills, and how to access the patient portal to email providers for test results.

**Table 3. Initial and Final Outcomes for the Eight Beacon Measures for the 21 Clinics**

NQF Measure	Robust Clinics (n=12)			Nonrobust Clinics (n=9)		
	Baseline Clinic mean (%) of patients who met the measure	Final Clinic mean (%) of patients who met the measure	Paired T-Test p-value	Baseline Clinic mean (%) of patients who met the measure	Final Clinic mean (%) of patients who met the measure	Paired T-Test p-value
<b>HbA1c Screening</b>	72	85	.004	76	80	.312
<b>HbA1c Control</b>	47	62	.009	55	57	.504
<b>LDL Screening</b>	52	74	.002	68	73	.057
<b>LDL Control</b>	29	45	.002	41	47	.211
<b>BP Control</b>	67	79	.082	66	69	.621
<b>Nephropathy Screening</b>	62	77	.001	52	52	.909
<b>Eye Exam</b>	17	48	.000	11	19	.104
<b>Foot Exam</b>	22	65	.000	18	22	.216

One practice continues to mentor others with their EHR knowledge, with staff going to other practices to provide actual hands-on training that lasts for several hours. We often hear of practices conducting field trips to observe how successful clinics provide care coordination and care management. Several have shared referral forms they use to improve their ability to get lab and other visit results from specialists, and billing and coding information for care transitions. The *HealthInsight* staff also continues to invite these practices to share their Beacon lessons learned at our Learning and Action Network and other events.

### Robust Clinic Best Practices

The PFs shared best practices among the robust clinic teams. Of particular interest to staff were best practices associated with workflow improvements to increase the capture of foot exam documentation, urinalysis and cholesterol screenings at point-of-care, and correct blood pressure readings. The improvement processes were successful due to the ease of implementation:

- MAs asked patients with diabetes to remove their socks and shoes after entering the examination rooms. This served to remind the provider to conduct the exam, and to remind patients of the importance of daily foot checks. One clinic reported that they almost forgot to do so with one patient, and subsequently discovered an early stage heel ulceration.
- Front desk staff asked patients at check-in if they needed to urinate and sent them to the restroom immediately if so. Many patients, staff found, voided prior to the visit, consequently resulting in their inability to give a urine sample. Patients were asked to return to the clinic to give a sample, but would forget, and the test remained incomplete.
- Similarly, patients would forget to report to the clinic in fasting states, so providers would not order cholesterol screenings. Patients were forced to return for this test, resulting in another opportunity for them to forget and causing unnecessary delays. PFs shared evidence-based research about using nonfasting testing with providers. Some were reluctant to try this, but eventually began after peers shared confirmation of success.
- MAs received training on the importance of proper blood pressure measurement techniques, the need to recheck when readings were high, to advise the provider of high readings, and to remember to document correct readings into the EHR.

### Clinic Champions

Beacon clinics that met their clinical aims did so largely due to the presence of clinic champions. In our experience, clinic champions were often the driving force of Beacon success. Champions reflected a variety of disciplines from clinic managers, MAs or other nursing staff, to billing managers. As numerous studies attest, the following attributes are crucial: core behaviors of enthusiasm in promotion of innovation, networking, and resource utilization; overcoming “political” issues within organizations; providing a compelling vision; and increasing staff skills and confidence.<sup>23</sup> Most clinic champions were given authority by their leadership to hold team members accountable for not completing required

tasks or attending meetings. Clinic champions also went directly to providers whose clinical measures were not improving, to discover why and to offer assistance.

However, the mere existence of clinic champions did not result in improved clinical aims, as many were forced into the role by their leadership. Clinic managers were often assigned to lead the clinic’s Beacon QI team, regardless of aptitude for leadership, organizational skills, or EHR experience. For this reason, we cannot say that the presence of clinic champions is directly correlated with positive changes, but we can say there did appear to be a significant correlation with enthusiastic clinic champions. This topic bears additional research, as the clinic champion can be an important resource in change management.

### Quality Improvement (QI) Infrastructure

These clinics also demonstrated the ability to learn conceptually and operationally; that is, the “know-why” conceptual learning needed to understand cause and effect.<sup>24</sup> Clinics were taught to move beyond operational learning to address short-term goals, initially used to build confidence and motivation, to learning about QI theories and methods they could apply to other disease management processes and patient populations. We found that many MAs, for example, did not understand the importance of eye exams for patients with diabetes, so they often did not encourage patients to make and keep appointments.

