

Nebraska Advance Interoperable Health IT Services to Support HIE

Project Summary, Progress, and Impact

September 2017

On July 27, 2015, the Nebraska Information Technology Commission was awarded a \$2.7 million Advance Interoperable Health IT Services to Support Health Information Exchange (HIE) cooperative agreement (Grant Number 90IX0008) from the Office of the National Coordinator for Health Information Technology to support the adoption of health IT, the exchange of health information, and the interoperability of health information technology. Partners in the two-year grant included the Nebraska Health Information Initiative (NeHII) and the University of Nebraska Medical Center (UNMC).

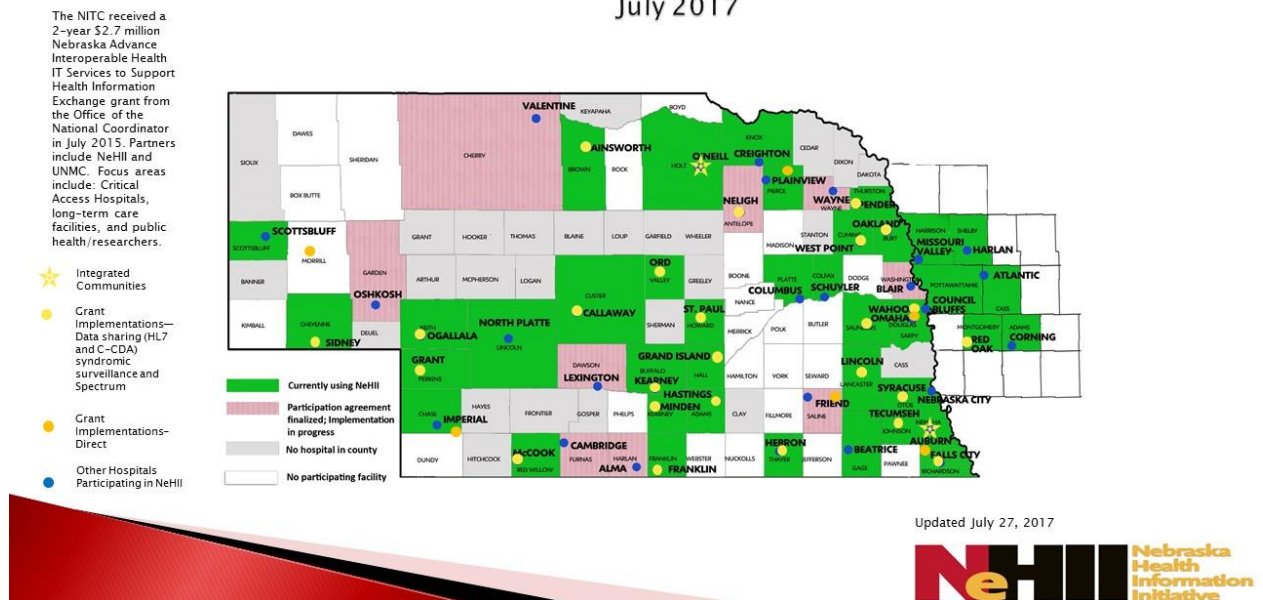
The grant supported the adoption of health information exchange through NeHII in 47 facilities and health systems—including 21 Critical Access Hospitals (CAHs)—in 31 counties in Nebraska and in Montgomery County, Iowa. Through the grant, the number of hospitals and providers sharing data with NeHII increased from 28 to 53. Over 700 providers and clinical staff were added as users. New functionality implemented included population health analytics, the use of C-CDA exchange to provide information to NeHII, and an HIE to HIE gateway with the Missouri Health Exchange. Two Critical Access Hospitals were also successfully implemented to share syndromic surveillance data with the State’s syndromic surveillance system.

The grant also helped health care facilities integrate health information technology into their workflow. UNMC provided assistance in workflow integration to facilities participating in two rural communities selected as integrated communities. Lessons learned are being shared through use case-based training modules. UNMC partners also worked with NeHII to demonstrate the ability to utilize NeHII to conduct research.

The map below shows the implementations funded through this grant.

