

Healthcare IT Collaboration in Massachusetts The Experience of Creating Regional Connectivity

Halamka J, Aranow M, Ascenzo C, Bates D, Debor G, Glaser J, Goroll A, Stowe J, Tripathi M, Vineyard G

In 2004, President George W. Bush established the Office of the National Coordinator for Information Technology (ONCHIT) for the purpose of encouraging adoption of electronic health records, creating a National Health Information Network, coordinating Federal health IT expenditures, and fostering creation of local facilitators of clinical data exchange known as Regional Health Information Organizations (RHIOs).

Local, state and regional leaders looking to form RHIOs have few successful examples from which to draw. Massachusetts is home to some of the earliest precursors to RHIOs in the country and, as an early adopter of community-wide healthcare IT projects, has more experience with RHIO-like activities than most other states. The history of data sharing organizations and efforts in Massachusetts provides many lessons learned which we believe are applicable to other evolving RHIOs nationwide.

To an outsider, the Massachusetts community health IT landscape presents an array of cross-institutional collaborations. As we will describe, the four major community-wide organizations – the Massachusetts Health Data Consortium, the New England Healthcare Electronic Data Interchange Network, MA-SHARE, and the Massachusetts eHealth Collaborative – have seemingly similar missions and overlapping members and leadership. Yet, closer examination shows a strong “division of labor” among these organizations, with each playing a key role in accomplishing the overall RHIO objective of facilitating regional data exchange.

While there are potentially many ways to divide up RHIO activities, in Massachusetts we see four separate roles: the Convener, the Transactor, the Grid, and the Last Mile. As we describe below, these four organizations perform these distinct but complementary roles in a way that fully addresses the overall mission of increasing diffusion of clinical IT to improve quality, safety, and cost-effectiveness of health care. Taken together, this virtual RHIO offers one operational model for achieving the objectives envisioned for RHIOs. In this article, we describe our organizations, their roles, and their efforts to date in hopes that others may gain from this experience. Our organizations' roles and contributions will continue to evolve and change as our ideas and products come to fruition.

The Convener: Massachusetts Health Data Consortium

In 1978, after 2 1/2 years of negotiations and six years of planning by the Office of State Health Planning in response to Federal initiatives, the Mass Health Data Consortium was founded as a non-profit coalition by the public and private health care organizations of the Commonwealth to develop a system for collecting, organizing and disseminating data on all hospital care in the state. For the first time, this required that competing hospitals in the state share their de-identified UB-92 and HCFA 1500 data with a third party organization that would normalize the data and redistribute it for aggregate analysis. This early work was important for two reasons – it enforced the use of standards for data collection and it required the information systems departments of the hospitals in the state to collaborate with each other.

In 1995, this data sharing activity led to the creation of the MHDC Affiliated Health Networks of New England and Chief Information Officer (CIO) Forum working groups. CIO's from payers, providers and employer groups agreed to meet on a monthly basis to discuss the use of IT to streamline healthcare commerce, reduce costs and enhance care delivery processes. Early work included common privacy/security guidelines, common data sets for describing clinical encounters and early discussions of how organizations could collectively address HIPAA compliance issues as a region, rather than a series of disjointed efforts.

In 1997, at an MHDC sponsored security conference, several CIO's of the payers and providers of Massachusetts gathered at dinner to discuss the creation of a network for the exchange of claims, referrals and benefits/eligibility transactions in Massachusetts. The group named the effort the “New England Healthcare Electronic Data Interchange Network” or NEHEN.

The Transactor: NEHEN

Three provider organizations (Partners Healthcare, CareGroup, and Lifespan) and two payer organizations (Tufts Health Plan and Harvard Pilgrim Health Care) worked together to formally create NEHEN LLC as an independent organization. Computer Sciences Corporation (CSC) was hired to manage a region-wide administrative data exchange effort, and by October of 1998, eligibility data began flowing among these early NEHEN members. Boston Medical Center joined in December 1999. University of Massachusetts Memorial and Boston Children’s Hospital joined in February 2000. As of 2005, 80% of the administrative healthcare transactions in Massachusetts flow over the collaborative NEHEN network.

This early work on transaction exchange built trust among the CIO's and established a business model that all could understand – cost avoidance. Before NEHEN, transactions such as claims cost \$5.00 in labor to submit via paper and email. After NEHEN, these transactions could be exchanged electronically for 25 cents. Suddenly, the payers and providers in the state were saving millions and redirecting healthcare dollars toward patient care instead of overhead.

The Grid: MA-SHARE

Successes with NEHEN led to the next MHDC “business incubator” project, MA-SHARE. The purpose of MA-SHARE is to foster improvements in community clinical connectivity, enabling appropriate sharing of inter-organizational healthcare data among the various participants in the healthcare system, including patients, clinicians, hospitals, government, and payers. Its operating goal is to serve as the clinical “grid”, providing community utility services that support secure clinical data exchange just as NEHEN provides administrative data exchange.

