ELECTRONIC HEALTH INFORMATION EXCHANGE: HL7, XML, AND HIPAA

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ABSTRACT

Although health information exchange has been around for a while, the landscape is quickly changing. It used to work that disparate computer system within a single institution was fine because each system served a unique purpose and was able to do the work of that department better. In addition to this, we are already looking at the next evolutionary step which is the interoperability of systems across different institutions. The use of HL7, standardization and following the rules of HIPAA and "meaningful use" have united the healthcare IT world in a way that has never happened before.

Keywords: **Health Information Exchange, HL7, XML, HIPAA**

INTRODUCTION

Information about our health records is typically dispersed among different hospitals, doctor's offices, urgent care or an ER that we visit. Anywhere we go to get care, they do not necessarily have all of the information that they would need to provide the best care possible. The information is in silos that exist as a result of various institutions and systems that do not talk to each other. It would be best for any healthcare provider to have all the information they needed in front of them to make a decision about the diagnosis and prognosis of a patient. This is needed in order to provide continuity of care with multiple providers.

Health information exchange is the approach to integrate systems with each other and allow for data sharing. This approach brings many advantages, such as: cost. When a secondary provider has to do additional tests and medical investigation that has been already completed at another institution, the cost for that medical institution goes up for your care. If that is passed onto the insurance company and then the customer through premium payments, then the cost of medical care could be greatly reduced just by making systems that are able to communicate with one another.

Two things have to be taken into consideration when looking at health information exchange solution. First is the security of the data and its compliance with HIPAA standards. The second is the accuracy of the data and using standardized methods to get this information. There are standardization agencies that have been around for a while such as HL7 inc. that have been working on these issues for years. The standardization allows the different computer systems to speak the same language. Standardization such as this is vital to the future of health information exchange. Also, with this highly personal data being exchanged, there needs to be security

controls to prevent health data from being shared with the wrong people, or from hackers gaining access to these records.

Another issue to discuss about health information exchange is defining the term "Meaningful Use". It is characterized by the use of Health Information Technology (HIT) to improve healthcare and further the goals of information exchange among health care professionals. One of the ways this is being accomplished is first through EMR systems. However this is only the first step. A true EMR will integrate all the information for a hospital if implemented correctly, however it still have to be able to talk with other systems outside of the selected EMR. This leads to many challenges to standardization and use of health information exchange and is not as easy as one might expect at first glance.

HEALTH INFORMATION EXCHANGE (HIE)

The rising cost of healthcare coupled with consistent provision of high-quality care has become major concerns for purchasers, providers, and policymakers. Health information technology is the best way to address rising costs by delivering greater efficiencies while also improving safety and quality. Electronic health information exchange across provider organizations have become the de facto way to go in organizing the healthcare IT plan.

Previous discussions in this topic argue that building a national health information infrastructure that will allow all health care providers to exchange data with each other would be the best option. However, most current activities have focused on local efforts through entities known as regional health information organizations (RHIOs). RHIOs may be the best alternatives because they can represent best the infrastructure of an area, and still work with other entities to define a more national approach when the time comes. An electronic, interconnected regional infrastructure is the best current way to handling the volume and uniqueness of health-related information required to efficiently deliver optimal care. As more provider organizations store data electronically, the future will be to electronically exchange the data with other providers.

Challenges to Establish HIE

One of the ways that will be difficult to incorporate all parties will be the requirement that everyone must have the ability to use the same standards that will continually change and require constant attention. For labs that do not focus on IT as one of their main strategies, it will make most sense to outsource this task to a third party. Many obstacles exist including the inability to distinguish between test codes from different laboratories to the inability to collect and transmit third-party payer information so the lab can get paid to the inability to accept various forms of formatted data (Fry, 2010). This example is just one microcosm of the overall reaching issues to overcome for implementation of HIE.

Since public health government agencies have to collect a large amount of information from these providers, it makes sense there would be an effect on the implementation process for HIE. Public health agencies rely on data reported by health care partners to conduct nearly every aspect of its core functions. Information technology offers the opportunity to replace manual reporting processes with automated ones. Innovators are increasingly developing ways to automate processes such as these. The electronic transfer of data for public health reporting requires each health care partner to translate data from its proprietary structures—its vocabulary

or format for storing data, and its protocols for sending the data as messages—into standards defined specifically by and for various public health authorities so the data are represented consistently and can be analyzed in a uniform fashion (Shapiro, et al., 2011). This would require the services of additional third party vendors. This means that there is a whole segment of the HIE world open in this economy that would be fast growing once certain standards and requirements were in place.

There is one application that will provide healthcare providers with point-of-service prompts. It is the ability to perform advanced reporting for clinical quality measurements, clinical decision support, a triggered alerting system, population health management, data-mining and customizable reports that will help the provider achieve meaningful use and better monitor chronic conditions (Choudhry, & Deas, 2010). This format is especially useful because it allows the patient to spend less time explaining (usually in non-medical terms) what has been going on with their medical history. This is one way that medical errors are prevented.