NeHII Adoption and ONC Grant Implementations

July 2017



Progress and Effort

Adding HL7 Data Sharing Participants

NeHII added 22 facilities as data sharing participants, including 15 Critical Access Hospitals (CAHs) and 5 clinics, through HL7 data exchange during the grant period. Prior to the grant, 9 CAHs out of 64 CAHs in Nebraska and 4 in Western Iowa were participating in NeHII. Over 600 users have been added at these facilities. Grant Target: 19 facilities

Project Description. Critical Access Hospitals play a crucial role in providing access to care for rural Nebraska residents. These hospitals often serve as the focal point or hub for all health care services in a region. Health information exchange and the expanded exchange of patient data is vital to improving care coordination, monitoring and improving quality of care, access to specialty care and increasing patient access to clinical history information. NeHII has worked with the Nebraska Office of Rural Health to identify additional funding sources to defray both implementation costs and on-going costs for HIE participation. Once a facility commits to sharing data with NeHII, the NeHII CEO ensures that the appropriate legal agreements are in place. The technical implementation that follows includes the configuration of the connectivity between NeHII and the facility, the sending and subsequent validation of test messages, the training of hospital providers and staff on the use of the system, and education for the hospital team on patient consent and patient education regarding HIE. The facility team works closely with NeHII for data validation and training efforts. The EHR and HIE vendors provide technical expertise and ensure connectivity and data integrity.

Impact. The addition of 22 data sharing participants has significantly increased the information available within NeHII, enhancing care coordination and increasing the value of the health information exchange. With the addition of 15 Critical Access Hospitals, NeHII now covers over 50% of the CAH beds in Nebraska. This allows for a greater exchange of pertinent data for patients who transition between these rural health care hubs and the acute care facilities in the Nebraska. These additional hospitals also support additional HIE users who increase the use of the data available in the exchange. The increased use of data leads to improved care coordination and a reduction in duplicated procedures and tests resulting in a better patient experience. In addition, the increased hospital participation creates more comprehensive readmission reports for each facility which can lead to a reduction in hospital penalties and the associated cost savings. The overall impact of the increased participation in the HIE by Critical Access Hospitals is a higher quality of care provided by all facilities.

This project also significantly increased the number of NeHII users. Over 600 users were added at the 22 grant-funded HL7 facilities.

Challenges. Cost, including the interface fees charged by EHR vendors, remains the biggest barrier to the adoption of health information exchange by Critical Access Hospitals. Grant funding, in addition to NeHII's new pricing structure which reduced the annual fee for participation by Critical Access Hospitals, significantly reduced this barrier.

HL7 Implementations			
Facility	Facility Type	County	County Classification
1) Physicians Lab	Lab	Douglas, Lancaster	Urban
2) Community Memorial Hospital (Syracuse)	Critical Access Hospital	Otoe	Rural
3) Auburn Family Health Center	Clinic	Nemaha	Rural
4) Community Medical Center (Falls City)	Critical Access Hospital	Richardson	Rural
5) Colglazier Medical Clinic (Grant)	Clinic	Perkins	Frontier
6) CHI Health – Nebraska Heart Institute Clinics (Lincoln)	Clinic	Lancaster	Urban
7) Pender Community Hospital	Critical Access Hospital	Thurston	Rural
8) Oakland Mercy Hospital	Critical Access Hospital	But	Rural
9) Simply Well (Omaha)	Wellness Program	Douglas	Urban
10) Think Whole Person Healthcare (Omaha)	Clinic/ACO	Douglas	Urban
11) Callaway District Hospital	Critical Access Hospital	Custer	Rural
12) Ogallala Community Hospital (Banner Health)	Critical Access Hospital	Keith	Rural
13) Saunders County Medical Center (Wahoo)	Critical Access Hospital	Saunders	Rural
14) Thayer County (Hebron)	Critical Access Hospital	Thayer	Rural
15) Perkins County Health Services (Grant)	Critical Access Hospital	Perkins	Frontier
16) Howard County Medical Center (St. Paul)*	Critical Access Hospital	Howard	Rural
17) Community Medical Center – Falls City Family Medicine Clinic	Clinic	Richardson	Rural
18) Valley County Health System	Critical Access Hospital	Valley	Rural
19) Franklin County Memorial Hospital	Critical Access Hospital	Franklin	Frontier
20) Johnson County	Critical Access Hospital	Johnson	Rural
21) Kearney County Health System	Critical Access Hospital	Kearney	Rural
22) Brown County Hospital	Critical Access Hospital	Brown	Frontier

