

PROJECT NARRATIVE

The mission of the Greater Boston Quality Coalition (GBQC) is to improve the quality and cost-effectiveness of care provided to patients in our community by focusing on ambulatory care sensitive conditions (ACSCs)—conditions that require good community-based care to prevent emergency department (ED) visits, hospital admissions and re-admissions. Despite many successful quality improvement (QI) activities in individual organizations in Greater Boston, there is a lack of coordinated activity across settings. Realizing a transformational vision of ambulatory care improvement requires engaging practices, patients, employers, health plans, and the community by integrating relevant information from data systems, coordinating quality measurement and reporting, and implementing comprehensive education and training.

We will initially focus on two specific conditions, **diabetes and pediatric asthma**. Diabetes represents the single largest public health issue facing both cities with the rate of hospitalizations for diabetes increasing over 33% between 1998 and 2007. Asthma accounts for a high proportion of pediatric hospital admissions in Boston and Cambridge and affects a disproportionate number of minority children. Ten percent of hospitalizations in 2007 for children under five years old were for asthma. These two conditions offer excellent starting opportunities for sustainable improvements in providing Boston and Cambridge residents with the right care, at the right time, in the right setting.

The GBQC is a powerful consortium with:

- Massachusetts Health Quality Partners (MHQP) – a broad based collaborative with a national reputation for quality measurement, provider feedback, consensus building and leadership in QI, public reporting and consumer engagement. MHQP is the operational home and fiduciary agent of GBQC.

- Eastern Massachusetts Healthcare Initiative (EMHI) – a coalition of Greater Boston Healthcare CEOs building consensus around the need for interoperable health information technology (HIT).
- New England Healthcare Exchange Network (NEHEN) –one of the most well-established and longest sustaining regional health information exchanges (HIEs) in the nation supporting care coordination, public health and quality measurement and reporting, based on the federal standards for certification and meaningful use.
- Massachusetts eHealth Collaborative (MAeHC) – an organization committed to assisting communities locally and nationally with practice and workflow redesign to optimize electronic health record (EHR) use, achieve meaningful use, and provide quality measurement and feedback through its Quality Data Center (QDC) data warehouse.
- Boston Public Health Commission (BPHC) – the City of Boston’s Health Department, providing public health leadership, in partnership with the Cambridge Public Health Department (CPHD).
- Massachusetts eHealth Institute (MeHI) – the state’s designated entity leveraging, coordinating and concentrating HIT efforts, state and federal funds and other assets
- Private and Public sector provider, payer, employer, and consumer Coalition members—leveraging expertise and experience in advanced EHR / HIT implementations, QI, and patient/family engagement that form the platform for ongoing system re-design activities in the Commonwealth to reduce hospital admissions, develop patient centered medical homes, improve care transitions and reduce the cost of health care.

As explained in the balance of our application, Greater Boston is unique in the breadth, depth and capacity of our existing collaboration and in the quality, competency and track record of the

organizations that make up GBQC. As a Beacon Community, the Consortium will extend Greater Boston's nationally recognized leading HIT capabilities in coordination with our substantial performance measurement, delivery system improvement and consumer engagement expertise. Through Beacon we will deliver a set of coordinated and integrated services including:

- Practice redesign and meaningful use assistance
- HIT design, development, rollout and workflow integration
- Support for QI interventions
- Standard evaluation, measurement, reporting and feedback
- Multiple patient and consumer engagement mechanisms
- Project management, governance, planning and facilitation
- Coordination with ongoing system redesign activities in the Commonwealth of Massachusetts through relevant Executive Office of Health and Human Service agencies.

We believe no other community in the nation is as likely to drive sustained QI and cost efficiencies through meaningful HIT use as Greater Boston over the next three years.

A. Current State and Gap Analysis of EHR Adoption and Meaningful Use

Current EHR Adoption Rates

Greater Boston's estimated EHR adoption rate for non-hospital based, ambulatory care physicians is 76%. The denominator for this calculation was drawn from the MHQP Massachusetts Provider Database (MPD). The MHQP MPD is a comprehensive and continuously maintained database grouping Massachusetts physicians into practice sites and medical groups. From the MPD, a total of 4,608 unique ambulatory based physicians are practicing in the region within 43 medical groups and 558 practice site locations. Over 90% of these physicians are affiliated with at least one of the six large physician networks in the region,

all of which are participants in this project. The numerator for this rate was drawn from survey data collected from these six networks. All of these networks have either completed or are in the process of system-wide EHR implementations as attested from the survey.

This analysis validates previous survey based studies conducted in Massachusetts in 2005 and updated in 2007 where the weighted practice site EHR adoption rate for the Greater Boston region was 43.8% with an estimated 65-70% of individual providers having EHR capability.¹

For hospital based providers, EHR adoption statewide in Massachusetts is estimated at 50% based on results from an online survey conducted by MeHI in June 2009. %. In Greater Boston specifically, all hospitals being targeted for the Beacon initiative have fully implemented EHR capabilities or expect to complete implementation in 2010. The survey asked about Computerized Physician Order Entry (CPOE) and all other technology needed to achieve meaningful use. The survey was completed by hospital Chief Information Officers (CIOs) and the response rate was 100. The advanced EHR penetration in Greater Boston positions the GBQC to provide access to proposed HIT tools that will enable large numbers of clinicians and clinical entities in the Boston area to more rapidly and effectively achieve meaningful use.

The project will serve a region defined by the nine hospital service areas (HSAs) below, as identified in the Dartmouth Atlas, encompassing the following ZIP Codes:

Community	Zip Codes	Hospital Service Area
Arlington	02474, 02476	Arlington
Belmont	02478, 02479	Cambridge

¹ Steven R. Simon, Christine S Soran, Rainu Kaushal, et al. “Physicians’ Use of Key Functions in Electronic Health Records from 2005 to 2007: A Statewide Survey” J Am Med Inform Assoc. 2009 July-Aug: 465-470. Boston-specific EHR adoption estimates resulted from sub-analyses conducted by Dr. Simon not presented in the published article.

Community	Zip Codes	Hospital Service Area
Boston	02108- 02125, 02127-02137, 02196, 02199, 02201, 02203-02206, 02210-02212, 02163, 02215, 02217, 02222, 02228, 02241, 02266, 02283, 02284, 02293, 02295, 02297, 02298	Boston
Brookline	02445-02447	Boston
Burlington	01803, 01805	Burlington
Cambridge	02138-02142, 02238	Cambridge
Chelsea	02150	Boston
Dedham	02026, 02027	Boston
Everett	02149	Boston
Lexington	02420, 02421	Arlington
Medford	02155, 02156	Medford
Needham	02492, 02494	Needham
Newton	02456, 02458-02462, 02464-02468, 02495	Newton
North Reading	01864, 01889	Winchester
Quincy	02171	Boston
Reading	01867	Winchester
Revere	02151	Boston
Somerville	02143-02145, 02153	Somerville
Waltham	02451-02455	Waltham
Watertown	02471, 02472, 02477	Cambridge
Wellesley	02457, 02481, 02482	Newton
Weston	02493	Waltham
Wilmington	01887	Winchester
Winthrop	02152	Winthrop
Woburn	01801, 01806-01808, 01813, 01815, 01888	Winchester

Providers Targeted for Direct Assistance

Greater Boston’s advanced EHR penetration provides a unique platform for this proposal, allowing us to involve a large number of providers without needing to devote significant project funds and resources to direct assistance on licensing and installing EHR technology. Rather, we will devote our resources to engaging with providers on how to use their existing EHR and HIE capabilities in a meaningful way to facilitate improvements to care quality, coordination and cost-effectiveness. There are over 4000 unique ambulatory providers practicing within six large physician networks and 34 community health centers (CHCs) affiliated with seven Boston

hospitals potentially eligible for assistance through a Greater Boston Beacon program. The exact number of providers requiring assistance and the detailed nature of the assistance they will require will be determined based on further analysis and the final design of the interventions planned under the project, as explained later in the application.

Uninsured, Underinsured, Medically Underserved and Minority Individuals

Since the passage of Massachusetts' landmark health care reform legislation in 2006, the Commonwealth has achieved near-universal health insurance coverage. Universal health insurance coverage provides our community and the nation with a unique opportunity to study many health care interventions on a population health basis and provides an early indicator of how health reform will play out on the national stage over the next several years. This is especially true as access to health services relates to the uninsured at the point of transition to becoming insured, and to the medically underserved and minorities, as they make up an important segment of the population experiencing that transition.

Based on the 2008 Massachusetts Health Insurance Survey, only 2.6% of residents statewide are without health insurance, but lack of coverage remains disproportionately high among Hispanic residents, at 7.2%. Furthermore, the Commonwealth, health plans, and providers are struggling to change patient behavior among many of the newly-insured to redirect them from utilization of EDs and hospitals toward more effective community and office-based care settings. Massachusetts' early experience with universal coverage, in fact, has already exposed that while it is a critical first step in improving the health of our underserved population, it is not sufficient to ensure access to the right services, at the right time, in the right place for patients and families.

