Evaluation of the State Health Information Exchange Cooperative Agreement Program

Case Study Report:

Experiences from Nebraska in Enabling Health Information Exchange (HIE)

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"I don't personally think we're at the point yet where we can say which model is the optimum model. I think there is a lot to be said for having one statewide HIE in a state like Nebraska where there is not a huge population... You have to figure out in each state what's important, what would bring people to the table and get them using the information that's out there."—HIE vendor

Report Summary	
Intervention and Setting	Between February 6th and 8th, 2012, the NORC State HIE Program evaluation team conducted a formal site visit of the state of Nebraska's program (HIE Program) and met with stakeholders in Omaha and Lincoln. The primary goals of the site visit were: ▪ To understand state implementation experiences with respect to governance and accountability, enabling HIE services, and establishing trust and sustainability; ▪ To identify common enablers, barriers, and challenges to HIE efforts; ▪ To understand provider perceptions and experiences with HIE efforts; and ▪ To generate "lessons learned" around engagement with large health systems and innovative HIE models.
Data Collection and Target Population	During the site visit, NORC held discussions about Nebraska's HIE efforts with representatives of the following groups: ▪ State Health Information Technology Coordinator (HIT Coordinator) and team ▪ Nebraska Health Information Initiative (NeHII), the lead technology organization ▪ Electronic Behavioral Health Information Network (eBHIN) ▪ State agencies (Medicaid Office, Department of Health) ▪ Providers (Nebraska Hospital Association, Nebraska Medical Center, Nebraska Medical Association, Pharmacists Association, Alegent Health, Regional West Medical Center) ▪ Specialty groups (NAMI Lincoln, NeHII consumer advisory council, Pathology Services) ▪ Regional Extension Center (Wide River Technology Extension Center) ▪ Industry stakeholders (Axolotl) NORC also conducted two provider focus groups
Key Take-Aways	Nebraska's success relies upon: ▪ Pre-HITECH activity and early buy-in from key stakeholders ▪ Long-standing relationships and a commitment to the public good ▪ Responsiveness to local market needs ▪ Coexistence of state-led and non-state-led HIE (public versus private solutions) Organizations providing comprehensive HIE services will have to examine value offered to HIE stakeholders resulting from emerging care delivery models such as Accountable Care Organizations

Introduction

Efforts to promote health information exchange (HIE) have been underway in the United States (U.S.) for over twenty years with the goal of increasing the quality and efficiency of health care. However, HIE has proved to be a constantly evolving market in which demand has shifted from one stakeholder group to another, and one HIE solution to another.

Progress in this arena intensified due to passage of the American Recovery and Reinvestment Act (ARRA) and the Health Information Technology for Economic and Clinical Health (HITECH) Act in February 2009, which created unprecedented new funding and incentives for HIE and the adoption of electronic health records (EHRs).[1] In August 2009, ONC issued a funding opportunity announcement (FOA) for the State HIE Cooperative Agreement Program, announcing it would distribute $564 million to states and territories to enable HIE.[2] By March 2010, 50 states and 6 territories (hereafter "states") received initial awards to plan and establish their programs.[3]

Eager to understand the effects and implications of the State HIE Cooperative Agreement Program, the Office of the National Coordinator for Health Information Technology (ONC) has contracted with NORC at the University of Chicago to conduct a multi-year evaluation of the program. Nebraska is an innovator state; by leveraging exchange infrastructure in the state, it has advanced its exchange capabilities and expanded HIE beyond the cities and into the rural areas of the state. As such, it may provide important insights to other states engaged in or planning exchange activities.

Key Factors That Influence HIE in Nebraska

State needs and state strategy are heavily influenced by local factors, such as geographical and population characteristics, the makeup of the local health care market, and levels of EHR adoption. Nebraska is the 38th most populous state with a population of 1,826,341 and an average population density of 23.8 persons per square mile.[4] However, most of its residents (73 percent) are concentrated in a handful of counties while the rest of the state is rural and sparsely populated.[5,6]

Nebraska's health care market consists of a mix of small provider practices and large health and hospital systems, concentrated for the most part in its urban areas. The majority of practices consist of a single physician (43 percent), 18 percent have two physicians, and 23 percent have three to five physicians. In total, ninety-four percent of all physician practices consist of less than 10 physicians.[7] The other major market players are local health plans, medical systems, and large hospital and provider associations, who have made investments in electronic health information systems.