Adding C-CDA Data Sharing Participants

NeHII added 2 independent ambulatory clinics and a provider network to NeHII through C-CDA data sharing. Prior to the grant, no NeHII facilities were exchanging data through C-CDA exchange. Grant Target: 5 facilities

Project Description. The C-CDA project participants consist of independent physician clinics and clinic networks. These facilities many times do not have IT capabilities to send HL7 messages to share their data; however, their certified EHR platforms can send structured documents in the consolidated clinical document architecture or C-CDA. Care coordination for patients who receive primary and/or specialty care from these facilities is challenging without access to the clinical data available in these documents. The Nebraska grant team worked with the ONC to ensure grant funding is available to defray implementation and resource costs for this project as well. Once a facility commits to sharing data in this format with NeHII, the NeHII CEO ensures that the appropriate legal agreements are in place. The technical implementation that follows includes the configuration of the connectivity between NeHII and the facility, the sending and subsequent validation that the document meets all specifications, the review of the parsing of the source data into the designated locations for information in the NeHII HIE, the training of clinic providers and staff on the use of the system, and education for the clinic team on patient consent and patient education regarding HIE. The facility team works closely with NeHII for data validation and training efforts. The EHR and HIE vendors provide technical expertise and ensure connectivity, compliance with document specifications, and data integrity.

Progress

C-CDA Implementations			
Facility/Organization	Facility Type	County	County Classification
CHI Health – TPN Clinics (23 primary care and specialty clinics connected)	Clinic/Provider Network	Lancaster, Buffalo, Hall, Otoe, Saline	Urban, Rural
Family Practice of Grand Island	Clinic	Hall	Urban
Montgomery County Memorial Hospital Clinic (Red Oak, IA)	Clinic	Montgomery (IA)	Rural

Impact. The addition of two clinics and 23 CHI Health-TPN primary care and specialty clinics as data sharing participants significantly increased the information available in NeHII, enhancing care coordination and making the health information exchange more valuable. Over 80 users have been added at these facilities with additional users expecting to be added after the end of the grant period. This project also demonstrated the feasibility of sharing data with NeHII through C-CDA exchange and provided valuable lessons learned, which will facilitate the addition of additional facilities through C-CDA exchange.

Challenges. As with HL7 exchange, costs, including interface fees from EHR vendors, is the biggest barrier. Additionally, technical barriers related to security requirements of the HIE platform also posed a barrier to facilities with electronic health record systems which could not meet the security requirements.

Implementing Direct Secure Messaging

NeHII implemented Direct Secure messaging in 15 facilities with an emphasis on long-term care and post-acute care facilities. Grant Target: 50 facilities

Project Description. Nebraska’s long-term care and post-acute care facilities are faced with challenges associated with coordinating care for patients transitioning to and from multiple and diverse care settings. Challenges to adopting HIE include cost; workforce related challenges; differences in clinical processes and information needs; lack of capacity to acquire, implement and use technology; and lack of awareness of the need for interoperable HIE. Direct secure messaging is a comparatively low cost of entry technology solution that is standards-based and easy to implement from a technical perspective. Engagement of LTPAC facilities usually starts with an overview of Direct secure messaging and how it relates to the exchange of patient information between the long-term care or post-acute care facility and its referral partners. Once a facility commits to the project, the NeHII CEO ensures that the appropriate legal agreements are in place. The technical implementation that follows includes the formal verification of the business and the primary responsible individual in keeping with DirectTrust requirements, the assignment of Direct secure addresses by NeHII’s HISP provider, ICA (Informatics Corporation of America), and training of the facility personnel on ICA’s web-based Direct webmail system. In addition to these ICA webmail implementations, NeHII, within the scope of this project, is also implementing ICA’s XDR integration with Howard County Medical Center’s EHR system to allow sending of continuity of care documents directly from the EHR to long-term care, post-acute care and other referral partner Direct secure addresses.

