

Evaluation of the State Health Information Exchange Cooperative Agreement Program

Case Study Report:

Experiences from Maine in Enabling Health Information Exchange (HIE)



at the UNIVERSITY of CHICAGO

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Case Study Report: Health Information Exchange (HIE) in Maine

“The important aspect of [the HIE program] is the linkages we have within the healthcare delivery system. We have been effective at collaborating with a number of other organizations that have established relationships with providers. Since our targets are providers and [large health] systems... we have been able to use [these relationships] as leverage points.” –*State Official*

Report Summary	
Intervention and Setting	<p>On December 5-7, 2011, the State HIE evaluation team conducted a formal site visit of the state of Maine’s State HIE Program and met with HIE stakeholders in Augusta, Bangor, and Portland. The primary goals of the site visit were:</p> <ul style="list-style-type: none"> ▪ To understand state implementation experiences with respect to governance and accountability, enabling services for HIE, and establishing trust and sustainability; ▪ To identify common enablers, barriers, and challenges to HIE; ▪ To understand provider perceptions and experiences with HIE; and ▪ To generate “lessons learned” around engagement with large health systems, distributed governance models, and consumer engagement strategies.
Data Collection and Target Population	<p>During the site visit, discussions about Maine’s HIE efforts were held with representatives of the following groups:</p> <ul style="list-style-type: none"> ▪ The state Health Information Technology (HIT) Coordinator ▪ HealthInfoNet (lead technology organization) ▪ State agencies (Medicaid Office, Department of Public Health) ▪ Provider associations (Maine Osteopathic Association, Maine Medical Association, Maine Primary Care Association, Maine Network for Health, Maine Hospital Association) ▪ Large health systems (Eastern Maine Health Systems, Franklin Memorial Hospital, Maine General) ▪ Employer organization (Maine Health Management Coalition) ▪ Quality organizations (Maine Health Access Foundation, Aligning Forces for Quality, Maine Quality Forum, Maine Quality Counts) ▪ Provider focus groups
Key Take-Aways	<p>Key take-aways from the site visit include:</p> <ul style="list-style-type: none"> ▪ Long-standing relationships, trust, a collaborative environment, and a shared vision underlies HIE success in Maine. ▪ Information exchanged electronically needs to be fully integrated into providers’ workflow to realize the benefits of HIE at the point of care. ▪ Emerging care delivery models, such as Accountable Care Organizations, may cause organizations providing comprehensive HIE services to re-examine value-add services offered to HIE stakeholders. ▪ Proving value to large health systems in an already established and continually evolving HIE environment is a challenge.

Introduction

Health information exchange (HIE) has been rapidly evolving since it began in the United States (U.S.) almost 20 years ago. Although previous HIE efforts were largely initiated through federal funding,¹ market-based solutions for HIE have recently emerged. Health information organizations (HIOs), or third-party organizations that facilitate the exchange of information between providers,² developed organically in several markets, such as Healthbridge in Ohio and the Indiana Health Information Exchange in Indiana. Furthermore, information exchange between affiliated providers expanded within large integrated delivery networks (IDNs) that enable exchange within their network and sometimes allow outside providers limited access to their systems. Private HIE solutions, such as electronic health record (EHR) vendors offering a range of HIE services, are also contributing to the increasingly competitive HIE market. According to the 2011 KLAS performance report, the number of live public HIOs in the country grew from 37 to 67 between 2010 and 2011 while the number of live private HIOs increased from 52 to 160.³ Other healthcare reform initiatives in the industry, such as the 2010 Patient Protection and Affordable Care Act (the ACA),⁴ and quality initiatives, including the patient centered medical home and health homes, have increased the demand for HIE.

The Health Information Technology for Economic and Clinical Health (HITECH) Act, enacted as part of the American Recovery and Reinvestment Act of 2009, further increased the development of and demand for information exchange. The legislation provided financial incentives to increase the adoption of health information technology.⁵ In August of 2009, the Office of the National Coordinator for Health Information Technology (ONC) announced the State HIE Cooperative Agreement Program, distributing \$564 million to 50 states and six territories in the U.S. to develop HIE. Furthermore, the Centers for Medicare & Medicaid Services (CMS) issued requirements for Stage 1 Meaningful Use (MU), providing incentive payments to providers for the adoption and meaningful use of certified EHR technology.⁶ In 2010, ONC launched the Direct Project to ensure providers have at least one option for meeting Stage 1 MU requirements. Direct is a set of standards, policies, and services offering a secure solution to enable inter- and intrastate exchange through a simple point-to-point “push” model between authorized providers.⁷

In order to understand the effects and implications of the State HIE Cooperative Agreement Program, ONC contracted with NORC at the University of Chicago to conduct a multi-year evaluation of the program, including in depth case studies of five states. In its efforts to implement statewide HIE services, Maine has established a unique governance model, engaged with large provider systems, and implemented a noteworthy consumer engagement strategy. As such, Maine’s experiences may provide important insights to other states planning or implementing statewide health information exchange.