EHR adoption, which can be used as a metric of HIE readiness and is a Meaningful Use (MU) requirement, varies depending on provider size. Among large health and hospital systems, EHR adoption is high, but among small providers and acute care hospitals adoption is lower. Among office-based physicians, one survey finds that the overall EHR adoption rate in Nebraska (59 percent) is only slightly higher than the national average (57 percent).[8] According to the latest American Hospital Association Survey, just 23 percent of non-federal acute care hospitals have adopted an EHR, compared to the 35 percent national average. However, 91 percent of these facilities intend to attest to MU compared to 85 percent nationally,[9] indicating a growing awareness and higher adoption levels in the future.

Nebraska also has several non state-led health information organizations (HIOs) that predate the creation of the Nebraska Health Information Initiative (NeHII), the lead technology organization

for the state HIE program. Major hospital systems in the state recognized an internal need to exchange health information and serve the sizeable rural populations who must travel long distances and see multiple providers to procure health care. For example, the Electronic Behavioral Health Information Network (eBHIN) is an HIO with a goal to provide continuity of care for patients with co-existing substance abuse and mental health diagnoses. eBHIN has an established network among providers offering substance abuse and/or mental health services. Another HIO, the Nebraska Statewide Telehealth Network, connects nearly all of the state's hospitals and all of the state's public health departments. Thayer County Health Services (TCHS) received a Critical Access Hospital-health IT grant that funded the creation of a Thayer County exchange organization called Southeast Nebraska Health Information Exchange (SENHIE). In addition, Western Nebraska Health Information Exchange (WNHIE) built health IT capacity in the Panhandle and developed plans to create a regional HIO with funding from the Agency for Healthcare Research and Quality (AHRQ), the Health Services and Resource Administration (HRSA), and others. WNHIE ceased operations in 2010, but the other HIOs continue to operate in the state.

Interest in promoting statewide HIE in Nebraska began prior to the establishment of the state HIE program. The Nebraska Biomedical Informatics Project (NBIP), convened in 2003 by the then-Lieutenant Governor, was a broad-based study by various stakeholders, including business, government, health care, and community and education groups. Findings from NBHIP included a recommendation for the state to promote statewide HIE and ensure all Nebraskans have an EHR.[10] These findings spurred discussions between the University of Nebraska and Blue Cross Blue Shield of Nebraska (BCBSNE) regarding the development of a health information network, and eventually led to BCBSNE providing the initial funding for the creation of NeHII.[11] NeHII began in 2005 as a collaboration between BCBSNE and several health organization representatives, and most of the large health systems, interested in creating a single EHR for providers across Nebraska. Because major health systems in Nebraska had already invested significant dollars in EHRs, a common EHR was never established; however, the group began discussing the need for statewide HIE. In 2006 and 2007, NeHII began collaborating with the state on strategic planning for statewide HIE to serve the predominantly rural state.

In November 2008, NeHII secured Axolotl as their HIE vendor and in spring 2009 NeHII implemented a 90-day pilot project in Omaha to demonstrate that Axolotl's technology would serve their business plan. The pilot securely connected hospitals, labs, physicians, pharmacies, and clinics within the metropolitan Omaha area and enabled real-time exchange.[12] By the end of 2009, NeHII reportedly covered 35 percent of Nebraska's hospital beds.[13] NeHII officially began offering HIE services as of March 2009, serving as the state's lead technical organization as a 501(c)3 non-profit. Table 1 provides a brief overview of HIE activities in Nebraska.

Nebraska's Approach to HIE and The Role of Contextual Factors

In response to the State HIE Cooperative Agreement funding opportunity, Nebraska submitted strategic and operational plans that outlined their approach. Here we describe the plans put forward by the state to address governance, technical structure, and consent, as well as the services the state went on to implement.

