Making Sense of Health Information Exchange and How It Can Work for You

Mike Murphy
Director of HIE at Forward Advantage
# Table of Contents

**Introduction** .................................................................................................................. 3

**HIE Overview** .................................................................................................................. 4

What is HIE, and Why is Interoperability Important? ................................................. 4

History .................................................................................................................................. 5

Considerations as We Move Forward ............................................................................. 5

**HIE Sample Use Cases** ................................................................................................ 6

**Understanding Key Terms** ............................................................................................ 7

What is an RLS? ................................................................................................................... 7

Clinical Document Architecture ....................................................................................... 8

Basic Patient Privacy Consent (BPPC) ............................................................................. 8

**HIE Infrastructure Building Blocks** ................................................................................ 9

**Choosing an HIE Model that Works for You** ................................................................. 10

Technical Models .............................................................................................................. 10

The Direct Project .............................................................................................................. 13

Things to Consider ............................................................................................................. 13

**Overview of the IHE Framework** .................................................................................. 14

IHE Framework Profiles and Actors ................................................................................. 14

**The Importance of Data Aggregation** .......................................................................... 15

**Next Steps** .................................................................................................................... 15

**Final Thoughts** ............................................................................................................. 16

**About Forward Advantage** ............................................................................................. 17

**About the Author** ........................................................................................................... 17

**Addendum: Additional Terms and Definitions** ......................................................... 18
Introduction

Although Meaningful Use incentives are driving increased investment in health information technology, other factors are equally important. The healthcare reimbursement model is changing from fee-for-service to a value-based approach. As the healthcare delivery market evolves, it will be essential to efficiently and effectively manage patient care, utilization, and costs to ensure better outcomes and continued financial viability. The keys to success in this new environment will be getting timely information where it is needed and capturing data across the care continuum to better manage clinical, financial, and research operations. Organizations that are prepared for this new environment will fare better than others who are not. Health information exchange (HIE) on a practical level and access to timely information are necessary components for navigating the increasing complexity of value-based reimbursement.

Recognizing these complexities, Forward Advantage is publishing a series of three white papers designed to help its customers navigate the road to HIE. We hope you find this first edition useful, as it offers key insights into what organizations should know and be considering as they move forward.
HIE Overview

What is HIE, and Why is Interoperability Important?

HIE is both a noun and a verb, as it refers to the technical and operational infrastructure and the process of actually exchanging information. HIEs (the noun) are defined as networks of unaffiliated* hospitals, health systems, ambulatory entities, and/or other third parties that share/exchange patient data and other information. They can be formed at the community, regional, state, multi-state, national, and international levels. HIE (the verb) is the process of connecting and exchanging patient information between different care providers.

With increasing pressure to improve quality and reduce costs, it is critical to provide continuity of care across different settings: acute, ambulatory, emergent, long term care, and home care. Interoperability allows providers to focus on delivering patient care without having to navigate through multiple systems. This is because relevant information from diverse sources is made available to providers within their own native user interfaces and workflows. Other significant benefits of interoperability include the ability to provide longitudinal patient health information across the care continuum for: effective treatment, patient safety and reduction of medical errors, population health and chronic disease management.

* Affiliated entities are typically either considered IDNs or enterprise health information organizations.
History

During the past ten years, healthcare organizations have been increasingly exchanging information electronically to facilitate patient care. Initially, these efforts involved the exchange of discrete data using HL7 interfaces and standards. Examples include the distribution of laboratory test results and public health reporting. More recently, the focus has shifted to include continuity of care documents and images based on the HL7 CDA framework and DICOM standards. This is a function of both changing user requirements and the incentives included in the Meaningful Use program, which require information to be transmitted electronically for transitions of care between different care settings.