The cities of Boston and Cambridge, the focused area for our project's interventions, have a combined population of close to 700,000. Approximately 23% of the residents in the two cities are Black and 14% are Hispanic. Almost one in four residents is foreign-born, a percentage that has been rising for decades. The largest numbers of residents are from Haiti, the Dominican Republic, China, Vietnam and El Salvador. Approximately 19% of residents live below the poverty line. The burden of poverty is disproportionately felt by children, especially those living in female-headed households, and people of color. In 2007, almost one-third (31%) of Boston's children lived in households whose income fell below the poverty level; 51.8% of female-headed households with preschool children have income below the poverty line. Black, Hispanic, and Asian males were 2.5-3.5 times more likely than white males in Boston to be unemployed. Race-based inequities in health outcomes exist across the life-span, with Black infant mortality rates (IMR) 2-4 times higher than white IMR, and Black residents living on average five years shorter than White residents.

Massachusetts and the Greater Boston area are national leaders in the collection of race and ethnicity data, with several regulatory mandates and initiatives intended to create robust data for integration into measurement, reporting, and QI in Greater Boston and across the state. The BPHC has worked with Boston hospitals to implement the uniform data framework developed by the BPHC in partnership with the Massachusetts Department of Public Health and the Massachusetts Division of Health Care Finance and Policy (DHCFP). Presently, 80% of hospitals in Boston— 10 acute care and one specialty care—are reporting four demographic measures (race, ethnicity, language, and level of education) to the BPHC for every inpatient admission, ED visit, or observation unit stay. The BPHC has developed a secure database to receive and capture this data for further analysis. In ambulatory care, some CHCs are collecting

this data but reporting to the BPHC has not begun yet. A key outcome of the Greater Boston Beacon project will be to leverage the excellent progress already being made in the area of race, ethnicity and language (REL) data collection to greatly improve our ability to track, understand root causes of, and develop interventions to reduce care disparities. More specifically, through Beacon, we will link REL data to information on access, utilization patterns, treatment and patient care experiences to 1) identify quality measures to report on by REL and level of education; 2) develop a process and framework to report the data to hospitals, health centers, and the public; and 3) support hospitals and CHCs in developing QI strategies.

Federally Qualified Health Centers and Safety Net Providers

There are over 40 CHCs within the Greater Boston Beacon Community geographic area – of which 34 are within Boston and Cambridge and will be eligible for inclusion in our project. To most effectively leverage and coordinate Beacon related activities within CHCs, we will be partnering with: 1) the Massachusetts League of Community Health Centers, an official HRSA recognized (PCA) primary care association for MA serving all FQHCs in the state; 2) Boston HealthNet (BHN), a partnership of BMC, Boston University School of Medicine, and 15 Boston CHCs and 3) individual institutions within the Beacon community with CHC affiliations-- Beth Israel Deaconess Medical Center (BIDMC) for example has affiliations with five HRSA supported CHCs: Dimock, Fenway, South Cove, Joseph M. Smith and Outer Cape Health Services.

The MA League is authorized by HRSA to provide training and development activities for centers related to P4P, managing change, and improving the redesign of the primary care visit. They have been assisting CHCs for 5 years in the readiness for EMR implementation, actual project guidance, support for implementation, and meaningful use. Boston HealthNet has

a highly evolved HIT infrastructure and has been the recipient of five HRSA grants to support CHCs implementation of HIT, meaningful use, development of data warehouse, and reporting capabilities to CHCs.

Cambridge Health Alliance (CHA) and Boston Medical Center (BMC) are the two largest safety-net hospitals in Massachusetts, serving large numbers of low-income patients covered by MassHealth (the Massachusetts Medicaid program). More than half of BMC patients have an annual income at or below poverty level, and about 70% of its patients are covered by public insurance and come from under-served populations — including low-income families, elders, people with disabilities, minorities and immigrants.

Collaboration with Institutions Training Health IT Professionals

The GBQC is working closely with MeHI, the state's designated agency for HIT coordination and HIE in the Commonwealth, as well as the Regional Extension Center (REC) for Massachusetts. In addition to the activities associated with the HIE and REC, MeHI, in collaboration with a broad base of stakeholders across the state, is currently developing a statewide strategy for HIT workforce development. In the meantime, the institutions that make up the GBQC house many of their internal and, in the case of academic institutions, external training programs for HIT professionals and medical professionals interested in the use of HIT.

VA hospital, DOD Medical Facility, IHS or Other Tribal Health Facility

There are no Department of Defense (DOD), Indian Health Services (IHS) or tribal health facilities in the service area. The Veterans Administration (VA) Boston Healthcare System has campuses in the Jamaica Plain and West Roxbury neighborhoods of Boston and outpatient clinics in Boston and neighboring Quincy. While Greater Boston is not a Virtual Lifetime Electronic Record (VLER) site, the GBQC infrastructure uses the same NHIN standards that the

VA intends to use for its interoperability projects allowing for future linkages when VA NHIN projects are developed throughout the country. The Boston VA has committed resources to participate on the GBQC Leadership Team to assure that the VA perspective is included in all aspects of the Beacon project and to create a partnership that will ultimately allow more timely and efficient interoperability between the VA and other settings. Similarly, we have worked with the CIO of IHS to ensure that GBQC can exchange data using the same patient summary and transmission standards as those being adopted for HIE by IHS.

Infrastructure Providing Secure Electronic Exchange of Health Information

As well detailed in other areas of the proposal, the New England Healthcare Exchange Network (NEHEN) –one of the most well-established and longest sustaining regional health information exchanges (HIEs) in the nation—will provide the HIE infrastructure for the GBQC Beacon Program.

Labs, Pharmacies, Diagnostic Centers, and Other Entities

The key provider participants in the project along with their affiliated physicians, CHCs and community hospital partners encompass a wide range of care settings and functions, including labs, pharmacies, diagnostic centers, and others. Among them, they provide the majority of patient care across Greater Boston and will bring enough volume and diversity to sufficiently test meaningful HIT use and our planned interventions for better ACSC outcomes.

Ninety-five percent of pharmacies in Massachusetts are connected to e-Prescribing networks and Massachusetts has been the #1 e-prescriber in the nation for three years.

B. Goals and Objectives

GBQC's vision is to create transformational gains in the health of Greater Boston residents by focusing on and applying HIT to the treatment and management of ACSCs – those

conditions for which good outpatient care is viewed as necessary to prevent complications and progress toward more severe disease that could result in ED visits and hospitalizations.

The realization of this vision can be demonstrated in the following future state case example. By 2014 when a child is taken to a Boston hospital ED with initial symptoms of asthma, his/her care will proceed as follows. The ED staff, after providing treatment, will consult with the family regarding the potential that the child has asthma. They will provide the parents with information about the comprehensive asthma management program that has been developed by GBQC and provide culturally tailored educational information in a medium that is most accessible to the family (i.e. cell phone application, written materials, interactive web-based links). Importantly, the patient and family will learn the critical importance of having access to a primary care Medical Home setting for both acute and longitudinal care for asthma, as well as all other health issues. Based on existing pathways for care integration enabled by interoperability, a CHC in the family's neighborhood will be identified. The discharge care plan will indicate both the necessary elements of asthma treatment and the need for timely follow-up in the Medical Home setting within 24 hours. The family will receive a copy of the care plan and agree to have it sent to the CHC so an appointment can be set up.

The CHC, upon receiving the discharge summary electronically will initiate a set of processes that have been defined and are measured by the GBQC. The practice will reach out to the family to arrange an initial appointment after which the clinical encounter and test results will be incorporated directly into the child's EHR. Prescriptions for appropriate asthma maintenance medications will be transmitted electronically to the pharmacy. If the child's prescriptions expire and the family does not refill them, the CHC will receive an electronic alert that will trigger an outreach call to the family. An asthma care plan based on national treatment

guidelines and a referral for home environmental assessment will be generated directly from the EHR. The family will be queried about access to the internet and provided with training on setting up and using a personal health record (PHR) through a secure patient portal to connect to culturally tailored educational resources, communicate with the practice, and give permission for other community providers to access the child's asthma care plan, including school nurses. The practice will schedule follow-up appointments as needed and periodically contact the parents through cell phone text messages or email to check on progress.

On a parallel track, each patient visit will create a clinical care document that is transmitted to the patient registry at the QDC for inclusion in ongoing measurement and reporting. The CHC will receive periodic physician and practice level performance reports on both utilization and quality of care provided to asthma patients to inform progress on quality improvement interventions and needs for new interventions. Data from this case and other cases will be aggregated and continually monitored through the GBQC/BPHC data warehouse. This data will be analyzed to understand patterns of care disparity within and across neighborhoods in Boston and determine potential interventions to reduce disparities.

From this vision, GBQC has identified five specific and immediate community goals for Beacon grant period:

1. Reduce preventable ED visits, hospital admissions, and readmissions, for patients with diabetes and pediatric asthma.
2. Improve public health surveillance to collect standardized REL and level of education data for all patients seen in ambulatory care settings.
3. Improve public health surveillance to identify and reduce care disparities.

4. Increase the compliance rate of recommended treatment and positive care outcomes for patients with diabetes and pediatric asthma.
5. Improve patient care experiences and patient engagement through IT enabled interventions.