Table 1. Background on Nebraska State HIE Activities

Funding Amount	$6,837,180
Population Size	1,826,341
Recipient Organization	State of Nebraska, The Nebraska Information Technology Commission's eHealth Council
State Designated Entity (Lead Organization)	Nebraska Health Information Initiative (NeHII)
Strategic and Operational Plan Approval Date	11/15/2010
ONC Strategic Model Classification[14]	Orchestrator/Public Utility*
Technical Model	Hybrid federated model
HIE Vendor	Axolotl
Regional Extension Center (REC)	Wide River Technology Extension Center
Regional and Specialty Exchanges	Electronic Behavioral Health Information Network (eBHIN); Nebraska Statewide Telehealth Network; Southeast Nebraska Health Information Exchange

*The Orchestrator/Public Utility Model, as defined by ONC, describes states wherein "statewide HIE activities are providing a wide spectrum of HIE services directly to end-users and to sub-state exchanges where they exist."

Leadership and Governance Models

Nebraska has elected to decouple the leadership and technical functions in establishing their two-entity governance structure. Under this approach, Nebraska is the recipient of the Cooperative Agreement funding and NeHII serves as the state-designated entity/lead technology organization. In this approach, the state assumes a leadership role, administering the grant to remove administrative costs and burdens from NeHII, and providing accountability and oversight. NeHII serves as the technical lead and the state integrator, responsible for providing HIE services at the state-level to connect health providers, organizations, and HIOs with each other (Table 2). The relationship between the two entities is well-tested: NeHII was established prior to the HITECH Act and assisted the state in applying for the Cooperative Agreement funding.

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

Governance Organization	Role
State of Nebraska, in cooperation with the Nebraska Information Technology Commission (NITC) eHealth Council	Established governance and oversight framework for state-led health IT; maintains a fiscal control and monitoring system; delivers disbursements to subcontractors and other funding recipients; supports and oversees NeHII implementation efforts; coordinates activities with NeHII, the REC, HIOs, and other stakeholders
Lead Technology Organization: Nebraska Health Information Initiative (NeHII)	Oversees implementation of the eHealth Plan and the Cooperative Agreement; collaborates with critical stakeholders; reports on the program's fiscal and programmatic progress to the eHealth Council and the state HIT Coordinator

Source: Approved Strategic and Operational Plans

In addition to the state HIT Coordinator and NeHII, there is an eHealth Council and several advisory groups to both the eHealth Council and NeHII involved in state-led HIE activities. The eHealth Council is an advisory body comprised of 25 members (all healthcare stakeholders) from the public and private sector. The group meets regularly to discuss health IT adoption in the state, new initiatives to support and promote health IT, best practices, privacy, security, and other issues regarding state-level health IT. The NeHII Consumer Advisory Committee has strong stakeholder representation and many members have been involved in health IT pre-HITECH Act and since the beginning of NeHII. The consumer group has been very involved in creating the state's consent policy and developing consumer outreach materials. The board credits NeHII with propelling HIE efforts forward in the state and works to ensure that stakeholders both share and convey a consistent message about NeHII as they build participation.

NeHII and its partners see the organization as a public utility and an agent for the public good. Early on, Nebraska's major health systems convened and decided HIE was in the best interest of the community and the state. They were concerned about examples of proprietary access to and competition for information, and felt there were other ways for organizations to compete and capture market share without limiting access to information. As a result, NeHII was founded as a non-profit and envisioned as a public utility. As a public utility, Nebraska and NeHII are committed to controlling costs and spending federal grants wisely. For example, the state uses its existing staff to administer ARRA funds rather than hiring new people or leaning on administrative support at NeHII. The Lieutenant Governor serves as the HIT Coordinator and chairs the information technology commission.