Key Factors That Influence HIE in Maine

Maine’s unique geographic and health market characteristics influence the evolution of HIE in the state. Maine has a relatively small population of 1,328,361 (41st out of 50 states)⁸ with approximately 42 percent of residents living in a rural area.⁹ There is high population density clustered in the central and southern areas of the state,¹⁰ where four of the five most populated cities or towns in the state are located.¹¹ This geographic concentration of population enables collaboration, as stakeholders are likely to know each other, frequently work together, and often meet face-to-face to discuss issues.

The state contains four major health systems: Central Maine HealthCare, Eastern Maine Healthcare Systems, Maine General Health, and Maine Medical Center. These provider organizations represent 1,585 (41 percent) of acute care beds in Maine.¹² Large health care delivery systems and IDNs own or are affiliated with approximately 75 percent of ambulatory care providers in Maine.¹³ As a result, a high percentage of providers are already engaging in some form of information exchange through affiliation networks and IDNs or private HIE solutions. EHR adoption in Maine is higher than the national average with 63 percent of office-based physicians using an EHR system in 2011.¹⁴

“Two thirds of Maine is pretty much uninhabited so all the people are concentrated in Southern and Eastern Maine. You could drive from one end of that population to the other in 3 hours. [Maine is] not that big and as a result, it’s very collaborative.”
—Former state government official

In 2008, several organizations coordinated the Maine Health Information Network Technology demonstration project to examine the feasibility of a statewide network for information exchange.¹⁵ The demonstration initiated efforts to connect the large health care systems in the state through HealthInfoNet (HIN), a private, non-profit organization providing HIE services.

The demonstration project, which was instrumental in building a foundation for HIE services in the state, connected Central Maine HealthCare; Eastern Maine Healthcare Systems; Franklin Memorial Hospital; Maine Centers for Disease Control and Prevention (CDC); Maine General Health; MaineHealth; and Martin’s Point Healthcare. Participating entities agreed to share patient data, rather than leverage it for competition, in order to improve patient care and care coordination in support of the concept of creating patient “medical homes.”

By the end of the pilot project in June 2010, health systems were sharing continuity of care records, admission, discharge, and transfer (ADT) data, medication lists, and problem lists. The exchange system included 735,000 patient records (56 percent of the population). Participants in the demonstration represent 52 percent of Maine’s annual inpatient discharges, 50 percent of annual emergency department visits and 45 percent of annual ambulatory visits.¹⁶ The project demonstrated successful data aggregation from different sources and locations and allowed health systems to experiment with and resolve various technical considerations for data sharing, including how data from various sources could be standardized and centrally stored. The connectivity enabled during this project remains intact, thereby allowing HIN to pursue additional services to expand and enhance the value of the exchange organization.

In 2010, Maine submitted their strategic and operational plan to ONC for Cooperative Agreement Program funding, designating HIN as the statewide HIO and lead technology organization. The 2008 pilot project served as an important “proof in concept” and HITECH funding allowed the state’s HIE stakeholders to develop a concrete plan for facilitating statewide HIE and expanding their existing HIE capacity.

Maine was also the recipient of \$12,749,740 over three years in ONC funding to participate in the Beacon Community Cooperative Agreement Program, an initiative to build and strengthen health IT infrastructure, achieve short run measurable improvements in care, and develop innovative approaches to care delivery within 17 select communities. The Bangor Beacon Community in Maine is working to use health IT to improve health outcomes for individuals with chronic conditions.¹⁷ In

September 2011, the Health Resources and Services Administration (HRSA) and ONC announced a joint funding opportunity, providing all federally qualified health centers (FQHCs) in Beacon catchment areas with \$100,000 each for one year to bolster their health IT initiatives and achieve quality improvement goals. The Bangor Beacon Community facilitated a partnership between HIN and the Maine Primary Care Association (MPCA) to establish an exchange infrastructure that helps FQHCs meet clinical quality reporting requirements. Table 1 provides a brief overview of HIE in Maine.