Direct Secure Messaging				
Confirmed Facilities/Providers	Facility Type	County	County Classification	User Counts
VNA of Omaha and Council Bluffs	Home Health	Douglas	Urban	21
Immanuel Pathways (Omaha)	Daycare Program for Elderly	Douglas	Urban	9
Sunrise Heights (Wauneta)	LTPAC	Chase	Frontier	9
Ambassador Health Omaha	LTPAC	Douglas	Urban	6
Florence Home - Omaha - Midwest Geriatrics	LTPAC	Douglas	Urban	5
Public Health Solutions (Crete)	Public Health	Saline	Rural	4
Osmond General Hospital (Osmond)	Critical Access Hospital	Pierce	Rural	4
Blue Cross Blue Shield Nebraska	Payer	Douglas	Urban	4
Colonial Acres (Humboldt)	LTPAC	Richardson	Rural	3
Hillcrest Health Services (Bellevue)	LTPAC	Sarpy	Urban	3
Royale Oaks - Midwest Geriatrics (Omaha)	LTPAC	Douglas	Urban	2
Skyview at Bridgeport (Bridgeport)	LTPAC	Morrill	Frontier	2
House of Hope - Midwest Geriatrics (Omaha)	LTPAC	Douglas	Urban	1
Home Nursing with Heart (Omaha)	LTPAC	Douglas	Urban	1
Howard County (St. Paul)	Critical Access Hospital	Howard	Rural	1
Total: 15 facilities implemented				75 users

Impact. While NeHII cannot quantitate the traffic of messages delivered through the ICA Direct email, we have been able to anecdotally determine that the increased access and use of Direct Secure messaging has resulted in improved care coordination between hospitals and long-term care and post-acute care facilities. Long-term care and post-acute care facilities are using this method of communication prior to discharge to communicate their ability to provide the appropriate level of care. Use cases for Direct are still not well developed or widely used in Nebraska, making Direct a hard sell. The Integrated Community project identified several use cases for Direct and provided an opportunity to better learn about the information needs of LTPACs. As use cases for Direct become more widely used, the use of Direct is expected to increase. The implementation process identified above is simple, straightforward and does not require complex IT infrastructure which makes its impact significant in the long-term care and post-acute care community which has varying levels of health IT capabilities.

Challenges. Use cases for Direct are still not well developed or widely used in Nebraska, making Direct a hard sell. The Integrated Community project identified several use cases for Direct and provided an opportunity to better learn about the information needs of LTPACs. As use cases for Direct become more widely used, the use of Direct is expected to increase.

Increasing Utilization and Integration of HIE

Team members from UNMC worked to increase the utilization and integration of HIE into the provider workflow by creating two integrated communities, developing use case-based training modules, conducting structured interviews of the recipients of Admission Discharge and Transfer (ADT) alerts, and conducting a quality improvement study of NeHII users.

Integrated Communities

Project Summary. Project team members from NeHII and UNMC worked to identify communities in which the hospital, clinic, long-term care/post-acute care facility, and pharmacy were interested in exchanging health information. Facilities in Auburn and O’Neill agreed to participate in the project. Team members worked with participants to identify and prioritize possible scenarios for the use of health IT or use cases. The project team then worked with participants to match use cases to the appropriate technology, implement the technology, test the technology, evaluate the quality and timeliness of the information sent and received, and integrate the technology into the provider workflow.

Progress. The following activities have been completed:

- UNMC investigators conducted on-site needs assessments to identify HIE “use cases” of value at all participating organizations in both integrated communities.
- NeHII personnel matched HIE technologies to the “use cases” identified by the participating facilities. Querying patient information through NeHII’s Community Patient Profile (CPP) and transmitting Continuity of Care Documents (CCDs) via Direct exchange supported a number of use cases.
- The technologies required to support use cases were successfully tested in the Auburn integrated community (hospital, clinic and 2 long-term care facilities).
- “Use cases” were implemented into workflow in the Auburn integrated community.

Impact. Members of the Auburn integrated community championed the adoption of a collaborative community-based approach to realize the value and utility of HIE. The hospital, ambulatory care clinic, and long-term care facility reported improved patient care and efficiency outcomes as a result of adopting electronic health information exchange technologies to support information exchange among their community partners. Community members were willing to adopt HIE solutions to meet their own needs and the needs of their community partners for the benefit of patients across the continuum of care.

This project can provide a roadmap for other communities considering the adoption of HIE.

