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## Michigan Health Information Network (MiHIN) Shared Services vs. the HIE Shared Services in Other States

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**Abstract:** This paper explores selected states health information exchanges in regards to how they are implemented and used. Health information exchanges are broken down and a concise background is given for a better understanding of how states are implementing their health information exchanges. This paper not only examines states use of their health information exchange, but how they will connect to create a nationwide health information network.

### INTRODUCTION

There are many different HIEs currently being implemented across the country in many different states. We will look at the similarities and differences of these, as well as explain how each one functions. Most states offer the same or similar core services, however some states offer more advanced services than others. The main goal is to eventually create a system of interoperability between all of these individual state's HIEs to lead to the creation of one Nationwide Health Information Exchange.

### History

The ultimate goal of the health information exchange (HIE) is to have a national network that enables the sharing of a patient's electronic health records (EHRs) from anywhere across the country. The exchange of data on this health information network (HIN) would drastically improve the quality of healthcare in our country by making important medical records available in real-time whenever they are needed.

The history of HIN dates all the way back to 1990, when the Hartford Foundation gave out several grants to different cities for the purpose of building what they called a, "community health management information system." This was the first major attempt to create a system that exchanges health information electronically (NORC at the University of Chicago, 2011).

None of these systems ultimately survived, primarily due to the lack of affordable and effective technology. Also once the grant money ran out it was difficult to find funding because it was not clear who should pay for it and that the return on investment was minimal.

During the mid-1990s another form of HIE was created—Community Health Information Networks or CHINs. Whereas the efforts in 1990 were grant funded, CHINs were mainly commercial efforts primarily aimed at reducing costs by sharing data. However most of these CHINs failed, largely because of the same problems faced in 1990.

In the early 2000's a new type of HIE organization began to arise. These organizations, called Regional Health Information Organizations (RHIOs) were local third-party organizations that facilitated the information exchange between providers within a small geographical area. The RHIO was an attempt to achieve more efficient and effective healthcare. RHIOs continue to develop to this day.

In 2004, the Department of Health and Human Services began developing the National Health Information Network. In 2009 the Health Information Technology for Economic and Clinical Health Act, or HITECH Act was passed. The HITECH Act incentivized the use of EHR systems. In order to get bonuses from Medicare or Medicaid, doctors, hospitals, or other providers must be able to exchange EHRs with each other.

## **FUNCTIONS AND DEFINITIONS OF THE HEALTH INFORMATION NETWORK**

The electronic movement, transfer, and sharing of health-related information is a set of national standards known as the Health Information Exchange (HIE). This allows for medical information to be shared and accessed from a secure electronic system eliminating the need for a paper-based system. HIE is a network exchange system that works to exchange a patient's critical information while keeping records up-to-date.

There are three forms of electronic medical records in place today, an Electronic Medical Record (EMR), Electronic Health Record (EHR), and a Personal Health Record (PHR). An EMR is a patient's information within one organization. For example, if a person was admitted to Bronson Hospital, all of Bronson's locations and entities would have access to that patient's EMR. It would be full of all the information collected on that specific person and only shared within Bronson.

Personal Health Records (PHR) allow an individual to share, update, and control their information. However, all information conforms to nationally recognized interoperability standards. This method will be least implemented. If patient's have access to their information, not all information could be correct and the chance of bad or incomplete information is higher.

The most important electronic record, and the most used throughout all HIE's is the Electronic Health Record (EHR). An EHR can be defined as "any information relating to the past, present or future physical/mental health, or condition of an individual which resides in electronic system(s) used to capture, transmit, receive, store, retrieve, link and manipulate multimedia data for the primary purpose of providing health care and health-related services." This allows for patients information to be accurate and up-to-date. Patients will not have to repeat information for new doctors or forget an important factor that is related to their health. The time to retrieve a patient's record is diminished because a hard copy is not required. All of a patients information can be accessed, analyzed, and updated (if needed) to help formulate the patients diagnosis. An EHR is an important step and crucial element in creating a Health Information Exchange Network (HIEN).

### **Data Exchanged through HIE's**

Multiple information can and will be exchanged through an HIE. Some of the most prominent data exchanged will be laboratory and radiology results, as well as patient care summaries and prescription information. Other networks within the HIE include data from emergency departments, claims and insurance information, inpatient discharge summary, and pathology among others.