There has been significant growth in HIEs during the past five years driven by market, regulatory, and economic considerations. Key factors are:

- Unique Patient Identifiers with cross-referencing between participant organizations
- Contribution of patient health information for appropriate purposes
- Ability to share information from source systems when requested
- Record location and connectivity between sources and consumers of information
- Agreement on core policies and procedures
- Agreement on technical standards and system design
- Adherence to security and privacy regulations

Considerations as We Move Forward

The value of HIE cannot be defined solely in terms of benefits accrued to providers, payers, or any other single group but rather must be considered in terms of benefits to all participants in the healthcare system: patients, providers, payers, and communities. In general, the primary benefits are improvements in the continuity, quality and safety of patient care, and better management of costs. Most healthcare delivery patterns are local to a given community. Reinforcing local relationships between hospitals, physician practices, long-term care facilities and others will support better community care. In addition, it will enable local participants to control their own destiny without relying on the often uncertain plans and/or unfavorable policy decisions of state and regional level entities.

State HIEs as well as some regional HIEs will face substantial challenges with sustainability in the years ahead. To assure that specific strategies and organizational requirements are met, hospitals and providers will need to invest in local infrastructure to support effective health information exchange in their own communities.
HIE Sample Use Cases

There are a wide variety of use cases supported by health information exchange. These range from referrals and transfers of care to emergency department treatment and public health monitoring. Examples of these types of scenarios include:

**Medical Researchers**
Access to outcome data for treatment protocols and drug therapies across defined populations to evaluate efficacy and outcomes.

**ED Providers**
Access to current patient allergies, home medications, and conditions documented in ambulatory or outpatient records when patients present in the ED.

**Primary Care Providers**
Access to admission notifications and hospital discharge summaries, along with the ability to retrieve/view lab results in their EMR to provide high quality patient care.

**Specialists**
Access to current ambulatory and recent inpatient records streamlines the transition of care and ensures coordination with the ability to share treatment notes.

**Care Managers**
Access to diagnoses, recent lab results, and home health data for appropriate intervention and care management.

**Public Health Agencies**
Access to immunization records, reportable lab results, and syndromic surveillance information to monitor population health.

And many other possible use cases, including medication reconciliation across different care settings.
Understanding Key Terms

**What is an RLS?**

A Record Locator Service (RLS) provides the mechanism for healthcare providers to both submit and retrieve patient information on demand to facilitate the coordination of care. It provides a centralized registry of patient records spanning multiple decentralized entities. This allows healthcare professionals to find patient information quickly by providing pointers to the correct location. Typically, the RLS will correlate patient identifiers from multiple sources to streamline searches. It supports automated information exchange based on a query/response approach.

This model does not require explicit identification of end points in advance for information exchange, and it permits entities to be a Document Source of patient information as well as a Document Consumer. A key benefit of an RLS is that it provides a method for connecting participating providers without requiring multiple point-to-point interfaces. This is illustrated in the diagram below.

**Point-to-Point vs RLS**

![Diagram showing Point-to-Point vs RLS interactions](image-url)
Clinical Document Architecture

To support Meaningful Use, the content types for document exchange should conform to the Clinical Document Architecture (CDA). This is the HL7 Document Markup Standard that specifies the structure and semantics of “clinical documents” for the purpose of exchange. HITSP C83 Content Modules define specific sections in each type of CDA. CDA is a flexible XML-based architecture that is both human readable and machine consumable.

- There are many types of CDA documents, including:
  - CCD (C32): Patient Medical Summary
  - Hospital Discharge Summary (C48)
  - History and Physical (C84)
  - Lab Results Report (C37)
  - ED Physician Note (C28)

The new Consolidated CDA Format (C-CDA) is required for Meaningful Use Stage 2. The new standard consolidates nine document types (templates) into a single guide, and it reconciles many of the ambiguities in the HITSP C32, the document required for Meaningful Use Stage 1. The purpose of the Consolidated CDA standard is to streamline summary of care communication. It states that all clinicians must use one of the specified templates to exchange data for these summaries with other providers.

Basic Patient Privacy Consent (BPPC)

BPPC is a profile that resides in both the IHE Information Technology infrastructure and Patient Care Coordination Domains. BPPC is a method for recording and sharing a patient’s privacy consent acknowledgement to enforce basic privacy policies appropriate for the specified use.

