

Health Information Exchange Statewide Environmental Scan Findings

Prepared for
Oklahoma State Department of Health
Center for Health Innovation and Effectiveness

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Table of Contents

I. Introduction and Background	1
II. Methodology and Assumptions	2
III. Health Information Exchange Key Concepts	4
IV. Observations and Findings.....	6
V. Current Environment.....	17
VI. Statewide Interoperable Health Information Network Options.....	20
Summary	26

I. Introduction and Background

The Oklahoma Health Improvement Plan (OHIP) coalition, chaired by Commissioner Terry Cline, Oklahoma's Secretary of Health and Human Services, is a public-private partnership of stakeholders that oversees the state's progress toward improving Oklahoma's strategic health outcomes.

The OHIP goals and work plan were originally created in 2010. The Oklahoma State Department of Health (OSDH) published an update to the OHIP in 2015 to describe Oklahoma's goals for the next five years, also referred to as "Healthy Oklahoma 2020." As part of this process, the OHIP coalition has established goals in four core areas of work: 1) Health Efficiency and Effectiveness, 2) Health Information Technology (IT), 3) Health Workforce, and 4) Health Finance. A workgroup comprised of Oklahoma stakeholders has been established for each of the four core areas.

The OHIP Coalition also submitted a proposal for a State Innovation Model (SIM) grant on behalf of the state of Oklahoma to provide a state-based solution to Oklahoma's healthcare challenges. Oklahoma was successful and received the grant. The grant is administered by the Oklahoma State Department of Health, which in turn created the Oklahoma State Innovation Model (OSIM) leadership team to manage and direct the work detailed in the SIM grant. The OSIM's goal is to improve health, provide better care, and reduce health expenditures for Oklahomans.

To support the Health IT workgroup, OSDH engaged Milliman to perform a statewide environmental scan of existing health information exchanges (HIE), to describe the status of health information exchanges within the state, and to develop a proposal to implement a statewide interoperable health information network. As part of this work, Milliman conducted interviews with numerous stakeholders. The purpose of these interviews was to document existing HIE capabilities and to solicit input on possible future directions of Oklahoma's HIE efforts.

This report presents findings identified during the interviews and from review of HIE initiatives in Oklahoma and other states.

Caveats and Limitations

This report was prepared by Milliman, Inc. (Milliman) on behalf of the Oklahoma State Department of Health (OSDH) in accordance with the terms and conditions of the contract between OSDH and Milliman dated April 1, 2015.

This report has been prepared solely for the internal use of, and is only to be relied upon by, the Oklahoma State Department of Health. Although Milliman understands that this report may be distributed to third parties, Milliman does not intend to benefit, or create a legal duty to, any third-party recipient of its work. If this report is distributed to third parties it should be distributed only in its entirety.

Milliman developed this report with information received from OSDH, as well as upon discussions conducted with OSDH representatives and stakeholders who participated in interviews. Milliman did not audit the source of any data or information Milliman received, nor did Milliman perform independent verification. If the underlying data or information is inaccurate or incomplete, the results of our work may likewise be inaccurate or incomplete.

II. Methodology and Assumptions

In conducting this environmental scan, Milliman worked with representatives of the OSIM team to identify selected organizations to interview about their experiences exchanging health information in the state.

A. Stakeholder Interviews

Milliman conducted in-person and telephone interviews with more than 20 individuals representing Oklahoma’s existing HIEs, health delivery systems, payers, state agencies, and other key constituencies. Individuals participating in the in-person and telephone interviews included those shown in the table in “Table 1: Interview Participants.”

Table 1: Interview Participants

Organization	Name	Role
Health Information Exchanges		
MyHealth Access Network	David Kendrick, M.D.	Chief Executive Officer
Coordinated Care Oklahoma	Brian Yeaman, M.D.	Chief Executive Officer
	Jason Kirby	Sales Consultant
	Joanna Walkingstick	Project Manager
	Jonathan Kolarik	Chief Clinical Informatics Officer
	Rodolfo Alvarez Del Castillo, M.D.	Chief Medical Officer
Healthcare Delivery Systems		
St. Anthony Hospital	Kevin Olson	Chief Information Officer
St. John Health System	Ann Paul	Vice President
	Bat Shunatona, M.D.	Medical Director
	Troy Cupps	ACO Operations Director
Payers		
Blue Cross and Blue Shield of Oklahoma	Joseph Cunningham, M.D.	Chief Medical Officer
Oklahoma Health Care Authority	Adolph Maren	Director, Electronic Health Operations
	Lisa Gifford	Chief of Business Enterprise Services

Organization	Name	Role
Other Stakeholders		
Oklahoma Department of Mental Health and Substance Abuse	Tracy Leeper	Decision Support Policy Analyst
Oklahoma State Department of Health	Becky Moore	Director of Informatics
	C. Alex Miley	OSIM Project Director
	Isaac Lutz	Health Innovation Planning Manager
Choctaw Nation Health Services Authority	David Wharton	Chief Risk Officer, Health Informaticist
Oklahoma Foundation for Medical Quality	Ashley Rude	HIT Practice Advisor
	Ashley Wells	HIT Practice Specialist
	Lindsey Wiley	HIT Manager

The goal of these interviews was to document capabilities for HIEs focused on sharing clinical data, operations, and capabilities within the state. Interviewees were also asked how they exchange and apply clinical information in electronic health records (EHRs), and about their perspectives on possible approaches for future Oklahoma health information exchange efforts.

B. Industry Knowledge

Milliman conducted research about HIE initiatives in other states to identify common challenges and keys to success. In addition to the research Milliman performed for this project, this report was developed with consideration of the approaches Milliman consultants have observed elsewhere. Milliman has incorporated these best-practice learnings into this report.

III. Health Information Exchange Key Concepts

To facilitate a uniform understanding of the concepts and terms used throughout this report, common definitions for selected key terms are presented below.

- **Centralized Data Model:** A centralized data model refers to a database system design in which disparate data sets are merged and stored in a shared location. This model is generally thought by data professionals across industries to be a technical requirement for efficiently conducting population health analytics. Centralized data models are generally capable of faster and more reliable performance for end users and greater flexibility to support multiple applications than non-centralized models. This model may be perceived as being at higher risk of breach due to the volume of data in a single location.
- **Comprehensive Primary Care Initiative:** The Comprehensive Primary Care Initiative is a multi-year initiative with a goal to improve primary care in seven regions nationally, including Tulsa, Oklahoma. The program offers population-based care management payment to support five comprehensive primary care focus areas:
 1. Risk-stratified care management
 2. Access and continuity
 3. Planned care for chronic conditions and preventive care
 4. Patient and caregiver engagement
 5. Coordination of care across the medical neighborhood

Multi-payer payment reform, continuous use of data to guide improvement, and meaningful use of health information technology are foundational precepts to the initiative.