A community grid is only valuable if it meets the demands of its customers. After conducting focus groups and many conversations with stakeholders, MA-SHARE determined that three community utilities would best serve the needs of the state.

Identifying the patient

First, there must be a common means to link patient data together across different sites of care. Early in our investigation, we realized that a national or regional patient identifier would be time consuming to create, and opposed by privacy groups who argue that a universal identifier poses too great a threat for privacy spills. In addition, such an identifier would necessitate a massive retrofit of existing IT systems, which already have institutional specific medical record numbers. A working group of MHDC spent a year on the problem of patient data linkage and designed an approach which can be layered on top of our existing healthcare IT infrastructure – the record locator service (RLS). The RLS will be a community-wide master patient index that contains no clinical data but does contain pointers to the sites at which a patient has received care. With patient consent, a record documenting the occurrence of each patient encounter will be forwarded to the MA-SHARE record locator service as part of each institution's registration process. Since no clinical data is forwarded to the RLS, the potential for privacy spills will be minimized. A sample entry for the RLS might appear

Name: John Q. Patient	Date of Birth: 01/01/1960
Institution: Beth Israel Deaconess	Identifier: 123456789
Institution: Dr. Flier's Office	Identifier: 567890
Institution: Personal Health Record at webMD	Identifier: 55555555

The RLS will function as a cross index, and provide a list of all locations which may contain data. We realize that simply recording the occurrence of a patient encounter at some locations may be disclosing of a clinical condition, as indicated in the following example:

Institution: Regional Drug Treatment Center	Identifier: 11111111
Institution: County HIV Clinic	Identifier: 22222222

By requiring consent, the RLS will assure that the patient remains in control of the institutional entries which are maintained in the Record Locator Service.

The MA-SHARE Record Locator Service was funded by a grant from the Markle Foundation and rollout will begin in August of 2005.

Exchanging Clinical Data

Once the Record Locator Service is available, it can serve as the foundation for the second major MA-SHARE project, the Clinical Data Exchange (CDE). One major driver for such exchange is the desire to reduce medication error in the state.

The Institute of Medicine's Crossing the Quality Chasm and To Err is Human reports emphasized that medication error is one of the major quality issues of our time. Over 98,000 preventable deaths occur each year due to adverse drug events. We recognize that such events can be reduced by Provider Order Entry, ePrescribing, and electronic medication administration records. All of these decision support systems require an accurate medication and allergy lists to be most effective.

Since the patient's sites of care are known via the Record Locator Service, we can build electronic interfaces to the hospital information systems and electronic health records at those sites, retrieving medication list and allergy list information to inform treating providers about patient history, as well as to provide lifetime care data to decision support systems. Such exchanges are done securely using internet technologies such as the Standard Object Access Protocol (SOAP), which provides a mechanism for secure exchange of information between organizations via the web. In order to be maximally useful, the information itself must be represented in a standard format, and thus we must have community-wide implementation guides that mandate the use of well accepted standards to build a clinical data exchange.

Our initial exchange of clinical data in Massachusetts will include medications and laboratory results. The Markle Foundation, eHealth Initiative and Robert Wood Johnson Foundation funded MA-SHARE to implement the Clinical Data Exchange, utilizing the Record Locator Service, by the end of 2005. Massachusetts was chosen for this project because of its early experience with a 2004 MA-SHARE pilot project for medication history exchange called MedsInfo-ED. The MedsInfo project linked together medication history data from pharmacy benefit management, health plan and MassHealth (Medicaid) databases to provide Emergency physicians with a comprehensive list of patient medications which were reimbursed by insurers. Many lessons were learned in this project about regulatory issues, data standards issues and privacy/security issues. We will be incorporate knowledge gained from the MedsInfo experience into the next generation Clinical Data Exchange infrastructure.

ePrescribing

In addition to needing complete information about existing medications and allergies, providers must complete an often complex workflow to order new medications. In recent years, there has been a major push to automate this workflow. However, the current marketplace for ePrescribing software is heterogeneous, and there is no single solution available that electronically manages all aspects of this prescription transaction. Some companies provide systems which route prescriptions to pharmacies, others provide connectivity to payers, and others connect to pharmacy benefits managers/mail order fulfillment firms.

We are implementing MA-SHARE's third community utility service, an ePrescribing Gateway, in order to electronically connect existing prescribing components through a common infrastructure that links prescribers to required patient information (eg eligibility, benefits, and formulary), regardless of which payer is involved, and also connects them to retail pharmacies, mail order programs and order fulfillment locations to deliver new prescriptions, renewals and changes.

