Best and Promising Practices Brief

Report prepared for: The North Dakota Health Information Network

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Introduction

This report is designed to be complementary to the previously submitted Environmental Scan Brief, developed as part of the CedarBridge consulting engagement with the North Dakota Health Information Network (NDHIN). This report on best and promising practices, including the Kanban-styled current state summary graphic ("eye chart"), will be part of a comprehensive business plan for NDHIN to be prepared by CedarBridge and delivered to the North Dakota Health Information Technology Advisory Committee (HITAC) in coming months. The business plan will include: a proposed budget, a return on investment brief, and a long term vision for the NDHIN. This report is not intended to stand alone without previously established context and reference to these other deliverables.

The scope of this work with the NDHIN does not include an in-depth review and validation of every functional area of a health information exchange (HIE), however, this brief provides resource links to many promising areas around the country, where like the NDHIN, new and innovative HIE services are being rolled out to meet participants' needs. Internally at the NDHIN, the brief should provide insights to where other HIEs are utilizing applications that the NDHIN is considering implementing. The best and promising practices that are presented in this report are intended to give the NDHIN and its stakeholders a starting point for future review and to serve as a reference guide for successful implementations of key service offerings.

The best and promising practice examples included in this brief were chosen to illustrate the areas of highest interest for the NDHIN's current and future growth. Some topic areas included on the Kanban chart are not mature enough to have had an industry best practice defined and validated with real-world examples. It is important to note that many areas of the NDHIN's operations are currently running quite well and can be said to already be deploying best practices when compared to other statewide HIE organizations.

Back Office / Administration

Operations:
The NDHIN has worked diligently to streamline its operations and is following industry best practices today.

Security/Privacy/Consent:
System security requires more focus from organizations today than ever before. With the diverse data contributors of a typical HIE, the system will often only be as secure as the weakest participating member, and therefore security support provided by HIEs is a developing best practice. The Utah Health Information Network (UHIN) is an example of a statewide HIE that provides their membership with assistance in protecting patient information and meeting privacy requirements under HIPAA and similar regulations.

The need for effective consent management will also increase as patients are made more aware of the NDHIN. Management of patient consent can vary state-to-state, depending on the consent model that is mandated. In addition, consent management becomes more complicated when

sensitive data becomes integrated within a HIE. The Healthix Regional HIE in the New York City area has a robust consent management system in which they offer to customize consent workflows to best support individual choices for sharing their data, while also supporting the Healthix member organizations' objectives. Similar to the consent model used by Healthix, Michigan Health Information Network (MiHIN) is working with the regional HIEs in Michigan to develop an electronic consent management system, in their efforts to design an electronic consent management system that can work in a federated model across many data organizations.

Healthix also provides detailed, publicly available privacy and security policies and procedures, which they publish on their web site. These policies & procedures cover consent, authorization, access, patient engagement, audit, breach, HIPAA compliance, sanctions, emergency access/disaster recovery, privacy & security governance, and role-based access standards.

Policies:
The most comprehensive list of policies around Health IT and HIEs that are currently in place has been curated by the Office of the National Coordinator. The State HIT Policy Levers Compendium includes examples from a wide variety of states to illustrate many ways that policy levers can be used to drive the adoption and use of health information exchange modalities. The NDHIN has developed a solid set of policies in line with other HIE organizations. As additional provider types are added to the network, existing policies should be reexamined, revised, and expanded upon in the future.

Processes:
The NDHIN is following best practices today in operations and processes and is able to support the current workloads of the information exchange.

Help Desk and Support:
The NDHIN follows best practices today in an outsourcing arrangement for help desk coverage. It is our understanding the vendor is performing well and has added capacity to cover additional users into the immediate future.

Finance/Sustainability:
Most, if not all, HIE organizations in operation around the country are still in the process of establishing the appropriate value-producing data exchange services for stakeholders. True sustainability is still more of an aspiration than a reality as HIEs continue to build and demonstrate value for their members. Maryland is a notable exception due to the requirement of Maryland's Health Services Cost Review Commission (HSCRC) for acute care hospitals to send demographic data to the statewide HIE, known as the Chesapeake Regional Information System for our Patients (CRISP).

Governance:
Now that the four-year ONC State HIE Cooperative Agreement Program has been completed, there have been several states that are in the process of establishing new processes for governing state health IT investments. Through an executive order of Colorado's Governor, John Hickenlooper, the Office of eHealth Innovation was established as the state-designated entity for governing health IT investments, and the Colorado eHealth Commission, made up of public and

private sector individuals was appointed. This example is notable because the stakeholders were fully engaged in the planning of the transference of the state-designated entity role from the Colorado Regional Health Information Organization (CORHIO) to the new Office of eHealth Innovation, and the conferring of governance duties to the new Office and the Commission. These types of shifts will likely continue for several more years, as the need for new statewide health IT assets expands, and functionality of these services also improve.

The current public/private partnership structure of the NDHIN best positions the HIEs governance structure through the end of the HITECH incentive programs in 2021. These ongoing incentives allow access to federal matching from CMS, as well as additional flexibility obtaining funding through subscription fees. CedarBridge recommends that the NDHIN consider revisiting its governance plan prior to 2021 to ensure it is the most beneficial structure moving forward.

Provider/Payer/Patient Relations:
In order to build a successful HIE, quality relations with payers, providers, and patients is paramount. There are currently a few state-wide HIEs that CedarBridge would recommend reaching out to for an in-depth review of their provider/payer/patient relations operations. The first state is the Delaware Health Information Network (DHIN) as they have been very successful in engaging payers, and because their population is similar to North Dakota's (950,000). The second state is Maine's HealthInfoNet, as they are also very successful in this area, but have a more rural, and still relatively small, population of 1,330,000. It is important to keep in mind that each of these organizations have been in existence for more than 10 years and therefore are more mature, offer a wide range of services, and have budgets exceeding $6 million per year. However, they do offer a glimpse into the NDHINs future and have many established operational best practices to explore in greater detail.