Training Modules

Project Summary. Project team members from UNMC worked with production specialists to script, record and produce training modules. Additionally participants in the Auburn Integrated Community were filmed talking about the project and how they are using health information exchange. The first module introduces electronic health information exchange and its potential to improve safety, quality, and efficiency in health care. Module 2 walks providers through how to conduct a needs assessment to identify gaps in information exchange and opportunities to improve it. Module 3 discusses electronic health information exchange technologies that may serve as solutions to support your identified information needs. Module 4 discusses some of the use cases addressed and includes clips of Integrated Communities participants. Modules 3 and 4 each include two segments, for a total of six videos.

Progress. The modules have been completed and are now accessible through the NeHII website to a local and national audience. The modules are available at <https://www.unmc.edu/pharmacy/research/HIEGuide/Index.html>.

Impact. The training modules will be used to educate clinicians and administrators about Health Information Exchange including:

- How to conduct a needs assessment to identify institutional value
- Common “Use cases” identified by peer organizations
- Existing technologies that support the exchange of health information
- Workflow considerations necessary for the successful adoption of HIE technologies.

Structured Interviews of Recipients of Admission, Discharge and Transfer (ADT) Alerts

Project Summary. Project Team Members from UNMC and the NITC developed a list of questions for the interviews with users of NeHII’s Admission, Discharge and Transfer (ADT) alert service, scheduled and conducted interviews with users, transcribed the interviews, and have completed report of the findings.

Progress. The project has been completed.

Impact. The study has helped team members better understand how ADT alerts are being used. Lessons learned include:

- Effective implementation requires careful attention to the specific workflow of the organization and the roles of the users.
- It is usually more effective for messages to flow to case nurses rather than physicians.
- It is difficult to make ADT message content and format consistent because of differing EMR source material and differences in charting conventions between institutions.
- Users were satisfied that ADT improved services to patients and increased efficiencies and reduced costs by avoiding unnecessary deployment of personnel resources when patients were admitted to another facility.

Quality Improvement Project: Evaluating Providers' Ability to Query NeHII, Nebraska's Health Information Exchange

Project Summary. The purpose of this quality improvement project was to evaluate the training that Nebraska Health Information Initiative (NeHII) users currently receive and identify opportunities for improvement. The survey assessed the ability of NeHII users to navigate NeHII's Community Patient Profile (CPP) and identify demographic and clinical information from a "test" patient.

Approximately 1,200 users received an email invitation to complete the online survey evaluation. The emailed invitation to participate included a link that takes the NeHII user to an online data collection form. The survey contained several demographic questions and 5 questions that could be answered using information found in the test patient's record contained in the NeHII CPP. Non-respondents to the survey received 2 follow-up reminders at approximately 1-week intervals. A total of 134 surveys were completed successfully.

Impact. The results were shared with NeHII. NeHII is working with training staff and the HIE vendor to make improvements to address some of the findings of the survey.

Implementing HIE to HIE Gateways

NeHII increased the ability to exchange data between HIEs by implementing 1 HIE to HIE gateway. NeHII currently has no HIE to HIE gateways in place. Grant Target: 5 Gateways

Project Description. Once an HIE commits to sharing data with NeHII, the NeHII CEO ensures that the appropriate legal agreements are in place. The technical implementation that follows includes an evaluation of the configuration options and consensus gathering for the best method of connecting whether it be through system query and response, cross community access, or the exchange of notifications. Once the method of the connectivity between NeHII and the HIE is determined and the method of sending data is confirmed, the organizations send and validate test messages to ensure compliance with specifications. The HIE team works closely with NeHII on data validation and training efforts. The HIE vendors provide technical expertise and ensure connectivity and data integrity.

Progress. The NeHII team worked with Missouri Health Connection to complete a gateway. Work on a connection with Unity Point in Iowa was underway when the grant ended. Work on the gateway will continue using other funding sources.

HIE to HIE Gateway
Facility/Organization
Missouri Health Connection

Challenges. NeHII team members reached out to several health information exchanges in surrounding states. Several barriers were encountered in implementing this project. The time to enter into the necessary participation agreements is a barrier to this type of health information exchange. The availability of resources from neighboring health information exchange is another barrier. Lastly, some technical barriers related to security requirements were also encountered.

Impact. This project demonstrated the feasibility of exchanging health information with another HIE and provided learning opportunities for NeHII staff. Over the next few months, NeHII will work with Missouri Health Connection to assess the impact of the connection.