Like NEHEN, this gateway is a community utility which enables electronic interaction among all the constituents in a multi-stakeholder workflow. Imagine that a provider writes a prescription for John Q. Patient for the medication Nexium. The e-Prescribing Gateway would do the following:

- a. Query regional payers for pharmacy coverage eligibility for the patient. The result – John Q. Patient is confirmed as a Harvard Pilgrim Patient who is eligible for outpatient pharmacy reimbursement with a \$5.00 co-pay per medication.
- b. After identifying the payer and confirming eligibility, the gateway checks the medication against a payer formulary. The result – Nexium is not included in Harvard's formulary and Prilosec is the recommended equivalent medication
- c. After performing the therapeutic substitution (Prilosec for Nexium) with provider and patient consent, the gateway forwards the prescription to the retail pharmacy or mail order pharmacy selected by the patient, which fills the prescription and submits a claim to Harvard Pilgrim Health Care's pharmacy benefits management firm, MedImpact, for payment.

Although many commercial firms may be involved in providing the workflow described above, the e-prescribing gateway provides a single community-wide infrastructure that eliminates much of the complexity of creating multiple legal agreements and interfaces with each institution and provider office. The payers and providers of Massachusetts have agreed to fund the creation of the e-prescribing Gateway and rollout will begin by the end of 2005.

By providing the Record Locator Service, the Clinical Data Exchange and the ePrescribing Gateway, MA-SHARE becomes the clinical information grid for the state. MA-SHARE has incubated several projects in the past two years, including the development of a national standard for secure email, credentialing simplification, and various research initiatives. At present, MA-SHARE is focused on the three core projects described above.

The Last Mile: Massachusetts eHealth Collaborative

Having a clinical information grid is only useful if providers can connect to the statewide infrastructure. Realizing that only 15% of the providers in Massachusetts use electronic health records, we realized that an important step in creating community connectivity is to ensure wiring to the “last mile” of the provider office. In 2004, the Massachusetts Chapter of the American College of Physicians, adopted as their top priority the promotion of universal adoption of electronic medical records in physician offices in Massachusetts. At the same time, Blue Cross/Blue Shield of Massachusetts was contemplating investing \$50 million to spearhead greater adoption of EMRs in the state. Leaders of these two efforts led the launching of a collaboration of 34 organizations to oversee a pilot project to implement electronic health records in three communities in Massachusetts in order to evaluate the impact of Healthcare IT on quality and cost in the provider office. An organization called the Massachusetts eHealth Collaborative was formed to execute this project. In March 2005, three communities were chosen based on their patient mix, geographic location and IT sophistication. Over the next 18 months, we will implement electronic health records and connectivity infrastructure throughout these three communities and we will evaluate the impact on quality of care and cost. MAeHC's mission is to use the lessons gained from these pilot projects to spearhead the universal adoption of Electronic Health Records across the state, engaging payers, providers, patients, QIO's, and employers in the process.

Thus, as of 2005, Massachusetts has four organizations to foster healthcare connectivity:
MHDC – the convener, educational organization and business incubator
NEHEN – the grid for community exchange of administrative data
MA-SHARE – the grid for community exchange of clinical data
MAeHC – electronic health records and the “last mile” connection of services to provider offices.

We recognize that creating community-wide connectivity for healthcare is not principally an IT project. The infrastructure built by the organizations described above must be solidified and institutionalized by standards and policies which facilitate the exchange of data. Major issues such as privacy, security, organizational trust, patient consent and standards adoption are prerequisites to IT implementation, and lack of agreement on such issues has stifled the creation of many prospective RHIOs across the country. All four of our organizations play important roles in Standards and Policy formation and adherence.

Standards and Policies

For the past 27 years, the Massachusetts Health Data Consortium has served as the primary educational and convening organization to address healthcare IT issues in the state. In addition to the convening the CIO forum, it also convenes two important committees – the Privacy and Security Officers Forum and the Technical Advisory Board (TAB).

Privacy and Security Officers Forum

The MHDC Privacy and Security Officers Forum is a multidisciplinary group comprised of payers, providers, employers, government regulatory agencies, patients and legal experts. Its purpose is to ensure all our community efforts comply with HIPAA, state-wide regulations that preempt or expand on HIPAA and community best practices. Issues such as patient consent, disclosure, data sharing for purposes other than treatment/payment/operations and technical mechanisms to protect patient privacy are discussed and agreed upon as a community.

Technical Advisory Board

All of our data exchange efforts require that commonly adopted industry standards be used to facilitate integration of existing electronic systems. However, this requires agreement on common use of standards, common mechanisms for controlling access to data, and common means of securely transporting data. The Technical Advisory Board discusses the standards that will serve as the basis for the "grid" and agrees on common implementation guides for the entire community

Although the Massachusetts Health Data Consortium convenes these standards and policy committees, the other organizations in the state – NEHEN, MA-SHARE and MAeHC agree to implement, test, and enforce the use of these standards and policies. For example, MAeHC will fund the installation of an electronic health record in a clinician office, only if it meets the interoperability requirements specified by the

technical advisory board, enabling the secure exchange of clinical data across the continuum of patient care

Lessons Learned

Over the past 20 years in which the authors have worked with our statewide organizations, we have learned many important lessons about success factors in community connectivity projects, which are outlined below.