In addition, the Utah Health Information Network (UHIN) was originally established as an HIE for payers. They currently connect to over 4,000 payers nationwide and support claims, remittances, claim status queries, and eligibility transactions. Michigan Health Information Network (MiHIN) has been successful in working with the largest payer in the state of Michigan (Blue Cross/Blue Shield) to provide payments to hospitals for sending ADT feeds to MiHIN.

HIE/Direct Infrastructure

Query/Clinical Data Repository/Record Locating Service/Interface Engine:
This category represents the current technology stack being provided to the NDHIN by Orion Health. Of the current HIE vendors around the country, Orion is known to be a market leader that delivers quality services and effective support. The Orion interface engine is used by every state in the country.

Enterprise Master Patient Index (EMPI):
The accumulation of patient data from a variety of sources presents the inherent, unavoidable issue of patient matching. All data relating to an individual, regardless of its origin, needs to be associated with the correct individual, and available in a comprehensive, longitudinal format. Without effective patient matching, an HIE cannot operate effectively. There are several reports

that have been published by the Office of the National Coordinator for Health IT (ONC) that will serve as helpful resources in structuring the NDHIN's patient matching policies and procedures; essential with the deployment of an EMPI. These reports include the *Patient Identification and Matching Final Report* and the *Master Data Management Within HIE Infrastructures: A Focus on Master Patient Indexing Approaches* report. It is recommended that software with sophisticated algorithms for probabilistic matching methods is deployed to ensure patient safety and improved care coordination with the most reliable match rate.

MiHIN's very effective use case of an EMPI is when the data is mapped to a Provider Directory to link patients to those healthcare providers with whom they have active care relationships, for care coordination services, risk stratification, and for quality measurement and payment.

Provider Directory:
Maintaining an accurate list of participating providers is an important aspect of any HIE. The ability to clearly track which providers/organizations are contributing data and who can access/receive data is crucial for the operations of an HIE as it allows for accurate audits and utilization review. In Michigan, MiHIN has taken a unique approach to provider directories and CedarBridge believes it warrants a presentation on how and why they implemented a Common Health Provider Directory (CHPD). Based on the Salesforce CRM model, MiHIN goes beyond the traditional provider directory database and instead acts as a routing preference engine. Due to this unique approach other HIEs outside of Michigan have adopted the concept of allowing virtual multi-state provider network(s) hosted in the cloud, which as mentioned above, can be mapped to the EMPI to more accurately establish those patients that providers have an active care relationship with. An initial overview of their system can be found here.

Health Information Service Providers (HISP):
HISP platforms facilitating DIRECT messaging require formal trust agreements between HISPs as well as with each individual that is given a DIRECT address, along with formal identification processes. Organizations such as DirectTrust (in partnership with EHNAC) and the National Association for Trusted Exchange (NATE) have created the policies, the accreditation programs, and the trust bundles to ensure that HISPs have met rigorous industry standards for trustworthy stewardship of protected health information. Trust bundles guide the protocols for exchanging and managing digital certificates that assure identities of data senders and receivers, and are at the heart of HISP services. The NDHIN's vendor Orion is a DirectTrust accredited HISP. The NDHIN follows best practices today in ensuring identification of all users of the NDHIN's HISP.

Image Exchange:
Historically, images are very hard to exchange between providers given their file size, and the detail/resolution needed when received by a provider. However, the availability of images can have an impact on a wide range of providers. The NDHINs Image Exchange solves this by associating images with reports so providers can quickly retrieve them while viewing any results report. However, no images are being stored within the NDHIN today. Hospitals have an edge server that stores the past 30 days of images, making them easily retrievable when facilitated by the NDHIN. Currently, this functionality is only being used by a small number of facilities and needs to be expanded to the entire NDHIN network in order to be considered a best practice. In New York, the Rochester Regional Health Information Organization was one of the first HIEs in

the country to implement image exchange. They have not only seen a successful implementation and adoption of this functionality, but have had studies performed to validate it's return on investment and direct impact on improving patient care.

Subscription Alerting:
In today's world, healthcare providers often never know when one of their patients was admitted to an emergency room, transferred within the hospital, or discharged. Admission, discharge, transfer (ADT) alerts allow for members of a patient's care team to be apprised of these situations, or even events, such as when an abnormal lab result is recorded or when a medication is prescribed. This functionality allows for providers and payers to begin discharge planning and follow-up care as soon as possible, preventing potentially dangerous lapses in care or communication. Subscription alerting offers more robust functionality to a wide range of providers and operational staff who are able to subscribe to certain patients within the NDHIN. In Maryland, The CRISP began their Encounter Notification Service (ENS) for ADT alerting early, and are well known for their success and experience in this area. Role-based, pushed alerts have been determined to be high-value in the current market, as long as they are well managed to avoid alert fatigue. The NDHIN should expand the availability of their subscription alerting functionality, allowing more providers and organizations to utilize this feature, in order to meet industry best practices in this area.

Oregon's Emergency Department Information Exchange (EDIE) is a unique web-based communication technology that helps to enable communication between the emergency departments within the state and other organizations. EDIE alerts hospital in real-time when a patient visits the emergency room and helps to identify "frequent fliers." In April of this year, legislation was passed that requires Prescription Drug Monitoring Program (PDMP) information to be integrated into existing health technology systems, including EDIE. Many believe this integration will "lead to a reduction in duplicative or inappropriate opiate prescriptions in Oregon emergency rooms."

EHR Integration/Single Sign On:
Providers require a way to seamlessly access information within the NDHIN without having to leave their EHR system and log into a separate application. Single sign-on EHR integration allows providers to link credentials and sign-on procedures in order to verify their identity simultaneously with both their EHR and the NDHIN. Then, directly from their EHR system, providers will be able to launch the NDHIN and access information on patients while maintaining the patient's context. Maintaining context is important in order to reduce the workflow burden of needing to search for patients within the NDHIN and following patient matching procedures. The major health plans and hospital systems in the Pacific Northwest have come together to create a strong set of use cases for single sign-on for clinics and hospitals into the health plan eligibility and enrollment sites for benefit checking and prior authorization, among other use cases. This service is provided by Washington's statewide HIE, OneHealthPort. The NDHIN needs to expand their single sign-on functionality to all connected EHR systems in order to meet industry best practices in this area.