> "There is just incredible support for Health Information Exchange in the State. Even if hospitals [have] been a little slow to join NeHII, it is really a concept that has widespread support in the State. And so many of our stakeholders are doing really incredible work."
> —*Nebraska State Leadership*

Technical Approach

Nebraska has taken a hybrid-federated technical approach to enable statewide information exchange that leverages existing private sector health IT/HIE capabilities in the state. In a hybrid-federated model independent databases, or edge servers, are connected to share and exchange information and users access information only when needed.[15] The separate edge servers avoid co-mingling of data. NeHII uses this logical configuration but physically stores the edge servers in a central location. Trading partners (e.g., hospitals, labs, clinics, government organizations) are provisioned an edge server that is outside the provider's firewall in the vendor's data center. Data providers create and maintain health information stored on the edge server, which includes lab reports, radiology reports, transcription reports, and Admission Discharge and Transfer (ADT) data. Trading partners access data via an Application Service Provider (ASP) model and control which data is shared within their federated network versus the broader NeHII community. NeHII services are listed in Table 3.

NeHII is also offering Direct Services to interested parties in Nebraska. The Direct Project is a set of standards, policies, and services offering a secure solution for providers to achieve Stage 1 MU and to enable inter- and intrastate exchange.[16] Direct uses a simple point-to-point "push" model

between authorized providers. Axolotl serves as the Health Information Service Provider (HISP)[a] for NeHII. At present, Direct does not play a dominant role in Nebraska; however, there are use cases for it. For example, regional networks in small geographical areas with limited exchange needs view Direct as an alternative to the state-led HIE program.

Table 3. Services Provided by NeHII

Services	Descriptions
Virtual Health Record (VHR)	▪ An integrated, comprehensive repository of results exchanged through NeHII and accessible to authorized providers ▪ Includes patients' laboratory and radiology results, history and physicals, consults, discharge summaries, visit records, medication history, problem lists, allergies, up-to-date eligibility information, exams ordered by clinicians, encounter notes, and referrals
Electronic Health Record (EHR)	▪ A portal that allows practices without EHRs to view patient information, share data, make referrals, and collaborate with any of the patient's caregivers electronically ▪ Certified for MU and connects providers to NeHII, enabling them to receive ARRA stimulus monies under the CMS EHR Incentive Program
e-Prescribing	▪ Ability to view patients' eligibility, allergies, prescription history, formularies, and generic and therapeutic alternatives when prescribing ▪ Prescriptions are checked automatically for dangerous interactions ▪ Prescriptions are transmitted to the patient's pharmacy and refills can be approved from any computer
Interoperability HUB/Physician Connection	▪ Builds a direct network from disparate certified EHRs and legacy systems, enabling interoperability and collaboration on patient care ▪ Allows providers to exchange data and can provide specific data for query by community-wide physicians
Direct	▪ Enables healthcare providers to electronically and securely "push," using the DIRECT standard,[17] specific health information, such as discharge summaries, clinical summaries from a primary care provider or specialist, lab results, or referrals to other authorized healthcare providers
Gateways	▪ Automated immunization gateway, public health gateway, ordering gateway
Other Services	▪ Master patient index (MPI), provider directory, clinical care summary exchange
Future Services	▪ The immunization gateway will extract data from third party EHRs (e.g., hospital) and send to Public Health through NeHII. ▪ Ability to run queries on and pull data from the Public Health Department ▪ Electronic lab reporting, syndromic surveillance

[a] A Health Information Service Provider, or HISP, is a logical concept that encompasses certain services that are required for Direct Project exchange, such as the management of trust between senders and receivers. It may be a separate business or technical entity from the sender or receiver, depending on the deployment option chosen by the implementation. Retrieved from: http://directproject.org/faq.php?key=faq

Recently, eBHIN decided to use the Direct services offered by NEHII to share behavioral health and substance abuse information with other providers who are not part of eBHIN, including health centers, and ensure comprehensive clinical care for patients. Finally, an independent reference lab is considering using Direct for three use cases: 1) as a mechanism for exchanging lab results with providers that currently do not generate sufficient billable tests to justify the development of an electronic interface. Direct would provide a viable option for replacing fax machines currently used for results delivery; 2) as a reference lab, they offer Direct services to hospital labs for some tests. Given the limited volume of labs, Direct offers a viable option for electronic connectivity in the absence of an interface; and 3) as a way to exchange electronically with payers to transmit supporting documentation for claims.