Table 1. Background of Maine HIE Activities

Background on Maine	
Funding Amount	\$6,599,401
Population Size	1,328,361
Recipient Organization	State of Maine/ Maine Centers for Disease Control and Prevention, Office of the State Coordinator for HIT
State Designated Entity (Lead Organization)	HealthInfoNet (HIN)
Strategic and Operational Plan Approval Date	8/16/2010
ONC Strategic Model Classification¹	Public Utility
Technical Model	Public Utility model with a central data repository and provider directory
Vendors	<ul style="list-style-type: none"> ▪ Orion for the portal, data repository, and interface engine ▪ IBM Initiate for the Master Provider Index ▪ Health Language Inc. as the data-mapping engine. ▪ GE Centricity for Direct services
Beacon	Bangor Beacon Community
Regional Extension Center (REC)	HealthInfoNet (HIN)

¹Department of Health & Services (HHS Human) Office of the National Coordinator for Health Information Technology (ONC). (February 2011). State HIE Strategic and Operational Plan Emerging Models

Maine’s Approach to HIE and The Role of Contextual Factors

The 2008 demonstration served as a “proof of concept” for Maine’s use of centralized architecture to enable HIE services for the state and to facilitate care coordination in support of patient-centered medical homes. Maine’s approach to HIE leverages its longstanding relationships with stakeholders, collaborative environment, and shared vision for HIE. Their overall strategy consists of expanding existing capacity and connections, and expanding stakeholder buy-in established through the demonstration project to secure more widespread use of state-led HIE services.

Leadership and Governance Models

Maine has chosen a two-entity governance model with additional support provided by the state Steering Committee, a state-led advisory board, and a consumer committee. The Office of the State

Coordinator for HIT (OSC), located within the Maine CDC, provides broad governance and public oversight for state-led HIE activities. The HIT Coordinator reports to the director of the Maine CDC. HIN is the lead technology organization responsible for technical operations. Each organization is represented on the other's board to maintain a consistent vision of the HIE Program's mission and goals, and to ensure shared decision-making. Table 2 below displays the roles of the OSC and HIN in leading the statewide HIE effort.

Table 2. Maine's Two-Entity Governance Model and Roles

Governance Organization	Role
Office of the State Coordinator (OSC) for HIT	State-wide HIT & HIE planning, Alignment with State Health Plan, ARRA Planning/Implementation, State Agency Coordination, Financial and Regulatory Oversight
Lead Technology Organization (HealthInfoNet)	Technical Operations, Data Aggregation, Meaningful Use Reporting, Quality Reporting, Data Exchange between Private Sector and State Agencies, Decision Support

Source: Approved Strategic and Operational Plans

Part of HIN's success in achieving stakeholder buy-in for the HIE Program derives from broad stakeholder representation on committees and advisory boards. For example, HIN's Board of Directors consists of stakeholders representing state government, public health agencies, hospitals, employers, health care providers, payers, consumers, a representative from the OSC, and no less than three other public members appointed by the Governor. The state convened nine-member OSC Advisory Board also represents a wide variety of stakeholders, including the Maine Health Management Coalition, employers, hospitals, physicians, health plans, consumers, and quality organizations. In addition, Maine's Health Information Technology Steering Committee (HITSC), a 26-member committee, serves as a forum to discuss HIE-related issues and to produce actionable resolutions. Four members of the committee are from the legislature and therefore have the ability to introduce bills that can serve as levers for the statewide HIE.

“What we benefit from is having all of us in a small state working together to promote [HIE]. We have the Office of the State Coordinator; we have Rural Health; we have the Medicaid HIT; we have the REC, HIN, Maine Quality; we have a broadband authority in Maine that's getting high speed access that is needed.” -*State official*

HIN formally facilitates consumer engagement through the Consumer Advisory Committee, a committee required by HIN's governance. Members of the Advisory Committee are mostly representatives from political groups with consumer interests, such as the ACLU and the Maine Health Access Organization, and representatives with specific concerns about mental health, privacy, and security. These committees allow HIN to broaden its perspectives on HIE and enable input from stakeholders. In addition to promoting broad stakeholder representation on committees, OSC and HIN staff members actively engage stakeholders through a variety of methods, including conducting workshops to educate stakeholders about HIE; leveraging the regional extension center's (REC) efforts to discuss exchange with providers; attending meetings

with provider associations; posting public meeting minutes; and making themselves available to answer individual questions.