Additional details associated with these goals are provided below, including specific improvement targets and baseline metrics.

Specific goals, improvement targets and performance metrics

Goal	Measurable Improvement Target	Baseline Metric(s)	
1. Cost Efficiency Goal: Reduce preventable ED visits and hospital admissions and readmissions for patients with diabetes and pediatric asthma.	Reduce the number of ED encounters and hospitalizations for pediatric asthma patients and pediatric and adult diabetes patients at Beacon institutions by 25% over the grant period.	Asthma – ED visits (pediatric)	57,463
		Asthma – Admissions (pediatric)	13,222
		Diabetes – ED visits (adult and pediatric)	105,139
		Diabetes – Admissions (adult and pediatric)	27,538
		Note(s): ED and Admission data drawn from 2008 data for six of seven hospitals targeted for intervention.	
2. Population Health Goal 1: Improve public health surveillance to collect standardized REL and level of education data for all patients seen in ambulatory care settings.	All Beacon practices and CHCs included in pilot interventions will submit REL data on 100% of patient encounters by the end of the grant period.	While 11 of 14 Boston hospitals currently transmit standardized REL data to BPHC, no CHCs or ambulatory care practices in Boston are currently submitting this data.	
3. Population Health Goal 2: Improve public health surveillance	A uniform community-wide measurement framework (“disparities dashboard”) will be implemented across	Several individual institutions within Greater Boston measure care disparities, but no standardized, ongoing community-wide	

Goal	Measurable Improvement Target	Baseline Metric(s)	
to identify and improve care disparities.	all Beacon hospitals and ambulatory care settings by the end of the grant period for reporting to BPHC for analysis measures related to ACSCs according to REL and level of education (starting with diabetes and asthma).	measurement and monitoring is taking place.	
4. Quality Improvement Goal 1: Increase the compliance rate of recommended treatment and positive care outcomes for patients with diabetes and pediatric asthma.	Increase the percentage of patients receiving all recommended ambulatory services for diabetes and asthma by 50%; increase the percentage of patients in good control by 25%.	Asthma – Use of appropriate medications (age 5-17)	87-100%
		Asthma – Assessment	TBD**
		Diabetes – HbA1c Testing (adults)	89-97%*
		Diabetes – HbA1c Testing (children)	TBD**
		Diabetes – LDL screening	56-97%*
		Diabetes – Retinal eye exams	66-91%*
		Diabetes – Blood pressure screening	TBD**
		Diabetes – Foot exam	TBD**
		Diabetes – Foot care and education implemented	TBD**
		Diabetes – Comprehensive Composite (all 5 diabetes screening tests performed)	TBD**
		Diabetes – Good HbA1c Control (<8)	69%†
		Diabetes – LDL-C Controlled (<100mg/dl)	54%†
		Diabetes – Blood Pressure Controlled (<130/80)	38%†
	Note(s): *Range of Performance Among Greater Boston Primary Care Medical Groups for Commercially Insured Patients (MHQP, 2009). ** Not currently collected. Will be added for Beacon. Baseline		

Goal	Measurable Improvement Target	Baseline Metric(s)	
	data to be collected at practice level in first four months of grant. † Statewide rate. Baseline data to be collected at practice level in first four months of grant.		
5. Quality Improvement Goal 2: Improve patient care experiences and patient engagement through IT enabled interventions.	Patient experience measures have proven challenging for physicians in Massachusetts and in other markets nationally to demonstrate improvement on in the absence of highly focused, intensive QI efforts ² . Individualized practice level improvement goals will therefore be set with each CHC and ambulatory practice based on baseline performance on these measures and strategic plan for QI.	Quality of physician-patient communication	84-98*
		Physician knowledge of the patient	76-94*
		Integration of care	73-93*
		Health Promotion	45-69*
		Access	65-91*
		Clinical team	70-94*
		Caring for a chronic condition	TBD**
		E-mail communication or web messaging	TBD**
		Doctor use of computer or hand held device	TBD**
		Patient Access to online patient health record (PHR) or EHR	TBD**
	Note(s): * 95 th Percentile Range of Mean Scores Across Practice Sites for Commercially Insured Patients (MHQP, 2009). <i>A 2008 MHQP pilot study of care experiences among MassHealth (Medicaid) patients showed significantly lower results when compared to commercially insured patients across all measures except health promotion, where score were comparable.</i> ** Not currently collected. Will be added for Beacon. Baseline data to be collected at practice level in first four months of grant.		

² California Quality Collaborative, Patient Experience Collaborative Evaluation, from presentation of evaluation results.

C. Proposed Strategy

Our strategy for achieving the goals outlined above will rely on the following:

- Leveraging our existing advanced HIT infrastructure.
- Coordinating with state-and federally sponsored HIT activities led by MeHI.
- Building on our advanced capabilities for evaluation, measurement, reporting and feedback.
- Building on the foundation of work on system redesign ongoing across the Commonwealth.
- Leveraging existing community-wide governance and strong working relationships.
- Incorporating our activities into already-sustainable models and organizations.
- Emphasizing multi-modal and multi-stakeholder participation.
- Fully embracing Greater Boston's diversity to address multiple population and provider needs and to achieve multiple goals, based on our system-wide approach, flexibility and breadth.

Advanced Infrastructure for secure electronic exchange of health information.

Greater Boston has a well established and advanced infrastructure for secure HIE based on a history and significant capacity to develop HIT infrastructure and applications; the participation of nearly all leading health care organizations in our geographic region in NEHEN; the presence and early pilot work in community-based EHR integration into patient care by MAeHC; and a widely shared awareness across the community of the importance of HIT.

NEHEN is providing GBQC's integrating HIE capability. Founded in 1998, NEHEN has evolved over the last five years to expand its mission beyond the administrative transaction

processing it was originally formed to enable to a mixed clinical/administrative mission. In 2003, interested NEHEN participants formed a counterpart organization, Massachusetts Simplifying Among Regional Entities (MA-SHARE), to begin collaborating on clinical data exchange. MA-SHARE conducted a number of pilot projects, including participating in one of the four original ONC-sponsored NHIN Architecture Prototype projects, led by Computer Sciences Corporation (CSC), NEHEN's long-standing program manager and HIT partner. This allowed MA-SHARE to leverage the NEHEN infrastructure and led to MA-SHARE's contracting with CSC for services similar to those being provided to NEHEN. Merger discussions between MA-SHARE and NEHEN begun in 2008 led to NEHEN's being reincorporated in July 2009 as a 501(c)(3) corporation, with an expanded board including participants from MA-SHARE and the community.

In parallel, beginning in late 2008, EMHI turned to NEHEN and CSC to explore how HIT interoperability could be used to promote Greater Boston health care improvement goals. Through EMHI, NEHEN is already engaged with GBQC members in meaningful use pilots for e-prescribing and sharing continuity of care document (CCD)-based clinical data summaries at transitions in care. NEHEN's plans are based on a thorough understanding of the EHR, HIT and HIE capabilities of the region's health care organizations and are fully-aligned with emerging national standards and current and projected NHIN specifications.

Existing EHR implementation programs being funded by most of the participating hospital and physician systems in GBQC, combined with meaningful use incentives from Medicare and Medicaid, some potential funding from other state sources, \$13.4M of REC funding and \$10.6M in Statewide HIE funding, will carry Greater Boston far beyond the 60% threshold for primary care provider (PCP) adoption of EHRs. Our focus with respect to EHRs

will thus not be on implementation, but rather on ensuring that participating physicians achieve **meaningful use** of their EHRs to support our Beacon goals.

Through Beacon, GBQC will further advance current capabilities across its participants by achieving the following:

- Expand participation in IT-enabled interoperability and care coordination initiatives such as NEHEN, the MAeHC QDC and standardized public health reporting to include more provider organizations and more active participation by existing participant organizations.
- Upgrade the functionality of existing participants' IT tools.
- Develop and demonstrate new forms of connectivity and integration (e.g., additional vendor packages or additional use cases, such as exchanging appropriate clinical information with payers).
- Rollout additional hosted services for less sophisticated providers.

Advanced Infrastructure for Evaluation, Measurement, Reporting and Feedback

Beyond NEHEN, MAeHC and MHQP are the chief collaborators on evaluation, measurement, reporting and feedback within GBQC, with additional input from BPHC, CHA, CPHD, MA League of Community Health Centers and other consortium members.

For 15 years, MHQP has been a national leader in the measurement and reporting of statewide comparative health care quality information. Since 2004 MHQP has aggregated and reported patient experience and clinical quality metrics statewide to the physician community and the public using nationally approved measures for measurement and reporting. MHQP's pioneering work to develop patient care experience measures contributed significantly to the development of national standards in this area. Through a number of research partnerships (Beth

McGlynn at RAND and Bill Thomas at University of Southern Maine), MHQP is also at the national forefront of addressing critical methodological questions around the performance and utility of clinical effectiveness and efficiency/resource utilization metrics.