BPPC provides a mechanism to record the patient privacy consent and a method for Content Consumers to use to enforce the privacy consent appropriate to the designated use. This profile compliments XDS (Cross Enterprise Document Sharing) by describing a mechanism whereby an XDS Affinity Domain can develop and implement multiple privacy policies. It also describes how that mechanism can be integrated with the access control mechanisms supported by the XDS Actors (e.g. EHR systems). Consent is typically facility based and relate to information held at that specific site.
HIE Infrastructure Building Blocks

The technical foundation for health information exchange includes many components, not all of which may be used in any given HIE implementation. The scope and level of complexity involved in a health information exchange typically determines how many components are included in the technical design. At a minimum, these four components are required for a basic implementation:

- **Enterprise Master Patient Index (EMPI)**
  Provides a means to assign and manage a unique enterprise patient identifier mapped to local patient identifiers resident in disparate HIT systems. An EMPI typically relies on patient demographic matching algorithms to determine correlations in patient identities between various source systems.

- **Healthcare Provider Directory (HPD)**
  Provides a directory of healthcare providers and associated information, such as their: NPI, specialty, credentials, hospital affiliation(s), practice address, telephone number, and other relevant data.

- **Record Locator Service (RLS)**
  Provides a means to store metadata regarding clinical documents intended to be shared with HIE participants along with their corresponding location in a distributed or federated network. HIE participants can query the RLS for the existence of patient health records and then retrieve these records from their source.

- **Clinical Data Repository**
  Required in the case where a centralized vs. federated HIE deployment model is selected. In this case, data feeds are typically sent in HL7 format to an integration engine which in turn routes the data for storage in the clinical data repository (CDR). The CDR is then used for data consumer applications, such as a clinical portal, to view and analyze patient health data.
Choosing an HIE Model that Works for You

**Technical Models**

There are several architecture designs for HIEs driven by participant requirements and the level of mutual trust among participants. The following is an overview of the characteristics of these different technical models.

- **Centralized Model**

  With this approach, all data is ‘housed’ in a shared central repository. Data is updated according to defined policies and procedures spanning from interoperability requirements to privacy and security policy and procedures.

  **Advantages**

  An advantage of this model is that it provides a uniform data format supporting a high degree of data interoperability. It also provides a cohesive, centralized system with defined methods, procedures, and policies for access, maintenance, and management/control.

  **Challenges**

  The challenges are that this model requires strong political and governance oversight, along with management of data ownership and control. It is also a more complex and challenging implementation due to issues ranging from technical scalability to support of privacy and security policies. Lastly, it is a more costly approach because of the need to store substantial amounts of information in a repository.
• **Federated Model**

With this approach data stays at the source of service, and the HIE entity manages a pointer to that information. The data source entity maintains custodianship and control over the data (i.e., medical records and indices). Data is queried from the data source organization when requested using a Record Locator Service (RLS).

**Advantages**

The advantage of this model is that it is the easiest and quickest way to achieve an exchange with less need for full integration. It also reduces the need for centralized storage capacity, and it limits conflict over data ownership.

**Challenges**

Challenges include the management of authorized and legitimate access to third-party systems and the designation and management of data standards and profiles for exchange. In addition, data control, availability, and response time are not guaranteed.
• **Hybrid Model**

According to HIMSS, this approach is the best of both worlds, using a combination of centralized and federated models. Parameters are specific to each HIE participant and are applicable to socio-economic, political, geographic environments, size, and other factors.

This is the most flexible model, because it supports participation by virtually any party. It creates a “firewall” between trusted data sources and external parties, while providing all the benefits of a centralized model to internal community HIE participants. However, it also includes the increased cost and complexity of supporting both models.
**The Direct Project**

Another method of health information exchange involves secure messaging, also known as Direct. The Direct Project is a government sponsored approach to health information exchange based on a set of standards, policies, and services that enable the secure transport of patient information between healthcare providers who know each other and already have a relationship of trust. It is designed to transmit a payload such as a medical summary between providers. It encompasses secure peer-to-peer messaging via the Internet/HISPs and connects users via a simple *push* of information.

The Direct approach requires explicit identification of end points in advance for information exchange. It is not automated, so it does not replace other methods of information exchange that support automated exchange. It only supports simple use cases and initial Meaningful Use requirements.