- **Continuity of Care Document:** A Continuity of Care Document (CCD) is a clinical summary about a patient that has been standardized for electronic transmission. Meaningful Use Stage 1 requires that a CCD include patient information, allergies, medications, problems, procedures, and laboratory results. The set of information required for the CCD is expanded for subsequent Meaningful Use stages. Throughout this report we use the term CCD to generically refer to a clinical summary capable of being transmitted electronically that would minimally adhere to the Meaningful Use Stage 1 requirements.
- **Data Warehouse:** A data warehouse is a type of database designed to aggregate information from disparate source systems into a single repository. Data warehouses are designed for more efficient data aggregation and handling of large volumes of data, whereas traditional databases are typically constrained to a single application for rapidly transmitting information from point-to-point, such as an EHR.
- **eHealth Exchange:** eHealth Exchange (also referred to as “The Sequoia Project” and/or formerly referred to as the “Nationwide Health Information Network (NWHIN)”) is a group of organizations sharing health information under a common framework and set of rules.

Participants include federal agencies, states, Beacon communities, and health systems. eHealth Exchange provides an interoperable health information exchange service that enables disparate users to share information through what is often referred to as a “network of networks.”

- **Federated Data Model:** A federated data model refers to a system design in which separate databases allow partial and controlled sharing of their data on demand. In a federated model, data is not stored in a central shared location. This model typically provides increased patient and provider privacy. A tradeoff of this model is the inability to conduct aggregate reporting and analytics. Federated data models may reduce trust concerns among stakeholders, lower the risk of breach, and may be developed more quickly than some centralized data models.
- **Health Information Exchange:** A health information exchange (HIE) is broadly defined as a system designed to pass health information from one party to another. Functionality such as patient or provider portals, reporting, and analytics may be added to increase utility.
- **Interoperability:** The term interoperability is frequently used in discussion and in literature, however, it is a term that may imply slightly different meanings to different users and audiences. In other words, it is a common term that may not be consistently interpreted. In this report, interoperability refers to a software system capability to send and receive information to and from other disparate systems.
- **Meaningful Use:** Meaningful Use is a federally sponsored program to accelerate the adoption of health information technology throughout the U.S. healthcare system, specifically the use of EHRs. Meaningful Use was conceptualized by the National Quality Forum (NQF) and founded on the principles of improved population health, care coordination, and patient engagement. Eligible providers receive federal funds to adopt EHR technology and demonstrate use of those systems in a meaningful way. The Meaningful Use program has three stages; most participants today are in Stage 1 or Stage 2.
- **ONC Certification:** Certification indicates that a system conforms to standards for health information technology (HIT) security and functionality as defined by the Office of the National Coordinator for Health Information Technology (ONC). The ONC has not yet published HIE certification standards, but has published standards for components that may be utilized by an HIE.
- **Population Health:** Population health refers to the health outcomes of a group of individuals, rather than the health outcome of a single individual. Population health management is an approach to health that seeks to improve the health income of the entire population. Use of data for analytics and measurement is an essential component of population health management.

These definitions and concepts are used throughout the remainder of this report.

IV. Observations and Findings

In this section, we describe the primary health data sharing efforts in use in Oklahoma today, as identified during the statewide environmental scan interviews and research. Like many states, Oklahoma has a number of active data sharing efforts underway, which are in varying stages of development and which were initially created for different intended uses.

A. Active Oklahoma Data Sharing Efforts

The advent of mature, widely adopted healthcare information technology has created an opportunity for the healthcare industry to share information and coordinate care in an entirely new manner compared to what was possible just a few years ago. Technological advances have created the opportunity for healthcare providers to reduce redundant testing, better control chronic conditions through early identification of at-risk individuals, and streamline patient handoffs among organizations. With the appropriate technical infrastructure, providers can access most or all of their patients' health records and encounters almost instantaneously.

The opportunity to manage patients through care transitions, conduct population management programs, and develop complete views of a patient's medical history has led Oklahoma's healthcare community to develop numerous data sharing initiatives. Data is exchanged through HIEs and EHRs, as well as through a diverse set of other methods.

Oklahoma has already made substantial progress in healthcare data exchange as a result of its healthcare and business environment. Competition has spurred innovation and technological development within the state, and two competing HIEs have emerged. OSDH is also working on a shared-service state agency HIE. These efforts have the potential to create building blocks for a more connected, efficient, and effective healthcare system that will improve the lives and health of the population.

B. Health Information Exchanges

Two HIEs currently operate in Oklahoma: Coordinated Care Oklahoma (Coordinated Care) and MyHealth Access Network (MyHealth). The HIEs began as regional initiatives; Coordinated Care in Norman and Oklahoma City, and MyHealth in Tulsa. Each organization is currently in the process of expanding its reach across the state. While both HIEs share a stated goal of improving the lives of Oklahomans through better healthcare, each has a different vision of how to achieve that objective. Each organization's distinct characteristics, such as governance model, system capabilities, and scope of data included in its data set, are summarized and described in "Table 2: Current Oklahoma HIE Features."

Table 2: Current Oklahoma HIE Features

Feature	Coordinated Care Oklahoma	MyHealth Access Network
Organization Structure	Not-for-profit	Not-for-profit
Major Grants Awarded	None	Beacon Community grant
Revenue Model	Fee and subscription	Fee and subscription
Board Composition	Community- and member-based	Community- and member-based
Unique Patient Lives (est.)	4,700,000	4,000,000
Provider Locations (est.)	455	800
Data Model	Centralized hybrid	Centralized hybrid
CCD	Yes	Yes
Population Management Tools	Yes (Pentaho)	Yes (Pentaho)
Analytics	Yes (LightBeam)	Yes (IndiGo)
Patient Participation Model	Opt-out	Opt-out
Unique Features	Advanced directives	Patient portal
Training Model	Train the trainer	Train the trainer
Demographic Data	Yes	Yes
Clinical Data	Yes	Yes
Claims Data	Not at this time	Yes (selected payers)

In the following sections, we describe key elements of each of the existing HIEs in greater detail.

1. Coordinated Care Oklahoma

Coordinated Care has been in operation in the Norman and Oklahoma City areas since 2014. The organization was founded by local hospitals and providers with a goal of providing physicians secure access to health information for their patients for treatment purposes.

When a patient sees a new provider, whether for a regular visit, emergency department visit, or a move to a long-term care facility following a hospitalization, improvements in care can be achieved if a complete clinical record is available to the provider as they deliver care. Coordinated Care focuses on providing support for these transitions by delivering a complete clinical record at the point of care.

a. Governance and Sustainability

Coordinated Care is a not-for-profit organization. The HIE's start-up costs were funded by health systems and provider groups. Ongoing operations are funded by members through subscription fees, typically paid on a semi-annual basis. A large provider group seeking to join the HIE would need to

negotiate an investor stake and permanent board position with the existing investors. Smaller healthcare organizations, such as rural hospitals, small provider groups, home health, hospice, long-term care facilities, and behavioral health facilities, are charged only for the cost of establishing their connections and ongoing subscription fees. HIE members join for a term of 3 years with the option of a 60-day cancellation.