Technical Approach

HIN considers itself a public utility model, providing a spectrum of HIE services directly to end-users and HIOs¹⁸ and features “heavy” infrastructure that includes a central data repository, master patient index (MPI), master provider index, data translation and mapping services, and an all-payer/all-claims database (Table 3). In building their central repository, HIN uses the continuity of care record data set for the content it stores and provides semantic data mapping to achieve data standardization for critical categories of clinical content (lab, prescription medication, diagnostic studies).

Table 3. Services Provided by HealthInfoNet

Name of Services	Description of Service
Enterprise master patient index	Provides a comprehensive index of patients in the state to facilitate queries
Translation services	Translates lab results to LOINC
Routing services	Exchanges electronic lab results which enhances the ability to identify public health concerns
Reporting of notifiable labs	Connects clinical labs, health care facilities, and the state public health department to facility reporting
Medication lists	Builds a comprehensive and historical list of discrete patient medication data
Patient consent management	Processes opt-out requests and removes the corresponding patient information from the system, preventing the patient information to be queried
Formulary data that identifies prescription drugs (with significant restrictions)	Enables analytics using discrete medication data and medication reconciliation
Exchange of admission, discharge and transfer data	Provides visit information, including why the patient sought out health care
Radiology results reporting	Connects radiologists and the referring physicians

Sources: Culver, D. (2011, December). HealthInfoNet Maine’s Statewide Health Information Exchange, Retrieved March 14, 2012, from: <http://www.nationalehealth.org/ckfinder/userfiles/files/HIN-SMRTNET%20PowerPoint.pdf>; National eHealth Collaborative (2011, July). Secrets Of HIE Success Revealed: Lessons from the Leaders. Retrieved March 14, 2012, from: <http://www.nationalehealth.org/ckfinder/userfiles/files/REPORT%20SecretsofHIESuccessRevealed.pdf>

For its current services, HIN contracts with four separate vendors: Orion, which hosts the portal, data repository, and interface engine; IBM Initiate for the master patient index; Health Language Inc. for the data-mapping engine; and GE Centricity for Direct services. This arrangement is the result of an assessment of the 2008 demonstration, which revealed that 3M®, HIN’s original prime HIE vendor, was too expensive and its software was unable to provide desired services, such as

incorporating PDFs into the data repository. As a result, HIN pursued a “best of breed” approach, contracting with multiple vendors, and is now able accept a broader range of document types. Between 2008 and 2010, HIN also shifted from a 3M® hosted database to a self-hosted database, reducing costs by approximately 40 percent and increasing control its over data and security.

Direct services may eventually provide another avenue for small and rural practices to connect to the statewide exchange program. Although Direct does not currently play a dominant role in the Maine marketplace, HIN plans to enable this service as another option for providers, particularly small and rural providers, to exchange information. Because 42 percent of Maine’s residents live in rural areas¹⁹ and 96 percent of medical offices in Maine have less than ten physicians,²⁰ Direct can facilitate exchange for providers in these areas who may lack EHRs with HIE solutions.

HIN has selected two vendors, Kryptiq and Surescripts, to provide Direct secure messaging services. HIN selected Kryptiq due to its significant (40 percent) market share of the GE Centricity EHR in Maine. Since GE fully integrated Kryptiq software with its EHR, providers can receive Direct messages in their EHR without going outside their workflow to retrieve and review messages. As Maine’s Direct HISP, Surescripts is responsible for provider credentialing and populating Maine’s internal provider directory. Maine will initially roll out Direct in the Beacon Community, even though the Beacon Community already uses secure messaging. As of December 2011, HIN had not gone live with their Direct services.