### **Benefits of HIE**

Implementing an HIE has many benefits but the main ones are:

- Improved Speed
- Enhanced Quality
- Improved Safety
- Reducing Cost of Patient Care
- Greatly improved completeness of patients records

Physicians will have the ability to instantly find, view, edit, and share medical information. Access will be granted to physicians from local, state, and regional governments as well as organizations such as the Centers for Disease Control (CDC) and other federal agencies.

## **Value of HIE**

The most valuable asset of implementing a health information exchange network is the standardization of data. Once standardized, the data transferred within the HIE can seamlessly be integrated into a patient's EHR, thus allowing for improved patient care. Electronic signatures will be implemented. All information within an HIE organizes data from multiple sources and brings it into one standardized set of information.

## **Users of HIE**

Physicians will be the primary users of a Health Information Exchange Network and electronic health records. Nurses, pharmacists and other healthcare providers will be able to access patient information from the local, regional, state, and/or the nationwide health information exchange network. Patients, if granted permission by the HIE within the area, will be able to update and edit their information through their personal health record (PHR).

## **THREE KEY FORMS OF HIE**

It is important to know the different ways in which information can be exchanged throughout an HIE. The three key forms are direct exchange, query-based exchange, and a consumer mediated exchange.

### **Direct Exchange**

“Directed exchange gives health care providers the ability to electronically send and receive secure information – such as such as laboratory orders and results, patient referrals, or discharge summaries – to other health care providers involved in a patient's care over the Internet via encrypted, secure, and reliable messaging” (The 3 Key Forms of Health Information Exchange, 2013).

“Directed exchange is used by providers to easily and securely send patient information—such as laboratory orders and results, patient referrals, or discharge summaries—directly to another health care professional. This information is sent over the internet in an encrypted, secure, and reliable way among health care professionals who already know and trust each other, and is commonly compared to sending a secured email. This form of information exchange enables coordinated care, benefitting both providers and patients. For example, a primary care provider can directly send electronic care summaries that include medications, problems, and lab results to a specialist when referring their patients. This information helps to inform the visit and prevents the duplication of tests, redundant collection of information from the patient, wasted visits, and medication errors.

Directed exchange is also being used for sending immunization data to public health organizations or to report quality measures to The Centers for Medicare & Medicaid Services (CMS)” (What is HIE?, 2013).

### **Query-based Exchange**

Query-based exchange gives health care providers the ability to find and/or request information on a patient from other providers and is often used for unplanned/emergency care.” (The 3 Key Forms of Health Information Exchange, 2013).

“Query-based exchange is used by providers to search and discover accessible clinical sources on a patient. This type of exchange is often used when delivering unplanned care. For example:

- Emergency room physicians who can utilize query-based exchange to access patient information—such as medications, recent radiology images, and problem lists—might adjust treatment plans to avoid adverse medication reactions or duplicative testing.
- If a pregnant patient goes to the hospital, query-based exchange can assist a provider in obtaining her pregnancy care record, allowing them to make safer decisions about the care of the patient and her unborn baby.”(What is HIE?, 2013).

## Consumer Mediated Exchange

“Consumer Mediated Exchange gives patients the ability to aggregate and manage their health information on the Internet. When in control of their own health information, patients can help transfer information between providers, correct inaccurate demographic, medical, or billing information, and track and monitor their own health” (The 3 Key Forms of Health Information Exchange, 2013).

“Consumer-mediated exchange provides patients with access to their health information, allowing them to manage their health care online in a similar fashion to how they might manage their finances through online banking. When in control of their own health information, patients can actively participate in their care coordination by:

- Providing other providers with their health information
- Identifying and correcting wrong or missing health information
- Identifying and correcting incorrect billing information
- Tracking and monitoring their own health” (What is HIE?, 2013).

## FUNCTIONS OF ELECTRONIC HEALTH RECORDS (EHR)

Electronic health records are important because they provide access to complete, up-to-date records of past and present conditions which improves patient health, quality of care, and patient safety. This is essential when EHRs are created so that they effectively communicate with each other and providers can have the latest information readily available.