With the active collaboration of the physician community, MHQP has developed the Massachusetts Provider Database (MPD) at the core of all of MHQP's ambulatory care measurement work. To date, 17,000 practicing Massachusetts physicians are in the MPD. All physicians, practices and medical groups in the Greater Boston area are included. The MPD is a unique web-based, password-protected system used by physician groups to update the assignment of physicians to practices and groups to make sure groupings are as accurate as possible.

Most recently, the Robert Wood Johnson Foundation awarded MHQP an Aligning Forces for Quality (AF4Q) grant on behalf of the Greater Boston community. The Greater Boston AF4Q initiative served as a foundation for both the governance and the community wide improvement goals for this Beacon Community proposal and provides excellent points of leverage and coordination given the alignment of end goals of AF4Q and Beacon Community initiatives and significant synergies between planned activities and scope across both initiatives.

Meanwhile, the MaEHC QDC, developed in 2007, contains detailed pseudonymized data for two Massachusetts communities (North Adams and Newburyport) including problems, procedures, allergies, medications, demographics (encrypted identifiers), tobacco use status, visits summaries, diagnoses, laboratory, and radiology results. Data is sourced from multiple EHR vendor platforms at hospitals and in the communities. MAeHC and MHQP (along with CSC) collaborated to create the QDC.

MAeHC is currently in a pilot with BIDMC, using NEHEN, to add clinical data to the QDC from over 1,000 clinicians who use BIDMC's hospital-built EHR platform and a vendor EHR. The warehouse is a nascent statewide hub for population health, clinician report card, and quality data submission to private and public payers and will serve as such for GBQC.

The Massachusetts League of Community Health Centers has developed a web-based central data repository and reporting solution for community health centers in Massachusetts to support operational and quality improvement reporting and accountability. To date, the system extracts data from three different EMR and three electronic practice management systems (EPM) and can produce more than 20 quality reports and measure over 40 health center specific key performance indicators with benchmarking reports at a range of level. Data can be compared center to center as well as provider to provider within centers. Health centers can also benchmark progress against aggregate data and nationally established standards.

The BPHC is a local leader in the acquisition of disparity data from inpatient systems. Data elements captured at each registration include race, ethnicity, primary language, and gender. The data is used to generate disparity report cards and provide feedback to policymakers and clinicians. In addition, Boston's syndromic surveillance system receives daily, de-identified patient visit data including date of visit, chief complaint, gender, zip code of residence, age, and race from all Boston acute care hospital and three urgent care/walk-in clinics. Data is received every 24 hours, and the chief complaint for each visit is categorized into syndrome groups based on the symptoms described in the chief complaint. Syndromes are stratified by age groups, zip codes, site of care, and gender, and analyzed for statistical aberrations in the number of daily visits.

The Boston Electronic Communicable Disease Surveillance and Outbreak Management System has been developed for reporting and management of over 80 reportable conditions. In addition to reporting, the system enables follow-up care and management of cases and contacts, enables outbreak detection and management, and supports a flexible workflow scheme. In 2010, BPHC's proprietary approach to gathering both disparity and surveillance data is migrating to a standard CCD exchange via the NEHEN gateway.

The Cambridge Health Alliance and Cambridge Public Health Department have developed the Asthma Registry ("Registry"), an electronic database that can be shared across providers to identify children with asthma and provide them with safe, effective and timely evidence-based care. The Registry provides essential information to the child's clinical care team at the time care is provided, such as medications, severity, and hospital use on over 1,400 pediatric patients. As a result of the Registry, hospitalizations and ED visits for enrollees fell (by 70% and 50%, respectively) over two years. The Registry is also used to identify disparities in hospitalization rates and ED visits for those enrolled. Six percent of Hispanic children and 7% percent of Spanish speaking children (3-19) who are patients of CHA are asthmatics compared to only 5% of White children. The hospital and ED rates for the last year were not significantly different by either race or language. The success of the Registry to date suggests that continuity of care, improvement in quality of care, and even family education can improve with its use. BIDMC and Joslin Clinic have developed a similar registry for their diabetes patients which we will also study and consider incorporating.

Together, all of the components described above, along with the advanced infrastructure in place in the hospitals and their affiliated practices and CHCs, make up the advanced infrastructure for secure HIE and evaluation, measurement, reporting and feedback GBQC will

use as a Beacon Community. A list of references and abstracts documenting GBQC’s advanced capabilities in EHR, HIE, performance measurement and reporting is included in the attached file [ArticlesResearchandMeasuresofSuccessGBQC](#).

Proposed Beacon Intervention Sites

Seven hospitals and their affiliated admitting practices and CHCs have been chosen to pilot the various interventions envisioned in this project. Selections are based on analysis of referral and discharge statistics to determine clinical sites that accounted for a large volume of diabetes and pediatric asthma encounters in the community.

Hospital	Pediatric Asthma	Diabetes
Beth Israel Deaconess Medical Center		X
Boston Medical Center	X	X
Brigham and Women’s Hospital		X
Cambridge Health Alliance	X	X
Children’s Hospital Boston	X	X
Massachusetts General Hospital	X	X
Tufts Medical Center / Floating Hospital for Children	X	

Hospitals will produce three streams of information. First, visit summaries will be standardized CCD documents containing discharge summary information following ED visits, inpatient stays, and outpatient visits and sent to the patient’s PCP and/or referring specialist, as appropriate, with a duplicate stream going to the MAeHC QDC. BIDMC is already conducting these transactions over the NEHEN network to affiliated ambulatory physicians using eClinicalWorks. Second, ADT registration messages will be sent to the QDC for public health syndromic surveillance. The third type of information from the hospitals will be automated delivery of lab results for public health reportable conditions screening.

Selection of specific practice settings and CHCs will be made in the first two months of the project based on the following criteria:

- Sufficient volume of inpatient or ambulatory care for selected clinical conditions to measure the effect of an IT based intervention, including a high percentage of Boston and Cambridge residents.
- Presence of a vendor or self built platform that can be quickly adapted to send and receive data using national standards.
- Being an existing NEHEN member or willingness to participate in NEHEN.
- Institutional or practice readiness and demonstrated capability to engage in IT enabled QI — highly engaged IT and clinical leadership.
- Existing processes in place to address issues of care coordination, patient engagement, transitions and disparities that can be foundation for Beacon efforts.
- Payer mix of patients across sites representing Medicaid, Commercial, Commonwealth Care (subsidized non-Medicaid) and Medicare.

Physician offices on EHRs will produce structured CCD referral documents to be “pushed” to the next point of care (i.e., hospital or referring PCP or consulting specialist) and to the MAeHC QDC, MA League data warehouse for CHCs or specific Beacon institution warehouses. Physician offices will also generate automated post-encounter summaries that will contain extracted clinical data required for quality measurement and reporting.

HIT Enabled Interventions and Tools

GBQC will effectively support clinicians and their organizations in improving care management, care coordination (within and across delivery systems, public health agencies and the community), patient engagement and ultimately health outcomes for patients with diabetes and pediatric asthma by leveraging existing advanced HIT capabilities to introduce the following set of HIT enabled tools and interventions:

- 1) Advancing the meaningful use of interoperable EHRs to provide more accessible information to patients and providers;
- 2) Expanding the use of a Clinical Summary Transmission Gateway to improve information exchange from hospital and ambulatory visits to the patient's medical home, community health center, PCP or referring physician;
- 3) Further populating the Quality Data Center and expanding registry capabilities to provide timely performance measurement and feedback to clinicians based on meaningful use and other nationally validated quality measures; improve identification of disparate patterns of care; and identify best care management practices for wider dissemination;
- 4) Introducing a standard Public Health Reporting Gateway to expand population-level surveillance of disease-specific encounters;
- 5) Enhancing patients' engagement in managing their conditions through better access to and support for personal health records and other electronic tools for care tracking, communicating with providers and receiving personalized health education information.

While these interventions may be unable to address all of the factors thought to account for preventable ED visits and hospital admissions, they will provide a foundation for making significant reductions over time in two ways.

First, they create a system, processes and a technology platform for more granular and systematic reporting of potentially preventable hospital utilization, which will allow more comprehensive community-level tracking and monitoring of such visits than exists today.

Second, they provide processes and technologies to close information gaps between hospitals and ambulatory physicians that prevent hospitals from making accurate admissions

decisions and prevent physicians from having meaningful knowledge of the nature and frequency of their patients’ ED and hospital encounters.

All of our interventions utilize standards-based transactions to create greater information sharing for care coordination and information aggregation for performance measurement, population/panel management, hospital utilization tracking, public health surveillance, reporting, and case management. Our hope and expectation is that by generating more accurate community-level information and more timely point-of-care information, we will provide hospitals, physicians, and patients alike with tools that allow them to attack the roots of preventable admissions.

While our pilot will focus on a subset of hospitals, practice sites, and CHCs within Boston and Cambridge, the above solutions will be simultaneously offered to our broad regional community through already-established and sustainable networks and governance structures to speed diffusion of these innovations, to broaden the impact of the interventions they support and to allow all Greater Boston providers achieve a high level of early EHR meaningful use.

Our HIT tools are being tailored to each of our goals, as summarized in the following table.