Upgrade to Amadeus Platform:
Industry best practices dictate that users should never be more than one release behind the current product they have in place from their vendor in order to avoid outdated functionality and

reduced product support. Orion Health has announced the availability of their new Amadeus Platform which has valuable features and functionality that the NDHIN will require. The enhancements will deliver significant value to the NDHIN's stakeholders. It is recommended that the NDHIN upgrade to this new platform as soon as possible.

Continuity of Care Document (CCD) Discrete Data:
To date, HIEs have been somewhat successful in building custom applications that extract discrete data from Consolidated-Clinical Care Document Architecture (C-CDA) documents that are received from provider EHR systems. This extraction and reconciliation allows the received data to be integrated with clients' other medical history and for the data to be included in any analytic capabilities. There are currently no existing industry best practices for this data extraction and reconciliation process and in some cases the technology is changing to other approaches, such as the integration of EHR systems directly with the HIE. It is our recommendation that the NDHIN continue to monitor the market for changes in this area, avoiding the practice of pursuing custom programming, while maintaining their current approach for maintaining CCDs.

Wellness and Gaps Window:
Several providers have asked for an alert that would display 10-12 key data elements related to wellness and gaps in care events for relevant patients. This could include information regarding when a patient's next medical screening or annual physical is due, or any medication compliance that is important to discuss when counseling patients. There are no existing best practices associated with this functionality today, and if implemented, the NDHIN would need to consider a custom programming engagement to add this functionality.

Genomic and Social Data:
The Amadeus Platform of the Orion Health HIE suite now provides for the storage of genomic and social data within patient records. There are not current best practices around these features as they are relatively new areas of focus within the industry. However, it is highly recommended that the NDHIN explore possibilities for the implementation of this functionality. The perceived value and understanding of both of these areas is evolving quickly and it is predicted that soon it will be of high value to have this data available for quality reporting and data analytics, at the least, in order to meet the requirements of alternative payment models.

MMIS, Eligibility, Insurance Exchange Integration:
CMS has instructed states, if at all possible, to combine the assets of their systems, rather than stand up duplicate components for each of the MMIS, Eligibility Systems, HIE, APCD and other systems that are being funded. Since the current systems in North Dakota are already in existence, CMS requests states connect similar assets such as provider directories and eMPI databases to ensure that all like systems are kept in synch and contribute the latest provider and patient information across systems when changes occur. Best practices are to utilize the technology built into these systems to accomplish this. It is highly recommended that the NDHIN enhance their provider directory at a minimum to synch with others in the Medicaid enterprise and beyond.

State Systems:

Many states are moving forward with analyzing their current use of technology, including information technology, and how it can be utilized most effectively. The recommendations below are the recognized best practices based on the experiences of these states. CedarBridge recognizes that for several of the below areas there are very few existing best practices that can be transferrable to any other state, given the uniqueness of each situation.

Immunization Registry:
In the opinion of CedarBridge, the NDHIN's bi-directional interface between the North Dakota Immunization Information System (NDIIS) and providers/organizations is very close to being an industry best practice today and was a very well executed implementation. CedarBridge recommends reaching out to MiHIN Shared Services to explore their success in obtaining immunization records from pharmacies. Each night, large chains and other pharmacies send a high volume of immunization records into the MiHIN system, helping to increase the amount of data available to their users, and therefore improving patient care and stakeholder value in the system. In addition, immunizations are only required to be reported on individuals under the age of eighteen in North Dakota. In order to achieve a true best practice in this area, immunization records on all North Dakotans should be submitted to the NDIIS, either via a direct connection or the NDHIN.

Reportable Labs:
In the current state, the NDHIN's collection and storage of lab information from community stakeholders can be considered a best practice. Most hospitals are submitting lab information and the system is supporting this process with little or no complaints. The submission of lab information is mandatory by these providers and the NDHIN provides an excellent service in this area.

Syndromic Surveillance:
Washington State Department of Health, together with Washington's statewide HIE, OneHealthPort, have developed detailed implementation guides to support public health reporting through the HIE, including with the state Syndromic Surveillance system, the Controlled Substance system, the Cancer Registry, and the Immunization Registry. Collection of data into the Syndromic Surveillance systems is important to prevent disease outbreaks and helps to monitor overall public health. The NDHIN needs to connect with all public health entities in the state in order for them to meet industry best practice in this area.

Cancer Registry:
State cancer registries often contain a large amount of valuable health data on a vulnerable and expensive group of people. Integrating these registries with HIEs, and making this data available for the purposes of care coordination, health management, and analytics is widely recognized as an important connection. The Kentucky Health Information Exchange was one of the first states to connect their cancer registry to a state HIE. Their background in cancer registry requirements, interoperability, and roll out to providers could prove invaluable to the NDHIN as it works on its own system. In North Dakota, any provider can connect to the cancer registry as a way to meet certain Meaningful Use requirements, as a result the data is reported to be robust. The NDHIN is

not currently connected with the cancer registry, but this connection has been identified as high value for its members. When building this connection, the NDHIN should consider single sign-on in order to ensure they are achieving the industry best practice.

PDMP:
Prescription Drug Monitoring Programs (PDMPs) represent a collection of important medication information, typically relating to controlled substances. PDMPs also represent a reporting burden for providers and organizations. In Nebraska, the Nebraska Health Information Initiative (NeHII) HIE maintains and manages the state PDMP and has saved Nebraska an estimated $1 million in setup fees and over $100k per year in maintenance charges. New legislation passed this year will require all licensed dispensers providing medications to Nebraskans to report controlled substance data to the state PDMP starting in 2017 and all medications (controlled or otherwise) will be reported starting in 2018. This will make the state PDMP, run through NeHII, the state-wide medication reconciliation tool for all providers/organizations in the state. According to NeHII representative at the ONC Annual Meeting, they are utilizing CMS 90/10 funds for the initial implementation. CRISP in Maryland has interstate PDMP bi-directional viewing access with current connections to Maryland and Virginia's PDMPs, and additional states underway.