Other methods of exchange may be better suited for more complex scenarios, such as emergency treatment (break the glass), continuity of care referrals, and real-time population health management. Direct is also not very well suited for Accountable Care Organization (ACO) requirements where information must be captured in transit. Data transmitted via Direct does not persist in the clinical record and is invisible for most other purposes, such as research, analytics, and reporting.

**Things to Consider**

Any model can support Meaningful Use, but the path of least resistance for Stage 2 favors either a Direct secure messaging approach or a federated query/response approach. This is because they do not require complete consensus among participants on policy and governance issues.

On the other hand, a centralized or hybrid model with a clinical data repository is more suitable for organizations that want to capture and use data for actionable purposes. Examples include population health management, chronic disease management, and utilization management initiatives such as ACOs.
Overview of the IHE Framework

Query-based health information exchange is a robust method of supporting the broad sharing of information across many participants. It also captures the data necessary for sophisticated patient care initiatives, such as population health management, patient-centered medical homes, and ACOs. The primary methods for query/response health information exchange are based on the Integrating the Healthcare Enterprise (IHE) Framework.

Integrating the Healthcare Enterprise (IHE) International is an organization that enables healthcare users and IT developers to achieve interoperability of systems through the precise definition of healthcare tasks, the specification of standards-based communication between systems required to support those tasks, and system testing to ensure conformation of specifications.

IHE is an initiative designed to stimulate the integration of information systems in hospitals and other care settings. It is sponsored by a wide range of organizations in North America and beyond, with primary sponsors being HIMSS and RSNA. The fundamental objective is to ensure that information used for medical decisions is available and correct. IHE defines a technical framework for implementing messaging standards; however, it is not a standard. It supports existing standards such as HL7, ASTM, DICOM, etc.

IHE Framework Profiles and Actors

The IHE framework consists of Profiles and Actors. An IHE Integration ‘Profile’ is designed as common language that healthcare professionals and vendors can use to discuss integration needs in precise terms. A profile is defined by the IHE ‘Actors’ involved and the set of ‘Transactions’ exchanged by each of the actors.

IHE defines transactions in relation to ‘Actors’ in an effort to abstract the role of functional components from specific products within the healthcare system environment. Examples of these include:

- Document Source/Consumer
- Document Registry
- Document Repository
- Patient Identity Source
- Patient Encounter Source/Consumer

See appendix ‘A’ of IHE Technical Framework for a complete listing.

The Importance of Data Aggregation

Data aggregation across multiple facilities and source systems can contribute to improved continuity of care. Some HIE platforms are capable of aggregating information from multiple sources into a combined summary. The advantage of this approach is the ability to merge available CCDs into one, aggregated CCD document for treatment, analysis and reporting. This allows for quick viewing of important clinical information (such as known allergies, history of medication use, etc.), and it enables coded information to be consumed by the receiving EHR system. Customizable information presentation is provided via style sheets and filters to constrain the facilities included or to define a specific date range.

Next Steps

As organizations continue on the path to health information exchange, it’s necessary to be aware of key roadblocks:

- A lack of shared vision/objectives among stakeholders
- A lack of trust among participants
- An incomplete value proposition
- An inability to agree on common governance/legal policies, staffing, and other resource issues

To avoid these roadblocks, all stakeholders should have some involvement in the initial policy development process, as well as ongoing operational decisions. Engaging all stakeholders, including physicians in the community, will be essential for long-term success. This requires a clear and compelling value proposition for all participants. Examples include: improved speed and efficiency of referrals to close the loop for both the sending and receiving sides; the automated exchange of information without adversely impacting provider workflows; access to critical information about diagnosed conditions, medications, allergies, etc. to enhance patient safety; and support for achieving the transitions of care measures associated with Meaningful Use incentives.
Final Thoughts

Healthcare organizations are facing many market and regulatory pressures and are seeking to build HIE capabilities to support strategic initiatives that will help them survive and thrive both now and in the future. They are seeking a broad solution set that can cost effectively meet their needs.

Although improving the quality and coordination of care is important, the key priorities for most organizations are: building or maintaining a competitive market position, cost reduction, and revenue growth. Tapping into government incentives through the ARRA Meaningful Use program is one example. Formation of ACOs is another example of this direction. Participation in a community HIE initiative can help support these objectives.