NeHII selected an opt-out model of patient consent. When NeHII first commenced their activities, Nebraska law only allowed for the release of health information for 180 days. Thus, an opt-in model would require patients to re-consent to information exchange every 180 days, a significant barrier to successful exchange. NeHII convened focus groups and found that patients did not object to information being shared, and thus chose an opt-out model. According to NeHII reports, the opt-out rate has been consistently less than two percent.[18] The law has since changed regarding the 180-day reconsenting requirement but the opt-out model remains.

Sustainability Approach

Nebraska's current sustainability model includes a participation/subscription model with monthly fees. Health systems, hospitals, and physicians pay for monthly access, which are marked up slightly above the cost of infrastructure paid to Axolotl, whereas payers commit to a per member per month cost. Major hospital systems and medical centers also provide substantial financial support. NeHII and its stakeholders believe strongly in the non-profit mission of providing a public good, but are also sensitive to the harsh financial realities in the state and the need for additional revenue beyond local support.

Nebraska is exploring innovative inter-state partnerships in their sustainability planning. NeHII is in conversation with nearby states about franchising their HIO services. Wyoming and Central Illinois are two potential partners who, instead of funding, building, and managing their own local infrastructure and services, may choose to use NeHII as their HIE services vendor. NeHII sees this venture as a way to both further their mission of enabling information sharing in areas of need and ensure long-term sustainability of Nebraska HIE.

Implementation

With the goal of serving as the statewide HIE, NeHII officially began exchanging data in early March of 2009, soon after the ARRA/HITECH legislation was passed. NeHII worked with the state to write the strategic and operational plans and to build a budget. The State received the Cooperate Agreement funds, which were then distributed to NeHII, allowing them to pursue greater market penetration by expanding from Omaha into Lincoln and more rural areas. NeHII continued their contract with Axolotl, a full service HIE vendor, having worked with them on the Omaha pilot project. NeHII has expanded its service offerings incrementally as the availability of funds has allowed, carefully weighing stakeholder demand. Currently, NeHII offers a central repository and an EHR, e-prescribing, a hub for exchange among physician practices, and Direct services. NeHII has also prioritized services related to labs, public health reporting, and e-prescribing technology. As of December 2011, NeHII had connected 15 hospitals in Nebraska and Iowa and had 1400

participating providers.[19] In 2010, OptumInsight (formerly Ingenix), a health services business, bought Axolotl. The company purchase delayed NeHII's implementation timeline, but otherwise NeHII reports satisfaction with Axolotl's services.

NeHII has invited existing regional and local health HIOs to participate in the statewide exchange program to the extent that it meets their needs; however, only one organization, eBHIN, is currently collaborating with them.

eBHIN is one of the state's most innovative partnerships. This organization is unique in that behavioral health information is not typically exchanged because of the complexities of navigating the associated privacy and security protections (i.e., HIPAA & 42 CFR Part 2). eBHIN has been able to overcome these obstacles by working extensively with their providers and patients to establish a trust framework and ensure the minimum necessary information is transmitted in accordance with HIPAA privacy requirements. NextGen, the vendor, provides eBHIN's EHR and HIE capability to establish a centralized data repository and standardized patient record exchange. The system uses a core data set that is already in use by publicly funded behavioral health providers in the state, which allows eBHIN to offer services to other behavioral health regions. eBHIN has been looking to establish electronic connectivity with other provider offices where their patients may obtain routine medical care. Given the sensitive nature of the information being exchanged, until recently, this was only possible if providers became part of the eBHIN network. The Direct services offered by NEHII offer a unique option for eBHIN to share sensitive health information with other providers like community health centers. eBHIN will be able to provide behavioral health care records via the HISP operated by NeHII, and in the future copy medical records to the eBHIN Central Data Repository (CDR) records to make medical treatment records available to behavioral health providers.

One other area of potential collaboration is the public reporting eBHIN providers have to complete. Facilities must submit data to the Substance Abuse and Mental Health Services Administration (SAMHSA) for national outcome measures through the state. Facilities found themselves duplicating efforts by entering data into their own EHR as well as into the state Magellan system, which they could not query. Initially, eBHIN hopes to limit duplicate data entry by using their HIE platform to submit data from provider EHRs to Magellan. eBHIN will then explore how data collected by NeHII can be leveraged in the future.