The NDHIN is currently connected with the North Dakota PDMP and allows providers to access this system seamlessly. However, in order for this connection to be considered an industry best practice, the NDHIN will need to allow designee access (beyond just credentialed doctors) and access to interstate PDMPs.

State Agencies Use of DIRECT:
There are many use cases for DIRECT messaging throughout state government by departments who are providing direct care to citizens or who are coordinating care and need to be able to securely communicate and exchange patient health information. Additionally, there are communications with social services agencies that can also benefit from the use of DIRECT. The NDHIN is currently meeting best practices in this area for the state agencies who are utilizing this service, however the NDHIN should continue to roll this service out to other agencies who could benefit from the service.

Health Department:
The Health Department in particular has many use cases for health information exchange and the use of DIRECT secure messaging. The NDHIN is already following best practices in the roll out of DIRECT services to the Health Department.

Developmental Disability (DD) EHR:
The developmentally disabled population typically require a wide range of health and social services. Within North Dakota the DD system and providers who serve this vulnerable population could greatly benefit from access to the NDHIN's data set, while other community providers would benefit from the DD system's data contributions. There is no documented industry best practice in this area to date.

Department of Corrections EHR:
Transitions of Care for this population from pre-incarceration through post-incarceration has been troublesome in the healthcare environment nationwide and exchange with the Department of Corrections EHR system would go a long way in addressing care coordination issues with this population. ONC has recently held a webinar addressing this subject. This is a maturing industry practice that is still in its infancy, and the NDHIN should monitor any progress that is made in other states closely.

Behavioral Health:
The exchange of behavioral health data, including the integration of this data with clinical data, presents significant concerns and challenges around consent, privacy, security, and compliance. To date, very few HIEs have successfully implemented a way to effectively manage behavioral health information. However, organizations have gained experience and best practices are slowly starting to take shape. The SAMSHA-HRSA report gives a good summary of the initial pioneering efforts in this area. CedarBridge recommends contacting the Colorado Regional Health Information Organization (CORHIO) to discuss their experiences and lessons learned in this area. Also, HealthInfoNet in Maine, although somewhat of a newcomer to this area, currently use an Orion platform and have shown some promising results.

In addition, the Kansas Health Information Network (KHIN) and Johnson County Mental Health presented at HIMSS this year to describe their approach at addressing the privacy concerns around behavioral health and substance abuse information. Under the KHIN approach, health information that is protected under 42 C.F.R. Part 2 will be made available when a medical emergency exists and patient consent has been obtained at the point-of-care.

The North Dakota Department of Human Services will be implementing the Netsmart Avatar EHR system across their behavioral health and substance abuse facilities and providers. Netsmart is a market leader in the behavioral health EHR market and the implementation of Avatar will allow the NDHIN to more easily achieve an industry best practice connection with state providers. Connections with private entities should also be prioritized, but no solid best practice has been developed for many of these connections due to their lack of technical infrastructure and consent/privacy restrictions.

State Veterans Home:
The State Veterans Home is a long term care facility (LTC) that has similar use cases for exchange as any other LTC facility in the state. The LTC section below highlights the best practices which are currently in use.

University Student Health:
Students transitioning from their local communities and primary care providers into the state's university system often are seeing new providers in the university health systems with little or no access to their medical histories. Connectivity of the university health system's EHR to the NDHIN network will greatly help this transition of care. The best practices in this area are similar to clinic best practices detailed below.

Federal Systems:

Federal agency partners have been slow to develop health information exchange technology that is interoperable with their often large scale EHR systems. Recently, the obstacles that have long prevented this integration are being conquered and more and more HIEs across the country are building connectivity and exchange opportunities with these important federal partners, as well as with other HIEs through the national Sequoia Project.

The Sequoia Project:
There best practices for The Sequoia Project are loosely defined, as it is merely the national "spine" network that all HIE networks connect to in order to pass data back and forth between one another. The NDHIN has already established this connection and already has this capability firmly in place today, and therefore is meeting the industry best practice in this area.

Indian Health Services (IHS):
A total of 5.5% of the North Dakota population is made up of Native Americans, many of which receive medical treatment via IHS-operated clinics and hospitals located both in North and South Dakota. To date, electronic access to medical histories within the IHS EHR system has not been readily available. In 2015, the IHS began to roll out their DIRECT secure messaging platform. The NDHIN has started work with the IHS around connecting with this platform, which is still somewhat immature and will continue to evolve over time. The NDHIN has secured a commitment from IHS to be the first national pilot for connectivity to the IHS' HIE in the fall of 2016 and is looking forward to beginning work on that project.

The Department of Veterans Affairs (VA):
North Dakota has over 56,000 veterans currently living in the state and a large veterans' hospital and clinic located in Fargo. The VA has been connecting with HIEs for a few years, allowing providers on public health exchanges such as the NDHIN to access medical records stored within the VistA EHR system. However, a comprehensive roll-out of this capability has been slow, as each connection presents unique challenges and requirements. The VA has been wise to take a conservative approach in rolling out connections to ensure quality exchange exists and is sustainable before moving onto the next opportunity. One of the oldest implementations and one that continues to be monitored is with the UHIN in 2010. DIRECT secure messaging is also available with the VA. The NDHIN is actively in discussions with the VA to roll out DIRECT messaging functionality. The VA is currently working on a similar project in Alaska, where Orion is providing the HIE platform. Once this project is completed, it can be translated to the NDHIN, at which point a best practice will be employed.

The Department of Defense (DoD):
Coordinated Care Oklahoma (CCO) has recently become the nation's first HIE to connect with the DoD. Plans are already on the table to accelerate the DoD's connectivity with other HIEs across the country. The NDHIN should contact both CCO and the DoD to discuss this initial success and determine when the NDHIN can be added to the list of HIEs who would like to establish connectivity with the DoD. With two major DoD bases located in the state, this would be of great benefit to both soldiers and their families who are medically served by this department within the state.