Connecting Hospitals to Nebraska’s Syndromic Surveillance System

NeHII increased interoperability by connecting 2 Critical Access Hospitals to the State of Nebraska's syndromic surveillance system. Prior to the grant, one Critical Access Hospital was submitting data to the syndromic surveillance system through NeHII. Grant Target: 8 Hospitals

Project Description: Once a facility commits to using NeHII to submit syndromic surveillance data to the Nebraska Department of Health and Human Services Division of Public Health (NDHHS DPH) through NeHII, the NeHII CEO ensures that the appropriate legal agreements are in place. The technical implementation that follows includes the configuration of the connectivity between NeHII and the facility (if not already connected), evaluation of the data content compliance with the NDHHS DPH specifications, the addition of required elements that are not already being sent, the validation of data content, and the confirmation of data delivery to DPH. The facility team works closely with NeHII and the NDHHS DPH team for data element evaluation and appropriate modifications. The DPH team confirms compliance with requirements and receipt of the data. The EHR and HIE vendors provide technical expertise and ensure connectivity and data integrity.

Progress. Two Critical Access Hospitals were connected to Nebraska’s syndromic surveillance system through NeHII. Two additional facilities were underway when the grant period ended and will be completed using another funding source.

Syndromic Surveillance Projects			
Facility/Organization	Facility Type	County	County Classification
1) Community Hospital–McCook	Critical Access Hospital	Red Willow	Rural
2) St. Francis Memorial – West Point	Critical Access Hospital	Cuming	Rural

Impact. The use of NeHII for submission of syndromic surveillance data from hospitals enables the hospital and NDHHS DPH to reduce the number of data feeds that they need to maintain. Submission through NeHII also results in more robust data to NDHHS DPH and more comprehensive patient data available in the HIE for exchange. This work has also increased the number of hospitals sending their syndromic surveillance data to NDHHS DPH.

Challenges. Time is the biggest challenge to implementation of syndromic surveillance projects. The sending of additional data elements not found in a common ADT demographic feed, including specific clinical observation information (e.g. height, weight, blood pressure, smoking status) that are important from a syndromic surveillance perspective, takes time to identify the electronic health record (EHR) sources of data and to assess the capabilities of the EHR to extract that data to populate the messages sent to NDHHS. The formatting of the data must meet the NDHHS Syndromic Surveillance Event Detection of Nebraska (SSEDON) implementation guide strict requirements and requires involvement from hospital and vendor interface development resources to provide compliant data elements that successfully populate the NDHHS syndromic surveillance repository.

Implementing Population Health Analytics

NeHII increased interoperability by implementing population health analytics for six facilities. Prior to the grant, population health analytics was not available through NeHII at baseline. Grant Target: 5 facilities

Project Description. NeHII has partnered with their HIE vendor, Optum, to implement a population health analytics tool to increase the understanding of the patient data in the HIE at an aggregate level. The project consists of source to standard mapping for data fields from each facility, data review, user interface validation, measure identification and development, measure implementation and validation, consent implementation, user access evaluation through the NeHII use case process, user training and finally access to the tool.

Users can query the following measures to assess adherence to quality measures and to improve population health:

- **Measure 1: Inpatient 30 Day Readmit.** Describes the number of patients admitted to an inpatient encounter within 30 days of a discharge from a previous inpatient encounter out of the total number of patients admitted to an inpatient stay (not including skilled nursing or long-term care).
- **Measure 2: Emergency Room Frequent Users.** Describes the number of patients with more than 3 ER visits during a one year time frame out of the total number of patients who have received care in an ER setting.
- **Measure 3: Undiagnosed Diabetes.** Describes the number of patients with a hemoglobin A1c lab test result equal to or greater than 8.0 without a diabetes diagnosis out of all patients that have A1c greater than or equal to 8.0.
- **Measure 4: Diabetes Short-Term Complications Admission Rate.** Describes the number of patients over the age of 18 who were admitted as an inpatient with a short-term diabetes complication (ketoacidosis, hyperosmolarity, or coma) out of all patients who were admitted as an inpatient during the specified period.
- **Measure 5: Hypertension Admission Rate.** Describes the number of patients over the age of 18 who were admitted as an inpatient for hypertension out of all patients who were admitted as an inpatient during the specified period.
- **Measure 6: Angina without Procedure Admission Rate.** Describes the number of patients over the age of 18 who were admitted as an inpatient for angina without a corresponding procedure code for a cardiac procedure out of all patients who were admitted as an inpatient for angina during the specified period.
- **Measure 7: Colorectal Cancer Screening – Based on ACO Measure # 19.** Describes the number of patients age 50-75 who have had the appropriate screening for colorectal cancer out of the total number of patients in this age category.
- **Measure 8: Ambulatory Care Sensitive Conditions: Admissions for Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults– Based on ACO Measure # 9.** All discharges with an ICD-10 principal diagnosis code for COPD or Asthma in adults ages 40 years and older with risk-adjusted comparison of observed discharges to expected discharges.