Coordinated Care's board is comprised of health systems, small provider groups, large provider groups, rural hospitals, post-acute care, and community participants. Coordinated Care has entered into an agreement with Yeaman and Associates, with Dr. Brian Yeaman serving as CEO, to provide organizational support, legal counsel, operations, finance and project management, and general oversight of the HIE.

b. Business Model

Coordinated Care's HIE includes patient data for over 4,700,000 unique patient lives and 800 provider sites, 455 of which actively contribute data to the HIE across the states of Oklahoma, Texas, and Missouri. The HIE provides a mechanism for member organizations' providers to inquire about a patient's healthcare by collecting and sharing patient demographic information, primary care provider, allergies, vital statistics, immunization data, problems and conditions, procedures, diagnostic results, labs, medications, discharge summaries, patient notes, and individual encounter records. Coordinated Care accepts and shares standardized and non-standardized data (such as a descriptive notes about the patient's condition) via the HIE, though analytics can only be run on standardized data.

There are two ways that HIEs typically store and provide access to health data: centralized data model and federated data model. Coordinated Care can accommodate both centralized and federated models. Once data from a federated model is viewed by a provider, it is stored in the centralized database and updated the next time that patient's information is queried. Access to Coordinated Care queries and data is provided on-demand. On-demand access means that, when users query the system, they are presented with the most recent EHR information available, although the data may or may not be stored in a single central repository or data warehouse.

Users access the HIE via a Cerner Corporation (Cerner) technology-based single sign-on, or via a web portal. For many EHRs, the users access the system through an EHR-integrated connection called a servlet, which expands the HIE information within the EHR system as a new window. Servlet technology enables a user to view Coordinated Care's consolidated patient views through the web. The bidirectional feed between the HIE and member organization loads a CCD from the HIE into their EHR upon request. This is advantageous to providers because it does not interrupt clinical workflow, allowing them to open their patient's aggregated record as if it were already integrated with their EHRs.

For EHRs that do not support this technology, access is provided through a web portal. The web portal offers view-only access for patient searches and analytics. Some EHRs can access the web portal via single sign-on, allowing the provider to click a link that opens Coordinated Care's web portal in a browser window after having automatically logged the provider in. Others require that a provider open

a browser, navigate to the web portal, and log in to the portal. Seamless integration increases the likelihood that a provider will use the system during a visit, thus the advantage of integration and single sign-on is an increased usage rate.

Organizations wishing to join Coordinated Care can form a full connection with the HIE through their EHR, or can access the HIE only through the web portal. If the organization wishes to form a full connection, Coordinated Care consults with the organization to determine how best to build the connection. Coordinated Care reports that implementation of a typical connection takes six to eight weeks, but that individual connection times may vary depending on the provider, the specific EHR installation, and other related considerations.

c. Healthcare Analytics and Population Management Tool

Coordinated Care has focused its primary efforts around developing HIE tools that support patient transitions of care, presenting a complete medical record on-demand at the point and time of care.

Coordinated Care is also developing analytics capabilities via two vendors, Pentaho and LightBeam. LightBeam is Coordinated Care's primary analytics partner. The product provides an analytics warehouse that standardizes data for analysis. Pentaho provides risk stratification, population health management, and condition management reports to HIE users. Standards-based reports, such as HEDIS measures, and information on utilization, treatment, and clinical quality are also available.

In addition to providing a solution for health data integration at the point of care, Coordinated Care adds value for its members by integrating a tool called MyDirectives in the HIE. MyDirectives is a multistate electronic repository for a patient's portable advanced directives. Integration of this information can be valuable to providers in emergency medical situations and allows the care team to follow the patient's wishes, even in urgent settings where there would otherwise be a potential cost to delaying treatment to locate a patient directive. If a patient whose provider participates in Coordinated Care has filled out an advanced directive with MyDirectives, that information is available to all providers that participate in the HIE.

d. Policies and Procedures

Coordinated Care follows an opt-out model for sharing patient data for providers based in Oklahoma. In this model, patients are notified that their information will be shared over the exchange by member organizations and are given the opportunity to opt out of participation.

Coordinated Care also operates in Arkansas, Kansas, Louisiana, Missouri, and Texas. Operations spanning multiple states require special consideration due to variations among state regulations. For example, in Missouri, patients must explicitly opt in to have their records shared across the HIE. Missouri patients are notified that their information can be shared over the HIE and are given the opportunity to opt in. Because Coordinated Care includes Missouri-based providers in the HIE, a capability has been developed to overwrite the default opt-out setting if a patient has been seen in Missouri.

Coordinated Care reports low rates of patient opt-outs from provider groups in Oklahoma or Texas and says that approximately 90% to 95% of patients opt in from Missouri-based groups. Because of this, Coordinated Care believes that most patients are interested in the sharing of their records to facilitate coordinated and potentially higher-quality care.

e. Technology Evaluation

Coordinated Care uses Cerner as the HIE's primary technology vendor partner. Coordinated Care has, however, customized a CCD for its members. The decision to customize the CCD was made to strengthen the usefulness of the system in supporting care transitions and to allow connections to areas of healthcare which, such as home health and long-term care. The custom Coordinated Care CCD aggregates available clinical information into a single view. This model has a distinct advantage over most EHR technology, where users must separately view each instance of a patient's chart. In other words, each unique provider's chart for a patient is an "instance" and the treating provider must separately view each instance, rather than as a consolidated, patient-centric view as provided by Coordinated Care's CCD.

Coordinated Care's data model can be described as a centralized hybrid. Coordinated Care allows three types of connections:

1. A centralized connection hosted by Cerner that includes demographic information and clinical records.
2. A centralized connection hosted by Cerner for demographic information and a federated clinical record only accessed when a patient's chart is opened.
3. A fully federated connection that stores no information within the HIE's database.

Coordinated Care's connections are primarily the first and second connection types, with an equal distribution between the two. Centralizing patient demographic information enables accurate patient matching by building a master patient index (MPI), an operation that identifies which records throughout the system pertain to a single patient. An accurate MPI reduces the likelihood that data is missed when a patient's information is accessed via the HIE. It also reduces the probability that another individual's information is accidentally accessed by the provider. The MPI provides an efficient means to keep a patient's clinical information in the primary EHR and only accesses it when another provider needs it, rather than storing it in a centralized database. This arrangement is thought by some to maximize the security and privacy of patient records. The fully federated connection type is primarily used by healthcare organizations that lack sufficient EHR technology to be fully connected.

