Using the C-CDA Standard to Meet Meaningful Use

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The Centers for Disease Control and Prevention reported that in 2010, 35 million patients were discharged from non-federal short-stay hospitals in America.[1] Vitally important not only to those discharges—but to every discharge that takes place—is whether important information about the patient's condition, care plan, vital signs, current medication list, discharge instructions, and functional status was transmitted in a timely fashion to the provider responsible for those patients' care.

The landmark study by the Institute of Medicine *To Err is Human* found breakdowns in communication as the leading cause of errors in a clinical environment.[2] For example, a delay in a discharge summary getting to a primary care provider may increase the risk of hospital re-admission by as much as 50 percent.[3] Furthermore, research shows that anywhere from 50 percent to 91 percent of adverse events or mishaps may be caused by failures to communicate vital patient information.[4]

One method that could help ensure patient information is safely transmitted to the appropriate parties is known as the consolidated clinical document architecture (C-CDA) standard. The possible benefits of using C-CDA include improved communication among physicians, increased interoperability between disparate healthcare systems, and attestation to "meaningful use" EHR Incentive Program standards.

Closing the Communication Gap

To improve communication between healthcare professionals, which is part of stage 2 meaningful use requirements, both hospitals and eligible professionals are required to provide a summary of care record for each transition of care or referral. One method hospitals and eligible providers may use to create a summary of care record is HL7's C-CDA standard.

To fully appreciate C-CDA, it is important to understand extensible markup language (XML), along with another HL7 standard derived from XML known as the clinical document architecture (CDA).

X Marks the Spot

The extensible markup language, better known as XML, was developed to allow documents created in one application to be shared seamlessly with another application, and more importantly, be read by both humans and computer technology. XML accomplishes this goal in two ways. First, it defines how data has been encoded so that the receiving application can read the information contained in the document. Second, because it is a markup language, it contains metadata that describes the data within a document. The most common forms of metadata contained in an XML document are called "elements" and "attributes."

For example, a simple text based document could contain the following data: "Gregory House." Anyone reading this document would not know the role being played by Gregory House nor the context in which this data is being shared. XML specifies that data can be defined by enclosing it with a set of angular brackets containing a set of user defined elements and attributes. Using XML the data can be transformed into:

<AttendingPhysician>

<LastName>"House"</LastName>

<FirstName>"Gregory"></FirstName>

</AttendingPhysician>

Now the reader of the document knows that "Gregory House" is a physician who may be attending to a patient. The problem with XML is that it provides a set of basic rules for creating a generic document that can be shared across applications. What is needed is a standard for creating clinical documents. This is where CDA comes into play.

Explaining Clinical Document Architecture's Role

CDA is a "document markup standard that specifies the structure and semantics of a clinical document," according to an article in the *Journal of the American Medical Informatics Association*.[5] CDA uses templates to group uniform sets of information based on a clinical context. The templates act as a set of building blocks that can be used to create a variety of clinical documents.

A CDA document will contain the following structural elements: header, body, section, narrative block, and entry. A header contains vital information about the document, the patient and the provider, and ensures that the documents can be shared with other providers and health information systems. The body can include text, images, sounds, and other multimedia content contained in one or more sections. A section will have a narrative block which presents data in human readable form, and an entry that codes the data so that it can be processed by a computer and incorporated into an electronic health record. Examples of common sections include: allergies, medications, problems, immunizations, and vital signs.

A is for Architecture

The A in CDA is important because it shows how this standard is a framework for creating other standards. In theory, CDA can be used to create almost any clinical document imaginable. Therefore, it is unrealistic to expect that every healthcare application could be programmed to accept all the possibilities. To narrow down the possibilities so that a specific type of clinical document can be shared by two disparate healthcare applications, a method of constraining the schema of the CDA standard was needed. This is where an implementation guide comes into play.

An implementation guide is merely a way of taking the specifications defined in the CDA standard for what a valid clinical document looks like and narrowing its scope so that a specific clinical document(s) can be created. Creation of an implementation guide provides healthcare organizations with a standardized set of guidelines for sharing and exchanging a specific set of documents. With a published implementation guide in hand, healthcare organizations do not have to re-invent the wheel every time they want to share a clinical document. They just refer to the implementation guide.

In terms of meaningful use, one of the most important implementation guides is known as the "HL7 Implementation Guide for CDA Release 2: IHE Health Story Consolidation, DSTU Release 1.1–U.S. Realm," otherwise identified as Consolidated-Clinical Document Architecture (C-CDA). So, in reality, C-CDA is both an implementation guide and a standard. What C-CDA, both the standard and implementation guide, provides is a set of instructions on how to structure nine document templates that are common to most patient's electronic health records, and make them sharable across different healthcare organizations, providers, and healthcare information systems.