“Direct becomes the ‘poor man’s interface’ and can help us out a lot with those practices to get them immediate access and be able to submit data to the exchange.” *-Public stakeholder*

Though HIN was initially concerned about the value and role of Direct, after exploring further it concluded that Direct could complement its services and architecture by providing an immediate, low-cost method for exchange and eliminating some of the current manual processes in health care delivery. Direct helps providers meet MU requirements and improve coordination of care among different partners in the absence of an HIE-enabled EHR system. Stakeholders identify common use cases for Direct, including:

- Coordinating care with providers unlikely to install EHRs, such as nursing homes, long term care and behavioral health providers
- Exchanging referrals between primary care and specialty providers
- Submitting medication prior authorization requests to Practice Benefit Managers and Plans
- Providing a secure method for smaller labs to send reportable results to Maine Centers for Disease Control and Prevention
- Coordinating care in the context of Accountable Care Organizations (ACOs) and health homes
- Exchanging clinical care summaries

HIN and the Public Health Department leverage existing infrastructure to streamline information exchange. The 2008 demonstration project confirmed the technical feasibility of organizing and sharing standardized data amongst large hospital systems and the state public health department. HIN provides public health information, allowing providers and the state to move from a manual to an automated and streamlined process for information exchange. To simplify and eliminate duplicate electronic lab reporting from independent labs, an initial focus of the HIN/public health partnership, HIN uses a rules engine, which identifies reportable labs from lab providers connected to HIN. Once HIN identifies a reportable lab, it routes labs to the public health department. Currently, the state public health department supports direct receipt of electronic labs from the laboratories, although this may change in the future as other entities use HIE services offered through HIN. Maine established ImmPact2, a complete immunization registry, prior to HITECH. HIN is collaborating with the public health department to support bidirectional exchange between the ImmPact2 registry and provider EHRs.

“Our efforts to actually physically connect [people] and manage content is [more than] just moving content from point A to point B. It is actually taking the data in and standardizing it to support some of our other objectives.” –*State official*

Maine is pursuing an opt-out model to encourage patient participation in HIE. HIN is responsible for managing access controls and securing all the data in its system. If a patient opts out of the exchange, HIN removes all clinical data on that patient from the system to prevent queries on this information. Maine’s consent model includes exceptions for specific instances of sensitive health data. As of December 2011, the rate of patient opt-out was very low with only 0.8 percent of Maine residents choosing not to participate in HIN.²¹

Until recently, Maine did not permit the electronic transmission of sensitive health data including behavioral health, substance abuse, and HIV/AIDS information. Recent legislation LD 1331,²² allows patients to opt-in sensitive data to the exchange. For organizations such as FQHCs, this missing information is crucial to treat a patient. At present, the practical implementation of this consent model (i.e., the point during registration and treatment when the patient opts in to share sensitive information) is still under development. Moreover, lack of existing data about behavioral health and substance abuse, and incomplete data, due to patients who opt out, may limit the value of connecting to HIN for this particular purpose. Although the change in legislation to allow patients to opt-in their mental health information is significant, this issue remains an area of unresolved complexity.

Payment Structure and Sustainability Approach

To support their technical services, HIN is in the process of developing a sustainability model consisting of subscriptions fees from hospitals. Hospitals pay HIN for the upfront connection cost plus an annual subscription fee per user (see Table 4). Hospital affiliated practices qualify for a group discount if they use the hospital’s EHR and the hospital is consolidating data for delivery to HIN.

Unaffiliated physician practices with 11 or more physicians pay a one-time setup cost of \$10,000, while those with 10 or less providers pay a one-time setup cost of \$5,000. HIN also charges these practices a \$600 per provider annual fee. When practices enroll through the Maine REC (MERECE),

those with 10 or fewer physicians are not charged a set-up fee or subscription fee in the first year, while those with more than 10 providers are only charged a one-time fee of \$5,000.²³ HIN is considering an annual subscription fee of approximately \$120 per provider for Direct addresses.

Table 4. Subscription Fee for Hospitals

Hospital Bed Size*	Annual Fee**
25 or less (and CAH)	\$25,000
26-49	\$40,000
50-75	\$50,000
76-99	\$75,000
100-150	\$90,000
151-250	\$125,000
251-500	\$175,000
501+	\$200,000

* For specialty hospitals and other facilities, HIN manages subscription pricing on a per provider basis at approximately \$1,000/provider per year. These prices are negotiable and dependent on the complexity of the EMR interface. Source: Culver, D. “Update on HealthInfoNet Maine’s Statewide Health Information Exchange.” Maine Critical Access Hospitals CEO Meeting, Sebasticook Valley Hospital. 8 December 2011. ** 2011 HIN pricing estimates. These fees are determined based on HIN’s operating costs to maintain interfaces.