Coordinated Care's data model mirrors the HIE's primary intended purpose as a point-of-care clinical information source, a condition management tool, and population health management tool.

f. Vendor Procurement and Project Management

As Coordinated Care's technology partner, Cerner is responsible for most application development work. Lightbeam is Coordinated Care's analytics vendor. MyDirectives was selected as the vendor for

the HIE's advanced directives capability. Yeaman and Associates provides a project manager to oversee vendor-based development efforts.

g. Marketing, Outreach, and Training

Coordinated Care's sales and marketing activities are conducted statewide. Coordinated Care Oklahoma participates in statewide conferences and initiatives to raise awareness of the HIE and its capabilities.

Coordinated Care operates its training function as a "train the trainer" model. This training approach is popular among technology vendors because it enables the client's team to spread adoption of the application on a timeframe that is right for the client organization; even following completion of the technology implementation. This method directly trains several individuals within a client organization to become experts on the technology. These individuals then conduct training sessions for the rest of the organization. Coordinated Care also offers web-based seminars and printed reference guides to supplement the primary training model.

h. Certifications

While the ONC does not provide certification standards for HIEs at this time, it does certify components that may be used with various HITs. MyDirectives, Coordinated Care's advanced directives technology provider, offers an ONC-certified advanced directive capability, which the HIE provides to its members.

2. MyHealth Access Network

MyHealth was started in 2009 with a goal to improve health, improve healthcare, and reduce costs by creating a complete view of all the care Oklahoma patients receive. Based in Tulsa, the MyHealth HIE collects patient information to create opportunities for early intervention with at-risk patients, assist in treatment decisions during the patient visit, and enable population management programs through analytics and reporting tools.

a. Governance and Sustainability

MyHealth is a not-for-profit organization. Dr. David Kendrick is the organization's CEO. The HIE was started as a result of a large stakeholder meeting convened to discuss Oklahoma's health outcomes.

In May 2010, MyHealth received an ONC Beacon Community grant to fund use of HIT to advance the vision of patient-centered care and to provide better population health and better patient care at a lower cost. The Beacon grant funded investments in infrastructure and technology to support the MyHealth platform and to expand its population management and clinical quality reporting capabilities. MyHealth's ongoing operations are funded by membership fees. MyHealth reported that its fee schedule is comparable to Coordinated Care Oklahoma's fee schedule although Milliman did not independently verify that claim.

MyHealth's board of directors is comprised of 20 members. The board represents a broad mix of constituencies, with participants from health systems, tribal organizations, patients, universities, private payers, clinicians, representatives from the community, public and allied health organizations, and one individual appointed by the governor. Health systems occupy six seats. This structure was designed so that decisions and initiatives require cross-stakeholder agreement and collaboration.

b. Business Model

The MyHealth HIE has records for over 4,000,000 patients, contributed to by over 260 member organizations across approximately 800 sites. MyHealth provides the capability to share and collect patient information intended to support care coordination, including demographic information, vital signs, medications, radiology, allergies, lab results, immunizations, social and family history, encounters and procedures, admissions, discharges, and transfers. To join MyHealth, organizations must be professionals in good standing in the healthcare industry with a demonstrated need, benefit from participation, and be approved by the MyHealth Board of Directors. Once granted membership, organizations participate in a technology evaluation to ensure connections are feasible and that the required data can be extracted from their HIT systems.

Authorized users may access patient data on-demand via the HIE by logging in to a web portal from their EHR using single sign-on. Providers have access to a consolidated CCD that summarizes and presents relevant point-of-care information. MyHealth leadership reported that most health system users access the portal when there has been a known care event, such as a hospitalization or for analytic purposes.

As a participant in the Comprehensive Primary Care Initiative (CPCI), MyHealth is expanding its HIE data model to include claims data for value-based assessment of care. The intent of the CPCI program is to evaluate whether risk-stratified care management, access to care, planned care for chronic conditions, patient and caregiver engagement, and coordination of care across healthcare organizations can achieve improved outcomes. The results of this program are intended to inform future Medicare and Medicaid policy, and within the state of Oklahoma is expected to be used in evaluating pay-for-performance program effectiveness for the state's payers.

The HIE's data sources for claims information are currently Blue Cross and Blue Shield of Oklahoma and the state Medicaid program, SoonerCare, which is administered by the Oklahoma Health Care Authority. Underlying this initiative is a clinical quality measurement program that was introduced and developed in partnership with Blue Cross and Blue Shield of Oklahoma.

c. Healthcare Analytics and Population Management Tool

MyHealth offers a suite of analytic reporting tools for population health management. Additional functionality available in the MyHealth provider portal includes health analytics for clinical quality reporting and population health evaluation, risk assessment tools, identification of high utilizers of emergency departments, care transition, and care gaps reporting, as well as a direct messaging interface.

MyHealth provides three analytic and decision support tools; MyHealth Analytics, a Pentaho implementation; DocSite, a rules-based care gaps and care opportunities report; and Archimedes IndiGo, a risk-stratification and decision support system. MyHealth has also incorporated Tableau, an interactive data visualization product, into its analytics offerings. We note that these analytic and population management capabilities can be quite powerful, particularly when the inbound data is of high quality and predictable in format and structure. Lack of standardization in EHR workflows and charting is common among provider groups and is a likely barrier to be overcome before the robust reporting capabilities of MyHealth can be fully realized.

d. Policies and Procedures

MyHealth operates under an opt-out model in which participating organizations inform patients their data will be shared across the HIE to improve and streamline the care they receive unless they explicitly decide not to have it shared. MyHealth reports relatively low rates of patients opting out. As the HIE is currently focused on Oklahoma-based provider groups, it has not been necessary to develop an opt-in solution.

e. Technology Evaluation

MyHealth's technological capabilities have evolved over time as the needs of the HIE have changed. The HIE can be accessed via an independent web portal, or a single sign-on to a web-based portal from a link in the electronic health record (EHR) system. Clinical users can access a consolidated CCD that aggregates relevant clinical information from all data sources into a single view. The HIE's data model can be described as a centralized hybrid, which allows two types of connection for organizations to share data:

1. Centralized connection hosted by MyHealth that includes demographic information and clinical records.
2. Federated clinical connection hosted by MyHealth that enables data to be viewed in the portal, but prevents the data's inclusion with the HIE's analytic reporting suite.

Additionally, view-only access to demographic data and clinical records is available for members who do not have an EHR compatible with the technical requirements of data sharing.

