THE HEALTH COLLABORATIVE

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Patient Centered Data Home
Heartland Pilot: Final Report
The High Impact Pilots Award: 90AX0012

September 2018

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Overview of The Health Collaborative

In April 2015, The Health Collaborative, the Greater Cincinnati Health Council, and HealthBridge merged into a single organization called The Health Collaborative. The three well-respected, long-standing nonprofit health and healthcare improvement organizations are now working together under a single management structure, which more efficiently aligns their services and more effectively meets the needs of the communities, stakeholders, and members served. The strength of the merged organization gives members and community stakeholders alike more efficient and aligned access to the data and informatics capabilities of HealthBridge, the multi-stakeholder collaboration championed by the Health Collaborative, and the clinical care delivery improvement services of the Health Council. Collectively, they have brought tens of millions of dollars to the region to support new technology, improve the care delivery system, lower the overall cost of care, and promote health.

The HealthBridge service line ensures that area hospital systems and physician practices stay on the cutting edge of Health Information Exchange (HIE) technology, transparency, and interoperability. In 1996, five health systems and two health plans proposed a "secure private Internet" for Greater Cincinnati. Shortly thereafter, HealthBridge was incorporated as multi-stakeholder, not-for-profit corporation, and within a year it had gone live with a community-wide portal offering hospital and health plan content with no-fee access for any physician practicing in the region.

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Project Start: September 2016

Project End: September 2018

Executive Summary

Patient Centered Data Home (PCDH) aims to place the patient at the center of care, whenever and wherever care occurs. PCDH is an initiative to connect Health Information Exchanges (HIEs) across the country with one another to ensure patient history and information follows the patient wherever care is needed. In addition to travelers, "snow birds," and college students, this is most applicable to patients who live near state borders and travel for treatment.

The PCDH initiative is made up of four (4) regional pilot groups: Heartland, Western, Central, and Midwest. Each pilot group approached the PCDH model differently, so the goal of this report is to explain how the Heartland Pilot took on this initiative. The Heartland Region includes the following seven HIEs spanning five states:

- Great Lakes Health Connect (GLHC) in Michigan
- Michiana Health Information Network (MHIN) in Indiana
- Indiana Health Information Exchange (IHIE)
- HealthLINC (HL) in Indiana
- The Health Collaborative (THC) in Ohio
- Kentucky Health Information Exchange (KHIE)
- Eastern Tennessee Health Information Network (etHIN)

PCDH strives to address the following Care Coordination Measurements:

- Safety: Increase in allergy data has been made available by sharing data between HIEs via PCDH
    - Method: Count the number of PCDH transactions shared among participating HIEs
- Privacy & Security: Increase patient matching when transacting between two (2) or more HIEs

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- Method: Measure/monitor percent of patient matches achieved between participating HIEs
- Interoperable Exchange: Measure how many ADT exchanges occurred during the period, how many results were queried and returned among participating HIEs, the percent of encounters where data on patient existed in more than one HIEs
  - Method: Count of inter-HIE ADT notifications and percent of total encounters resulting in ADT notifications, inter-HIE PCDH queries and count of clinical data summaries, percent of all encounters in which PCDH resulted in a shared inter-HIE clinical data summary

This project ran from September of 2016 to September of 2018. The Health Collaborative served as the prime recipient and was responsible for issuing funds to HIEs and for all reporting to the Office of the National Coordinator. Indiana Health Information Exchange acted as the project manager and hub for connecting to the additional regions. This report describes the processes for implementing the technology solution in the Heartland Pilot region, key findings, lessons learned, recommendations on standards and implementation guides, and the project's potential for widespread use.

Processes for Implementing the Technology Solution

What makes this project so unique is that each of the four pilot groups are tackling the challenge of connectivity in different ways. By taking this approach, we learn best practices from each pilot and form a concrete rollout plan across the nation. For the Heartland Region, we chose to have point to point connections with each HIE in our region.

In order to establish connectivity, we first had to convene a working group. The working group was comprised of technical contacts from each of the seven HIEs. Regular meetings were scheduled on a weekly, and later bi-weekly schedule with the goal of getting all organizations together on one call in order to collaborate and identify challenges or commonalities. A project manager from Indiana Health Information Exchange (IHIE) was assigned to coordinate with the various organizations.