<i>Health and Cost Goals Health IT tools & interventions</i>	Cost goal: Reduce Preventable ED/Hospital Visits from Diabetes and Pediatric Asthma	Health goal: Track and Measure ACSCs and Disparities in Care and Outcomes	Health goal: Measure and Improve Patient Outcomes
Clinical Summary Transmission Gateway	<ul style="list-style-type: none"> • Discharge and ED visit summary to PCPs and referring physicians • Summary push to QDC for reporting • Structured quality data push to QDC and other quality aggregators 	<ul style="list-style-type: none"> • Discharge and ED visit summary to public health • Reportable condition report from hospitals to public health • Reportable condition report from QDC to 	<ul style="list-style-type: none"> • Discharge and ED visit summary to PCPs and referring physicians • Care summary push from primary care to specialists and vice versa • Summary push to QDC

<i>Health and Cost Goals Health IT tools & interventions</i>	Cost goal: Reduce Preventable ED/Hospital Visits from Diabetes and Pediatric Asthma	Health goal: Track and Measure ACSCs and Disparities in Care and Outcomes	Health goal: Measure and Improve Patient Outcomes
		public health <ul style="list-style-type: none"> • Lab results from hospitals to public health 	for reporting <ul style="list-style-type: none"> • Structured quality data push to QDC and other quality aggregators
Quality Data Center	<ul style="list-style-type: none"> • Hospital admission and ED visit reports for community tracking / registry and to participating physicians 	<ul style="list-style-type: none"> • Reportable condition report on ambulatory practices from QDC to public health 	<ul style="list-style-type: none"> • Meaningful use measure calculation and reports to ambulatory clinicians
Public Health Gateway	<ul style="list-style-type: none"> • Surveillance of disparities in hospital use for ACSCs pushed to public health 	<ul style="list-style-type: none"> • Surveillance of ACSCs and reportable conditions pushed to public health • Case management of reportable conditions • Measurement of disparities in care and outcomes 	<ul style="list-style-type: none"> • Surveillance of ACSCs and reportable conditions pushed to public health • Case management of reportable conditions • Measurement of disparities in care and outcomes
Claims Data Warehouse	<ul style="list-style-type: none"> • Physician and practice hospital utilization tracking and reporting 	<ul style="list-style-type: none"> • Community-level hospital utilization tracking and reporting 	<ul style="list-style-type: none"> • Claims-based quality measures • Patient experience surveys
Patient portals/PHRs	<ul style="list-style-type: none"> • Secure patient/provider email • Timely sharing of glucose and peak flow measurements on patient portals • Timely sharing of medication information • Asthma and diabetes education materials • Linkage to community resources 		

Improving Care Coordination: Clinical Summary Transmission Gateway

Using NEHEN as the backbone for HIE, participating entities will be outfitted and trained to create, send, receive, and act upon CCD-based clinical summaries. Each of the participating hospitals’ systems will be configured to generate CCD-standard discharge summaries to be routed through the NEHEN network to the PCP or referring physician. Since

all participating hospitals are already a NEHEN member, the configuration effort will focus more on their internal HIS systems and associated workflows than on interfacing or network issues.

For the CCDs to serve as notifications of hospital visits, post-discharge care planning and syndromic surveillance reporting, NEHEN is defining a common approach that will provide enough information to serve the multiple purposes required, but constrained enough to make the specification operational across institutions and systems. This approach expands on a service that NEHEN already provides to some of its member institutions in which hospital discharge summaries (ED and inpatient) are “pushed” to a patient’s PCP and/or referring physician immediately following completion of the encounter via structured XML, fax or secure e-mail.

Similarly, physician practices referring patients to the hospital will be trained and enabled to generate summary CCDs that will be forwarded to the hospital to support more appropriate care. This functionality, too, is being piloted by NEHEN at BIDMC, integrated with eClinicalWorks, a dominant ambulatory EHR vendor in our community. On the ambulatory side, participating PCPs and specialists will be trained and enabled to generate CCD referrals and consultation summary documents for uniform transition of care health exchange.

Measuring and Reporting Performance

Quality Data Center

The MAeHC QDC is the primary repository of clinical measurement and evaluation data for the GBQC. NEHEN will be used to transport clinical summary documents systematically and routinely extracted from participating EHRs in the community to populate the QDC. The QDC will serve as the agent for the CMS Meaningful Use quality reporting requirements for which a reporting mechanism has not yet been specified. MAeHC is an officially qualified CMS 2010

PQRI Reporting Registry. Other quality measurement entities and repositories at participating organizations will also receive quality measurement data by the same means as the QDC.

The QDC has the capability to calculate seven quality measures based on clinical data, such as those defined and validated by:

- National Committee for Quality Assurance (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS)
- National Quality Forum (NQF)
- Centers for Medicare and Medicaid Services (CMS) Physician Quality Reporting Initiative (PQRI)
- Payer Contract Incentives (Pay for Performance)
- Joint Commission Core Measures, and
- The forthcoming CMS Meaningful Use measures

Currently in use by BIDMC, MAeHC is broadening the base of participating QDC practices to include the hospitals and ambulatory practices in GBQC. In addition, measures are being added to support the project’s cost saving and health improvement goals:

Measure Category
Hospital admissions by condition
ED visits from patient panel by condition
Hospital readmission by condition

Claims Data Warehouse

GBQC has the advantage of having the deep expertise of MHQP in claims-based measurement and reporting as well. While clinical data from EHRs is increasingly recognized as the “gold standard” for measuring and evaluating cost, quality and effectiveness, claims data is much more widely available today and provides a broader base for calculation. MHQP has

already built robust data collection and measurement capabilities based on claims data in Massachusetts in partnership with its health plan partners. As EHR data collection mechanisms are being assembled, GBQC will conduct a feasibility study to determine if and how the clinical and claim data streams can be leveraged in combination to aid health plans, providers, public policymakers and other researchers and advocates. Included will be an assessment of:

- Matching patients across multiple data sources by means of a master patient index (MPI) or other mechanisms.
- Consideration of how such integrated and aggregated data could be used more effectively for pay for performance (P4P), provider feedback and other purposes.
- Creating a roadmap for shifting from claims to EHR-sourced data over time, with consideration of where claims data will continue to play an ongoing role.

MHQP will also continue to provide both clinical and patient experience measurement reports to program participants through its ongoing statewide measurement programs.

Advanced Reporting Capabilities

The MAeHC QDC will receive duplicate streams of “push” transactions, as well as quality data extracts from ambulatory practices and lab results from hospital labs. It will act as a data steward for public health reporting, aggregating data from multiple sources, matching patient records from disparate systems, and forwarding the aggregated and matched data to the BPHC and the CPHD for surveillance reporting, reportable conditions case management, and disparities monitoring.

This architecture will enable the generation of a number of reports that will be used in interventions at the provider-level to improve management of diabetic and asthma patients.

These reports will include:

- Hospital Readmission Report – for hospitals and physicians, providing statistics on readmissions at the hospital and physician level (within institution and cross-institution).
- Hospital Admission Report – for physicians, providing statistics on admission frequency of ACSC patients, by hospital.
- ED Visit Report – for physicians, providing statistics on ED visit history of ACSC patients, by hospital.
- Quality Report – for physicians, providing web-based benchmarking reports on meaningful use and other nationally validated measures (as described earlier).
- Disparities Data – for public health entities, enabling systematic, robust disparities monitoring of diabetes and pediatric asthma patients.
- Syndromic Surveillance Data – for public health entities, enabling standardized, city-wide, syndromic surveillance (also fulfills hospital meaningful use requirement).
- Reportable labs – for public health entities, for reportable conditions monitoring and case management as appropriate (also fulfills hospital meaningful use requirement).
- Immunizations reporting – for public health entities, for immunization registries (also fulfills hospital meaningful use requirement).

Additionally, to have better synchronization of patient movement and record movement through the health care system, we will add quality measurement reporting at the physician-level on meaningful use measures as well as condition-specific measures. Web-based reports already in use by MHQP statewide will be leveraged for the Beacon project to allow longitudinal tracking as well as peer comparisons across the community. The system will also allow identification of patients requiring attention for the next reporting period to provide physicians tools to improve their performance. The MAeHC clinically-based measures and the MHQP

claims-based performance measurement are complementary tools that provide clinicians with multiple views of their performance along a variety of measures.

Improving Care Management: Community Diabetes and Pediatric Asthma Registries

The GBQC will create community diabetes and pediatrics asthma registries to allow better patient-level visibility into the medical histories of patients with these conditions, drawing heavily on the experience gathered in the construction of the CHA Asthma Registry, the BIDMC/Joslin Diabetes Registry and the MAeHC QDC. These registries will form the foundation of a community-wide chronic disease registry to be used for population health surveillance, feedback and monitoring for the clinical community and development of community based care management and improvement programming. During the grant period, the framework for the registries will be fully developed, allowing for significant advancements in tracking disease burden, identifying best practices, and linking patients to community-based services and support.

In Phase One of this effort, the GBQC will conduct a feasibility study of the above diabetes and pediatrics asthma registries to determine the best data sources for key registry elements, which elements best link to the HIT/HIE advancements created as part of the Beacon initiative, which elements will require additional, future HIT capabilities, and where a community-wide registry should be housed. The product of this assessment will be a 3-5 year roadmap for achieving full community-wide registry capabilities for Greater Boston.