Social Security Administration (SSA):
The SSA has been actively pursuing HIEs for connectivity specifically for the enhancement and streamlining of the disability determination process. Many HIEs as well as large healthcare organizations have taken advantage of this process as it has allowed for revenue generation back to HIEs from the SSA. MedVirginia was one of the first HIEs to connect with the SSA and the formal use case was recently documented by the MiHIN is an excellent example of the process and its benefits. The NDHIN should consider taking advantage of this revenue opportunity as a value-added service provided to its members.

State-to-State Exchange:
Currently, the NDHIN has the ability to query and exchange data with approximately 20 other states and HIEs across the country. With the influx of oil workers and other out of state residents and visitors, this functionality is critical in being able to acquire longitudinal health records regarding the state's current population. The priority is currently to concentrate on border states and "snow-bird" states that many North Dakotans visit during the winter months. Additionally, Utah, Colorado and Arizona are automating ADT alerting between the states in a unique system that the NDHIN should study and perhaps adapt allowing ADT alerts from other states to be automatically delivered back to the NDHIN.

CMS, CDC, and other Federal Agencies:
Opportunities will continue to present themselves for building connectivity to other federal agencies such as CMS, CDC, and others. There are no best practices for building connectivity to these entities today as each HIE represents a unique project with specialized requirements.

National Registries:
It has been suggested that the NDHIN should connect to a number of national registries in order to provide access to and the contribution of data by providers and organizations. There are no best practices available today for these types of connections as few HIEs, if any, have had successful experiences connecting to national registries. The National Institute of Health has developed an impressive list of existing national registries that should be investigated.

Meaningful Use Eligible Providers:

Hospitals and clinics across the country have been the primary target for connectivity to HIEs for a number of reasons. First, the Meaningful Use initiative from CMS had substantial financial incentives for these organizations to connect and share data. Additionally, these organizations had many data elements that were easier to exchange with a greater level of need from many other community providers. While there are many good examples across the country of connecting hospitals, clinics, and laboratories to both state-wide and regional HIEs, instances where providers such as chiropractors, dentists, and optometrists are connecting to HIEs in large numbers are very rare.

Hospitals:
Since early in 2012, Maryland has had all 46 acute care hospital connected to their state-wide HIE, an HIE of similar size to the NDHIN. The governor was very involved with the Maryland Hospital Association and all 46 hospitals in order to ensure this important milestone was accomplished. Most of the hospitals in North Dakota are currently connected through the NDHIN, at varying levels of participation. The NDHIN should strive to connect the remaining hospitals and grow participation in order to ensure they are meeting industry best practices.

Clinics:
The Indiana Health Information Exchange (IHIE) currently sends results to over 25,000 providers in 6,000 locations throughout Indiana via their DOCS4DOCS (D4D) service, for which they won a 2016 Healthcare Informatics Innovator Award. Additionally they are integrating these results directly into physician EHR systems to provide the ultimate in HIE integration. The NDHIN should research these best practices to ensure they are providing high-value services to clinics and hospitals alike.

Urgent Care:
Stand-alone urgent care clinics located in many cities are normally connected to HIEs in the same manner as affiliated or independent clinics in the state. See the above Clinics section for related best practices.

Mini-Clinics:
Mini-clinics, which are often located within pharmacies, are also normally connected to HIEs in the same manner as affiliated or independent clinics in the state. See the above Clinics section for related best practices.

Large Reference Labs:
Many HIEs throughout the country currently have interfaces built with the large reference labs, LabCorp and Quest. These companies offer mature interface capabilities and have improved their HIE connectivity through diverse and widespread experiences over the years. An example of just one of these connections is the Santa Cruz HIE which has connectivity to both organizations. These large reference labs have a smaller footprint in North Dakota, compared with other states, however the connection remains important for building longitudinal health records and adhering to the mantra of "no data left behind." In addition, the NDHIN should aim to connect with all of the smaller local reference labs in order to ensure best practices are met in this area.

Chiropractors:
There are currently no industry best practices for connecting chiropractors to HIEs as there has not been much experience to date with this group of providers. However, chiropractors have real needs to access both medical histories of patients as well as imaging studies performed by hospital and stand-alone imaging centers. Hospitals and providers have a strong interest in receiving data and imaging from chiropractors as well.

Dentists:
There are currently no industry best practices documented for connecting dentists to HIEs today as there is little experience with this group of providers. Use cases are growing quickly for this connection as dentists continue to expand the services that they provide.

Optometrists:
The Kansas Health Information Network started their work with optometrists early in 2011. They were extremely successful using DIRECT messaging to help increase the exchange between optometry offices and primary care providers across the state. They used this service in communicating results of annual diabetic eye exams as well as being able to send color images of eye examinations in lieu of more traditional exchange methods, such as couriers. The use case for connecting this groups of providers is strong, and the NDHIN should investigate how this can be achieved. Best practices in this area are still maturing, as this connection has not been achieved in many states.

Non-Meaningful Use Eligible Providers:

There is a tremendous opportunity for the coordination of care between the providers who were included under Meaningful Use, and those who were excluded. The inclusion of these additional data sets in HIEs would be invaluable to community healthcare delivery, and would be a major step towards addressing the social determinants of health. However, this type of exchange has additional regulatory barriers (both federal and state-specific) and in most cases is still in its infancy nationwide. Therefore, it will be more difficult to find a relevant best or promising practice for the NDHIN in many cases.

Local Public Health Departments:
Approximately half of the local public health departments in North Dakota are connected to the NDHIN today. North Dakota has followed best practices to date and should continue to work toward 100% coverage of these providers as they provide immunizations, screenings, syndromic surveillance, and care coordination to many residents, in addition to other vital healthcare services.

K-12 Schools:
Nursing services available within K-12 school systems often contribute vital information to children's health records. No best practices exist in the marketplace for connecting these providers. Although many HIEs have services in this area, there are no out-of-the-ordinary instances to cite.

Behavioral Health:
Behavioral Health entities in the private sector, both inpatient and outpatient have very similar use cases as those at the state level. See behavioral health in the "State Systems" section above.

Residential Treatment Centers:
Residential Treatment Centers have similar use cases as inpatient and outpatient behavioral health organizations. See behavioral health in the "State Systems" section above.