The majority of our small, independent clinics lacked knowledge and experience with QI methodology, particularly in frontline staff and managers,<sup>25</sup> with whom we met the most frequently, but also with providers. This included management and leadership training, use of metrics as outcome- and performance measurement, and effective communication. Practices also lacked time, resources, staffing, and adequate HIT, which also presented unique challenges.<sup>26</sup> The absence of a QI culture, including change management, dictated the need to establish this as a foundation before real clinical success could be attained. QI, as noted by Coleman and Endsley,<sup>27</sup> often evokes dread in physicians, due to its association with extra work and confusion with quality assurance. PFs, therefore, had to establish a more holistic approach than initially expected, beginning the process by establishing trust, and educating staff in such basics as how to facilitate effective meetings.

The *HealthInsight* staff sustains contact and continues to assist our former Beacon clinics in a wide variety of additional QI work. The practices, with their QI framework, excel at new projects due to new skills and understanding of how to identify, assess, monitor, and evaluate their activities. The practices’ level of improvement is not only being maintained, but increased, as we speak with staff who now attend national conferences to continue learning about new models of care and how to improve patients’ health. These same practices attend our Patient-Centered Medical Home (PCMH), Physician Quality reporting System (PQRS), and Million Hearts webinars. We see practices sharing their Beacon reports and dashboards at local workshops to demonstrate how

they improved their care quality, and we see them becoming more involved in our communities by reaching out to others, forming coalitions, and serving on committees.

### Challenges and Lessons Learned

Change fatigue was common in our Beacon clinics, as transformational change is intimidating, arduous, and can cause staff burnout if done too quickly.<sup>28</sup> Additionally, studies now reveal that small- to moderate-size clinics find practical application of measurement and innovation difficult due to the substantial motivation and resources needed. The close coupling of practice facilitation techniques and HIT by the IC<sup>3</sup> Beacon team helped alleviate some of the challenges discussed in other QI projects to improve diabetes care.

Although we had clear understanding of desired clinical outcomes, in retrospect, we underestimated the level of commitment and work clinicians needed to be dedicated to the Beacon project. This occurred partly due to the unknown aspects of EHRs, as well as understanding of small, independent clinic culture. We slowly discovered that the majority of our small clinics lacked knowledge and experience with QI methodology, particularly in frontline staff and managers, with whom we met most frequently, but also providers.

Unrealistic or undefined expectations on both the PF's and clinics' parts, coupled with absence of clinician time, resources, staffing, and adequate HIT, also presented unique challenges. Our initial clinical assessment did not address practice readiness for change so some clinics lacking the requisite QI culture and engagement were recruited, ultimately leading to some clinics being dropped from the Beacon project altogether. The absence or limits of a QI culture, including change management, dictated the need to establish this as a foundation before real clinical success could be attained.

Beacon PFs represented a diverse range of education, expertise, and experience in health care, QI, project management, and facilitation skills. Efforts to determine the amount of time and frequency of site visits, levels and types of education and training provided, and facilitation skills and needs to best effect change, were ultimately not determined in our project as the variation in skill level and clinic desire for assistance both varied. Clinic feedback about practice facilitation was quite positive, with many clinics reporting that they could not have met goals without it.

The Beacon project began at the same time as the REC's MU, which had both positive and negative consequences. We believed EHR adoption and use could be gained faster using diabetes care improvement as the platform to demonstrate EHR functionality. As mentioned previously, some Beacon PFs were also REC staff, which we thought would give clinics the added advantage of real-time EHR use for diabetes care.

Beacon clinics attained MU, but some did not often completely gain the requisite understanding of improving diabetes care pro-

cesses because REC staff possessed greater EHR technical experience than QI. Conversely, Beacon PFs had greater understanding of clinical processes and QI than they did of EHRs, necessitating bringing REC staff to site visits. Clinics, as a result, were often confused about the two different programs and how they overlapped, as well as facilitator roles and tasks, making it difficult for them to know who to call for extra assistance. Extensive cross training between the two types of PFs would likely have provided a more streamlined process, decreasing misunderstandings of the programs' purposes, as well as different goals and expectations. Costs may have also been lower from paying one facilitator salary rather than two, and avoiding duplication of efforts.

