HIE Best Practices: Responding to Member Needs with Flexible Services and Technology

Answering to their value proposition, HIEs survive in a dynamic, demanding healthcare landscape by continuing to evolve.

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Summary: More health information exchanges (HIEs) are flourishing today in a rapidly changing healthcare environment. HIEs that adapt to their stakeholder's needs do well. This paper reviews 14 HIEs, common characteristics and trends that contribute to an HIE's success. In a transitioning healthcare landscape — strongly influenced by the shift to performance-based payments and meaningful-use requirements — HIEs must be flexible in their services and technology solutions, and responsive to member needs.

In the last 5 to 10 years, healthcare stakeholder needs have shifted and gained prominence, and health information technology (IT) has been much more widely adopted, drastically changing the prospects for and status of health information exchange (HIE). In 2009, the Health Information Technology for Economic and Clinical Health Act (HITECH) amplified this transformation in the HIE landscape by incentivizing healthcare providers to use electronic health records (EHR) — with goals to improve quality and coordination of care, eliminate costs associated with duplication, and increase patient participation in care. Consequently, EHR use increased from 48 percent in 2009 to 78 percent in 2013 (Hsiao & Hing, 2014) among healthcare providers, with hospitals and ambulatory facilities, followed by large physician practices, as early adopters.

Widespread adoption of EHR is a component of improved population health, and data exchange is needed to maximize EHR benefits. Today, in order to qualify for incentives, providers must demonstrate their progress in these areas. The Centers for Medicaid and Medicare Services (CMS) outline three stages for meaningful use of EHR:

- data capture and sharing;
- advanced clinical processes;
- and improved outcomes.

HIE is critical to reaching the full potential of each of these steps.

It enhances the value of EHR by serving as a platform for providers to securely share patient information. HIE can facilitate care collaboration among hospitals, private practices, accountable care organizations

(ACOs), patient-centered medical homes (PCMHs), and federally qualified health centers (FQHCs). The Accountable Care Act is shifting the reimbursement model to pay for performance; as a result, providers will actionable real-time and analytic data to optimize population health — and HIEs will fill this need.

More-informed clinical decisions and greater collaboration between facilities, supported by HIE, can:

> • significantly decrease costs associated with procedure redundancy;
> • improve speed and efficiency of care;
> • and enhance the quality of care (What is HIE?, n.d., para. 1).

HIEs must provide for the timely, accurate, seamless data retrieval needed by providers to survive in a performance-based healthcare market. In this interest, HIEs must carefully pursue strategies — including vendor selection and management — that overcome the hurdles in engagement, technology, and adoption that these pioneering efforts encounter every day currently.

> HIE uptake is tracking with expanded EHR use, and HIEs and their vendors are now thrown a host of challenges in putting health information exchange into broad, effective use at the point of care.

According to KLAS (2014), more than a dozen technology vendors serve HIEs now, and these companies dominate the HIE market. Vendors chosen by HIEs are enmeshed in accommodating variable stakeholder needs. Many remain challenged to fully respond, but the ability to do so drastically influences HIE success (KLAS, 2014). Current HIEs pursue either a single or multi-vendor approach.

A view of 14 prominent, HIEs in the U.S. — with a summary of their member and vendor strategies and use cases (specific services) — reveals approaches that help HIE's thrive and deliver increasing value.

HIE Elements and Services

Features

HIEs were initially conceived primarily as portals to query-based data retrieval, a model in which participating HIE members would establish their own health information service provider (HISP) technology arrangements through a combination of vendor and internal resources. In reality, HIEs are trending towards providing both the HISP and exchange functions.

HIEs offer certain common components or building blocks of modern data transfer for purposes of patient care:

- *master patient index (MPI).* HIEs can accurately match information for a specific patient from disparate entities.
- *electronic information delivery.* HIEs are able to facilitate more efficient delivery of clinical information, looking to do away with the still common reliance on faxed or mailed hard-copy information.
- *query portal access.* Providers can solicit care-team information and other health data for a particular patient.
- *secure messaging services.* Providers can securely send messages to other providers (OneHealthPort, 2010).
- quality reporting. HIE's are starting to provide regional and state quality reporting, for example summaries of 30 readmission rates for hospitals.

Below are various services that currently define health information exchange.

HIE Services

Direct exchange of clinical information

"Direct" is a nationally accepted protocol, based on the Direct Project, for sending clinical messaging securely outside of a particular network. It is similar to an extra-secured form of email. It supports transmission of such forms as the Continuity of Care Document (CCD) and inpatient/discharge information.