The majority of MyHealth's data source connections are fully centralized. An advantage of a centralized data repository is that it enables the aggregated reporting necessary to build effective population health reports. In addition to the core technology platform, MyHealth's suite of additional reporting and systems uses the capabilities of a number of technology vendors. These capabilities create value for organizations that are interested in quality reporting, population management programs, and clinical decision support capabilities that are more comprehensive than transmission of the clinical record from point to point.

f. Vendor Procurement and Project Management

MyHealth has a number of vendor relationships due to the HIE's diverse set of reporting-related features. Vendor relationships exist with Archimedes, Cerner, Covisint, MedUnison (Doc2Doc),

Microsoft Health Vault, and Verinovum, with future plans to incorporate technology from Direct Project. MyHealth manages vendors and delivery of technology projects under its Privacy Officer position to ensure that privacy, security, and other important data integrity requirements are monitored and maintained.

g. Marketing, Outreach, and Training

MyHealth operates a “train the trainer” model for aiding participants in adopting the technology. Additionally, MyHealth also offers web-based seminars and printed reference guides.

h. Certifications

MyHealth is deploying an ONC Stage 2-certified patient portal for use by its provider participants’ patients. MyHealth also plans to deploy an Oklahoma Bureau of Narcotics and Dangerous Drugs (OBND)-certified Prescription Drug Monitoring Program (PDMP) in the near future.

C. *Oklahoma State Department of Health*

Oklahoma’s state agencies handling health information have historically experienced challenges in sharing data across departments. To address this challenge, the Oklahoma Health and Human Services cabinet created the Deliverable Interoperable Components Utilizing Shared Services (DISCUSS) committee designed to collaboratively share resources among the Oklahoma Health and Human Services agencies for the development and implementation of shared information technology products, services, and technology frameworks. Membership of DISCUSS includes the Department of Health, Department of Human Services, Department of Mental Health and Substance Abuse Services, Department of Rehabilitation Services, and the Health Care Authority.

In 2015, DISCUSS members agreed to create a shared-services state agency HIE that would facilitate the sharing of the state’s data across agencies and would link the disparate systems. State health data has a number of factors that influence how and when it can be shared. For example, birth and death information and sensitive patient registries cannot be shared with a public exchange. Other data, however, would most certainly benefit from clinical integration. One example of such data is clinical data services provided by county health departments and labs.

A system for sharing data among agencies is anticipated to create benefits for private entities in Oklahoma as well. For example, hospitals are required by law to report patient discharges to several agencies. Integration could mean that only one data feed would need to be sent to the state.

Due to the sensitive nature of part of the state’s health data, state ownership of the data asset was deemed by DISCUSS to be imperative for patient privacy. The vision for interstate agency information sharing is to develop an MPI that identifies when disparate records are associated with the same person, and to allow access to consolidated information via a secure portal.

Orion Health was recently selected as the technology vendor to support this effort; the implementation effort is expected to take approximately two years. Once fully functional, this data warehouse is intended to integrate state agency data, reducing costs and increasing the effectiveness

of state agency programs, as well as to simplify the reporting burden for hospitals and providers. The HIE could be connected via a network of exchanges or federated connections to other state healthcare organizations to share certain, limited data while benefiting from up-to-date information on critical diagnoses for state registries.

Through DISCUSS, the state is moving quickly to address a known gap in its data sharing capabilities. When the HIE is functional, it will serve a key role in serving Oklahoma's health information sharing needs.

D. Other Oklahoma Data Sharing Initiatives

Investments in developing shared databases and reporting interfaces may be the most direct manifestation of HIE initiatives in Oklahoma, but two other forces will begin to influence the market and shape Oklahoma's HIT landscape: (1) EHR interoperability development, and (2) a growing initiative to connect existing HIEs.

1. EHR Interoperability

Federal incentive programs such as Meaningful Use, have been a major driver of HIT investment. Meaningful Use participants must attest that they meet the requirements for each Meaningful Use stage in order to continue to receive EHR incentive program funds. Meaningful Use Stage 2 emphasizes interoperability. As providers prepare for Stage 2 attestation, many EHR vendors are investing significant time and energy to help them achieve their goal because so many of the Stage 2 objectives and measures require demonstrated adoption of the technology capabilities in the vendor systems.

ONC reports that there have been substantially fewer vendors requesting ONC Stage 2 certification thus far compared to Stage 1 requests. Two factors appear to be driving this decrease in applications for certification: developing the capability to meet Stage 2 requirements is technically challenging, and many of the early EHR companies are being acquired or going out of business as the market matures.

While sharing information among different EHR platforms has been a challenge, substantial progress has been made in sharing clinical records across installations of the same EHR system. Large care delivery systems make frequent use of this capability in instances where there are multiple discrete installations of the EHR across practices. This technology enables the patient's chart to "follow" them throughout the organization.

The current state of EHR interoperability has two general shortcomings. First, if a patient receives care at a hospital or clinic that is not part of the delivery system, there is no way to automatically incorporate data from that visit into the patient's primary chart. Second, EHRs do not typically consolidate patient information into a single view. This condition requires providers to open each location's record independently. Lack of a consolidated patient view severely limits the practical use of EHR interoperability technology in a patient visit. This is primarily due to the amount of time needed to completely review a record and the number of visits per day in a typical provider's schedule.

Most EHR interoperability is not yet mature enough that regular and effective usage in care delivery settings is actively occurring. However, the attention of EHR vendors to this capability suggests that, in the future, a more user-friendly application of this technology will be available.

2. Network of Networks

HIEs are most effective when the number of locations and patients covered by the system is maximized. In Oklahoma, this currently means stakeholders must either choose the information contained in a single HIE or pay increased costs to subscribe to both. Significant time, money, and effort goes into developing and connecting EHRs to an HIE, and the multi-year subscription agreements that most vendors require are evidence of this fact. The cost of switching HIEs is high.

Oklahoma's present HIE and information-sharing initiatives are regionally based, despite Coordinated Care's and MyHealth's continued expansion across the state. An initiative is underway to increase connectivity and health information sharing between Oklahoma's existing HIEs. Coordinated Care and MyHealth are exploring the option of joining an existing network of networks through an organization called eHealth Exchange, the largest HIE network in the country.

eHealth Exchange is a nationwide "network of networks" that has established a standard legal framework and technical specifications to allow member organizations to more easily establish federated connections to one another. Federated connections through an established third party have an advantage in that there is no need to invent or define the sharing interface. Current eHealth Exchange board members include organizations such as Epic, Kaiser Permanente, the American Medical Association, Workgroup for Electronic Data Interchange (WEDI), and the Healthcare Information and Management Systems Society (HIMSS), among others. Participants include federal agencies, states, Beacon communities, and health systems. Establishing connections to such a network would make Coordinated Care and MyHealth interoperable not only within the state of Oklahoma, but nationally with any other eHealth Exchange participant, once the connections are built.

All individuals interviewed by Milliman during this engagement expressed interest in connecting the existing HIEs and establishing a "network of networks." This approach is not without risks, however. Introducing an external third party as the critical connection point to Oklahoma's cross-system interoperability solution is a potential risk should eHealth Exchange's system ever fail. Healthcare data shared across eHealth Exchange will be limited to point-of-care clinical information, because the federated connection inhibits use of analytics or aggregation of information for reporting purposes.

