Unstructured documents in health information exchange

AN IGC WHITE PAPER
Health information exchange (HIE) technologies are growing in visibility, especially as more healthcare providers seek Medicare and Medicaid certification for meaningful use of electronic health records (EHRs). Though HIEs are typically thought of as working with structured health data, there is a growing realization that much of the information in patient medical records is in unstructured documents such as PDFs, Microsoft Office documents, text files, JPEGs, DICOM images and more.

This paper will describe the three types of HIE and briefly discuss methods for including unstructured documents in HIE processes.

Defining the three types of exchange

The U.S. Office of the National Coordinator for Health Information Technology has identified and is promoting three types of HIE:
- Query-based exchange
- Directed exchange
- Consumer-mediated exchange

Query-based exchange is what most people think of relative to HIE. The exchange of information can take place either within a provider system (multi-hospital or integrated delivery networks, for example) or between unaffiliated providers. Query-based exchange routinely involves creating a community network of clinical data sources that feeds the creation of dynamic online virtual health records. The system is primarily focused on ensuring record sharing when unplanned care takes place, such as in an emergency room. A physician or other provider caring for an individual types in the patient’s name and the HIE system combines information from multiple provider, laboratory and pharmacy sources into a view of the patient record.

Directed exchange is being developed by the Direct Project, which is sponsored by the Office of the National Coordinator. Directed exchange is based on secure email or messaging between providers or between providers and patients. It allows a known and credentialed individual to securely send information on a patient to another known and credentialed individual, or to a location of the patient’s choosing. Initially it is a “push” system—meaning that it pushes information from one location to another as needed—but it will eventually be capable of “pulling,” or enabling requests for information.

Consumer-mediated exchange is a paradigm in which the consumer—or patient—controls the sharing of health information. This can be done in several ways, including use of directed exchange and/or personal health records (PHRs) and related platforms such as Microsoft HealthVault. The consumer shares medical information with those who need it (providers, family members, caregivers, schools, camps and so on) while also having the option to assemble, maintain and manage their own health information in a PHR.

With the increase in the implementation of EHRs, doesn’t that mean that the data being moved around by HIE processes is structured? It is sourced from databases behind all of these EHRs, after all. However, according to IBM, Ovum and other researchers, unstructured data accounts for more than 80 percent of an institution’s data, and the volume is doubling every five years. A Health Story—an industry alliance including HL7, IHE and HIMSS Analytics—reports that 1.2 billion clinical documents are produced each year, and much of the information needed for patient care is in unstructured documents. If you move only structured data around, you risk producing an incomplete picture of the patient’s condition.

Viewing unstructured data within HIE systems

Query-based exchange. Most query-based exchanges have either a completely distributed architecture or a hybrid distributed/centralized architecture, both of which involve each participating institution maintaining its own edge server. An edge server maintains copies of a subset of the institution’s health records and is indexed by the HIE to provide appropriate information on demand. The information is often sent to the HIE in an HL7 message with a continuity of care document (CCD) attached. This CCD is typically a structured XML document, but it can contain attachments of unstructured documents in the form of encapsulated data. The HIE then assembles the information from various sources and creates a view of the patient record.

“As we approach the 2020s, the trend toward big data, tools and systemization of care will revolutionize the way hospitals and physicians work and, most importantly, the way patients are treated.”

—Dan Risken, MD, Health Fidelity, FutureMed, and Stanford University

Some HIE vendors include DICOM viewing in the provider interface, while the DICOM image itself remains in the providing institution’s repository. For this reason, and for the purpose of viewing unstructured data in other formats, query-based exchange vendors should incorporate a universal viewer in the provider interface. This viewer could also add functionality such as the ability to create a new PDF or TIFF of the viewed document, with or without markups and annotations (including redactions, if necessary) and storing...
that new document in the provider’s own repository. This is especially important if providers are required to archive patient information that was used to make a clinical decision. Maintaining evidence of the information used to make a decision is required for purposes of malpractice defense, as well as continuity of care.

Directed exchange. Directed exchange is essentially a secure email system using standards agreed upon for use via the Direct Project. Messages can have attachments, which will often be CCDs but can also be PDFs, TIFFs, JPEGs and so on. Directed exchange is rapidly increasing in use across the U.S., but one challenge not yet fully addressed is how to incorporate its use into existing workflows. One answer would be to use a document viewer inside an EHR or hospital document management system as the hub where patient documents—both unstructured and structured—are assembled. A directed exchange email client could then be launched to send the documents to the next point of care, or to the patient. From a patient-use perspective, one can easily imagine a patient using a smartphone to take a picture of a wound or suspected skin cancer, making a notation on the JPEG image via a mobile viewer and sending the image to a primary care physician or dermatologist for evaluation.

Consumer-mediated exchange. In consumer-mediated exchange, the patient has responsibility for sharing information with those who need it. Some patients will opt to transmit their health information from a provider or health plan portal to their own PHR or another platform. A PHR allows patients to assemble their medical information and use it to better manage their health. PHRs that are part of a platform architecture allow the patient to choose applications to interact with their data—much in the same way that an Apple iPhone is a platform for Contacts or Calendar apps. Consumers need access to a universal viewer that will allow them to view information in various formats, make notes within unstructured documents and remove health data that they choose not share. In fact, John Mattison, MD, the chief medical information officer at Kaiser Permanente, has indicated that PHRs will play a key role in the redaction of sensitive health information by consumers.7

In 2012 Manhattan Research found that tablet use by doctors has increased to 62 percent from 27 percent in 2011, with half of doctors surveyed using them at the point of care. Clearly, any healthcare document viewing solution must be cross-platform and compatible with mobile devices.12 Providers, health information organizations, health information service providers (which operate Direct-based networks) and health IT vendors should ensure that HIE solutions provide the cross-platform, online and mobile capabilities that are necessary to interact with structured and unstructured data to support the quality of care expected in the 21st century.

5 Health Story. “About the Health Story Project.” www.healthstory.com/about/about.htm
6 Patient to Provider Issues and Implementation. The Direct Project’s Implementation Group Wiki. December 18, 2012. wiki.directproject.org/Patien	t+to+Provider+Issues+and+Implementation
9 IBM, 2011.

Summary

Though any electronic exchange of health information is better than none, some observers argue that there are risks. For example, physicians could make poor decisions based on incomplete patient data provided by an HIE system. The Health Record Banking Alliance believes that HIE value and sustainability are tied directly to whether or not comprehensive patient information can be made available.8 It makes sense for any of the three types of HIE system—query based, directed or consumer mediated—to be capable of viewing, annotating and redacting unstructured documents as needed. 9 10 11
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