In Phase Two, pilot implementation of the roadmap will begin with key registry elements for diabetes and pediatric asthma care that can be built from the platform of IT/HIE tools already in place within the institutions and ambulatory care settings included as demonstration sites in the Beacon initiative (as described elsewhere in the proposal). Potential

target areas include key data from standardized asthma action plans used by most Boston pediatricians and core diabetes care metrics, including HbA1c testing and results.

Reducing Care Disparities: Public Health Gateway

Public health surveillance reporting will allow BPHC and CPHD to monitor community-wide trends in the aggregate, but also to conduct deeper investigations by key disparities factors. This will allow greater targeting of QI and workflow efforts to identify and attack root causes that are in the control of clinicians.

BPHC has recently joined NEHEN, and the NEHEN gateway is currently being modified to transport much broader and richer surveillance and population health reporting and analysis than exists today. Key information important to syndromic surveillance, reportable conditions, and identification of health delivery disparities is being identified to populate the CCD and HL7 message types. Guidance and training will be provided to staff at each of the participating institutions by NEHEN and MAeHC to incorporate appropriate documentation approaches in clinical workflows, establish triggers within the EHR systems for release of this information, and integrate the EHR system with the NEHEN gateway at each clinical site to allow secure, standardized transport to the BPHC, directly and through the QDC (depending on the required level of data filtering, scrubbing and transformation). The BPHC feed will stand in as a pilot for state and federal public health reporting requirements in meaningful use for which reporting mechanisms are not yet in place.

Improving Patient Engagement and Self Management Support: Patient Portals/PHRs/Technology-assisted Interventions

GBQC is also fortunate to have multiple, mature, highly functional patient portals already live in the community. We will build on this existing capability by first creating more uniform content and functionality for diabetes and pediatric asthma across the individual institution

patient portals (such as a common denominator of clinical summary data, condition-specific and culturally appropriate patient education materials, clinical monitoring tools and linkages to community resources that would be common to all systems). GBQC will also develop a coordinated and concerted education and marketing plan for clinicians and patients to increase adoption of patient portals in every institution across the community.

PHRs in the Greater Boston area include: Atrius Health's Epic MyChart, BIDMC's PatientSite, Children's Hospital Boston's Indivo, eClinicalWorks' Patient Portal and Partners HealthCare's Patient Gateway. These systems give patients access to problem lists, medications, allergies, diagnostic test results, and in some cases, clinician notes. Administrative functions include secure patient-provider email, appointment making, medication renewal, and specialty referrals. Some of these PHRs are already interfaced to Google Health and Microsoft HealthVault. The NEHEN gateway will be modified to transport CCD-based data to populate PHRs consistent with the meaningful use criteria for patient engagement and data sharing.

While PHRs can be important tools in the effective management of chronic disease, the public is largely unaware of their potential.³ The digital divide remains a significant barrier to PHR adoption by the predominantly minority and low-income population targeted by the project's diabetes and pediatric asthma interventions.⁴ The project will develop and demonstrate several strategies for promoting the use of PHRs and related technology-assisted interventions for low-income individuals and families to improve self management of diabetes and pediatric asthma. These strategies include: 1) educational efforts targeted both at consumers and

³ Connecting Americans to Their Healthcare July 2004; Markle Foundation Report.

⁴ Garvin, J, Odom-Wesley, B; Rudman, WJ.; Stewart, RS. Healthcare Disparities and the Role of Personal Health Records. *Journal of AHIMA*. June 2009.
http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_043826.hcsp?dDocName=bok1_043826.

clinicians to encourage patient use of PHRs; 2) home health monitoring systems for diabetes patients to support self monitoring efforts; 3) cell phone applications to help patients with diabetes improve monitoring of glucose control; 4) using cell phones and the internet to “push” educational information and prompts about care to patients and their family caregivers to improve management of diabetes and pediatric asthma; and 5) enhancing Asthma Action Plans for ongoing management of pediatric asthma through improved linkages among schools, clinical sites and the family of the patient, and interactive elements to make the plans more family-friendly.

To execute our strategy, the GBQC consortium members are providing a core set of services to advance our community goals in parallel with working to ensure increased EHR adoption and meaningful use.

Practice Redesign and Meaningful Use Assistance

The clinicians participating in the GBQC Beacon Program have a high rate of EHR adoption which will only climb considering active implementation programs that will go live before the end of 2010. Many local hospital organizations are taking advantage of Stark safe-harbor provisions to subsidize EHR implementations for hundreds of physicians over the next two years. EHRs are the entryway to health exchange in the GBQC.

However, it will be impossible to improve hospital-practice information flows, exchange clinically relevant information, or aggregate quality or surveillance data if clinicians are not entering the data consistently and completely to begin with. MAeHC has considerable experience identifying data documentation and workflow requirements to support health exchange and quality data analysis, and working on-site in clinical settings to establish

sustainable workflows and configure HIT systems to support decision support, HIE, and structured data aggregation.

MAeHC will work with the selected providers to identify required practice and workflow redesign and issues related to EHR meaningful use, focused on the program's intervention strategies. MAeHC and NEHEN will collaborate to determine data, interface and site integration requirements at the providers sites for clinical summary exchange (for care coordination), quality measurement and public health reporting, including determining strategies related to populating PHRs and incorporating other patient engagement tools. MAeHC will develop and maintain practice-specific workflow and EHR consulting plans for each provider and will take the lead role in managing execution of the plans for provider organizations (hospitals, CHCs, and office-based physicians) to effectively participate in the Beacon project and achieve meaningful use. MeHI has been working very closely with MassHealth and is actively engaged with them through an Interagency Services Agreement to assist with the development of their State Medicaid HIT Plan (SMHP). MeHI, as the REC, will also be contracting with MassHealth to certify all Medicaid Eligible Providers for meaningful use from 2011-2021. Additionally, MeHI, MassHealth and the Beacon Community will work closely with the planned Patient Centered Medical Home Initiative scheduled for fall 2010.

Health IT Design, Development, Rollout and Workflow Integration

GBQC will leverage the following current or planned NEHEN capabilities in the course of the project:

- Clinical Summary Exchange – inpatient discharge communications between hospitals and ambulatory offices, ED discharge communications with ambulatory offices, and ambulatory visit summary exchange between specialists and primary care offices.

- Quality / Population Health Reporting – submission of quality measures from EHRs to a statewide quality registry, submission of disparity data, immunizations, reportable labs and surveillance with public health.
- e-Prescribing – pharmacy benefit eligibility, formulary enforcement, medication history, prescription routing to retail and mail order pharmacies, and pharmacy initiated refill through existing NEHEN functionality.

NEHEN is currently managing installation and integration of clinical exchange gateways at each provider participating in GBQC. NEHEN software and implementation/integration assistance is being provided for GBQC participants as part of the program, and being made available to other interested parties in the region in parallel.

MAeHC will be available to assist providers in implementing required EHR and practice workflow changes, based on previously established consulting plans. When data begins to flow through the NEHEN gateways, MAeHC will oversee data integrity testing with support from NEHEN/CSC.

Support for Quality Improvement Interventions

Through the Beacon Program, GBQC will build on the platform for creating a sustainable quality improvement infrastructure already planned through Greater Boston's AF4Q interventions. The synergies between AF4Q and Beacon present a unique opportunity to truly transform the care delivery system for patients with diabetes and pediatric asthma through integration of Greater Boston's advanced HIT infrastructure and proposed Beacon interventions with the many existing QI activities and community resources across delivery systems, public health, and community initiatives.

Managed by MHQP, local and national QI experts from the National Initiative for Children’s Healthcare Quality (NICHQ), the Institute for Health Improvement (IHI), and MassPRO will constitute a QI workgroup to provide overall advice to GBQC about how best to leverage ongoing QI activities, share and spread innovations, and effectively engage clinicians in HIT supported quality improvement. Several ongoing efforts will serve as helpful models to frame and support this work. First, IHI’s State Action on Avoidable Re-hospitalizations (STAAR) initiative in Massachusetts focuses on reducing rehospitalizations by working across organizational boundaries and by working to address structural barriers to successfully spread better practices to improve transitions and measurably reduce readmissions at a state-wide level. The Strategic Plan for Care Transitions developed by the Massachusetts Statewide Quality Improvement Initiative (SQII) will also serve as an important framing tool for the QI Workgroup.

Specifically, we will design and facilitate learning collaboratives and communities of practice among the participating clinicians to successfully integrate the IT enhancements proposed here into an ongoing QI strategy to improve coordination and management of care for patients with diabetes and pediatric asthma. We will utilize a “coaching model” that brings resources and quality experts virtually as well as directly to front line clinical and office staff to assist them in learning and applying improvement principles and tools, promoting just-in-time learning while at the same time building a learning network to exchange and test potential best practices targeted at improving clinical outcomes and care experiences for patients with these conditions.