### Workflow of an Electronic Health Record

The picture below, Figure 1, shows a typical workflow of an electronic health record. When a patient schedules an appointment, it is entered into the computer. The patient will then update their health history, contact, and insurance information on a computer or tablet. This information is integrated with their EHR. When visiting the physician, the physician will access the patient’s information on the computer or tablet and enter the necessary data. If lab results are needed, the data will be sent to the lab electronically. This information will be uploaded into the patient’s EHR when complete.

### Core Functions

An electronic Health Record (EHR) is concerned with “not just the data that is stored electronically, but what can be done with it, or its functional benefits. According to the Institute of Medicine, EHRs have eight core functions.

1. Health information and data
2. Result management
3. Order management
4. Decision support
5. Electronic communication and connectivity
6. Patient support
7. Administrative processes and reporting
8. Reporting and population health

The Computer-Based Patient Record Institute (CPRI) has three key criteria when dealing with EHRs. This provides for a better understanding and universal use of EHRs.

1. Capture data at the point of care
2. Integrate data from multiple sources
3. Provide decision support

## Adoption

EHR Adoption is not only a new requirement by the United States government, but there are social forces driving adoption as well. Some of the social forces include, health and safety concerns, health care costs, and an increasing mobile and connected society via the web. When dealing with health and safety concerns, electronic health records can “improve access to a patient’s medical information, helping to reduce preventable medical errors. EHR provides access to complete, current records of past and present conditions, improving patient health, quality of care, patient safety, thereby helping to reduce costs. Today, patients typically move or change doctors more and see multiple specialists; EHR improves continuity of care by allowing practitioners to share exam records, test results” (Gartee, 2011).

## BENEFITS OF ELECTRONIC HEALTH RECORDS (EHR)

### Health Maintenance

“Health maintenance improves patient health through prevention and disease management, includes immunizations, patient education, counseling, and screening, and analyzes data to identify patient eligibility for clinical trials or chronic disease management” (Gartee, 2011).

### Trend Analysis

Trend analysis is another useful benefit of using an EHR and can present the user with a wide range of information regarding a patient’s record. Clinicians can compare data extracted from patient’s record while allowing the provider to spot trends in the patient’s health record. An analysis can show test results (typically in real time) and vital signs from all visits. Some examples of current trend analyses are growth charts, flow sheets, graphs, and cumulative summary reports.

### Alerts

Alerts are great ways to help avoid mistakes and provide a patient with accurate care. Alerts can appear automatically, alerting the physician of a special situation. Some examples of alerts are listed below.

- Drug Utilization Review (DUR). Figure 4.
- Prescribed drug is checked against the patient medication list.
- Ingredients of prescribed drug are checked against ingredients of current medication.
- Duplicate therapy: Different drugs of the same class.
- Food and drug allergies.
- Some drugs cannot be given to patients with certain condition: patient’s diagnosis history is checked. For example, many people with asthma have sensitivities to certain drugs that can precipitate an asthma attack.
- Drug might be affected by certain foods or alcohol interactions; Patient education chart is created.
- Recommended guideline for the use of drug: Too much, too little, too many days, too many refills could cause overdosing, under dosing, or abuse.
- Formulary alerts
  - Preferred drugs
  - Non-preferred drugs
  - Non-covered drugs
    - Lab
    - Insurance alerts.

- This alert shows that the patient is not covered to have a certain procedure done and/or a drug is not covered under their program. The patient would need to sign a form relaying this information. The form can then be printed or electronically sent to the patient for them to fill out and return.

## **Decision Support**

Provides access to relevant, evidence-based information including:

- Defined protocols (standards plan of therapy established for different conditions)
- Results of case studies
- Standard care guidelines
- Drug formularies
- Dosing guidelines

## **EXISTING MODELS AND PRACTICES OF HIE**

There are certain models that are followed by each state as they implement their HIE services. These models can be broken down into two categories. There are the governance models and the strategic and operational plan models. The governance models cover the roles for State Designated Entities driving the health information exchange within each state. The three governance models are centralized, hybrid, and decentralized. The strategic and operational plan models cover different approaches made by states to implement their health information network. The operational plan models are elevator, capacity-builder, orchestrator, and public utility.

### **Governance Models**

The first type of governance model is a centralized model. In a centralized model one SDE becomes the health information organization (HIO) for the entire state. This HIO is then connected to different regional health information organizations (RHIOs) throughout the state. The SDE is at the center of this model performing core services such as ePrescribing, delivery of lab results, and computerized physician order entry (CPOE). Advantages of a centralized model include a single user interface, a single consent model, and a single sustainability model.