Those nine templates include: the continuity of care document (CCD), history and physical, diagnostic imaging, consult note, surgical operation report, progress note, procedure note, discharge summary, and unstructured document. The unstructured document can be used for sending scanned forms. C-CDA also provides instructions for creating 60 different section templates, and 82 entry templates. The term consolidated is used because the standard represents an amalgamation of efforts by HL7, the Healthcare Information Technology Standards Panel (HITSP), Integrating the Healthcare Enterprise (IHE), and the Office of the National Coordinator for Health IT (ONC) to create a clinical care document (CCD) that can be shared in terms of semantic interoperability among different providers. C-CDA takes all the standardization work done by all these players and places it in one standard.

How C-CDA Works

C-CDA does not facilitate the transport of clinical documents. Therefore, to meet meaningful use standards in relation to transition of care and referrals, a mechanism for sending a C-CDA generated clinical document from one provider to another provider is needed. One method identified in the stage 2 meaningful use requirements is known as DIRECT. DIRECT is a specification designed to send encrypted health information from one security trust agent (STA) to another STA using the Internet.

For example, using certified electronic health record technology (CEHRT), a hospital discharging a patient creates a discharge summary using C-CDA. The discharge summary is placed in a DIRECT message (DIRECT.msg) and sent over the Internet to the patient's primary care provider. The primary care provider reviews the information contained in the summary, and integrates important data into the patient's electronic health record. This example is known as a native implementation because all activity takes place natively within the electronic health record (EHR) systems of the hospital and primary care provider. No third party intermediary is required. In some implementations an intermediary may be required.

Current C-CDA Use

Several healthcare organizations such as the Mayo Clinic and Kaiser Permanente have already begun testing their implementations of C-CDA for meeting stage 2 meaningful use requirements. Results of those tests are forthcoming. An example of the role the CDA standard can play in sharing health information data comes from the Southeast Minnesota Beacon project.

A software application known as PH-DOC was used to help public health nurses perform medication reconciliation for patients living at home. The project included 11 counties and three primary care facilities: the Mayo Clinic, Winona Health Systems, and Olmstead Medical Center. Using PH-DOC, a public health nurse could make a request for electronic documentation from the three primary care facilities. Each facility was running a different EHR software program. Data was returned to the nurse in the form of a CCD document generated using the CDA standard. The data in the document was parsed and used by the PH-DOC application to perform medication reconciliation for the patient, and generate an accurate list of the current medications that the patient was taking.

HIM's Role in Using C-CDA

Health information management (HIM) professionals can play several roles in the successful use and implementation of the C-CDA standard to meet stage 2 meaningful use requirements. First and foremost is that all electronic records must be properly documented to reflect the patient's current health status along with the care they have received. This could be handled as part of a healthcare organization's clinical documentation improvement (CDI) initiative. Second, during the implementation and maintenance of vendor-supplied EHR software, HIM professionals can be involved in the configuration of C-CDA functionality.

A third role is managing vocabulary mapping requirements. Many EHR applications may use internal coding systems that do not conform to federal standards. However HIM professionals can work with EHR-specific vocabulary services or crosswalk tables that map internal codes to the codes needed to create the final C-CDA documents. For example a healthcare organization may use ICD-9 to create a patient problem list, but as defined by meaningful use standards, C-CDA documents must use SNOMED CT.

Finally, HIM professionals can use tools such as the SMART C-CDA Scorecard to test and validate the documents created by their EHR application. This tool checks how well a document conforms to the C-CDA standard while providing suggestions for improvement. This could help lead to discussions with the organization's vendor on how they may improve their product.

Notes

1. Centers for Disease Control and Prevention. "Hospital Utilization (in non-Federal short stay hospitals)." 2014. www.cdc.gov/nchs/fastats/hospital.htm.
2. Institute of Medicine. *To Err Is Human: Building a Safer Health System.* Washington, DC: The National Academies Press, 2000. http://www.nap.edu/catalog.php?record_id=9728.
3. Lenart, L.A. et al. "Rethinking the Discharge Summary: A Focus on Handoff Communication." *Academic Medicine* 89, no. 3 (2014): 393-398.
4. Ibid.
5. Dolin, R.H. et al. "The HL7 Clinical Document Architecture." *Journal of the American Medical Informatics Association* 8 (2000): 552-569.

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