Both EHR interoperability advances and initiatives to connect Oklahoma's HIEs to a "network of networks" advance the cause of healthcare information sharing throughout the state despite some potential drawbacks. These are positive developments in the HIT landscape for Oklahoma.

V. Current Environment

To understand perspectives and considerations regarding potential avenues to connect Oklahoma's health information, it is necessary to also understand the healthcare environment within the state. Milliman's findings about several key stakeholder groups are described in this section.

A. Reasons to Share Data

OSDH was interested in learning why organizations in Oklahoma are sharing healthcare data. Interview participants expressed a variety of motivations for exchanging healthcare information, including developing a more complete patient record, reducing duplicative testing, measuring clinical outcomes in pay for performance measurement, and an increased ability to manage patient populations in need of assistance, for example those with chronic conditions.

One major challenge facing the U.S. healthcare system today is that when a patient receives healthcare outside of a single "primary" care delivery system (such as receiving care at a hospital or clinic that is under different ownership), critical information about vital statistics, tests conducted, test results, diagnosis, and medications prescribed are not available to the patients' primary providers. Sharing critical clinical information at critical points (e.g., when a patient is hospitalized, transferred to a long-term care facility, or is being seen for a routine visit) can significantly influence both the cost and effectiveness of care.

By connecting clinical information across disparate delivery systems, participating providers are able to construct a longitudinal view of a patient's care that can improve decision making at the point of care, reduce readmission rates, reduce expensive duplicative testing, and enable population management programs that allow effective outreach and intervention to patients who are the most at-risk for major medical events.

The integration of claims and clinical data was important to a number of the interviewees. Many payer organizations try to align providers' financial incentives with providing treatment that keeps patients healthier and reduces billable events through pay-for-performance quality programs. One challenge with these programs is using a standard methodology to evaluate performance. Payers measure activity based on claims data, and providers measure it based on clinical information. Applying the same measures to these different data sets can yield conflicting accounts of performance. Utilizing a trusted third party to match claims and clinical data and report performance can improve both payers' and providers' abilities to trust the fidelity of the performance measure outcomes.

B. Data Sharing Concerns

OSDH also wanted to understand interviewees' concerns regarding sharing health information and related data. Interview respondents actually expressed few overt concerns about sharing healthcare data in a controlled and secure manner.

Oklahoma uses an opt-out model for patient permissions, meaning that most organizations will inform patients that their data will be shared unless patients specifically ask for their information to be

excluded. Interviewees seemed comfortable with this model, and several individuals offered evidence that the vast majority of patients will consent to having their information shared if the purpose and manner in which it is shared is described to them.

Data sharing concerns were expressed by stakeholders representing smaller provider groups. While these stakeholders support the value of sharing data, their concerns related to the cost to connect to an HIE and the ongoing subscription fees. Of note, EHR vendors can charge fees to enable the technology that integrates single sign-on capabilities or to provide extracts to an HIE if the provider group's EHR is hosted by the vendor. The combination of these charges was reported to have the potential to double the initial connection costs of joining an HIE.

Nationally, concerns commonly expressed in states with HIE efforts similar to Oklahoma's include fears that information sharing increases the likelihood of a Health Insurance Portability and Accountability Act (HIPAA) compliance breach, challenges to opt-out models due to potential patient and/or provider privacy concerns, data security concerns, lack of trust in partnering organizations leading to low participation rates, and antitrust concerns related to the use of data to make contracting or purchasing decisions.

As Oklahoma's efforts to connect its healthcare ecosystem become more widely publicized, it is possible that concerns raised in other states will also be raised in Oklahoma.

C. Provider Environment

Oklahoma has a varied and complex healthcare provider environment, due to its unique population distribution, business environment, and special constituencies within the state, such as Native American tribal nations.

Oklahoma City and Tulsa both have well established, mature healthcare delivery organizations that invest in HIT. Due to the size and complexity of these healthcare organizations, many are making internal investments in population health management analytics tools. A limitation of these efforts is that these tools can only analyze data the systems can access, primarily for care provided within their clinics and facilities. This creates an incentive for these groups to share data outside of their organizations.

During the interview process, we also learned that many providers and critical access hospitals in rural Oklahoma are choosing to affiliate with, or being acquired by, larger care delivery organizations. This aggregation can help these rural providers afford HIE connections and other HIT that might otherwise be beyond their reach.

Oklahoma is home to 38 Native American tribal nations, 36 of which are federally recognized. Each one is a completely autonomous nation responsible for making decisions about the healthcare of their members. Indian Health Services (IHS) is a federal agency within the U.S. Department of Health and Human Services responsible for providing federal health services to Native Americans. This agency provides infrastructure and support to Oklahoma's tribal nations, though the individual nations

operate independent health services, and these services are not broadly interoperable. IHS has initiated a data warehousing project that will enable some data sharing across health services organizations, but the warehouse is not yet distributing any information to the tribes.

D. Payer Environment

Oklahoma's health insurance market is relatively consolidated. Commercial payers are typically large, well-funded, and able to make investments in HIT to support corporate priorities.

According to the *Oklahoma Insurance Market Analysis* report, published by Milliman in August 2015, 49% of Oklahoma's population is covered by commercial insurance through an employer or other private insurer. Another 21% is covered by Medicaid, and 14% by Medicare, and 2% through other public sources. Approximately 14% of the state is uninsured. Oklahoma has generally higher rates of government-subsidized insurance and uninsured compared to other states.

Interviewees reported that managed care arrangements that use incentive payments to providers for performance based on agreed-upon quality measures are becoming more prevalent in Oklahoma. They cited a belief that a key element for success in these types of arrangements is using a trusted third party to measure performance, without which disagreements on the validity of results published by either the payer or provider group can be common and disruptive to meeting the overarching program goals.

Blue Cross and Blue Shield of Oklahoma has signed a participation agreement with MyHealth to send regular extracts of claims data to the HIE for the purposes of measuring pay-for-performance outcomes in its provider network. As a contracting prerequisite, network providers are required to be actively participating with MyHealth to ensure uniformity and thoroughness of reporting. This collaboration highlights the value that external repositories, such as HIEs, can bring to such programs.

Engaging payer organizations in the process of exchanging health information will be important as these organizations represent a large and consolidated stakeholder group within the state. The importance of payer engagement and participation will increase, as will their incentives to partner with HIEs and providers to improve the health of Oklahomans and reduce the overall cost of care.

VI. Statewide Interoperable Health Information Network Options

Oklahoma intends to develop a statewide interoperable health information network to further its goals as part of the Healthy Oklahoma 2020 plan. There is a range of options to achieve this goal. To ensure that an appropriate option is selected, a number of important considerations must be evaluated. In this section, we discuss these options and considerations for the development of a statewide interoperable health information network.