One of the factors to overcome is the perception of using HIE from the perspective of the healthcare providers and patients. The three most common themes that emerged from the focus group discussions and qualitative comments from the written questionnaires were (1) concerns about privacy and security, (2) the potential benefit to a person's health, and (3) the desire for more information about the consent process. Privacy was a concern because information is not completely secure when transferred. There is always the possibility that is can be "hacked" and the data can be stolen. Benefits were actually a huge draw for patients as they saw that their specialist could see all the needed information.

A paradigm shift must also occur with the arrival of HIE. Providers must now view patient information as the patients' property, not as an enterprise asset. Only once this ownership view changes will institutions be willing to share data with perceived competitors. Also, hospitals must ensure that physicians verify medical information obtained through HIEs. Reliance on outdated information from third-party providers obtained through HIEs could still expose a hospital to medical malpractice claims (Page, 2010). When there is a change in the way business in conducted, there are a whole host of legal and perceptual changes that must take place in order for the idea to move forward.

PROTOCOLS FOR STANDARDIZATION

HL7

"'Level Seven' refers to the seventh level of the International Organization for Standardization (ISO) seven-layer communications model for Open Systems Interconnection (OSI) - the application level. The application level interfaces directly to and performs common application services for the application processes. Although other protocols have largely superseded it, the OSI model remains valuable as a place to begin the study of network architecture. HL7 exists to create the most widely used standards in healthcare (www.hl7.org)".

The HL7 requirements can create many complications for HIPAA efforts and in compliance issues. The HL7 actually goes hand in hand with the HIPAA solution that you must implement to be compliant with the standard. For instance, providers must be HL7 to be compliant or else the system will not communicate the patient data to payers so the provider can get paid for

services rendered. On the other hand, payers must also have the HL7 solution implemented so that the claims processing system is able to take the information in that format. Otherwise the payer will not be able to serve their provider base effectively. It is key, to have HL7 for interoperability. HL7 is a small, but critical component to from the HIPAA perspective.

An integrated information system with a central database is easier to install and maintain if all parts of that system are from a single vendor. Most use an interface engine by taking an HL7 feed and piping it to wherever they want it to go. About 95% of all internal connections to the LIS use an HL7 interface. The main decision for hospitals is, are they going to best-of-breed or all-inclusive. For years, hospitals only looked inward when choosing information systems before they began establishing bidirectional links to physician practices and other hospitals. A product for the inpatient environment with a Web-based interface solution that allows a hospital to build individual access points for clinicians is a superior model (Rogoski, 2011). HL7 is a decision that a healthcare organization must make as a whole. You cannot implement only a part of it. It needs to be an overall part of the IT strategy for the organization. In order to do this, the approach must come from a top-down strategy. In time, HL7 will expand to be used in more and more systems. This will provide the healthcare provider with all the information they need to make quicker decisions. When lab results are entered in from another party, but the interface allows those results from a lab to be available in close to real time that will offer a distinct advantage in providing care.

Interoperability is a key function of ensuring that the widespread Electronic Medical Record (EMR) adoption could yield the social and economic benefits that we desire. Without interoperability, the EMR adoption will strengthen the information vaults that exist in today's paper-based medical files, resulting in even greater proprietary control over health information and, with it, control over patients themselves. A relational database requires data to be specified in tabular form and conformed to a predefined schema and constraints. This data requirement promotes data integrity but discourages rapid development of the database and any changes on irregular data or data that evolves rapidly. The Relational Database Base Management System (RDBMS) will continue to be a dominant information management system in the future, which manages all the critical enterprise data. It is however, difficult to support data sharing and data exchange in large-scale databases.

XML

XML shows significant benefits when used as an input/output format. It is also a language that is flexible and already defined. This makes it inexpensive for infrastructure because the tagging system is so flexible and allows the user to label the data any way they wish to define it. It does not require a pre-defined schema, although, there must be some understood structure to the data for it to be the most effective. The XML document contains structured and unstructured data, and their semantic context that will be sent to other systems for data sharing when there is no standardized data exchange format which is applicable. With XML becoming used more and more by many people, it will be an advantage to use this structure as it will have support of the overall IT community in using.

It is known to most healthcare organizations, that disparate systems have difficulty communicating with one another because the data in each one is structured differently. By using

schemas, which are a sort of map, unity among data interoperability can be achieved more easily. With health information systems in the U.S. that have a lot of variety, having the correct tools is important to achieving success. The key to simplifying the complexities found is to rely on established standards such as XML and integrate the use of HL7. In the end, you will save money, be more efficient and have better data by implementing a system that is throughout the organization by doing enterprise resource planning.