- **Measure 9: Heart Failure Admission Rate by Zip Code – Based on PQI #8.** Discharges, for patients ages 18 years and older, with a principal ICD-10-CM diagnosis code for heart failure.

Progress. Six facilities and health systems have been provisioned to use the Spectrum population health analytics tool.

Population Health Analytics			
Facility/Health System	Facility Type	County	County Classification
1) Nemaha County Hospital, Auburn	Critical Access Hospital	Nemaha	Rural
2) Mary Lanning Healthcare	Health System	Adams	Urban
3) Montgomery County Memorial Hospital	Critical Access Hospital	Montgomery (IA)	Rural
4) Nebraska Methodist	Health System	Douglas	Urban
5) CHI Health	Health System	Douglas, Lancaster, Hall, Buffalo, Otoe	Urban, Rural
6) Sidney Regional Medical Center	Critical Access Hospital	Cheyenne	Rural

Impact: NeHII will work with users at participating facilities to determine the impact of this project.

Developing Demonstration Projects for Research

NeHII and UNMC team members worked to increase interoperability by developing demonstration projects which integrated HIE data for comparative effectiveness research.

PCORnet Project

Project Summary. UNMC and Nebraska Medicine are a participating site in the National Patient Centered Research Network (PCORnet.org). UNMC maintains a de-identified, standardized data mart containing detailed patient level records extracted from the Nebraska Medicine EHR and linked to other patient level data.

The goal of this project is to extend clinical data on de-identified patient records by linking NeHII encounter records to Nebraska Medicine patient records. The data will be included in the UNMC supported PCORnet data mart. The team explored a number of options to receive, link and de-identify patient records. The proposed plan finally received NeHII privacy and security committee approval at the beginning of July.

Working with Nebraska Medicine IT, NeHII and Optum the team identified HL7 message types to be sent to a Secure FTP site shared between NeHII and Nebraska Medicine. Initial messages were sent and test mappings were performed. We learned July 24th that reconfiguring the SFTP gateway disrupted the current Nebraska Medicine - NeHII linkage. The team lost days while the VPN was reconfigured and was unable to begin the data feed at the end of the grant period.

The team intends to complete the work as part of the Nebraska Medicine – NeHII collaboration as resources allow.

NeHII as a Data Source for Comparative Effectiveness Research

Project Summary. The purpose of this project was to develop a simple retrospective research project using data from the Health Information Exchange (HIE) that demonstrates the potential of the HIE to provide a more powerful research database than either individual health system electronic medical records (EMR) or insurer claims databases. The promise of using an HIE, in this case NeHII, for research is that the data available will cover all patients seen at any participating data provider and will include clinical information not seen in insurance claims data.

This project sought to describe the incidence of influenza like illness (ILI) and definitively diagnosed influenza by practice setting over the 2015-16 and 2016-17 flu seasons. Further, the study sought to identify the frequency of influenza testing and whether the test result (positive or negative) was linked to specificity of diagnosis (ILI or influenza). Utilizing a query of HIE data, researchers were able to identify a significant number of patients across practice settings with both a broad diagnostic definition (ILI) and a narrow diagnosis (influenza). From there researchers were able to link patient level influenza lab tests and results, which signals a methodological improvement over either insurance claims data or individual provider electronic medical records.

Impact. This straightforward influenza project demonstrates the potential of using NeHII for research purposes. In order to achieve its potential, efforts will have to be taken to improve the completeness and access to the data.