Example: A *primary care physician (PCP) refers a patient to a specialist and sends a message via Direct to the specialist with the relevant patient information. This transaction seeks to enhance continuity of care and ensure that the patient receives care from a provider better informed about his or her needs.*

Notifications

Alert notifications. These notifications are real-time alerts to providers that a patient had been either admitted to, or discharged or transferred (ADT) from, a hospital. To facilitate alert notifications, patient attribution is enabled either through provider subscription to an MPI or by using payer information to link a patient with a provider (Purkis, Morris, Afzal, Bhasker, Finney, 2012). Alert notifications have become an essential part of HIE value services, because they provide near real-time input to the clinical care team that directly affects all-important follow-up care. Alert notifications thus contribute to quality and coordination of patient care.

Example: *A patient arrives at hospital for emergency room. Upon either admission, discharge, and/or transfer, an alert is sent to the PCP, which informs this physician of the patient's visit. This alert*

prompts the PCP to seek additional information, through a query portal access, and to follow-up with the patient Having these steps consistently in place is especially important when managing care for chronically ill patients.

30-day readmission notifications. This notification alerts providers that a patient has been readmitted to the hospital within 30 days of his or her most recent past hospital discharge. Providers can opt to receive readmission reports for all patients or only designated patients. This notification directly supports hospital response to Medicare's 30-day readmission penalty for hospitals.

Example: *A patient is discharged from the hospital on July 1ˢᵗand is readmitted on July 18.ᵗʰ⸴ The patient's PCP will receive a 30-day readmission notification.*

Claims history

Providers — both hospitals and physician offices — can request recent utilization information on a patient via participating insurance payers who are members of the exchange. They receive translated claims information that carries important indicators of the patient's recent medical usage, including tests, procedures, and other care.

Example: *A patient arrives at an emergency room slightly incoherent and with indications that he may be entering early stages of septic shock. The emergency department team wants to determine quickly this individual's recent past medical history, particularly whether he has undergone any surgeries, or primary or hospital care for infectiona. Using his insurance card or other ID information, they are able to determine his healthcare insurer and send a request to the exchange that returns claims-based information on recent care. His primary care provider is able to do the same when the patient visits him for follow-up care later in the month.*

Automated team finder

Providers — both hospitals and physician offices — seek to confer with or update other clinicians who have provided healthcare to an individual. They send a request through the exchange, which pulls this information either from the patient's healthcare insurer for from a clinical repository of information.

Example: *A patient is admitted through the E.R. at a university medical center and spends two days in the hospital for a severely fractured vertebra. The hospital wants to send a hospital discharge and care summary to the patient's PCP, community hospital, physical rehabilitation center, and orthopedist. The hospital requests information on the identify of these providers through exchange and can then direct*

inquiries, conferences, referrals, discharge notifications, and care summaries to the patient's full care team or to select members of it.

Directory requests via the web

Taking advantage of the MPI, members can query specific information about an individual patient, such as admissions or care information through a web portal providing information from data repository or payer-query system.

Example: *A cardiologist is seeing a heart failure patient for her six-month check up. He wants to know if she has experienced any additional hospital admissions during that time period. He queries the web portal for this information.*

Automated web services

Members can specify types of information requested from the data repository and access this information through a web interface or via a push-out information tab within their EHR.

Example: *A specialty department wants to view all recent care for patients to be seen in its diabetes clinic for the week. It accesses this summary report via the web portal.*

> Direct exchange and alert notifications are happening now. Image transfer and connection to public-health databases are increasing. Meanwhile, analytics are part of the Big Data future of HIEs.

Prescription drug monitoring program (PDMP)

In addition to interoperability features, HIEs also approach population health by establishing public health affiliations, the most prominent example of which is their linking to PDMPs (prescription drug monitoring programs, which are statewide electronic databases that allow states to collect and analyze data on prescription drugs dispensed within their state). Convenient access to state PDMP's via HIEs enable providers to coordinate with state efforts to track potential prescription drug misuse and abuse (Frazier, 2013).

Example: *A PCP is treating a patient for chronic back pain and prescribes an opiate pain medication. The prescription is intended to last the patient four weeks. The patient fills the prescription at a local pharmacy, where the pharmacist enters the necessary information into the statewide PDMP. Within two weeks, the patient returns to the PCP and states that the pharmacist only filled two weeks worth of medication. To confirm this information, the PCP references his original prescription for one month with the information the pharmacist entered into the PDMP database.*

Image exchange during a traumatic event

Image exchange during a traumatic event can be critical to care and survival. This is especially true if a patient is transferred between hospitals during the emergency period. The ability to efficiently share images between medical centers and radiologic practices reduces redundant imaging and saves critical time during urgent care periods.