HIPAA

There are many parts to HIPAA, however the one that has the most impact on EDI is Subtitle D of the Health Information Technology for Economic and Clinical Health Act (HITECH Act), enacted as part of the American Recovery and Reinvestment Act of 2009. It addresses the privacy and security concerns associated with the electronic transmission of health information.

There are several components to HIPAA that have HL7 requirements. A 275 transaction is needed to be coded in HL7 format. HIPAA 275 is additional information to support a health care claim or encounter. To send or receive detailed claim or encounter information, you must transmit or receive patient "order data"—diagnoses, test results, observations, treatment modalities, and so forth—in HL7 format. Providers: To submit a 275, your systems must express patient data as an HL7 ORU message; Use the appropriate LOINC code; wrap the ORU in the BIN segment of an X12Ncompiant 275 "claims attachment" transaction. To process a 275, your systems must be able to parse the HL7 ORU message. In HL7 terms, an ORU message is an "observation result/unsolicited."

HL7 is an integral part of health compliance with HIPAA. There are standards that HIPAA has instituted that require the use of something like the HL7 standard. However, as one can see, it is a very complex set of rules by which to resolve. Addressing interoperability issues has led to a renewed interest in Logical Observation Identifiers, Names and Codes (LOINC). Established in 1994, LOINC was essentially ignored. LOINC allows an LIS to encode lab results so those can be read by other departmental systems, physician practices, hospitals, and other labs (Rogoski, 2011).

Meaningful Use

The reason to have meaningful use documentation has never been clearer. To receive financial incentives for meaningful use of electronic health records, physicians and hospitals will need to engage in Health Information Exchange (HIE). In 2009, congress authorized $30 billion in incentives to push forward meaningful use EHR's. Only 13 RHIOs in the country seem capable of supporting stage 1 meaningful use criteria. These entities cover only a small proportion of hospitals and ambulatory practices, which means that most providers must identify alternative ways to meet HIE-related meaningful use criteria. For most providers, joining regional organizations that supports HIE is the most viable approach (Adler-Milstein et al., 2011).

Considerable discussion is taking place now in the United States around the notion of *meaningful use*, and about ensuring that our interoperability strategy supports *meaningful use*. At the heart of meaningful use is simply a requirement for *data re-use* as in re-using clinical trial data in the construction of decision support rules, re-using clinician-captured data for quality reporting,

public health reporting, etc. If there were separate models and XML schemas for immunization data, medication administration, pharmacy dispensing, lab, and clinical summaries, and that the onus was on the implementer to reconcile the differences in the data in order to support data re-use (Jaffe et al., 2009).

Problems with Protocols Used for Standardization

At the heart of the technical side of standardization is the problem of ambiguity. In order to even exchange data properly, there has to be a clear vocabulary. One in which the data means the same thing in all settings. This is not the case. A term may not mean the same thing if interpreted with a physical therapist as compared to a nurse or a physician. This will also have to be rectified in the effort to standardize. It is important to have architecture in place (Jaffe et al., 2009).

XML is the best fit for standardization, since has a unique structure that defines its requirements in a schema. Once the data is put in the correct format to match that schema, the data can be read by any number of systems. This is the strength of the XML base language. The flexibility of the XML nature allows it to work with the HL7 CDA in order to provide a missing link between the HIM and the EMR system. This in turn is able to improve upon the process of coding, abstracting, and getting more accurate data that is fully compliant. The HL7 CDA provides a framework in order to integrate a number of processes in order to reduce cost and increase revenue. It does this through streamlining processes for reimbursement, regulatory and research and revenue cycle management (Klein, 2006). The architecture of a standardized format is usually a very complex piece of information. It has many facets of information that have to be considered. The problems only begin with understanding difference in the definition of medical terms in this case. It is a hierarchy of data that should be able to go into any system. To make something truly universal, there have to be many decision points as well as exceptions in certain circumstances. Once the architecture is in place, there is still the creation of the data file or stream that has to be created and documented. This is a long and laborious process; however with the cooperation of many stakeholders, it can be accomplished jointly. It will be the creation of a user community that will work together to define the future of the data language and communication in order to evolve with the most current medical trends.

CONCLUSION

There is so much information to keep straight when planning and utilizing an HIE. There must be documented "meaningful use" in order to be eligible for government rebates. HIPAA standards must be met no matter what in order to protect patient data from falling into the wrong hands. HL7 is also a complex language that requires great attention to implement, however will become a crucial part of HIE. The standardization that will take place needs to be strategic so that communication with everyone else is able to be achieved. The main thing to understand from all of this is that this is about interoperability of software. In order to achieve this, each entity must come to a common table to come together with a single vision. Each must agree to the terms of standardization and each must be able to incorporate the plan into their businesses.

REFERENCES

References are available upon request. Please contact catat@nku.edu for any further questions.