Lessons Learned

Recruitment and Engagement of Long-Term Care and Post-Acute Care Facilities (LTPACs) and Critical Access Hospitals (CAHs)

- It takes a lot of work to engage Critical Access Hospitals and long-term and post-acute care facilities.
 - The biggest barrier to health information exchange remains cost, including interfaces fees from the electronic health record vendors of hospitals, clinics, long-term and post-acute care facilities, and other health care providers.
 - Many long-term care facilities are owned by companies with facilities in multiple states. This made recruitment of facilities more difficult as corporate decision-makers were often unfamiliar with NeHIE and wanted to maintain consistency in the use of health IT in all of their facilities.
 - A health information exchange is most valuable to participants when their key medical trading partners also participate. When a key hospital chooses to not participate, it can negatively affect recruiting efforts. The creation of private health information exchanges can present challenges to a public statewide health information exchange.
 - Patients are the primary beneficiary of health information exchange. More information on the impact of health information exchange on patient outcomes is needed to help facilities better understand the value of health information exchange.
 - Having a partnership with the State of Nebraska has been helpful particularly for the syndromic surveillance project. The support of the State of Nebraska adds credibility and increases the utility of participating.

Better Understanding the Needs of Long-Term and Post-Acute Care Facilities

- Work on the Integrated Community project has helped us better understand the needs of long-term and post-acute care facilities and the importance of including long-term care and post-acute care facilities and others providers in the health information exchange. Through the grant, the team has developed several use cases for exchanging health information with long-term and post-acute care facilities. Demonstrating the value of different use cases will facilitate efforts to engage long-term and post-acute care facilities. Some of the use cases currently being implemented in an integrated community include:
 - Long-term care facilities access the query-based health information exchange to support the pre-admission process for a patient being discharged from the hospital and admitted to the long-term care facility.
 - Long-term care facilities receive a continuity of care document (CCD) from the discharging hospital to support admission to the LTC facility.
 - A long-term care facility sends a continuity of care document to a physician clinic when a resident of the long-term care facility has an appointment at the clinic.
 - The Critical Access Hospital receives a continuity of care document from a large tertiary care hospital when a patient is transferred to assist with the admission of the patient to the Critical Access Hospital.

- A physician's clinic receives a continuity of care document whenever a patient is discharged from the hospital to improve the continuity of care.
- A long-term care facility and physician's clinic check the query-based health information exchange for lab results to ensure appropriate dosing of medications.
- An emergency room physician checks the Prescription Drug Monitoring Program (PDMP) for controlled substances prior to prescribing an opiate.

Integration of Health Information Exchange into the Provider Workflow

- The process developed for the Integrated Communities Project is proving to be useful in engaging providers and helping them integrate health information exchange into their workflow.
 - The process started by bringing together providers within a community, including the hospital, clinic(s), pharmacy, and long-term and post-acute care facilities, to discuss their interest in sharing health information and to kick off the process.
 - The facilitators/workflow integration specialists from UNMC set up follow-up meetings with providers to identify what health information was needed from other health care providers.
 - With technical assistance from a NeHII project manager, the appropriate technologies for exchanging health information exchange were matched to each use case.
 - The team worked with facilities to prioritize use cases.
 - The team then worked with facilities to implement the appropriate technologies, test the technologies, evaluate the quality and timeliness of the information sent and received, and integrate the new process into the provider workflow.
- The process works best when a local health care provider acts as a community champion, encouraging community health care providers to participate in the progress.
- Having a facilitator to start the engagement process is another key component. It was also very helpful to have a project manager from NeHII as part of the team to provide technical assistance.
- Having all participating providers set up with both Direct and query-based exchange early in the process allows for the implementation of a greater number of use cases.
- Health information exchange isn't plug and play. It takes time and effort to integrate health information exchange into the provider workflow. For example, the NeHII Community Patient Profile (CPP) is easy to implement, but usage doesn't usually take off unless the CPP can be accessed with single sign on from the electronic health record. Direct has been touted as an easy first step for health information exchange, but in reality it takes time and effort to identify use cases and to work with other health care providers to begin exchanging information.
- Structured interviews were conducted with ADT subscribers to understand how ADT messaging was implemented and used and the impact and user satisfaction with the service.
 - Effective implementation requires careful attention to the specific workflow of the organization and the roles of the users.
 - It is usually more effective for messages to flow to case nurses rather than physicians.

- It is difficult to make ADT message content and format consistent because of differing EMR source material and differences in charting conventions between institutions.
- Users were satisfied that ADT improved services to patients and increased efficiencies and reduced costs by avoiding unnecessary deployment of personnel resources when patients were admitted to another facility.