Example: *An individual is involved in a traumatic accident and is rushed to a local emergency department (ED). The ED performs diagnostic imaging and realizes that the patient needs to be transferred to a different hospital to undergo surgery. The patient is then transferred by ground or air to the second hospital. During this time, a Direct message is sent to the recipient hospital with images accompanying clinical notes. Once the patient arrives at the second hospital, treatment is immediately administered without repetitive evaluation and time-consuming and duplicative imaging.*

Data analytics

Data analytics is anticipated to become a significant component of HIE activity as the healthcare landscape shifts to performance-based payments and population health, and as HIEs mature. With proper privacy safeguards and permissions in place, this feature has the potential to permit HIEs, health systems, insurers, municipalities, regions, states, public health organizations, and researchers a robust opportunity to evaluate care quality, population health, and disease management across whole healthcare service areas or subsets of patients or providers.

Example: *An ACO wants to determine staffing needs and potential services it should provide to address adverse health outcomes in its community. To do this, the organization analyses aggregate data from its regional exchange to map health trends in its target population, revealing care shortcomings and disparities. The organization is able to make appropriate staffing decisions and provide services that effectively address health needs in this community group.*

Other HIE use cases could include management of sensitive data from behavioral health populations and prisons.

Discussion, Commonalities, Lessons Learned

Successes and Problems Align

The HIEs profiled here have some common aspects that contribute to their accomplishments. These can be loosely characterized as a number of features that ultimately cultivate and maintain stakeholder interest, commitment, and usage. And these traits are consistent with those listed for HIE success by the National eHealth Collaborative (2011):

> • Alignment of stakeholder and HIE priorities;
> • Neutrality needed to build trust;
> • An understanding of clinical workflow needed to manage and integrate changes;
> • And broad emphasis on interoperability.

Similarly, a recent article by Hagland (2013) reflects on HIE success factors by highlighting common problem areas:

> • Absence of data granularity, or deeper level of detail in data;
> • Lack of interoperability (vendors fall short of providing the technology needed to achieve interconnectivity required for exchange);
> • and failure to align HIE goals with stakeholder goals.

Key concepts:
• common goals
• trust
• detailed, interoperable data
• attention to workflow

One or More *Right* Vendors

HIEs must make astute selection of one or more vendors in order to deliver services successfully. Vendors, in turn, must be able to satisfy changing stakeholder demands for solutions and services. This is especially true in an environment where federal standards for HIEs are not yet solidified. One Florida HIE recently expressed this concern: "…along with all the other challenges that HIEs face, changing federal regulations are forcing [them] to adapt [their] software and figure out how to pay for it" (Hall, 2013). As a result, a number of existing HIEs — including several interviewed for this review — are modifying vendor selection to continue to ensure value for their members. Vendors must be prepared to implement and deploy appropriate technology to achieve interconnectivity and routine data transfer required for different use cases.

HIEs mesh perfectly with increased reliance on electronic health records and expanded meaningful use. The challenge comes in implementation and adoption, with vendor selection critical to success.

HealthShare Exchange
OF SOUTHEASTERN PENNSYLVANIA, INC.

HealtheLink, RHIO, and QHN are three HIEs that have recently experienced vendor changes. HealtheLink faced data granularity and notification fatigue, which occurs when an individual receives too many notifications, challenges that its initial vendor could not address, and so chose a new vendor that could close these technology gaps (D. McNichol, personal communication, June 27, 2014). RHIO and QHN also switched vendors, to provide a more robust platform. Both sought to achieve various aspects of interoperability such as Direct messaging and support for other services (Quality Health Network - QHN, 2014; J. Eisenstein, personal communication, July 9, 2014).

> • Physicians respond positively to alert notifications.
>
> • In-house versus vendor management of data technical infrastructure is a topic of concern for many HIEs.
>
> • Health information exchanges have begun to explore ways to contribute to public health initiatives.

As one approach to addressing these chalenges, 43 percent of the HIEs reviewed here selected a multi-vendor strategy as a means to provide the comprehensive features needed to achieve interoperability for their designated use cases. HealthInfoNet is a prime example of an HIE with multiple vendors: "It would have been easy to fall in line with a single-vendor solution for all HIE needs, but HelathInfoNet made a conscious decision to bring together a number of vendors . . . This model has provided more flexibility and given HealthInfoNet a robust platform to expand upon" (Rogow, 2012). In this scenario, not only does a multi-vendor model provide some exchanges with more comprehensive features, it has given them the flexibility needed to adapt to evolving stakeholder demands — a key attribute of a successful HIE.

> Vendors must perform according to required use cases or HIEs will change or add vendors or move to internal technology operations.