Openness and Transparency

Community connectivity efforts must be open and transparent on several levels. Our community connectivity project organizations have open membership to all constituents - payers, providers, patients, vendors, and employers. All activities of our organizations are communicated openly via websites, newsletters and meeting minutes. All our intellectual property including source code, policies and legal agreements are shared openly across the community. We do not require proprietary software and we emphasize the adoption of broadly accepted industry standards. This openness results in our organizations being inclusive rather than exclusive. The climate of openness creates a trusted forum where organizations can set aside their competitive concerns.

One member, one vote

We recognize that the health community is comprised of small community hospitals and large integrated deliver systems, small payers and larger payers, solo practitioners and multi-specialty groups. The governance in all of our community connectivity organizations follows a Senate model rather than a House of Representatives model. Each organization represented has one vote regardless of their size or economic power.

Cost avoidance model

In healthcare there are many intermediary organizations such as clearinghouses, which charge on a “per transaction” basis for connectivity services. Because the cost structure of the infrastructure needed to provide such services has relatively high fixed costs and relatively low variable costs, we believe that collaboration to jointly invest in the fixed costs to reduce overall costs for all is a more effective model than a transaction fee or service chargeback model. To date, all our community connectivity organizations are funded via community collaboration such as in kind contributions of effort and yearly subscriptions to sustain the collaboration. In this fashion, we make commerce as frictionless as possible and keep our operating costs low. All participants benefit from the economies of scale achieved by sharing the upfront fixed cost and creating connectivity together as a region rather than working separately on disjointed and redundant solutions.

Coordinated Decentralization rather than a single community database

We believe that healthcare is local – the majority of the care of patients is delivered within 25 miles of their home. Local institutions are the best stewards of data quality, security and patient preferences. Hence, none of our projects use a patient identified centralized database of clinical information, minimizing the possibility that these data can be compromised by hackers or contain inaccurate information out of synch with that in hospitals and doctors offices. In addition, the experience of Community Health Information Networks (CHINs) in the 1980s taught us that local institutions are unwilling

to hand over their clinical databases to a third party organization to maintain. Our approach, which leaves the data inside the firewalls of participating institutions, but delivers it directly to the provider in response to a secure web-based query, has been accepted throughout the community. Communities decide on their own level of aggregation. Some hospital groups may store data together and some community groups may offer a shared outpatient clinical record, but there is no centralized statewide database.

RHIOs perform many different roles

Convening and operations require very different individual and organizational skill sets. It is possible to have a single organization do both, but it is not necessary. Having overlapping memberships in multiple organizations is key to building trust and getting consistency across organizations. It can be taxing on the individuals who are involved in multiple meetings, but is a key ingredient in formative stages and less important once the organizations have reached steady state. Once trust is built among individual leaders, much can be accomplished without big summit meetings.

Summary

The price of not moving forward with RHIOs is high. Healthcare in the United States is delivered in a heterogeneous and uncoordinated fashion, creating islands of patient information in provider's offices, hospitals and chronic care facilities. The end result is waste and error. In the state of Massachusetts alone, it is estimated that \$4.5 billion per year is spent on inappropriate or unnecessary care, often the result of redundancy due to lack of patient information integration.

The problem is national in scope. At the 2005 meeting of the National Governor's Association, the Governors of the states of Massachusetts, Indiana, Missouri, Michigan, and Tennessee discussed that Medicaid budgets are spiraling out of control and the only solution on the horizon is implementation of healthcare information technology to coordinate appropriate care, reducing cost and improving quality.

Organizations in Massachusetts have evolved to provide the standards, policies, education, infrastructure and implementation required to achieve the community connectivity that is fundamental to solving the myriad problems endemic in US healthcare today. The Massachusetts Health Data Consortium convenes our committees and educates our stakeholders. NEHEN connects our payers and providers for administrative transactions. MA-SHARE provides the community utilities needed implement clinical connectivity. The Massachusetts eHealth Collaborative ensures connectivity to our utilities by implementing standards-based technology in provider offices.

Working together, these organizations offer value to all stakeholders while at the same time building the trust necessary to incubate and test new ideas, and create ever greater value, over time. Over the next several years, we will continue to learn a great deal about regional health information exchange, including the business models required to sustain community organizations. As these lessons are learned, we will communicate our experiences openly with the hope that our success can be shared and our failures avoided in other regions of the country.