Standard Evaluation, Measurement, Reporting and Feedback

MAeHC and MHQP are collaborating to determine an overall evaluation, measurement and feedback plan for GBQC. The current assumption is that the MAeHC QDC will serve as the primary target system for quality and public health reporting data, building on current capabilities. The plan developed by MAeHC and MHQP will identify the scope of the target quality metrics to be evaluated, consistent with meaningful use standards and requirements. It will detail data flows from participants to QDC, scrubbing and data normalization strategies, registry locations and requirements, public health data transformation and reporting, and any other secondary use functions for the data (including for use by the Commonwealth of Massachusetts or payers, as determined appropriate). The QDC will be enhanced based on these requirements.

Making ambulatory physicians aware of the utilization of hospital resources by their patients will be a key factor in reducing preventable admissions. Lack of information flow between hospitals and physicians, unintentionally made even more pronounced by the use of hospitalists, means that physicians may not even be aware that their patients are visiting the hospital for preventable conditions. For example, analysis of ED/admission/readmission encounter data from a variety of hospitals across Boston revealed that anywhere from 8% to 50% of hospital encounters do not have any information on the patient's PCP and/or referring physicians. Using the clinical gateway, we will first work with the hospital systems to create more disciplined and uniform processes for recording PCPs and referring physicians of patients at registration.

MHQP and BPHC, with input from other experts participating in GBQC, are determining a feedback and education strategy for providers and patients. As data volume builds in the QDC,

interventions work teams facilitated by MHQP and BPHC will evaluate patterns and design or modify intervention, communicating them to MAeHC, resulting in potential modifications to workflow through consultation with provider participants. These modifications may also require modifications to site interfaces and extracts, to the NEHEN gateway or to the QDC. This cycle will repeat for continuous improvement and application to other participants, conditions, etc. throughout the Greater Boston Beacon project.

Multiple Patient and Consumer Engagement Mechanisms

GBQC will work with each of the participating institutions to facilitate greater patient management of their own care through a variety of approaches and mechanisms. MHQP and BPHC, with expert input from other GBQC participants, are designing baseline and ongoing patient surveys related to getting caring for chronic conditions, patient engagement in their care and the use of HIT among residents of Greater Boston to help manage their care. Surveys will be used to establish baselines and measure the effects of our interventions over time. For clinicians who appear to be underperforming in patient engagement, we will assess various strategies for enhancing their capacity.

In parallel, we will work with each of the participating entities to enhance their patient portal and PHR offerings to provide features and functions targeted to diabetes and pediatric asthma patients, and to coordinate and enhance their marketing and outreach campaigns to increase adoption by all patients generally, but for diabetes and pediatric asthma patients specifically. We will investigate the best “common feature set” for our target conditions.

Greater Boston has a strong platform for connecting patients with diabetes and other chronic diseases to community resources for nutrition and physical activity via the Mayor’s Health Line, run by the BPHC. The Health Line, which serves 8,000 callers a year, offers

assistance to callers on health insurance, finding a PCP who will accept new patients and other public health issues. The line also specializes in providing multilingual assistance. BPHC will enhance the Health Line's referral system to improve electronic interface with consumers, and to develop and pilot an electronic referral system to link with clinical providers.

BPHC will use information gathered through the aforementioned surveys to develop other public health policy and programs. MHQP will use the information collected as input in developing a comprehensive public/private program for patient engagement and will coordinate with participating providers on the role of PHRs, patient remote monitoring and self-reporting tools and patient/provider education and communication around the program's specific interventions. MHQP and BPHC will work with the Partnership for Healthcare Excellence and Health Care For All, patient advocate organizations on the GBQC leadership team, to develop this patient engagement program.

Other patient engagement tools that may be considered include functionality and clinician/staff training on secure messaging for enhanced patient/physician communication; designing common methods for displaying and accessing important self-management information across patient portals, such as blood glucose levels, peak flow measurements, and current medications; common content and availability of patient education materials; common links to local resources that facilitate better self-management; and interfacing of all patient portals with Google Health and Microsoft Health Vault to allow portability and integration of information across systems.

Finally, MHQP's Clinical Quality Reports merge results across the Commonwealth's five largest commercial health plans (with plans to integrate MassHealth data on a pilot basis beginning in 2010) to create statewide and regional practice site, medical group, and physician

network ambulatory care comparative performance reports. Currently, scores are calculated for over 30 ambulatory care measures, both preventive services and chronic care management services. In 2005, MHQP implemented the first in the nation statewide survey of patient care experiences with PCPs and office practices; it continues to be fielded biennially (most recently in 2009). Practice level results from both MHQP measurement programs are reported to physician organizations and health plans for internal business purposes and to the public via the MHQP website. Direct public reporting of provider effectiveness and other program results is another important tool for engaging patients and the public at large.

Coordination with State and Federal Activities Related to Meaningful Use

The State HIT Coordinator from MeHI is a member of the Project Management Oversight team and there will be coordination of the Beacon effort and MeHI effort, given that the leadership and organizations that chair the MEHI Ad Hoc workgroups are that same as those leading the governance of the GBQC. MeHI plans are well aligned with this Beacon proposal.

GBQC will fully engage state and ONC-funded activities to maximize the effective use of federal program funds. GBQC expects the MeHI-sponsored REC to play the lead role in advancing EHR adoption for providers needing such assistance and expects that GBQC-sponsored HIE will serve as a critical component in any State-level HIE funded partially or in full with federal funds.

Project Management, Governance, Planning and Facilitation

These GBQC services are outlined in the Section E of our application.

D. Populations with Specific Needs

The proposed interventions are designed to reduce health disparities in Greater Boston, and to meet the needs of providers serving racial, ethnic and linguistic minority populations. The

project's Public Health Reporting Gateway will provide state and local public health authorities with improved capacity for population level surveillance of disease specific encounters by REL and level of educational attainment.. Massachusetts and the Greater Boston area are national leaders in the collection of race and ethnicity data, with several regulatory mandates and initiatives intended to create robust data for integration into measurement, reporting and QI. The project's proposed investment in the Public Health Reporting Gateway will strengthen data reporting and analysis needed to design, implement and evaluate interventions to improve health equity.

Racial and ethnic minorities in Boston and Cambridge will be a central focus of the proposed technology-assisted community health demonstration projects designed to help reduce ED admissions and hospitalizations for individuals with diabetes and pediatric asthma. In Boston, as across the nation, there are significant disparities in diabetes incidence and burden.⁵ Approximately 10% of Black adults in Boston report having diabetes, compared to 5% of White adults and 6% of all residents. Black Bostonians consistently had the highest diabetes hospitalization rate from 1998 through 2007; almost four times that of Whites and Asians. The diabetes hospitalization rate for Hispanics increased 200% from 1998 to 2006 (Hispanic data are unavailable for 2007). For pediatric asthma, Boston has hospitalization and ED visit rates 2-3 times higher than those for the state as a whole. In fact, for Black and Hispanic children in Boston ages 0-14 years, rates of asthma hospitalization rates are 50-75% higher than for their Black and Hispanic counterparts statewide

In Cambridge, approximately 18% of Black adults have diabetes, compared to only 3% of White adults and 4% of the entire Cambridge population. Almost 3% of Black adults in

⁵ Data in this section is from the Boston Public Health Commission, *Health of Boston 2009*.

Cambridge have had a diabetes-related hospitalization, which is double that of the rest of the Cambridge adults. Cambridge asthma rates are very high as compared to the 7% Massachusetts average. Children in Cambridge have even higher hospitalization rates as it pertains to asthma, with Black children aged 0-14 (2,243 per 100,000) having double the rates of Hispanic children (1,031 per 100,000) and quadruple the rate of White children (650, per 100,000).

For both diabetes and pediatric asthma, the proposed interventions are designed to help providers at several hospitals and health centers more effectively implement the evidence-based chronic care model, which seeks to improve patient care and health outcomes through a focus on self-management, decision support, clinical information systems, delivery system design, and organization of health care and community supports.

E. Project Management

GBQC builds on a successful governance model developed to align key healthcare, public health and community organizations to collectively advance quality and equity in the region. This model was initially implemented to form the collaborative governance structure for the Robert Wood Johnson Foundation's AF4Q Program for Greater Boston and is now well positioned to provide a community governance structure for the Beacon Program.

The Greater Boston AF4Q process has proven to be an effective catalyst for stakeholder organizations affiliated with MHQP and EMHI, and other organizations in this effort, to create a shared vision for high value healthcare and align expertise and initiatives in performance measurement and public reporting, consumer engagement and QI to advance quality and equity in health care.

Given the alignment of the scope and goals of the AF4Q and Beacon Community initiatives and a desire to create the most efficient governance structure for Greater Boston, we

have expanded the AF4Q governance structure to include the area's extensive expertise in all aspects of HIT, and to create an overarching collaborative governance model for the Greater Boston community that can support AF4Q, the Beacon Community and other potential collaborative activities in the future.