Aligning Trends

Trends observed in the featured exchanges reflect unique and demanding stakeholder agendas that require HIEs and their vendors to deliver services such as Direct messaging, lab and radiology results, query-based emergency department access, public health connections, and other member/stakeholder-specfic needs. Services common to all HIEs reviewed here include secure messaging and query-based emergency department portal access. Another widely used feature, labs and radiology results delivery, is a trend associated with more mature HIEs.

> Anticipating stakeholder needs and expanding service portfolios is imperative to the survival of HIEs, especially with the emergence of new payment models and patient-centered care.

Direct messaging is present in most HIEs here. Distinctly, OneHealthPort chose to omit Direct messaging in order to give providers the "flexibility needed

to push and pull documents [at their discretion]" (S. Merk, personal communication, July 9, 2014). At the same time, features that support public health initiatives and population health management are dispersed increasingly among HIEs.

Fully half of HIEs reviewed here incorporate public health surveillance and or immunization reporting capabilities. Other less-common population-based services are connection with PDMPs and 30-day hospital readmission reports.

Potential trends that these interviews revealed include shifts towards enhanced notifications. After ADT integration, for example, NeHII reported that physicians demonstrated a 63 percent satisfaction rate with having alert notifications (D. Bass, personal communication, June 30, 2014). Similarly, RHIO shifted from a focus on lab and radiology report services to greater emphasis on alert notifications. A majority of the featured HIEs also offered push-notifications (versus standalone query portals).

In addition to these notification trends, status updates from the featured HIEs exposed an affinity among some exchanges for managing data in house — and for the flexibility and control that this arrangement affords. (S.Flynn, personal communication, July 1, 2014). As a case in point, RHIO stated that currently nearly a third of its staff members were technical-support personnel charged with managing and controling data internally (J. Eisenstein, personal communication, July 9, 2014).

> Direct messaging and ADT notifications are common services. Lab and radiology results access and connection with public databases are becoming more common. Many HIEs are also looking to provide CCDs and analytics.

Looking ahead, continuity of care documents (CCDs), data analytics, and public health-related features are prospective services for a number of HIEs. For the latter feature, more than a third of the above HIEs indicate that they have syndromic surveillance, immunization reporting, and/or PDMP as future service goals.

Broadly speaking, current and prospective trends for established HIEs center on quality, cost-containment, and meaningful-use goals,

> **Traits of Success:**
> • alignment of stakeholder and HIE priorities
> • neutrality
> • proper vendor selection and good vendor performance
> • interoperability
> • efficient workflow management
> • agility in responding to stakeholder needs

emphasizing comprehensive, seamless patient care. These themes become more important with the proliferation of accountable and patient-centered care models of care. In all of these realms, HIEs will play a pivotal role, connecting data sources and providing access to patient health information. In order to achieve success, an HIE must adjust to all of these exigencies continuously.

Financial Sustainability

Although each HIE has a unique financial sustainability model, featured HIEs did display certain trends. Most notably, a majority of the HIEs acknowledge that sole reliance on grant funding does not support long term sustainability. Instead, long term sustainability was largely associated with membership fee volume. In turn, long term sustainability is linked with an HIE's ability to provide value-based services to stakeholders. Arguably, once an HIE is more reliant upon subscriber contributions, grant money could be used as seed money for future ventures.

Profiles of Established HIEs

Bronx RHIO

The Bronx Regional Health Information Organization (RHIO) is a health information exchange located in Bronx, New York. Currently, this organization serves the majority of the Bronx-area's 1.4 million residents, and exchanges data on 95 percent of borough discharges including 600,000 annual emergency department visits.

Technology vendor(s): Optum Insight/Axolotl

Stakeholders/members/participants: hospitals, physician groups, community health centers, nursing homes, home health agencies, NYC Department of Health, private physician practices, congressional budget office, diagnostic and treatment centers, health plans, and public health organizations.

Services:
- query tool that permits providers to view patient information (lab, radiology, medication, insurance eligibility, transcribed report information) through a secure web portal
- secure clinical messaging for select patients
- ADT/registration information for patient demographics, allergies, and consent status
- lab results (pathology)
- comprehensive medication information
- radiology reports

• transcribed reports (discharge summary and any other available reports).

Future services:
    • consult report delivery (automatically sent to referring provider, a feature that can also deliver other clinical documents, such as radiology reports across facilities)
    • ED notification alert when a patient admits to a Bronx emergency department (L. Weber, personal communication, July 17, 2014; Bronx Regional Health Information Organization, n.d.).

Financial Sustainability: The Bronx RHIO is a not-for-profit entity supported by contributions from participating organizations- in the form of service fees-and grant funding from federal, state and local governments. Corporate sponsorship opportunities are also available to interested organizations.