> "We think [HIE is] a single vehicle we can use to provide access to information that occurs within our organization and make that information more available to physicians, to payers and to other health systems. We see it as a key methodology for making patient information more universally available for those who need it in treatment..."—*Hospital System Representative*

NeHII's recruitment strategy has largely focused on encouraging exchange activity in hospitals and large health systems. NeHII pursued this strategy as hospitals and large health systems have the resources (time, systems, and IT staff) to establish connectivity with NeHII. Furthermore, by connecting to hospitals, NeHII can establish connectivity with their affiliated ambulatory providers. There are a few isolated examples where large hospital systems are using NeHII to connect to their affiliated providers, largely in cases where they are on different EHR platforms and use NeHII to exchange data between disparate systems.

In some cases, smaller hospitals find implementing their own HIE networks to be very expensive and it is more cost-efficient to subscribe to NeHII. NeHII also allows organizations to push information to federal and state entities to meet reporting requirements. These entities include Centers for Medicare & Medicaid Services (CMS), state-level agencies, and administrators around the state.

Some of the barriers to hospital buy-in include subscription costs, concerns that exchanging information will erode patient loyalty to the hospital, and lack of integration of data available through NeHII into provider workflows. In addition, many of the large hospitals and health systems already offer desired services, such as analytics and quality improvement information to their providers. Thus, organizations view NeHII's data and services as either redundant or incomplete by comparison. Accountable Care Organizations (ACOs) are a present but yet unknown force in Nebraska. In general, stakeholders recognize a need for ACOs to further integrate information within their integrated delivery networks. One health system speculates that ACOs may choose to participate in state-led HIE but in addition may develop a single platform for their users or create their own systems or databases. Finally, NeHII has roots as an Omaha-hospital based initiative and has yet to engage major systems in Lincoln. One is private system that may not have a rationale for taking part in a statewide effort, and the other is part of a larger interstate system whose leadership may not be motivated to take part in Nebraska-only initiatives.

Although NeHII has been successful in accruing a critical mass of data, it has been unable to secure a critical mass of users even among its major philosophical supporters and board members. Some stakeholders attribute this to other available options for exchange in Nebraska and to the yet unmet need to demonstrate clear value to its major financial supporters. Consequently, the state HIE program has not penetrated the market to its potential.

There are currently a variety of unmet exchange needs in Nebraska that offer NeHII an opportunity to continue its expansion. For example, Nebraska has many physicians who practice at multiple locations. State-led HIE services can provide a one-step process for these physicians to access information, rather than having to log onto multiple portals. The state also has patients who travel for care and seek care at multiple locations. Many providers do not currently have a portal to connect affiliated physicians to community records and would like to use NeHII to do so. Currently, affiliated physicians access applications and systems remotely through a Virtual Private Network (VPN). One provider system expresses willingness to provide EHR interfaces to independent physician offices through NeHII. However, current demand is low while adoption of EHRs in independent physician offices is just starting to take root.

> "Here is something that I think is critical: you [need to] have the same message coming out of all of the hospitals. Because what can happen is that you have a hospital in the middle of Nebraska that can make up a poster, put it up, and you look at it and go, 'That's not right.' Hospitals and providers need to understand that they [should] use the same material and not make their own." —*NeHII member*

Other large systems would like to use NeHII to transfer lab results between labs and clinics; perform patient matching between hospitals and clinics; and transfer immunization records through NeHII to the state. The Public Health Department would like to use NeHII for electronic lab

reporting and immunization reporting. Many organizations are choosing to use NeHII to facilitate their public health reporting and to avoid duplicate data entry.

NeHII engaged in extensive Omaha-based stakeholder involvement from the very beginning and leveraged the relationships of a small community. Interviewees report having all the major players at the table: payers, the State, pharmacists, physicians, health systems, consumers, and others. Because Omaha is a small community, NeHII leveraged a progressive, community-minded thinking and pre-existing relationships to meet goals.

NeHII has worked extensively with providers and hospitals on consistent messaging and marketing materials. It has developed consumer pamphlets for patients, doctors, and other organizations. When a new hospital signs up, NeHII works with the hospital to do public service announcements or pays for media to promote the partnership to consumers. Currently, NeHII is working with an advertising agency on a consumer education campaign aimed at doctors.