Long Term Care, Assisted Living, and Basic Care:
The leaders in LTPAC/HIE integrations in the country are CORHIO in Colorado and KeyHIE in central and northeastern Pennsylvania. Leaders from both of these organizations have recently left their organizations and joined the CedarBridge team and are available for consultation at any time. In addition, Testing Experience and Functional Tools (TEFT) grants are being offered by CMS to nine states in order to test quality measurement tools and demonstrate e-health in Medicaid community-based long-term services and supports. These grants represent the opportunity for rapidly developing best practices in this area. Due to the many transitions of care between these organizations and acute care hospitals and local clinics, connectivity and exchange are crucial for building value for the NDHIN stakeholders and presenting long term care providers with the data set that they need in order to provide high value care to their patients.

In addition, The KeyHIE in central and northeastern Pennsylvania has developed a tool that allows long term care providers to transform standard Organization for the Advancement of Structured Information Standards (OASIS) documents into CCDs and transport them via DIRECT secure messaging to the central HIE and/or providers across the state. This tool should be vetted for use by all long term care, assisted living, and basic care organizations in the state.

Home Health:
The KeyHIE tool described in the long term care section above also allows home health providers to transform standard OASIS documents into CCDs and transport them via DIRECT. This tool should be vetted for use by all HHS agencies in the state. Prevention of readmissions of patient into hospitals is the key driver to exchanging data with these agencies. CORHIO's Patient Care 360 tool is showing strong success in use by LTPAC and home health workers in Colorado.

Hospice and Palliative Care:
Most Hospice and Palliative Care organizations are paper based today and therefore there are few best practices that exist in this area today. The NDHIN should continue to monitor any developments in this area.

Emergency Medical Services (EMS):
To date, the state with the most experience integrating EMS entities with HIEs has been California. This California program is still very new and additional research and development of a solid, long term, and robust solution will be required by the NDHIN. The PULSE sub-recipient grant award announcement and the EMS sub-recipient grant award announcement add some additional information. Healthix in New York City also has a unique program that the NDHIN may wish to consider for disaster preparedness and emergency readiness in the future. Run reports contain vital information to emergency room physicians and the timely exchange of these documents are important for the transition of patient care.

Pharmacies:
Connections to local pharmacies have many use cases for community hospitals and providers, from coordination of patient care for patients suffering from chronic conditions, to medication reconciliation, to the submission of immunizations. The regional health information exchange in eastern Tennessee has been successful in working with local pharmacies to provide them with

beneficial use cases. The East Tennessee Health Information Network (ETHIN) is a good resource to discuss further participation by local pharmacies. The NDHIN does not currently accept medication information (prescribed or filled) into the network. This information would greatly increase the value of the network to key stakeholders.

Durable Medical Equipment (DME):
Providers of DME deliver specialized medical equipment to patients of need. A DME service of particular importance, especially in consideration of disaster preparedness, are oxygen services. Access to the listing of rural residents in need of oxygen services is vital when communications have been cut off due to extreme circumstances. There are no significant best practices in this area today.

Podiatry:
The results of annual foot exams for diabetic patients are very important to primary care providers when coordinating care for these patients. Today, exchange of this data is often difficult or non-existent given the technical limitations. Connection of these providers would help tremendously in treatment of this chronic disease that is hugely expensive to the system. No mature industry best practice exists in this area to date.

Newborn Screening:
Newborn screening, including the areas of sight and hearing, is vital to early development of children. While some of these results are being transmitted to hospitals today, not all of this information is available to all providers. No mature industry best practice exists in this area to date, but it is important that this data becomes part of the NDHIN.

Audiology:
Often not covered by health insurance policies, audiology services are a frequently overlooked area of healthcare exchange but to those who suffer hearing loss these providers are an important part of their care team. No mature industry best practice exists in this area to date.

Prosthetics & Orthotics:
While a limited percentage of the population has need for these services, these providers serve as a significant member of the care team for patients who do require prosthetics or orthotics, and are often in close communication with the primary care provider. No mature industry best practice exists in this area to date.

Payment Models:

Accountable Care Organizations (ACOs):
New payment models such as ACOs are being piloted throughout North Dakota today and will require advanced tools and data that only the NDHIN will be able to provide. CedarBridge was asked to prepare a report for the Office of the National Coordinator in 2014 on *Health Information Technology Infrastructure to Support Accountable Care Arrangements* that you will find of value in determining best practices around ACOs.

Patient-Centered Medical Home (PCMH), Care Coordination, and Episodic Quality Reporting:
The basis for many of the new payment models centers on Patient Centered Medical Homes and care coordination to achieve desired results. MyHealth Access Network, based in Tulsa, Oklahoma was selected as the convening organization for a demonstration project launched by the Centers for Medicare and Medicaid Services (CMS) called the Comprehensive Primary Care Initiative (CPCi). The initiative is a multi-payer, value-based payment model focused on the transformation of primary care practices into patient centered medical homes.

MyHealth serves as data aggregator for the program, brining claims and clinical data together and providing claims-based measures, such as the Healthcare Effectiveness Data and Information Set (HEDIS), and electronic Clinical Quality Measures (eCQM's), as well as unique hybrid measurements possible only with combined clinical and claims data. These measures are used by providers to guide their day to day management of patients as well as by the payers and employers to assess value and reward high-performing providers and patients.

Social Service Integration:
Social Service assistance has long been proven to have direct effects on individuals' quality of health. Poverty, education, housing nutrition, and other social services can all effect the health of individuals. A simple referral system between care coordination platforms and social services organizations has shown to be a best practice in this area. An example of this work is The Camden Coalition (New Jersey) and a nonprofit group called Community Oriented Correctional Health Services (COCHS) that have worked together, along with Camden County officials, the jail warden, community health providers, and a technology contractor to bring all medical providers serving inmates onto the HIE platform.

Referral System:
In conjunction with care coordination solutions, an electronic referral system is a high value return on investment for providers. This functionality allows for electronic referrals between providers, including to social service organizations, to be coordinated and tracked effectively via the HIE. This functionality has shown to have positive results in the compliance of reporting requirements for organizations and health outcomes of patients. It is a best practice that an electronic referral system be implemented along side a care coordination system as part of the NDHIN.