Phase 1 of the project was to define the ZIP codes within the geographic boundaries of each HIE. Once defined, the ZIP code files were then shared and integrated into each HIE in order for the mapping functionality to be established. This set the foundation and

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logic for messages to be exchanged in and outside of each region. As HIEs are potentially added to our region or updates are made, these codes must be updated at each HIE to maintain accuracy.

Phase 2 of the project was to trigger an Admission, Discharge, and Transfer (ADT) notification upon an event. If a patient from Indianapolis was admitted to Cincinnati Children's Hospital, The Health Collaborative (THC) would need to trigger an ADT notification to IHIE based on the patient's ZIP code in order to alert the HIE of the encounter.

For this to occur, HIEs connected to one another via VPN or Web Services. ADT messages were received and normalized to the Heartland HL7 2.X specification. Due to each organization being on different platforms, there were various steps taken internally to make the data functional.

For example, Michiana Health Information Network (MHIN) created a pass-through function in order to pass the originating ADT message into the MHIN Master Patient Index and then back out to add the MHIN Enterprise ID. Message normalization is then performed in their Mirth Connect Engine to meet HL7 format and vocabulary standards before being passed on to Heartland participants. Additional infrastructure was created in SQL that stored all outbound routing ZIP codes and only messages with qualifying ZIP codes are then routed outbound. Although there were various hurdles to overcome, all HIEs in the Heartland Region were exchanging ADTs with one another by May of 2017.

Phase 3 of the project was to establish a query and retrieve functionality for Continuity of Care Documents (CCD). Using the example above of a patient in Indianapolis traveling to Cincinnati Children's, once THC sends an ADT to IHIE, and IHIE recognizes that patient, THC then queries IHIE to retrieve relevant clinical information to effectively treat the patient while at Cincinnati Children's.

We achieved this functionality by leveraging eHealth Exchange and IHE Profiles. Specifically, ITI-38 Cross Gateway Query, ITI-39 Cross Gateway Retrieve, and ITI-55 Cross Gateway Patient Discovery profiles were utilized. Said profiles allowed for C-CDA compliant CCDs and utilizing the eHealth Exchange ensured that we were compliant with connectivity, legal, and governance framework. Indiana Health Information Exchange, Kentucky Health Information Exchange, Michiana Health Information Network, and Great Lakes Health Connect are currently exchanging CCDs. The Health Collaborative,

HealthLINC, and Eastern Tennessee Health Information Network are finalizing testing efforts with the remaining HIEs. All HIEs in the Heartland Region will be live exchanging CCDs with one another by the end of September 2018.

Phase 4 of the PCDH project is to expand beyond our regional borders to the other participating pilots. We established connectivity with the Central, Western, and Midwest regions in July of 2018. Since that go-live, 18 HIEs in total have been exchanging ADT notifications with one another.

Challenges and Lessons Learned

This project has been the first of its kind for HIEs in our region which means many learnings have come with the new connections and new technology. The HIE-to-HIE interactions and troubleshooting sessions at the technical level have been extremely beneficial to navigating through the various phases of the project. Conversations among the respective technical contacts were not occurring prior to this project. These interactions have helped navigate the differences across HIEs with different platforms and capabilities. While connectivity was challenging at times, it was helpful to work through them and discuss the obstacles as a group.

Due to each HIE being on its own technology platform, all organizations worked separately and established separate, unique code bases. This means that one HIE could not take advantage of a fix done by another HIE, and the level of effort to solve the same problem is higher due to the different HIEs having to each resolve independently for their system. Various platforms across the organizations also meant that we had to schedule and prioritize around vendor enhancements, upgrades, and replacements. Previously determined timelines had to be pushed back to accommodate these significant changes and balance resource availabilities.

Security requirements also varied from organization to organization, which required coordination among various moving parts. Although the security issues were eventually resolved for most organizations, we still have instances where HIEs are not able to exchange data bi-directionally due to hurdles that could not be overcome. With the rollout to future HIEs, we need to keep the various security requirements in mind and respect that, with such highly sensitive data, not all HIEs will be able to exchange bi-directionally with each point-to-point connection.

Due to the differences in data coming in from each HIE, many messages failed to process. To overcome this hurdle, we had to build transforms, change configurations, and reprocess the failed messages. This challenge makes every implementation unique from HIE to HIE and leaves us with an unscalable model. This has shown us that it is increasingly important for each organization to understand the differing requirements and specifications for ADTs and CCDs among participating HIEs.