The GBQC Leadership Team, jointly chaired by Barbara Ferrer (Executive Director, BPHC), Stuart Altman (EMHI Executive Committee Chair/ Sol C. Chaikin Professor of National Health Policy, Brandeis University) and Barbra Rabson (Executive Director, MHQP), is charged with determining strategic direction, ensuring that the closely related goals of both the AF4Q and Beacon Community projects are achieved, and that project activities and achievements can be sustained and broadened over the longer term. The Leadership Team represents a diverse group of stakeholders from across the continuum of health care delivery, public health, and community settings, as well as leaders of collaboratives for consumer engagement/advocacy and employer interests. The Leadership Team is drawn from a Community Council of over 60 key health care and community leaders positioned to mobilize their organizations to support Beacon Community project goals and provide ongoing communication between the project and the Greater Boston market. Stakeholders' enthusiastic endorsement of the proposal to leverage the newly-developed AF4Q community to support the Beacon Community initiative signals their true commitment to establishing the most efficient and effective collaborative infrastructure to achieve a lasting impact on Greater Boston health care.

The Greater Boston Beacon Community Planning Group, chaired by Barbara Ferrer, Barbra Rabson, and John Halamka (NEHEN Chair/ BIDMC CIO/EMHI IT Interoperability Advisory Committee Chair) will have specific responsibility for management and oversight of the proposed Beacon Community project. The Planning Group will be comprised of 10-15

leaders representative of key stakeholders in Greater Boston and will provide strategic leadership, oversee workgroup activities, and resolve any emerging challenges and barriers for the Beacon Community initiative. The Planning Group chairs will report directly to the Leadership Team about grant progress, achievement of milestones, and any strategic or implementation challenges.

Content specific Beacon Community Workgroups will be established and charged with developing and implementing work plans to accomplish the specific HIT, QI and population health strategies and goals of the Beacon Community initiative as detailed elsewhere in this proposal. All Workgroup chairs will serve on the Planning Group to assure coordination across workgroups and integration with the Planning Group and Leadership Team. Wherever feasible, content specific workgroups will overlap with both AF4Q workgroups and MeHI Ad Hoc workgroups to create maximum coordination and efficiency across these synergistic efforts. It is expected that the GBQC Leadership Team will meet on a quarterly basis; the Planning Group will meet monthly and each workgroup will meet at least monthly or more frequently depending on the timeline for deliverables.

The Planning Group and Workgroups will be supported by the Project Management Oversight (PMO) team, led by MHQP. MHQP will serve as the lead agency and fiduciary agent for the Greater Boston Beacon Community initiative. The PMO team will meet weekly throughout the course of the grant and will include lead staff from each of the consortium members—MHQP, NEHEN, MAeHC, BPHC, and EMHI. MeHI will participate on the PMO team in an advisory capacity, and ensure alignment and maximize efficiencies between state HIT workgroups in such areas as privacy and security and EHR adoption and assistance through the REC. The PMO team will be responsible for the operational oversight of the grant, will direct

implementation of the operational plan, and will develop and oversee implementation of an ongoing communication plan to keep community stakeholders informed about grant progress and opportunities to provide input. The project management team will also oversee all quarterly and annual reporting requirements. MHQP will provide a full-time senior level Program Manager and a full-time Project Coordinator to support the PMO team throughout the grant. Please refer to the budget narrative for a detailed description of staff roles and responsibilities. An organizational chart summarizing the governance structure described above is included the attached file named GovernanceStructureGBQC. A high level proposed project plan is included in the attached file named ProjectPlanGBQC.

F. Core Performance Measures

MHQP, as the grantee organization on behalf of GBQC, will oversee the strategy outlined below to ensure the timely and complete collection of information on core performance measures as required for quarterly and annual progress reports. MHQP has an established track record for reporting to federal and private granting organizations.

Strategy and Management

The PMO team, as described above, will be responsible for ongoing monitoring of the operational plan. This plan will be developed and refined throughout to document, communicate and track progress on interventions and evaluation, measurement and reporting criteria for both quality and public health. The plan is being based on the study of best practices in care and application of technology to specific conditions. The plan will include consideration of incorporating additional data streams (e.g., claims), additional HIT tools (Master Patient Index), and participants, including more active participation by public and private payers to accept data and play a role in interventions as part of their care management, P4P and disease management

programs. Facilitation and planning services will also determine the appropriate relationship of quality measurement to public health across the community to coordinate activities and avoid duplication of effort.

The MHQP Project Manager assigned to support the PMO will track operational capacity to meet objectives outlined in the plan including staffing levels, recruitment and retention of workgroup members and staff resources needed to support full functionality of organizational structures such as work groups and the Planning Group. Progress toward meeting HIT infrastructure goals of the project and integration of HIT into care delivery will be tracked by workgroups or the Planning Group depending on the specific goal. Progress, challenges and barriers toward meeting key project milestones will be documented by the Project Manager. The MHQP Finance/Contracts Manager assigned to the Greater Boston Beacon initiative will be responsible for financial management and reporting of project expenditures as mapped to budget and strategic goals.

Goals and Objectives

Greater Boston is fortunate to have an existing infrastructure for collecting performance information that will serve as baseline data and a vehicle to track progress toward our goals. Baseline measures will come from the ongoing MHQP ambulatory care clinical quality and patient experience measurement programs as well as from MAeHC's Clinical QDC. The MAeHC QDC will also capture the data to monitor ongoing progress with improving outcomes for patients with diabetes and asthma – we will select measures from the universe of proposed meaningful use standards. See Section B section for further details on specific measures that will be tracked. We will use information about hospitalizations for ACSCs by zip code already

being captured by the Massachusetts DHCFP to validate baseline data for our cost efficiency metric of reducing preventable ED use hospitalizations.

G. Evaluation

As noted elsewhere in the proposal, the GBQC has an extensive existing measurement and reporting infrastructure from which to collect care process and outcome metrics necessary to demonstrate the impact of well integrated HIT infrastructure enhancements on improving quality, patient-focused health care and population health. We will collect specific clinical quality, patient experience and service utilization measures related to our target conditions of diabetes and pediatric asthma to track our progress throughout the course of the grant period. We will participate in the external evaluation for all of the Beacon Communities, making all necessary data available to evaluators and sharing lessons learned from our implementation.

H. Coordination and Continual Improvement

As outlined in Section C, both the timely feedback of information to participants and a commitment to integrating such data into ongoing QI efforts is an integral part of the GBQC strategy for the Beacon initiative. GBQC is committed to collaborating with other Beacon Communities and REC through participation in HITRC organized activities and communication of best practices. MHQP is a founding member of the Network for Regional Healthcare Improvement (NRHI) a group of leading regional quality coalitions and has demonstrated a commitment to best practice sharing.

I. Organizational Capability Statement

See cover letter in the attached file CoverletterGBQC.

As noted in Section E, the Greater Boston community brings tremendous strengths, resources and commitment through the broad-based governance and operational structures in

place for the Beacon initiative. MHQP, EMHI, BPHC, NEHEN, and MAeHC form the consortium that will be accountable for achieving the objectives and deliverables set forth in the proposed application. All consortium members bring an exceptional level of organizational expertise and experience to the project. In addition, four of the five Consortium members are all established coalitions themselves and have successfully implemented a variety of cross-stakeholder HIT and/or quality information and improvement initiatives in the past. Each Consortium member organization is anticipated to be a sub-awardee of the cooperative agreement as each member’s participation is seen as integral to the project’s success.

Annual Budgets/Sources of Income/FTEs:

Consortium Member	Year Established	Tax Status	2009 Budgeted Revenues	Revenue Sources			Total FTE’s
				Member Dues	Program Revenues	Grants/ Other	
MHQP	1995	501 (c)(3)	\$1.9M	15%	80%	5%	13
BPHC	1995	Govt. Agency	\$148M		29%	71%	10
EMHI	2006	501 (c)(3)	\$0.55M	95%		5%	1
MAeHC	2004	501 (c)(3)	\$4.1M		100%		19
NEHEN	1999	501 (c)(3)	\$5.9M	95%	5%		18*
* Contracted							

Roles of Staff in Different Functional Areas

Consortium Member	HIT Implementation	Workflow & Process Redesign	HIE Interface & Exchange	Hardware & Network Infrastructure	Quality Improvement	Privacy & Security	Outreach & Communication
MHQP		X			X		X
BPHC	X	X		X	X	X	X
EMHI		X	X				
MAeHC	X	X	X	X		X	
NEHEN	X		X	X		X	

Previous Experience

While the depth and breadth of experience among consortium members has already been detailed throughout the proposal, the chart below summarizes again the strengths of each consortium member.

Experience in:	Consortium Members				
	MHQP	BPHC	EMHI	MAEHC	NEHEN
EHR Implementation				X	
Workflow redesign and clinical QI	X	X	X	X	
Outreach, education on-site technical assistance	X	X		X	
EHR adoption and meaningful use assistance	X			X	X
Standards based interoperability & HIE			X	X	X
Technical assistance re: Federal and State privacy/security requirements		X		X	X
Practices/providers served 7/1/08 to 6/30/09		26 CHCs, 12 teaching hospitals	234 / 5900, across 5 large medical groups	154 / 558	500 / 7,500
Key staff (see 1-page resumes for these individuals in attached file ResumesGBQC)	Barbra Rabson, Melinda Karp	Barbara Ferrer	Catherine Annas	Micky Tripathi	John Halamka, Greg DeBor