HIN’s long-term sustainability remains a concern for stakeholders. HIN’s sustainability, like that of other statewide exchange organizations, depends on securing a critical mass of users to increase the value of exchange. To do so, HIN must prove that their services provide a discrete value-add that stakeholders cannot obtain through IDNs or EHR vendors. Given ongoing consolidation in healthcare practices and expansion of various private options for HIE, HIN has to demonstrate how the services they provide bring value to different stakeholders to drive initial adoption. In the future, they must be flexible and responsive to market evolution in the state, assessing and reassessing the core functions it provides to the community and gauging stakeholder demand for a variety of services. Many stakeholders suggest that HIN focus on a narrow scope and core services that bring value to HIE stakeholders. They note HIN’s focus on meeting market demand for several different capabilities, as opposed to focusing on a few core services, may limit its ability to remain sustainable post-ONC funding. However, a recent report disagrees with this assessment and speaks in favor of diversifying, not limiting, services. Based on interviews and a survey of HIOs, both in operation and others that have closed, the report finds that data diversity and volume or “saturation” is necessary for HIO success. It also finds that achieving high levels of use that allow an HIO to meet its value proposition is a longer process than most organizations anticipate and one that is therefore underestimated in sustainability plans. In this scenario, additional revenue streams become necessary to close gaps and ensure sustainability.

Implementation

HIN’s overarching goal is “preserving and improving the health of Maine... [through a] patient centered health system that uses highly secure, integrated electronic health information systems to advance access, safety, quality, and cost efficiency in the care of individual patients and populations.”²⁴ This goal is achieved through the exchange of a range of clinical and administrative-based data, some of which also addresses the need for providers to meet MU requirements (Table 5). As of December 2011, HIN had connected 21 hospitals, with 32 more under contract, and

hosted a health record for 76 percent of residents in Maine. HIN had also completed their Direct implementation and planned to make directed messaging services available to providers in January 2012. HIN staff report establishing their Direct service was technically easy and that the service was implemented within a month.

Table 5. Data Currently Exchanged with HIN Participants

Patient identifier and demographics	Laboratory and microbiology results
Encounter history	Dictated/transcribed documents
Diagnosis/conditions/problems	Adverse reactions/allergies
Immunization records	Medication history (commercial and MaineCare)
Radiology reports	

Source: Culver, D. (September 2011) Update on HealthInfoNet: Statewide Health Information Exchange and Maine Regional Extension Center. Retrieved March 14, 2012, from:
http://www.mainemed.com/annual/2011/AS2011_DevCulver_HealthInfoNetPresentation.pdf

Providers in Maine expressed enthusiasm for an array of exchange services, not all of which pertain to MU. Two of the main drivers of HIE in Maine are provider interest in tracking their patients closer to real-time and in using HIN as a hub for exchange. In addition, hospitals are seeing increased demand from providers for hospital admission notifications, particularly when a patient is admitted to a hospital outside their affiliated health system. Using HIN to reduce the number of interfaces and reduce costs, particularly for smaller practices, is another area of interest among providers. Below are additional use cases that specific stakeholders mentioned:

- The interests of large IDNs in statewide exchange vary from using HIN to exchange information between affiliated and unaffiliated practices to having patient information immediately available to emergency room providers.
- Hospitals are interested in exchanging data with emergency transport services to gain efficiencies in patient routing and transfers.
- Payers are interested in exchange to reduce cost, such as tracking emergency room visits and assessing ways to limit future consumption of emergency room services.
- Potential provider use cases include electronic exchange of referrals and consultations, and in care transition areas such as long-term care, home care, and primary care. Providers are also interested in exchange of behavioral health information.
- Independent physicians report the desire for statewide exchange to meet MU requirements and send referral information.
- Large self-insured employers are interested in exchanging information on wellness programs with their members.
- Medicaid hopes to achieve integration across care teams through exchange; they also aim to share data nationally to learn best practices from other states.

Although enthusiasm among providers is a boon for state-led HIE efforts, the lack of alignment between provider needs makes it difficult for HIN to identify and implement targeted services that bring value to all providers.

HIN's primary recruitment strategy involves targeting large health systems. HIN believes attracting large health systems will enable them to aggregate sufficient data in their clinical repository. Over time, HIN hopes this will motivate smaller unaffiliated providers to join the exchange program as well. Since approximately 75 percent of ambulatory care providers in Maine are in groups or affiliated with larger health systems, HIN believes they will eventually access these providers by collaborating with large health systems. HIN is also connecting with hospitals, ambulatory providers, national labs (LabCorp/Quest), and the public health department.