Medicare Shared Savings Programs and Medicaid Waiver Programs:
Medicaid waiver programs around the country are building best practices for robust health information exchange through value-based and alternative payment models. In New York, the Delivery System Reform Incentive Payment (DSRIP) Program has establish Performing Provider Systems (PPS) throughout the state aimed at utilizing existing infrastructure, such as RHIOs and the New York eHealth Collaborative (SHIN-NY and NYeC), aimed at building additional infrastructure to redesign delivery systems through information sharing and robust quality reporting. In California, the Medi-Cal 2020 Waiver aims to accomplish similar goals through a variety of programs, including the Public Hospital Redesign and Incentives in Medi-Cal (PRIME) program, the Global Payment Program (GPP), and Whole-Person Care (WPC) regional pilots. Additionally, Orion Health has an optional module within their HIE technology stack that

supports Medicare Shared Savings Programs that the NDHIN and stakeholders should evaluate if they are involved in these types of programs.

Payer Systems:

Claims History:
There is a growing recognition that by combining claims data with data from EHRs, a more comprehensive and complete view of a patient's health needs can be developed. The UHIN started as a claims hub and grew into a state-wide HIE over time. Having both types of data available in the system has given them some unique advantages that should be explored by the NDHIN.

Risk Scores:
The Colorado Beacon Consortium (CBC) is one of 17 communities selected by ONC to take part in the Beacon Community Cooperative Agreement Program to demonstrate how health IT investments and Meaningful Use of EHRs advance the vision of patient-centered care. The CBC has partnered with the Quality Health Network and the Rocky Mountain Health Plan to pilot a new tool that allows patients, payers, and providers to obtain individualized health risk profiles, along with potential treatment benefits.

Gaps in Care:
Tennessee is early in the process of developing Patient Centered Medical Homes and Health Homes for their 1.5 million Medicaid members. To facilitate these initiatives, they are implementing a shared care coordination application between three managed care organizations which will provide patient claims history, generate risk scores, provide current gaps in care, and provide ADT alerts for primary care providers.

HEDIS and Star Reporting Audits:
HIEs provide remote access to medical records that payers cannot easily access currently, as well as analytics that can allow for the discovery of health encounters they may not know about. It is often discovered that routine health-related encounters such as flu shots and annual eye examinations have been administered that can be effectively added to the organizations quality measurements.

Medicaid/CHIP Plans, Medicare Plans, Commercial Plans, Workman's Compensation:
Payer involvement in HIEs represents true bilateral benefits. Through claims, payers can offer a unique data set that includes information from a wide variety of organizations and providers. The HIE can offer payers patient information beyond their available data, as well as facilitating effective care coordination and data analytics, necessary for effective participation in alternative payment models. As patients move from one health plan to next, or on and off of Medicaid, the ability to follow the patient becomes very valuable. A general industry best practice is to have data available on as much of the relevant population as possible available within the HIE, including payer data. The NDHIN is in discussion with many of the payers throughout the state to ensure they are meeting this best practice in the future state.

Large Self-Insured Employers:
Large Self-insured employers represent an ever increasing segment of the payer market, and as described above for other health plans, their data needs to be represented in the NDHIN. CedarBridge has been working with Intel Corporation across the country for the past few years on an employer led collaboration. This white paper on the initiative can serve as a valuable reference to this type of initiative and help guide the NDHIN towards achieving the industry best practice in this area.

NDPERS:
The State Employee Health Plan covers 68,000 North Dakotans. The state should work closely with the NDHIN to ensure the payers and providers that provide care to the members of this state-funded plan have access to the most complete healthcare information data set as possible, as well as the ability to utilize any available state-wide applications, including care coordination and data analytics. In order to achieve the best practice in this area, the NDHIN needs to ensure an effective connection with NDPERS.

Patient Engagement:

Personal Health Records and Patient Portals:
Patient engagement is key to any program designed to raise the quality of the health of a population. There is great value in making a patient part of their care team and granting them access to both access and contribute to their health record. ONC published its PHR Key Considerations document in 2015 highlighting implementations in both Kansas and Pennsylvania. Jim Younkin from the KeyHIE HIE is now with CedarBridge Group and can add additional insight into the implementation in Pennsylvania.

Telehealth, Remote Monitoring, and Patient Reportable Data:
The ability to connect with providers over reliable broadband connections, or to remotely monitor patients with complex or chronic conditions, represents a huge development in the effective, affordable delivery of healthcare. This ability is particularly important in rural communities, where the availability of specialty providers is severely limited. Two examples of remote monitoring pilots that have seen successful are the Bangor Beacon Community in Maine and the Western New York Beacon Community in Buffalo (an initiative of HEALTHeLINK HIE). In Bangor, devices such as automated medication dispensers, glucose and blood pressure monitors, and scales are used for remote monitoring to allow care coordinators and homecare agencies to extend their reach to patients. In Western New York, the pilot deployed telemonitoring devices that allowed patients to submit glucose, blood pressure, and weight readings to the HEALTHeLINK HIE. Although these pilots were not directly implemented by payers, they demonstrate how these pilots are showing value across the continuum when implemented effectively. The NDHIN should monitor how technology continues to mature in this area, as well as how policies develop to allow for the efficient reimbursement of these services, to ensure they are adopting industry best practices as they emerge.

Mobile Applications and Patient Reportable Data:
The Orion web site states, "Patients can contribute health data to their longitudinal patient record through Apple HealthKit or a wearable device. This information is then added to their health record, and could include blood pressure, heart rate, blood glucose, weight, and steps. This provides the care team with a comprehensive real-time view of the patient's health and care plan at a glance." Implementation of healthcare data from these devices should be a high priority for the NDHIN, as the current industry best practice is to engage the patient as much as possible, facilitating their ability to be a central member of their care team.

Patient Alerting:
Beyond medication alerts, DIRECT secure messaging between providers and patients has many benefits including lowering out of pocket costs. The NATE trust bundle is at the heart of security for these types of applications. Please see the subscription alerting section above for more information on best practices in this area.