A. *Intended Use*

The single most important consideration for Oklahoma when determining how to establish an interoperable health information network across the state is what uses the system should support. No other consideration is likely to have as much bearing on the system's technical design and viability. The database architecture, data model, and supplementary reporting and analytics are all a derivative of the intended use. Three general scenarios for using Oklahoma's health information network exist:

1. Point-of-care support
2. Clinical decision support
3. Claims/clinical analytics support

Each scenario includes the functional capabilities of the one preceding it. For example, an HIE that passes enough information to provide clinical decision support would also provide point-of-care support for its users. These capabilities are discussed in detail below.

1. Point-of-Care Support

In the point-of-care support scenario, information is exchanged among clinical locations for use in the patient visit. The transmitted data must include basic demographic information for patient matching and relevant clinical information, such as that which is found in a CCD.

Using an HIE in this manner has the potential to improve the quality of care. Better patient outcomes may be achieved by reducing errors and providing a more informed treatment plan. Combined clinical information can improve decisions made in-visit about testing, diagnosis, and treatment. This type of interchange can also be augmented with value-added services. Imaging and lab results are frequently shared, and some HIEs are incorporating additional data elements (e.g., advanced directives).

2. Clinical Decision Support

In a clinical decision support role, HIEs aggregate patient information for reporting. This reporting typically takes two forms: "within-visit" analytics to identify risk factors and potential testing needs at the time of care, and population-level analytics independent of a single patient visit to assist with population management. Using an HIE to assist with clinical decision support typically aggregates a patient's information from all locations within the HIE.

Population management reporting aggregates clinical information about all patients from all locations within the HIE for a specific parameter, such as a disease (e.g., diabetes, chronic heart failure), to aid

in the identification of patients who are not currently being seen, proactively identifying those who are overdue for testing or who have a combination of factors that put them at-risk for a major medical event. This analysis enables the healthcare organization to reach out to the identified patients in an attempt to educate and/or provide them the needed care.

MyHealth's and Coordinated Care's tools (e.g., patient disease registries, emergency department utilization reports, and use of condition management analytics and reporting to identify high-risk patients and suggest high-value treatments) are examples of system use under this scenario. When carefully conducted and clearly presented, the results of analytics have the advantage of drawing the provider's attention to areas of interest for a given patient that might otherwise be overlooked in a visit, such as an overdue health screening or monitoring test.

3. Claims/Clinical Analytics Support

Using data in this manner for analytics typically combines information from payers and providers to evaluate care outcomes based on the entirety of a patient's clinical care. There are generally two progressive stages to a claims/clinical analytics. The first stage is a shared measurement framework in which performance is measured by one entity that all parties agree is the "trusted source." The second stage is to pair the combined claims and clinical data with cost information to draw conclusions about care outcomes and treatment protocol value, given the cost of providing these services.

Blue Cross and Blue Shield of Oklahoma's partnership with MyHealth to analyze and report on pay-for-performance measures for its network of providers is an example of the first stage in value-based assessment of care, establishing a trusted measurement framework. We note that, as of today, no cost data has been integrated into an HIE in Oklahoma; this exercise is more typically conducted in a framework referred to as an "all-payer claims database" or "value-based analytics database."

B. Governance Model

Governance refers to the process for developing the guidelines and rules for oversight and management of an organization or function. Throughout Milliman's interviews, participants stated that they had considered governance, a stance on information privacy, and information safeguards as much as an HIE's technical capabilities before agreeing to join or participate in a specific HIE. Ultimately, they viewed their decisions as an exercise in trust in the HIE and its leadership.

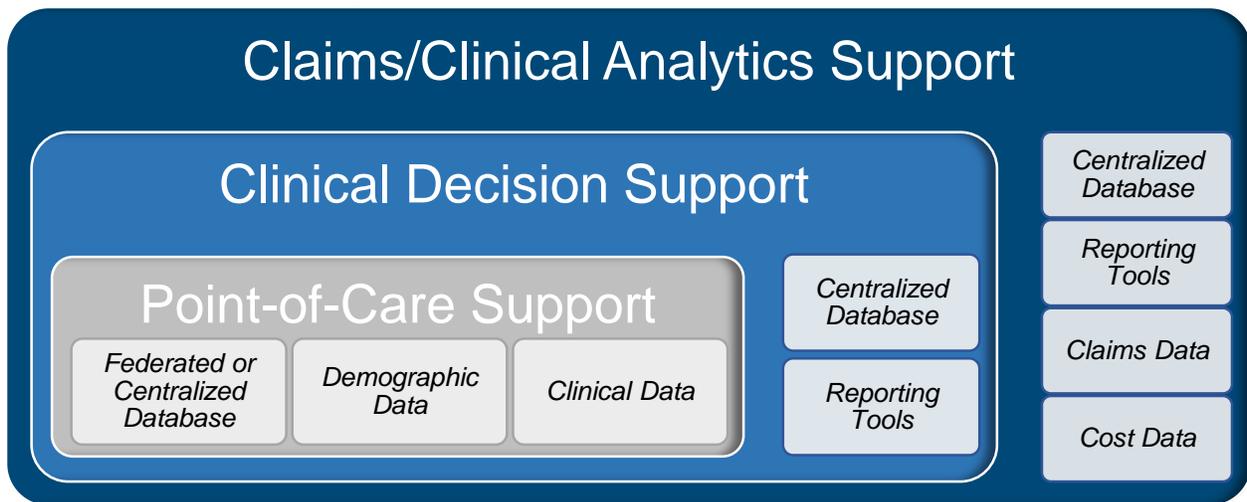
Experience gained from other HIE initiatives nationally suggests that agreeing upon or legislating what information is shared, and when and to whom it is accessible are key determinants for the utility of an exchange or network of exchanges. Important decisions that need to be made about the exchange's governance structure should include how the exchange is funded, who operates it, who owns it, and whether participation will be optional or required for healthcare organizations in the state.

Whether participation is optional or mandatory is an especially important consideration, as HIEs are most effective when they include a patient’s entire healthcare footprint. The state will need to weigh the potential reporting, information security, and trust burden for organizations and individuals against the utility gained by having connections among all providers throughout the state for the sake of improving the health of the population.

C. Database Design and Data Model

The initial system architecture of a health information network for Oklahoma will have long lasting impacts. While technology can be upgraded and redeployed, doing so is a costly and time-intensive endeavor, made more complex as the number of stakeholders increases. The intended system use may dictate the database design, but system design options do exist. Additional layers of data and system capabilities can be developed over time, as shown in “Table 3: Use Case Technical Requirements.”

Table 3: Use Case Technical Requirements



An overview of technical requirements for each of the use cases is provided below.

1. Point-of- Care Support

For point-of-care support, either a centralized database or federated database architecture, may be used to transmit data. Successful HIEs exist under both centralized and federated database structures, both within the state and across the country. Consideration must be paid to any other intended uses of the system. Federated databases cannot effectively aggregate and report information, so they are primarily used to support point-of-care initiatives.