Colorado Regional Health Information Exchange (CORHIO)

Established in early 2010, the Colorado Regional Health Information Exchange is a state-designated entity that serves the eastern part of the state, with 92 percent of hospitals enrolled in the HIE. CORHIO is a full-service integrated HIE providing:

- Query Based Exchange,
- Results Delivery-Based Exchange
- Direct Messaging
- Image Delivery
- Integration with Public Health

Chesapeake Regional Information System for Our Patients (CRISP)

The Chesapeake Regional Information System for Our Patients (CRISP) is a statewide health information exchange in Maryland and Washington, DC. Currently, this organization serves over 8 million patients in the area and exchanges data with at 47 acute-care hospitals.

Technology vendor(s): Mirth Results, Initiate Master Patient Index, Audacious Inquiry Encounter Alert, Secure Exchange Solutions

Stakeholders/members/participants: hospitals, physician groups, community health centers, nursing homes, home health agencies, Maryland Healthcare Commission (MHCC), Maryland Department of Health and Mental Hygiene (DHMH), Maryland Health Services Cost

Review Commission (HSCRC), private physician practices, diagnostic and treatment centers, health plans, and public health organizations.

Services:

> • query tool that permits providers to view patient information (lab, radiology, medication, PDMP, insurance, transcribed report information) through a secure web portal
> • secure clinical email messaging
> • ADT/registration information for patient demographics, allergies, and consent status
> • lab results (pathology)
> • comprehensive medication information including PDMP
> • radiology reports
> • transcribed reports (discharge summary and any other available reports).
>> • encounter notification service to primary-care providers and care coordinators on the admission and discharge from a hospital
>> • hospitalization reporting, including 30-day readmission reporting for hospitals across all participating hospitals. Some of this is in support of the HSCRC.

Future services:

> • healthcare analytics to include more sophisticated reporting for participants and public health.

Financial Sustainability:

CRISP identifies key revenue sources:

1. Current state funding, although continuous state funding should not be assumed.
2. Benefits should be discounted according to the degree of risk associated with that benefit.
3. Ongoing grant monies should not be included in the sustainability model.
4. Revenue should be pursued equally from stakeholder(s).
5. Transaction models should not incentivize HIE service implementation.
6. Subscription fee models should incentivize HIE service implementation.

CRISP applied the eHealth Initiative (eHI) model -- "Health Information Exchange: From Startup to Sustainability" – to attain key revenue principles. Specifically, financial sustainability stems from $10 million in state funds, subscription fees, and philanthropic donations. However, philanthropic donations are not expected to be continual.

Delaware Health Information Network (DHIN)

The Delaware Health Information Network (DHIN) is a statewide HIE. One of the more mature HIEs in the country, DHIN has enrolled almost 100 percent of hospitals and health systems in Delaware, and also incorporates out-of-state hospitals.

Technology vendor(s): Medicity, AI Alerts

Stakeholders/members/participants: acute care hospitals, payers, private practice physicians, long-term care facilities, lab and radiology firms, and pharmacies.

Services:
- Direct messaging
- real-time encounter notifications
- access to lab and radiology data
- immunization registry update information for the Delaware Division of Public Health's DelVax Immunization Registry System (facilitated by sending HL7 VXU messages through three, distinct, available transport channels — Direct secure messaging, SFTP upload, or interface capabilities).

Future services:
- CCDs
- HL7 immunization registry query (VXQ) messages (Delaware Health Information Network, n.d.).

Financial Sustainability: DHIN recognizes that public transparency and alignment of HIE services and stakeholder values are crucial to achieve financial sustainability. Emphasis is placed on driving enrollment volume in order to decrease transaction costs – current transactions are 25 cents per transaction.

Eastern Tennessee Health Information Network (etHIN)

Incorporated in 2005, the Eastern Tennessee Health Information Network serves 19 counties of eastern Tennessee.

As a full-service HIE, etHIN provides the following services to its consumers:

- Virtual Health Record (VHR) - clinical portal

- Clinical Inbox - data push subscription service

- etHIN Direct SX – healthcare only secure messaging

- Full HIE Integration to Physicians' EMR (Bi-directional or uni-directional)

- Immunization Registry (IR) and Electronic Lab Reporting (ELR) - updates, full reports

- Image Gateway – images are available, tied to radiology reports

- Connect Gateway – connection to the nationwide eHealth Exchange

Great Lakes Health Connect (GLHC)

Great Lakes Health Connect (GLHC) is the largest and most comprehensive exchange in the state of Michigan. The regional Great Lakes Health Information Exchange merged with Michigan Health Connect as of July 1st, 2014 to create GLHC. Great Lakes Health Connect now serves over 80 percent of the hospital beds in the state of Michigan and 20,000 providers.