EHR adoption and functionality provided significant challenges throughout the Beacon project, particularly in the ability to run meaningful clinical data reports for population health purposes, an issue that is still problematic today. RECs nationwide reported over 19,000 issues in 2012, with provider engagement and administrative challenges ranked highest.<sup>29</sup> Practice, vendor, and attestation emerged as the three top issues. We discovered the same three issues with our independent Beacon clinics. However, attestation processes were much less problematic since the Medicaid program was up and running; practice and vendor issues provided the majority of difficulties. The 21 independent clinics participating in IC<sup>3</sup> Beacon used 12 different EHR systems, illustrating the challenges posed while interacting with multiple dissimilar systems. The MU reports generated by certified EHRs are not always useful for QI initiatives, partly because the MU reports are provider specific and may not always be useful to other clinics. A close collaboration with vendors is needed to make their products more robust and able to produce the reports needed to evaluate and improve patient care. Additionally, future projects like IC<sup>3</sup> Beacon will be instrumental in changing clinic culture so that QI becomes routine.

Data documentation proved to be a significant hindrance in the monitoring of QI outcomes. Despite the use of a software system to automatically extract data from clinics' EHRs, the team faced several challenges validating the data and ensuring that the data reflected the reality of practice. Clinics continue to document data using free text as opposed to structured coded elements. While processing free text is becoming more common due to natural language processing methods, these sophisticated tools are not commonly available in smaller clinics with limited resources.

### Conclusion

Our efforts led to significant changes in how practice staff optimized their EHRs to manage and improve diabetes care. They also developed competencies in QI methods, team-based care, systems thinking, and data analysis, while establishing the framework for sustainability. We continue to work with some of the Beacon clinics in other improvement initiatives, and have discovered that many clinics have integrated lessons learned through the Beacon initiative. One clinic, for example, continues to use PDSA cycles to test changes, another has fully implemented a highly successful MA-led care coordination program. They have all learned and

continue to use registries for population health, have implemented formal care transitions processes and billing, and use alerts and reminders.

Some of the nonrobust clinics have not maintained some of the changes made during the initiative. One clinic that was visited a year later was no longer using some protocols and processes, such as group diabetes classes; another was not using patient self-management techniques that had been learned, and approached *HealthInsight* to work with them again to reconcile this issue. Some of the IC<sup>3</sup> Beacon practices are currently transitioning to new models of care such as PCMH. Four of the Beacon clinics are in a PCMH pilot. They wanted to participate, although Utah payers are not yet reimbursing for this model, because they wanted to sustain and grow the practices they learned through the Beacon project.

Many of the Beacon clinics continue to ask for more training and assistance in practice redesign, and are participating in smaller QI initiatives for diabetes and other chronic disease management. One robust clinic modified the Beacon QI process and applied it to patients with Chronic Obstructive Pulmonary Disease, and is participating in a clinical study. Another is positioning itself to join an Accountable Care Organization.

Through this process we learned that an extensive readiness assessment improved clinic retention, clinic champions were important for successful QI efforts, EHR systems do not necessarily come ready to produce reports needed to track patient progress, and that financial incentives were needed for clinician motivation and follow through. In general, smaller, independent clinics lack knowledge and experience with QI. These clinics also lack time, resources, staffing, and adequate HIT to improve patient care using electronic clinical data, pointing to greater need for expert technical assistance. As our national health care leaders continue to focus on the Triple Aim, they must also put consideration into providing free assistance, or reimbursing practice staff for initiating and improving health care.

The experience, knowledge, and skills gained by clinics and *HealthInsight* staff resulted in building a strong foundation for all future initiatives, as we have greater understanding into practice transformation and change management. A strong QI infrastructure, including visionary, supportive leadership, highly committed staff and teams, improved communication skills, and understanding and use of quality and performance metrics is crucial to practice transformation. Our staff has improved clinic recruitment processes, developed clinic retention plans, and has increased focus on change management as a result of Beacon lessons learned.

IC<sup>3</sup> Beacon has been instrumental in creating a strong community partnership among various organizations, as well as serving to improve collaboration among providers representing a comprehensive range of services and specialties. The Beacon project directly

benefits health care consumers as practices begin to move toward a more integrated medical neighborhood, providing patient-centered care focused on addressing health and well-being, not just health care. The IC<sup>3</sup> Beacon project in Utah met and continues to meet the shared vision of better health and lower costs, and the experience of the last few years has helped the community prepare for the changing health care landscape.

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