There are many factors and trade-offs involved in establishing community HIEs which require clarity and consensus on strategies, operational objectives, governance, and technical infrastructure. These domains are interdependent and involve considerable complexity and risk. Careful planning and preparation is required to support successful implementation and operation of a community HIE initiative.

For assistance with planning and implementing your community HIE project, contact Mike Murphy at Forward Advantage Inc. by email at mike.murphy@forwardadvantage.com
About Forward Advantage

Since 1993, Forward Advantage has provided solid solutions that integrate seamlessly with healthcare information systems. With more than 1,200 installations worldwide, it is in the leading position to provide innovative and cost-effective solutions for healthcare organizations. This includes products and services for report distribution, HIE, data migration, and identity management. More information on Forward Advantage and these product and services can be found at www.forwardadvantage.com.

About the Author

Mike Murphy has more than 25 years of experience in information technology and telecommunications. During the past eight years, he has focused on the application of these tools within the healthcare domain.
Addendum: Additional Terms and Definitions

**ADT** (Admission Discharge and Transfer) – An HL7 interface messages used to update a patient’s details.

**ATNA** (Audit Trail and Node Authentication) – The IHE profile that establishes security measures that, together with the security policy and procedures, provide patient information confidentiality, data integrity, and user accountability.

**BPPC** (Basic Patient Privacy Consent) – A method for recording a patient’s privacy consent acknowledgement to be used for enforcing basic privacy appropriate to the use.

**CCD** (Continuity of Care Document) – An implementation guide for sharing continuity of care record (CCR) patient summary data using the HL7 clinical document architecture (CDA).

**CDA** (Clinical Document Architecture) – An HL7 standard XML-based markup standard intended to specify the encoding, structure, and semantics of clinical documents for exchange.

**EHR** (Electronic Health Record) – An electronic historical record of a patient’s health information, generated by one or more encounters, in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports.

**HIE** (Health Information Exchange) – A system that provides the capability to electronically move clinical information among disparate healthcare information systems while maintaining the meaning of the information being exchanged.

**HL7** (Health Language 7) – An all-volunteer, non-profit organization involved in the development of international healthcare informatics interoperability standards. It is also used to refer to some of the specific standards created by the organization.

**IHE** (Integrating the Healthcare Enterprise) – An initiative by healthcare professionals and industry to improve the way computer systems in healthcare share information. IHE promotes the coordinated use of established standards such as HL7 to address specific clinical needs in support of optimal patient care. Systems developed in accordance with IHE communicate with one another better, are easier to implement, and enable care providers to use information more effectively.

**LDAP** (Lightweight Directory Access Protocol) – An application protocol for reading and editing directories over an IP network.

**OID** (Object Identifier) – An identifier used to name an object. HL7 and other healthcare-related information interchange standards use OIDs for globally unique identifiers for both individual information objects as well as references to code systems and data element dictionaries.

**PDQ** (Patient Demographic Query) – An IHE profile that specifies guidelines for querying patient ID by demographic details.

**PDQv3** (Patient Demographics Query HL7 v3) – The profile that extends the Patient Demographics Query profile leveraging HL7 version 3.
**PIX** (Patient Identifier Cross Referencing) – An IHE profile that specifies guidelines for cross-referencing a unique patient ID between healthcare organizations.

**PIXv3** (Patient Identifier Cross-Reference HL7v 3) – The profile that extends the Patient Identifier Cross Referencing profile leveraging HL7 version 3.

**XCA** (Cross Community Access) – An IHE profile that allows for the access of clinical documents across care communities.

**XCPD** (Cross Community Patient Discovery) – An IHE profile that allows for identification of patients across care communities.

**XDS** (Cross Enterprise Document Sharing) – An IHE profile that specifies guidelines for sharing clinical documents across healthcare organization boundaries.

**XUA** (Cross-Enterprise Community Assertion) – An IHE profile that provides a means to communicate claims about the identity of an authenticated principal (user, application, system, and so on) in transactions that cross enterprise boundaries.