The second type of governance model is a decentralized model. In this model the SDE acts as a facilitator. Its role here is to set policies and regulations while creating an environment for existing HIOs to connect with each other. In this model the SDE provides no core services for the HIE. Advantages of a decentralized model is leverage against existing HIEs, support for diverse communities, and minimization of privacy or liability issues.

The third type of governance model is a hybrid model. The hybrid model combines parts from both the centralized and decentralized models. In this model the SDE creates policies and is responsible for implementing the states HIE but not the HIO. Therefore it does not hold onto clinical data. The SDE's goal here is to create a system of interoperability between existing HIOs and hospital systems. In this model the SDE provides limited services such as master patient index, provider registry, and auditing services. Advantages of a hybrid model include leverage against existing HIEs and support for diverse communities.

### **Operational Models**

The first model for operational plans is the elevator model. In an elevator model, states have a focused effort to achieve interoperability so providers can meet stage 1 meaningful use. This is level of interoperability is done through the use of a directed exchange services. One risk of this model is not having a basis for a cost-effective approach to reaching stages 2 or 3 of meaningful use.

The second model for operational plans is the capacity-builder model. The main goal of this model is to strengthen existing sub-state exchanges financial support or incentives. For this to work, a state must already have in place multiple sub-nodes which cover a large portion of the state. Then, through the use of funding, they can cover gaps between nodes. The risk with this model is that you are dependent on sub-state nodes and must deal with a potential lack of coverage in the state.

The third model for operational plans is the orchestrator model. This model contains a state level network which facilitates HIE transactions across different sub-state exchanges to create a larger network. The goal here is to create statewide interoperability. The risk with this model is the same as the capacity-builder model. There is a dependency on the sub-state nodes already in place.

The fourth model for operational plans is the public utility model. The goal for this model is to provide a wide variety of HIE services directly to end-users. This model focuses on having the state entity being the center of HIE activities. The risk with this model is that there is a single point of failure at the state entity.

## **CURRENT STATUS OF MICHIGAN HEALTH INFORMATION NETWORK (MiHIN)**

The Michigan Health Information Network (MiHIN) Shared Services has come a long way since its creation in 2010. Currently there are seven sub-state Health Information Exchanges that will be linked through the MiHIN backbone. These seven HIEs will cover all of the approximately 29,000 active licensed physicians in Michigan. In addition to covering all physicians there are several areas that give physicians multiple choices between sub-state HIEs. The two largest of the seven HIEs are Southeast Michigan HIE and Michigan Health Connect. SEMHIE covers 51% of active Michigan physicians and Michigan Health Connect covers 45%.

The latest agreement in HIE advancement came between MiHIN Shared Services, DigiCert, and Nitor Group. This agreement means that Nitor Group will use DigiCert's federally bridged certificates for secure interstate sharing of electronic health information. This will provide Michigan residents a trusted way for their providers and insurers to exchange private medical records across state boundaries to wherever they may receive treatment. Using these new enhanced certificates allows all information to stay securely encrypted between providers in Michigan and in other states. It will shorten the times to receive electronic records while improving patient outcomes at a lower cost. This agreement will also serve as a model for other states that are trying to implement meaningful use stages of electronic health records.

As of May 26, 2011 all states have had their strategic and operational plans approved. There are currently seven trailblazer states whose goal is to support the alignment of state level HIT activities and to transform the health care delivery system. This will create models that other states can use during the implementation of their plans.

### **Michigan HIE Analysis**

Michigan has a rather unique approach for its governance model. This is because it focuses on a public/private partnership. For Michigan this partnership is between the Health Information Technology (HIT) Commission and the MiHIN Shared Services. In this model the HIT Commission is held responsible for setting statewide policies along with monitoring HIE implementation and overseeing ongoing HIE activities. The MiHIN Shared Services is responsible for implementing the statewide HIE infrastructure, developing financing strategies, and facilitating the operational plan implementation. This approach with two separate entities promotes efficient decision making along with a system of checks and balances.