The second phase of the project, exchanging ADTs with one another, was readily achievable by all HIEs in our region. All technical contacts understood the work involved in establishing the connections, which leads us to believe this is still an industry heavily dominated by HL7. While this was easily achieved, there are many improvements that could be made to ADT notifications to provide more information to the recipient. Currently, the ADT notification is not robust and lacks detail for the receiving HIE to accurately and completely understand the event. Although an HL7-dominated industry, this project has motivated our organizations to develop more robust query and retrieve methods, rethink our current structure, and further reinvent our technologies used.

In order for the query and retrieve method to be successful, HIEs must be able to support IHE profiles. The HIEs must also have buy-in from their participating health systems to retrieve CCDs in order for this project to provide the most accurate clinical summary. When querying another HIEs system's repository for patients, Cross Community Patient Discovery (XCPD) should be checked for accuracy.

Key Findings

Patient Centered Data Home is a viable, effective method for exchanging data across our nation for patient care. Although HIEs have differences, they are uniquely and ideally equipped to manage interoperability at a national level. These organizations, in large part, have been embedded in their communities for over a decade, earning trust from health systems, specialty groups, behavioral health facilities, and independent physicians. Due to each HIE working toward common initiatives, we are all invested in long-standing relationships and connections with one another. Working together was effortless because we all understood the technology, the hurdles, and the opportunity for our region.

We found that it was important for our region to clearly separate technical issues from the business and process issues. It was easy to get caught up in the business/process matters when trying to work through various technical components of the project. In order

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to facilitate expeditious communication, it was important for our technical group to defer business and process issues to the Heartland Region leadership team.

With seven HIEs covering five states, we experienced overlap of hospitals and ZIP codes. Our region had to work through issues of duplication because two or even three HIEs were connected to the same health systems. For example, THC currently covers Cincinnati, Northern Kentucky, and a few counties in southeastern Indiana. A large health system in Northern Kentucky, St. Elizabeth, is connected to both KHIE and THC meaning both organizations were receiving ADT notifications for an event. In order to overcome these issues, our region had to define boundaries by county and ZIP code and determine who was covering what area of the state.

In terms of the data, we found that HIEs should enforce data vocabulary standards before accepting data from HIEs. Vocabulary standards can help in the interpretation of ADT alerting fields, routing of ADT alerts, and the aggregation of clinical data when performing queries for CCDs. HIEs should strive to aggregate data from data sources and provide an option to return a single, on-demand document, which contains an aggregation of clinical data from various sources.

Recommendations on Standards and/or Implementation Guides

The Heartland Region has various suggestions on improving the standards and implementation guides for future PCDH expansion. For more standardized data sets, we suggest making NPI a requirement for data sources. This will allow for more concise and descriptive ADT alerting to the receiving HIE and ultimately, the receiving organization and/or provider.

Currently, connectivity can be established in two ways, VPN and SSL Web Services. This makes the system unscalable and more difficult to manage. The Heartland Region proposes that for future connection, there be one medium of connectivity (SSL). By standardizing this approach, we have a scalable infrastructure allowing new HIEs to join easily.

There are a few more general recommendations that go beyond PCDH, one being to engage data sources and health systems to provide more uniform data sets for encounters across all regions. The second is to provide more implementation guides

around Data Catalog Vocabulary conformance and Patient Identification Storage according to the IHE PIX Profile standards. By doing so, the scope of work and requirements for new participating HIEs are further defined.

Project Potential and Next Steps

The Patient Centered Data Home initiative has potential to be a national exchange hub allowing patients' medical records to follow them across state lines, no matter where they seek care. The concept of PCDH can evolve into a nationwide alerting system that not only HIEs can subscribe to, but also inpatient systems. Additional technical infrastructure may be necessary, but what has been established has the potential to be the framework for a valuable service across the national healthcare landscape.

Over the past two years, the Heartland Region has exchanged over 6 million ADT notifications within our region. More detail on the metrics can be found here. In 2019 we plan to open CCD exchange beyond our region, connecting and exchanging clinical data with dozens of HIEs and thousands of providers across the country. This initiative has been built at a community level, bringing together our region's HIEs to work together toward a common initiative with the patient at the center of each goal. Under the leadership and direction of the Strategic Health Information Exchange Collaborative (SHIEC) we will continue to push toward connecting the HIEs across the country and defining success in each region.

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Supporting Information

[Metrics Report](#)

[Heartland PCDH Video](#)

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