Ancillary Patient Assistance Services:
Patient assistance services include in-home, non-medical help (laundry, house cleaning, yard work, painting, etc.), sitters, transportation services, and even physical supplies such as air conditioning or heating. As care coordination applications are rolled out, and alternative payment models reimburse for the holistic treatment of an individual, these non-traditional care givers are becoming more important components of the patient's care team and therefore need access to the certain patient data elements, a care coordination application, as well as DIRECT secure messaging functionality. As an industry best practice, the NDHIN should be looking at ways to include these non-traditional care team members into the collaborative environment.

Fitness Centers and Weight Management:
With a 32.2% obesity rate (similar to the national average), the weight of North Dakota's population has a significant effect on the overall health of the state. If the NDHIN begins to seek ways to include fitness centers and weight management programs into the network, they could enhance the ability for a patient's PHR to be a valuable tool in the fight against obesity. There are currently no best practices available today in this area, but the NDHIN should monitor how technology develops in order to be prepared for adoption when it has matured appropriately.

Applications:

Advance Directives/POLST/MOLST Registries:
Although a slightly different model than what the NDHIN is considering, the MiHIN HIE use case for advance directives gives several good extensions and ideas that the NDHIN may wish to consider. Several states today offer advance directives registries connected to their HIE, but there are a variety of different implementations, and therefore no set pattern for success at this point. States that have decided to integrate the process with their Secretary of State offices seem to have the highest level of participation. Increased availability of advanced directives, or POLST/MOLSTs, to hospitals and emergency medical services allow for patients wishes to be respected more frequently, and represent a significant cost saving to the system.

Data Warehouse/Analytics:
The ability to run analytics on the available health information of an entire state, instead of a small local population or subset of information, such as what is available within a single health system, cannot be underestimated. One of the best new approaches in HIE analytics comes from Maine's HealthInfoNet. While there are several different models across the country, each of which should be explored, Maine's new approach is one that the NDHIN should examine as they enter this new application area. UHIN, MyHealth in Tulsa, Oklahoma, and MiHIN also have capabilities that should be explored.

Credentialing:
There is a tremendous amount of redundant activity and cost involved in provider credentialing in North Dakota. Oregon recently became the first state to pass legislation that requires a centralized system for the purpose of providing credentialing organizations access to information necessary to credential or re-credential all health care practitioners in the state. Contacting the Oregon Health Authority for a deeper discussion is a recommended first step in exploring this option for the NDHIN.

Chronic Disease Registries:
One example of a successful, progressive chronic disease registry can be seen in Florida where the COPD Foundation received funding from the Patient-Centered Outcomes Research Institute (PCORI) to establish the COPD Patient Powered Research Network (CPPRN). The goal of this two phase project is to use patient-centered outcomes research to improve the quality of life, functional status, and survival in patients with Chronic Obstructive Pulmonary Disease (COPD). As part of phase one (completed 2015), the CPPRN enrolled 100,000 people with COPD into a chronic disease registry with a "scalable data hub." Phase two of the project is currently underway to utilize that registry and data hub to support patient-driven, patient-centered outcomes research. Please see the National Registry section earlier in this document for additional information on the best practices in this area.

Additional Operational Considerations:

Meaningful Use:
The NDHIN's primary mission is to facilitate the exchange of health information between a wide range of stakeholders across the healthcare continuum. However, as a result of this work, the NDHIN does help to support providers in obtaining Meaningful Use incentives payments and meeting quality reporting. At this time, the NDHIN should not consider restructuring their priorities, as North Dakota's Medicaid agency still administers the Meaningful Use program.

Collection of Quality Outcome Data:
The NDHIN clinical data repository contains a wealth of data that can be used in the future to design quality measurements for value-based episodic care and PCMH reporting. Additionally, if providers feel that the NDHIN should provide reporting on their behalf to CMS, other federal agencies, accreditation organizations, or payer organizations, the NDHIN can certainly explore

that possibility in order to provide their stakeholders a high value service. Today, few HIE organizations are collecting and submitting quality data on behalf of their stakeholders.

Fee Structures:
Currently, the NDHIN is proposing some of the lowest annual subscription fees in the country for participating in an HIE. For example, KeyHIE in Pennsylvania requires a fee of $32,000 per year for critical access hospitals in their service area compared to the proposed $3,600 by the NDHIN. The minimal fee is a good testimony to the stewardship that the NDHIN is practicing. It is recommended that fee structures be reviewed annually by the NDHIN. When operating in a dynamic, rapidly evolving environment, unexpected costs often appear during a five-year period. It is difficult at the beginning of a project as comprehensive as this to anticipate all costs that are required however we believe a 10-20% margin of error of the current projections would be a reasonable expectation.

Revenue Streams and Sustainability:
The current sustainability plan as presented to stakeholders is reflective of similar plans that most other HIEs employ around the country. The state's share of expenditures in North Dakota is generous and the inclusion of payer organizations in sharing costs, having access to the system, and having the opportunity to contribute data is very forward thinking compared to many HIEs.

Potential Savings & Readmissions to Hospitals:
Topics such as potential savings from reducing readmissions to hospitals, and other items, through the utilization of the NDHIN are included in the Return on Investment Brief that will be delivered to the NDHIN as part of CedarBridge's overall contract.

Image Storing:
The idea of the NDHIN acting as an off-site, back-up storage location for hospitals in North Dakota has been mentioned on a couple of occasions. All hospitals are currently paying for this service today from commercial offerings. Building this as an offering from the NDHIN would take considerable resources and should only be explored after the initial phases of the NDHIN's five-year plan have been executed.

Staffing Models:
Part of what has kept operational costs low at the NDHIN, compared with other HIEs around the country, are staffing costs. The NDHIN runs a lean operational model and staff currently only employs four FTEs. The NDHIN will need to expand their staff in the near future in order to handle the day to day operations, as the number of connected stakeholders continues to grow. While initially building out new and enhanced functionality, the NDHIN can contract for staff augmentation until these projects enter an operational phase. If ongoing, state-wide applications such as care coordination, analytics, and others are added to the NDHIN's suite of offerings, permanent, long term staff will also need to be added to support such applications.

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