The Michigan Shared Services Network is built for performance, security, and stability. This is by maintaining few direct connections and only routing traffic that must cross to different HIEs. This network implements four core services that support a vast majority of clinical use cases. These services include security framework, messaging services, subject discovery, and document querying. The security framework allows for authentication of systems and users along with implementing security policies for auditing purposes. The messaging services allow you to push messages from one node to another. The subject discovery service allows you to perform searches for patients



across different HIEs. Then there is the document querying service which allows you to lookup data in the form of documents stored in the Michigan Health Information Network.

The biggest concern as Michigan's HIE is put into place is interoperability. This means that clinical or administrative services and applications can be shared and accessed across different HIEs. This is something that starts out with the local sub-state HIEs but must extend to other states HIEs and then onto a Nationwide Health Information Network (NHIN). That is why it is so important that Michigan supports the NHIN core functions of security, subject discovery, document querying, and retrieving documents. This system of interoperability will allow Michigan to easily exchange data between other states and federal agencies.

The following figure compares some key components of the Michigan HIE compared to other states.

	MI	AL	AR	CO	CT	DE	FL	HI	ID	IL	IN	OH	MD	VT	SC	NM	TX
<b>STANDARDS</b>																	
NHIN Exchange Specifications		✓	✓	✓	✓	✓	✓		✓		✓	✓				✓	✓
NHIN CONNECT		✓		✓	✓	✓					✓	✓			✓	✓	✓
NHIN DIRECT		✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓		✓
Exchange with federal agencies or other states via Nationwide Health Information specifications	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓
<b>PUBLIC HEALTH</b>																	
Electronic lab reporting of notifiable conditions	✓		✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓
Syndromic Surveillance	✓	✓	✓		✓	✓	✓	✓				✓	✓	✓	✓	✓	✓
Immunization data to an immunization registry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
<b>PATIENT ENGAGEMENT</b>																	
Patient Access/PHR		✓			✓	✓	✓		✓			✓	✓		✓		
Patient Outreach		✓	✓	✓	✓	✓	✓		✓			✓	✓	✓	✓		
<b>PRIVACY AND SECURITY</b>																	
Privacy and Security Framework based on FIPS		✓	✓	✓			✓				✓	✓		✓	✓		
Authentication Services	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audit Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>ADMINISTRATIVE SIMPLIFICATION</b>																	
Electronic eligibility verification		✓	✓		✓	✓	✓		✓			✓	✓		✓	✓	
Electronic claims transactions		✓			✓	✓	✓		✓			✓	✓			✓	
<b>QUALITY IMPROVEMENT</b>																	
Care Coordination	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓
Quality Reporting	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓		✓
Behavioral Health Information Exchange			✓	✓	✓	✓	✓					✓			✓		
<b>LAB STRATEGY</b>																	
Translation Services	✓	✓		✓		✓	✓	✓	✓			✓	✓	✓		✓	
EHR interface	✓	✓		✓		✓	✓		✓		✓	✓	✓	✓	✓	✓	✓
Policy strategy	✓	✓		✓		✓		✓		✓	✓		✓	✓		✓	✓
Order Compendium				✓		✓								✓			
Bi-Directional		✓		✓	✓	✓			✓			✓	✓	✓	✓		
Alignment with CLIA				✓		✓	✓		✓			✓	✓		✓		
<b>E-PRESCRIBING</b>																	
Medication History	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		
Set goal for 100% participation				✓		✓	✓	✓				✓		✓	✓		
Controlled substance strategy		✓			✓	✓											
<b>CARE SUMMARIES</b>																	
Translation services		✓			✓	✓						✓	✓	✓	✓	✓	
CCD/CCR Repository		✓		✓	✓	✓	✓		✓		✓		✓	✓	✓		
<b>DIRECTORIES</b>																	
Provider Directory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Master Patient Index	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Record Locator Services	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓
Health Plan Directory					✓	✓						✓					
Directory of licensed clinical laboratories				✓	✓	✓	✓			✓	✓	✓		✓			

## CONCLUSION AND FURTHER STUDY

Overall, each state has its own way of implementing their Health Information Exchanges. Some states offer the same core services while others may offer more advanced services. In the end, the main goal is to create a system of interoperability between all the states for the creation of the Nationwide Health Information Network. Further study and resources are required to dig deeper into all fifty state's HIE implementation and analysis.

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