Technology vendor(s): Optum.

Stakeholders/members/participants: private practice physicians, employers, hospitals, payers, community members, public health agencies, and community mental health service providers.

Services:
  • ADT notifications from both hospitals and nursing homes
  • DIRECT secure clinical messaging
  • Patient-specific queries
  • Structured lab results
  • Laboratory and scheduled orders
  • Automated referral system
  • Radiology reports
  • Access to transcribed documents
  • Immunization reporting to the Michigan Care Improvement Registry (MCIR), interfaced through the Michigan Health Information Network (MiHIN), which enables providers to receive real-time information through EHR systems.
  • Subscribe-to-patient feature that allows providers to automatically receive data on selected patients (Great Lakes Health Connect, n.d.)

Financial Sustainability: GLHC's financial sustainability model centers largely on the ability to link performance metrics, such as Meaningful Use Requirements, to funding. This is especially important for a merged organization; GLHC was formerly GLHIE and MHC.

HealthBridge

HealthBridge is a regional HIE located in Cincinnati, Ohio. It is a multi-state HIE that serves Ohio and is also connected to Kentucky and Indiana. The exchange provides services to 50 hospitals, 800 physician practices, and 7,500 physicians.

Technology vendor(s): Optum, Mirth, Health Landscape, IBM Initiate, and Wellcentive. (Healthbridge hosts and manages its own data repository.

Stakeholders/members/participants: physicians, hospitals, public health agencies, nursing homes, home health agencies, behavioral health providers, and payers.

Services:
- secure messaging
- Query-based exchange
- Emergency department alert notifications
- Electronic results delivery
- Eprescribing
- Syndromic surveillance
- Electronic claims check and eligibility verification.
- Population management capabilities through hbAnalytics solution (S. Flynn, personal communication, July 1, 2014; HealthBridge, n.d.).

> Though it requires significant onsite technical support, some HIEs have found that hosting and managing their own data repository enhances the flexibility and independence they seek in adjusting to evolving stakeholders needs.

Financial Sustainability: HealthBridge has a self-sustaining financial model. Each contract or service line has its own financial performance goals and contributes to the cost of running the organization. Grant funds are used solely for investing in new ventures.

HealtheConnections

HealtheConnections is a regional HIE that provides service for following 11 counties in Central New York: Onondaga, Oswego, Cayuga, Tompkins, Cortland, Madison, Oneida, Herkimer, Lewis, Jefferson, and St. Lawrence.

Technology vendor(s): Mirth

Stakeholders/members/participants: hospitals, physicians, long-term care facilities, laboratories, radiology centers, the Department of Health, behavioral/mental health facilities, and ambulatory care.

Services:
- Direct messaging
- Patient look-up through a secure web-based query tool

• Results delivery
• CCD exchange
• Secure messaging with Trust Bundle, Surescripts, Secure
Exchange Solutions, Hixny, HealtheLINK, and Rochester RHIO.
• Extend services to long-term care facilities and establish
connections with public health organizations
(HealtheConnections, n.d.).

Financial Sustainability: According to HealtheConnections,
sustainability is valued information plus valued services.

HealtheLINK

HealtheLINK is a regional HIE located in Western, New York.

Stakeholders/members/participants: 608 private practices, 26 hospitals,
eight regional radiology providers, three lab facilities, four home health
care agencies, three long-term services, two SureScripts facilities, and the
Veterans Administration.

Technology vendor(s): Optum Inc. and Mirth Cooperation.

Services:
• secure messaging
• alerts
• query tool that permits providers to view patient information
(lab, radiology, medication, insurance eligibility, transcribed
report information) through a secure web portal
• digital image exchange
• medication history query
• Veterans Administration query
• automated syndromic reporting
• immunization data with the New York State Department of
Health.
• CCDs
• inclusion of allergies
• EKGs
• Research analytics
• New York State Department of Health reporting (D. McNichol,
personal communication, June 27, 2009; HealtheLink, n.d.).

Financial Sustainability: HealtheLink receives funding from federal
stimulus, state funds, and stakeholders. Furthermore, sustainability can
be attained by incorporation of stakeholder values and also, large-scale
HIE adoption and use.   Additionally, HealtheLink notes that long term
sustainability should not rely on continuous grant monies and public
funding.

HealthInfoNet

Located in Maine, HealthInfoNet is a statewide HIE that serves 84 percent of the 1.2 million Maine residents.

Technology vendor(s): OrionHealth (clinical data repository, integration engine, and clinical port); Health Language (standardization of clinical data); GE Centricity (Direct services); and IBM Initiate (master patient index and provider directory).

Stakeholders/members/participants: medical providers, hospitals, state entities, and payers.