Patient education focuses on the benefits of participating. For example, if a traumatic surgery or health event is recorded in an EHR, the patient does not have to recount it at every visit to a new provider. Patient education is particularly important for those participating in exchange via eBHIN. Regarding mental health, newly diagnosed patients are often hesitant to share the information, whereas chronic or experienced patients are more comfortable sharing information. According to eBHIN, educating patients and addressing individual concerns has been the biggest challenge.

The REC promotes the concept of HIE but does not specifically promote NeHII. Wide River Technology Extension Center, Nebraska's regional extension center (REC), is a Quality Improvement Organization (QIO) and therefore focuses on the issues of quality of care, particularly transitions of care across the continuum. As a QIO, Wide River Technology Extension Center was familiar with NeHII prior to becoming the REC and reports having a good relationship with them. However, the REC remains "vendor-agnostic" regarding EHR and HIE vendors. Initially, this created tension between the two organizations, but NeHII understands that Wide River Technology Extension Center helps people learn about NeHII in the context of HIE. NeHII must promote itself and demonstrate value to convince providers to join.

Currently, major hospitals and medical centers provide huge financial support as a public service but do not see direct returns. One interviewee stated "the money has to come from somewhere, right?... The hospital doesn't receive direct value, but it's because the hospital is part of the community and we're all striving to make the health of the community better." This commitment to participating for community benefit but expression of uncertainty about organizational value was a recurrent theme. Another health system representative was more positive, saying that patients, physicians, health systems, and payers benefit from availability of information. From an organizational perspective, the physicians benefit directly but should not be burdened with the cost; the health systems should help provide them that benefit by investing in HIE.

> "Whether it's an ACO or more clinically integrated group that has needed a higher level of integration and information that should not limit your full support and participation in a broader health information exchange. I think that attitude has been a key to the success in Nebraska."—*Hospital System Representative*

Others suggest more investment by the payers and the state because currently BCBSNE and the major health systems in Omaha bear the majority of the cost of this program. Whether or not they see individual organizational value, according to certain stakeholders, payers should help pay for services they will use, and others they may not, to benefit the citizens of Nebraska and to ensure the project's sustainability.

To augment revenue, NeHII is providing shared infrastructure to Wyoming (e.g., master patient index, immunization gateway). According to one board member, NeHII dedicates attention to national conferences and is trying to attract business from other states, possibly to the detriment of local outreach and education efforts. Others find this strategy necessary and appropriate in order to ease local burden and ensure the long-term sustainability of Nebraska's HIE efforts.

Conclusion

Nebraska's HIE Program has successfully built off of the state's pre-HITECH investments in HIE. Early activities generated interest; the pilot project helped demonstrate NeHII's viability and secure stakeholder buy-in, while the HITECH funds allowed NeHII to expand beyond Omaha. These activities were further supported by a small and willing community committed to balancing the public good with the needs and pressures of the market.

Nebraska's progress is mixed when it comes to market penetration. Some of NeHII's participants leverage its services fully and transact frequently. Others are less informed or engaged and do not use its services to their full potential. Others, some of whom are key stakeholders, simultaneously express hope and doubt; they are supportive but feel uncertain about NeHII's ability to provide value in ways that distinguish it from other HIE efforts in the state and provide information that is not already available to state agencies.

Like many states, the future success of Nebraska's HIE efforts also depends on financial pressures and market forces. Its ability to expand its services and increase its uptake are critical to its long term success. Its ability to adapt to and/or anticipate changing needs for exchange will affect its viability as well. While ACO development is likely to support more exchange of health information in order to promote care coordination, it has yet to be seen whether ACOs will evolve around more community-based efforts or around their existing network of providers. The state has already made an investment in heavy infrastructure, which may render it difficult to respond quickly to shifts in the market. On the other hand, Nebraska is a state with a long history of HIE activity that has steadily and systematically built its current services in response to a local market that will not necessarily shift. It also offers a broad range of services that could be added in the future and is pursuing opportunities in neighboring states to protect and sustain its commitment to local health care.

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