Both existing HIEs identify shared patient records by using basic demographic information to construct an MPI. Once a clinical record match has been established, the network allows access to relevant clinical data about a patient. Typical HIE data elements under this model include demographics, encounters, problem lists, medications, images, lab results, and diagnoses.

2. Clinical Decision Support

The principal distinction between HIEs used for clinical decision support and point-of-care reporting is the requirement of a centralized database and the need to have a reporting interface and analytic logic built. Clinical decision support uses the same types of information found in a point-of-care application. Clinical decision support adds reporting capabilities that look at the contents of the database in various ways to aid in the treatment of patients.

The capabilities of a centralized database are more robust than in a federated model, as reporting on any type of information stored in the database is possible. One trade-off can be system complexity and increased support costs.

3. Claims/Analytics Support

When using a health information network for claims analytics support, a centralized database must house clinical and claims data, which is then used to match patients via an MPI. Clinical information is then aggregated and quality measures are presented to the user through reporting tools. If the system is being utilized to derive value-based reports, cost data is attached to the quality measurements.

Careful consideration of the processes Oklahoma’s statewide health information network should support at the beginning of formulating the HIE strategy has the potential to save substantial time and money. It can be challenging to decide on system capabilities, define what data elements will be collected, and select the format for data transfers to and from the HIE. However, it is Milliman’s observation that making these determinations before proceeding with work to build the system can decrease the overall cost of the HIE by eliminating rework due to reconsideration of the options.

D. Statewide Health Information Network Options

Oklahoma has several potential options that could result in achieving the goal of a statewide interoperable health information network. Those options are to develop and connect existing exchanges, choose an existing HIE, or construct a state-sponsored HIE. Each has potential advantages and considerations, as summarized in “Table 4: Health Information Network Options” below.

Table 4: Health Information Network Options

Option 1: Network of Exchanges	Option 2: Existing HIE	Option 3: State Sponsored HIE
<ul style="list-style-type: none"> • Least robust statewide capability • Moderate response to market needs; maximum stakeholder input • Moderate time to market 	<ul style="list-style-type: none"> • Adoption of existing capability • Responsive to market needs; moderate stakeholder input • Shortest time to market 	<ul style="list-style-type: none"> • Ability to customize statewide capability • Slower response to market needs • Longest time to market

1. Option 1: “Network of Exchanges”

Oklahoma’s free market is currently moving toward a federated network of exchanges through eHealth Exchange. Such an arrangement would support the sharing of core clinical and demographic data for point-of-care use. Because participation is voluntary, this approach has the advantage of not unduly disrupting business processes within the state, and integration can be done gradually as it makes sense for HIEs to join. This solution would likely require a moderate timeframe to implement. Coordinated Care has passed eHealth Exchange’s evaluation process and has established connections to other entities. MyHealth is in the process of undergoing evaluation by eHealth Exchange. This progress represents a potential existing path to establishing a network of exchanges throughout the state.

As connections to the network of exchanges are federated, data passed through eHealth Exchange cannot easily be used for analytics, population management, or value-based purchasing decisions. The voluntary nature of participation means that connections will undoubtedly be established on uncertain timeframes.

Current members of an HIE would still have the benefit of the features offered by their HIE, but data passed into the HIE system from eHealth Exchange would be limited in its usability for analytics as it would only represent patients that have been previously accessed by an HIE user and thus could be out of date. For healthcare organizations that value analytics and reporting, this option may be less desirable as it does not meaningfully expand the capability to manage patient populations. Thought must also be given to the fact that rural and small independent providers may require a subsidy to afford the costs of HIE membership.

An additional consideration is that eHealth Exchange would represent a critical node in Oklahoma’s healthcare information network and, as such, could be a potential failure point that could disconnect the state should eHealth Exchange lose funding, suffer technical challenges, or shift strategic direction. Re-establishing existing connections among organizations would be relatively simple, as the technical infrastructure would persist, but further network growth would be inhibited. While this risk is similar for any “single solution” that spans the state, every additional node adds incrementally more complexity and risk.

2. Option 2: Existing HIE

Oklahoma could select one of the two HIEs already existing in the state as the statewide information network. This would remedy a number of the drawbacks of Option 1. The overall setup time for connecting the state should be reduced, as participants would need to map their data to a single entity and that entity would not need to do any further transformation or data exchange with a third party. If the selected HIE meets Oklahoma’s desired use case(s), no further development would be required and the state would benefit from a pre-built, tested, and functional set of system features. Such a solution has the advantage of requiring no time to develop the cross-state information exchange capability, as each participating location would need to establish a connection to the designated HIE.

Attention must be paid to the fact that rural and small independent providers may require a subsidy to afford the costs of even a single HIE. Furthermore, this approach could disrupt Oklahoma's business environment by creating a potential "winner" through direct state action and decreased competition. This may slow competitive innovation within the state related to HIEs and force stakeholders onto a single model of governance, which could reduce trust and thus participation. The drawbacks of this must be weighed against the benefits of a uniform and expeditious solution for the state.

3. Option 3: State-Sponsored HIE

Oklahoma could choose to invest in a state-sponsored HIE. Oklahoma has already declared the intent to develop a shared-services state agency HIE under OSDH, which could be expanded for this purpose, or Oklahoma could construct another HIE. In either case, state sponsorship would let the state provide a uniform experience and functionality suite that exactly matches the desired system capabilities. As a state-sponsored solution, discretion around the funding and fee structure could enable rural and small provider groups to afford potential fees for connections.

The complexity and cost of creating an HIE should not be underestimated. Development of such a software solution is certain to be a long, challenging process that could delay information access across the state. Furthermore, current HIE participants may let their membership in private HIEs expire in order to prioritize the state's efforts.

Summary

Oklahoma has a moderately mature private sector HIT infrastructure already developed and operating within the state. Stakeholders are aware of the benefits of sharing healthcare data and are interested in participating in the process of establishing a statewide network.

Market forces have led to the establishment of two HIEs, with work underway on a potential third state-sponsored model. Similar goals drive each of the health information sharing efforts in the state; however, the system construct, contents, and utility vary, as each organization has a different view of how best to achieve its goals. Maturing EHR system capabilities will support basic data exchange in the future, but investment in healthcare information exchanges and cross-network data sharing initiatives will be necessary for Oklahoma to improve the health of its citizens at the desired rate.

Ultimately, statewide healthcare data exchange is a requirement for achieving the vision laid out in the Healthy Oklahoma 2020 plan. Current health information technology is mature enough to provide the technical foundation necessary for data exchange. Stakeholders are ready to be a part of the process. Oklahoma has created a framework to make decisions about how best to achieve its goals.

Careful consideration of the many options is needed for Oklahoma to make cost- and capability-conscious decisions on how to proceed. These decisions are difficult, yet critical to support improved health for Oklahomans today and into the future.