Services:
- Direct secure messaging
- encounter alerts (ADT notifications and a real-time report that generates a list of duplicate testing)
- 30-day hospital readmission reports
- lab and radiology results
- access to dictated and transcribed documents
- immunizations reports
- PDMP link
- VA link.
- analytics capabilities (to be supported by HBIsolutions)
- possible inclusion of PCMHs and ACOs into the exchange network (HealthInfoNet, n.d.).

Financial Sustainability: HealthInfoNet covers operational costs, which are associated with core HIE services, solely through participant fees. Furthermore, subscribers pay a monthly fee based on number of hospital beds and number of physicians in a medical practice. Additionally, the organization charges separate fees for data and IT support. In 2010, the organization received a $6.6 million federal grant to expand the exchange and in 2013, experienced a $1.2 million surplus.

Kansas Health Information Network (KHIN)

Kansas Health Information Network (KHIN) is a statewide HIE that handles nearly 1.5 million unique patient records and provides service to more than one third of Kansans.

Stakeholders/members/participants: hospitals, physician practices, pharmacies, long-term care facilities, eye care, FQHCs, public health agencies, and EMS.

Technology vendor(s): ICA's CareAlign Soltion

Services:
- Web-based query portal
- Direct messaging

• Electronic lab reporting
• Immunization reporting
• Syndromic surveillance
• Cancer registry reporting
• Patient health record (allows patients to view their health information via a Direct message)
• Patient health record mobile notifications (allow patients to view updates/changes to personal health record via email or text)
• VA connections
• Timely image exchange during a traumatic event (L. McCrary, personal communication, July 11, 2014; Kansas Health Information Network, n.d.).

Financial Sustainability: KHIN intends to ensure long-term sustainability by providing high quality HIE services at the lowest cost to providers.

Keystone Health Information Exchange (KeyHIE)

Founded in 2005, Keystone Health Information Exchange has been exchanging with providers in the counties of central and northeastern Pennsylvania. As a full-service HIE it provides the following services with exchangers:

- HIE Provider Portal,

- "MyKey Care" (HIE Connected Patient portal)

- "KEYHIE Transform" for Nursing home and Health agencies

- Clinical Summary to share with providers

- KEYHIE Direct Secure Messaging.

Louisiana Health Information Exchange (LaHIE)

The Louisiana Health Information Exchange is a single HIE serving the entire state of Lousiana since 2007. Exchanging since 2011, LaHIE has 239 signed participant organizations, houses more than one million unique patient records and processes more than 58 million transactions per month. LaHIE became the state designated entity, in 2009, to lead the planning and implementation of health IT grants made available by the American Recovery and Reinvestment Act (ARRA).

LaHIE exchanges with hospitals, providers, school health centers, home health agencies, and other healthcare-related organizations in the state. It provides the following services to participants through its exchange:

- Master Patient Index

- Provider Registry
- Record Locator Services
- User identity management and authentication
- Audit trail
- Consent management
- Patient Portal
- National exchange gateway
- Prescription drug monitoring
- Insurance eligibility verification
- Image viewing

Nebraska Health Information Initiative (NeHII)

Nebraska Health Information Initiative is a statewide HIE that serves nearly 1,400 facilities throughout Nebraska.

Stakeholders/members/participants: consumers, physicians, healthcare providers, employers, labs, and pharmacies.

Technology vendor(s): OptumInsight

Services:
- Direct messaging
- ADT messaging and notification
- 30-day readmission reporting
- Lab result exchange
- Electronic prescriptions
- Access to PDMP
- Syndromic surveillance
- Services to other states
- Connection with the VA (D. Bass, personal communication, June 30, 2014; Nebraska Health Information Initiative, n.d.).

Financial Sustainability: NeHII's sustainability model uses the following strategies to attain success: support from private sectors, regulatory barrier mitigation, participation in state programs, and also, use of additional funding sources. Specifically, subscribers pay $10 per month for VHR, $20 per month for EMR, $10 per month for e-prescribing, $15 per month for Direct, and $10 per month for interoperability. Additionally, NeHII uses a licensed-based business model to offset operational costs for HIE services.

OneHealthPort

OneHealthPort is a regional HIE located in Seattle, Washington.

Stakeholders/members/participants: hospitals, physicians, health centers, payers, long-term care facilities, Washington State Health Care Authority and Department of Health.

Technology vendor(s): Axway

Services:
- ADT notifications
- Radiology results
- Community referrals and consult lab reports
- Insurance eligibility and benefits
- Immunizations
- ePrescribing
- Public health associations
- PDMP participation
- Syndromic and reportable disease surveillance
- connection to the Washington State Hospital Administration Quality Benchmarking System (WSHA-QBS), which allows providers to track, compare, and analyze data for quality improvement (S. Merk, personal communication, July 9, 2014; OneHealthPort, n.d.).