HIN is strategically leveraging its central clinical repository to offer value-added services. For example, HIN is working on providing personal health records, developing a cloud-based central image repository, and collaborating with the New England States Consortium of Systems Organizations (NESCSO) to build a shared provider index. The index is currently under development, and will include providers in Maine, New Hampshire, and Vermont.²⁵ HIN will also use Direct in innovative ways to populate the central clinical repository. HIN engineered a solution to ensure that each time providers exchange a Clinical Care Document using Direct, a copy of the document is also sent to the central clinical repository. In this way, HIN plans to use Direct to populate their central clinical repository in support of sophisticated query-based exchange in the future. In addition, HIN is targeting small, unaffiliated providers, as part of their Direct strategy. This offers another option for HIN to build out a comprehensive clinical record for all patients in Maine. HIN is also considering other value-added services for HIE stakeholders.

HIN intends to launch a patient portal in 2012, using a 12-month phased approach, to allow patients to view their data, schedule appointments, refill subscriptions, and manage consent activities; this portal will connect to HIN's central repository to obviate the need for manual data entry. HIN is finalizing an agreement for patient portal architecture with MethodHealth, which is a partnership between MedforYou and MEI Informatics, two companies with experience in personal health record software and patient-centered technology. HIN will be a partner to the subsidiary, MethodHealth Maine, with a 25 percent ownership stake. MethodHealth will provide the core technology and customize it for HIN.

The portal will also facilitate communication between patients and employers, and health systems and providers. A taxonomy tool that translates clinical and medical concepts into consumer-friendly language will assist provider and patient understanding. While consumer demand for the patient portal is currently limited, HIN believes the portal will improve its value proposition to consumers and result in more support for state-led HIE activities. There is concern over who will pay for this service, as consumers are unlikely to provide funding. HIN is reaching out to large health systems, the payer community, and the statewide business coalition to collaborate in this effort.

Pre-HITECH initiatives have fostered relationships that are maintained because of collaborative spirit and physical proximity. Many individuals currently involved with Maine's HIE Program have a history of collaboration on similar projects, which has fostered a strong sense of trust and mutual respect. The willingness among experienced organizations to collaborate allows the governing entities to leverage these pre-existing relationships in the health care delivery system. Convenient and willing cooperation between stakeholders reduces the "silo" effect when implementing large health IT infrastructure and can be integral in securing provider buy-in for HIE.

Furthermore, the co-location of the REC and HIE activities within HIN allows the two initiatives to share common goals and approaches to bolster HIE adoption in the community. For example, in an effort to encourage participation in HIE, providers who sign a contract for REC services are required to connect to HIN. The REC is also responsible for promoting Direct, particularly among rural providers and smaller practices that may not possess alternative means to exchange. HIE is tightly integrated into the EHR adoption efforts of the REC and are not an afterthought.

Engaging users in information exchange is a difficult and slow moving process. Despite accruing significant amounts of data in the central repository, HIN has been unable to secure a critical mass of users. According to a variety of respondents, including HIN staff, hospital systems and state government representatives, utilization of HIN data remains low at point-of-care. Most providers cite lack of integration of HIN into their everyday clinical workflow as a barrier to regular use. In particular, logging into two separate systems in order to access patient information as is currently required for query-based or Direct exchange is a burdensome process providers. Although providers can access HIN data within their EHR (using a single log-in), querying the repository requires a provider to click on a link or radio button within their EHR to access the HIN portal, and then log into the HIN portal. An additional limitation is that data accessible through HIN cannot currently be downloaded and integrated into the providers' native EHRs. Consequently, providers report difficulty integrating data from HIN into their clinical workflow and patient records. To address workflow difficulties, HIN is developing tighter integration between the provider EHR and their portal. Once implemented, providers will only have to log in once to their EHR and will obtain automatic access to the HIN portal. HIN is also working on enhancing the provider usage data they collect to identify provider location when they access HIN data, and under what circumstances. This will alert them to system or workflow concerns, as well as inform outreach and education activities.

Like HIN, hospitals are also pursuing various strategies to better integrate EHRs into clinical workflow and to encourage their use. These strategies include identifying likely users and promoting usage among those groups. For example, one large hospital system in Maine focuses on the emergency department, nurses, especially triage nurses, and hospitalists. The hospital trains staff to access HIN data and to make relevant information available to the physicians. Given that emergency department doctors tend to work under time pressure, enabling nurses to access and deliver pertinent information to doctors may promote use of HIN data.

“HealthInfoNet is going to be supported by three groups, providers, payers, and government (a portion of that will be federal, a portion of that will be state). But it’s not going to be supported by any groups if it’s not being used. It’s got to be used.”—*State official*

Lack of technical capabilities and know-how in smaller practices hinder exchange. Small and rural based practices tend to lack the IT staff, internet connections, and technical know-how to establish connectivity with HIN. Furthermore, some small providers believe annual subscription fees for HIN services and EHR vendor costs exceed what they are willing to pay for connectivity. In an attempt to address these concerns, HIN plans to offer Direct services at \$120 per year for each provider. For small and rural providers who are in the process of establishing connectivity with HIN, as the REC, HIN also provides technical and education-based support. At present, HIN has seen limited demand for Direct services, in spite of its numerous use cases. Informants suggest this is partially due to lack of knowledge and awareness of these services among providers. HIN had not yet launched Direct services (as of

December 2011) so there is no corresponding data (e.g., adoption rates, new service contracts, etc) to confirm a presence or absence of demand.

The evolving healthcare marketplace creates new challenges and opportunities for HIN.

Healthcare reform and related changes in reimbursement and payment models, as well as the development of ACOs, have increased the need for data liquidity. HIN's full service model includes using its central data repository for data aggregation and analytic purposes. HIN also plans to integrate the data from its All-Payer All-Claims Database with clinical data for improved data analytics. However, these plans will be complicated by data ownership issues, which remain an area of tension in Maine. Although the All-Payer All-Claims Database is public data, HIN does not own the clinical data it plans to integrate. Instead, the organization it comes from owns the data, which creates issues around appropriate use for analytics and data aggregation.

In addition, the changing landscape, driven primarily by health care reform, is prompting large health systems to establish their own exchange systems and analytic capabilities, which could obviate HIN's role in analytics and challenge its value proposition. Many large hospital systems, despite their willingness to participate in the pilot projects, have developed internal HIE capabilities.

Therefore, their use cases for state-led HIE are limited to sharing demographic data with unaffiliated providers and using the hub for submitting public health data. Similarly, many ambulatory providers in the state already possess HIE capabilities through their hospital affiliations, which can make HIN's services redundant.

While these changes in the healthcare market bring into question the value of state-led HIE activities, HIN is carefully considering its future efforts. It sees its potential value as an organization that fills gaps in the marketplace, including the needs of small, unaffiliated providers. HIN is also working closely with MPCA and FQHCs served by the Bangor Beacon Community to help them meet quality-reporting requirements.

“Everybody is concerned about data ownership. Our biggest challenge to date has been getting the [health] plans to give the data to us because they see it as a proprietary asset. They see this [data] as how they will differentiate themselves in the new market of ACOs... and they do not want everybody else having access to the data.”
—*Healthcare quality representative*

Conclusion

Maine's HIE program successfully leverages pre-HITECH investments in health IT infrastructure to enable HIE. The 2008 demonstration project paved the way for leading health systems to collaborate and test the feasibility of exchanging key clinical data. Additionally, Maine's unique geographic characteristics and concentrated population along with long-standing relationships, trust, and a shared vision among the various collaborators in the state foster a collaborative environment for information sharing.

While HIN has been successful in connecting both large provider systems and ambulatory practices, they continue to wrestle with provider usage of data collected by HIN. This indicates that a strong business driver for data exchange must exist to ensure that philosophical support transitions to concrete use of the system. Once exchange is occurring, ensuring that providers use data at the point

of care requires “tight” integration into provider workflows. Absent this integration into clinical workflow, providers are not likely to realize benefits of HIE in care delivery.

An evolving health care market, changing payment models, and health reform are altering the dynamics of the health care environment in Maine, which may either accelerate or inhibit HIN’s future progress. If large health systems develop ACOs around specific organizations instead of around a community-based care delivery model, HIN’s expected value-add could diminish, putting its future sustainability into question. On the other hand, HIN’s investment in heavy central infrastructure enables it to provide a variety of HIE services. HIN is attempting to leverage the data they collect to advance new strategic initiatives, including consumer access to personal health records, care coordination in support of patient-centered medical homes, and a state-wide medical images repository.

While heavy central HIE infrastructure may allow a state or state designated entity to offer a broader range of services to its stakeholders, the health care marketplace may evolve in a way that creates unique challenges for states that have made this investment. Hence, early focus on stakeholder value proposition, integrating services into provider workflow, and adequate sustainability planning is critical for long-term success.

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