Financial Sustainability: OneHealthPort is a for profit entity that charges participating providers fees to utilize HIE services.

Quality Health Network (QHN)

Quality Health Network (QHN) is a regional HIE located in Western Colorado. QHN provides services for over 70 percent of the healthcare organizations in the region and more than 87 percent of area providers. The exchange serves nearly a half-million patients. It provides a repository of patient records, population health management information, risk stratification, and predictive modeling tools.

Technology vendor(s): Mirth (interoperability, data repository, Direct secure messaging, and HISP solutions); IBM Initiate (MPI); and Pluralsoft.

Stakeholders/members/participants: medical providers, labs, long-term care facilities, state and public health entities, payers and patient-centered medical homes.

Services:
- Alert notifications
- CCD exchange
- Electronic results delivery

• Data analytics tools
• Public health reporting and syndromic surveillance
• Business intelligence and analytics
• Mobile app that allows providers to access patient information remotely.
• Personal health record or physician-to-patient communications
• Integration of behavioral health information (Quality Health Network, n.d.).

Financial Sustainability: Quality Health Network generates revenue from hospitals (50%), Rocky Mountain Health Plans (RHMP) (25%) and the remaining 25% from occupational health, physical therapy, durable medical equipment, extended care, hospice, and physician practices.

Rhode Island Quality Institute (RIQI)

Rhode Island Quality Institute (RIQI) is a collaborative serving the Rhode Island (RI) community. The HIE comprises 400 healthcare providers and 95 percent of RI hospitals. Currently adding thousands of patients per month, RIQI has so far enrolled about a third of state residents into the opt-in exchange. RIQI was one of the first HIE's in the nation to exchange behavioral health data.

Technology vendor(s): Intersystem; J2 Interactive (consulting).

Stakeholders/members/participants: hospitals, physicians, payers, and lab and radiology centers.

Services:
• query tool that permits providers to view patient information (lab, radiology, medication, insurance eligibility, transcribed report information) through a secure web portal
• Direct messaging (to the HIE not provider to provider)
• Real-time encounter alerts
• Diagnostic imaging
• Tele-health alert homecare patient tracking
• Exchange of behavior health data.

Future services:
• PDMP participation. (A. Gupta, personal communication, June 20, 2014; Rhode Island Quality Institute, n.d.).

Financial Sustainability: RIQI utilizes a sustainable hybrid financial model comprised of public utility funding and business revenue.

Rochester RHIO

Rochester Regional Health Information Organization (RHIO) is a regional health information exchange organization covering Greater Rochester, New York. Currently, Rochester RHIO serves approximately 850,000 patients through its connections with 70 healthcare organizations, 13 county service areas, and over 200 physician practices.

Technology vendor(s): current — OptumInsight (Axolotl) (federated information architecture) and eHealth technologies (image exchange); pending — Mirth

Stakeholders/members/participants: physicians, hospitals, payers, academic institutions, labs, radiology centers, emergency medical services, home care, health systems, and the Monroe Department of Health.

Services:
- query tool that permits providers to view patient information (lab, radiology, medication, insurance eligibility, transcribed report information) through a secure web portal
- encounter alert notification
- Direct messaging.
- message tool that transmits results between hospitals, labs, and radiology practices
- patient portal where patients can provide consent and information on advanced directives (J. Eisenstein, personal communication, July 9, 2014; Rochester Regional Health Information Organization, n.d.).

Financial Sustainability: Rochester RHIO uses a financial model that relies heavily on payer involvement. As of 2009, 66% of operating expenses were covered by financial contributions from three regional healthcare plans. Participating hospitals contribute to approximately 30% of the annual budget, and remaining costs are covered by service specific fees and grants.

State Health Alliance for Records Exchange (SHARE)

State Health Alliance for Records Exchange is a state-based HIE located in Arkansas, currently serving 14 hospitals.

Stakeholders/members/participants: private practices, payers, diagnostic imaging and treatment facilities, and public health entities.

Technology vendor(s): Optum, eClinicalWorks, Greenway, GE Healthcare

Services:
- Secure messaging
- ADT notifications
- Immunization information
- Public health syndromic surveillance and disease reporting
- Lab and radiology reporting.
- Formation of public health agency associations
- Data analytics (State Health Alliance for Records Exchange, n.d.).

Financial Sustainability: SHARE utilizes a transparent funding strategy to facilitate their shift from grant reliance to long-term sustainability. Grant funds are primarily used to support innovative projects since monies may be a one-time disbursement. Therefore, participant contributions are vital to sustain long-term viability.

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