

Computer Assisted Coding with Standard Document Types – Advancing Best Practice in Health Information Management

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Introduction

The efforts to standardize clinical documentation are gaining momentum with collaborations such as the Health Story Project. The advancement of speech recognition, transcription and electronic documentation technologies provide the platforms to produce standardized documentation without placing additional burdens on clinicians. Computer assisted coding (CAC) solutions are benefactors of this effort which, in turn, also benefits HIM departments. All HIM professionals know that more consistent and complete clinical documentation increases the accuracy of coding results, and AHIMA is strongly supporting initiatives to set documentation standards. We will discuss these efforts and present examples of clinical documentation in standardized form. Today, CAC technology has been applied to both standard and non-standard document types. From this experience, we discuss best practices for initial implementation and ongoing maintenance of CAC solutions for both standard and non-standard documents.

This presentation will first give a brief overview of standard document types along with the goals of standardization efforts for clinical documents. Examples of both standard and non-standard electronic documents will be presented. Clinical Data Architecture for Common Document Types (CDA4CDT) is based on the well-established XML data structure and supports interoperability with electronic health record systems through a library of standardized section tags. We will discuss how tags provide a semantic structure to narrative text and how this structure can be utilized by CAC applications to optimize coding results. The final part of the presentation will be an overview of best practices for CAC on standard and non-standard document types. Users of CAC desire sustainable positive results. This requires a correct initial configuration and validation of CAC technology and ongoing maintenance of the system and measurement of results. We will discuss how the type, structure and quality of clinical documentation should be considered during CAC implementation and the factors that lead to successful deployment and use of CAC for HIM departments.

Background

Clinical documentation is created, transmitted and stored in a variety of formats. In a typical hospital that has multiple health information systems, the documentation will be a mix of structured data fields and narrative text. HIM professionals read this documentation every day and, because of the lack of standardization and the complexity of the information, it is a highly manual process which relies upon years of experience and education to correctly interpret the layout and content of documentation created on different systems and from different medical specialties. Current work on standards for clinical documentation is building on the HL7 Clinical Document Architecture (CDA) (Dolin 2001). Over the past two years, the Health Story Project has developed implementation guides for four document types: consultation note, history and physical, operative note, and diagnostic imaging report. These implementation guides have been accepted by HL7 as draft standards.

Computer assisted coding technology automatically generates codes directly from clinical documentation. There are two primary types (AHIMA 2004). (1) Natural language processing (NLP) applications scan and interpret unstructured clinicians' notes using specialized linguistic algorithms, extracting the clinical facts that support the assignment of codes. (2) Structured input applications integrate the coding into the clinical documentation process, producing clinical documents with embedded codes. NLP applications typically can work with current clinical documentation practices that produce unstructured text, such as dictation, speech recognition, and transcription. However, the variability in the format and layout of clinical documentation does increase the time and effort needed to successfully implement NLP-based CAC.

CDA and the four draft standards for clinical documents use an XML format (Health Story 2009). With XML, documents are structured into sections with identifiers, called tags that define the context, properties, and relationships of the information with the sections. The key feature of XML format is that the tags are standardized, each with a specific, well-defined meaning. This standardization should greatly enhance the interoperability of health information system, while at the same time preserving the richness of narrative text.

Methods

Standard document types should increase the adoption of CAC while reducing the effort needed to implement and support CAC. To support this proposition, we take two approaches. First, we examine the current use of standard XML documents in CAC by analyzing a Web Service, called CodeDirect, in current operation that uses XML-formatted documents. Second, we contrast both the type of documentation and the amount of specialized programming needed to implement a standard document versus a non-standard document.

A Web Service is an Internet-based program that can be initiated from a remote client. The remote client must provide appropriate credentials to ensure secure access and comply with the specified programming interfaces for the Web Service. The Web service that we describe here supports a secure coding function in which a document is submitted via an encrypted link. At the Web Service, an NLP coding function is executed and the results are returned in real-time to the remote client. All data is transferred using an XML format.

Analysis

To support coding workflow as part of the revenue cycle process, CAC applications handle patient demographics along with the clinical documentation. For non-standard document types, customized filters are programmed to recognize and extract the patient demographic information from typically the header or footer of the document. An XML-based document structures the patient demographics into a consistent format. Figure 1 is a table of fields that make up the patient demographics for the CodeDirect Web Service. These fields are grouped within XML elements, as list in the second column of the table.

Figure 2 shows an example standard XML document. XML tags are denoted by angle brackets '<' and '>'. In this format, a visit group will contain one or more visits, and each visit includes a physician document stored in the 'Text' field. Note that this format does not include markup of the sections within the physician documentation. A CDA version of this XML document is planned for future development.

Field	XML Element	Description
PatientID	VisitGroup	Patient Identifier
DateService	VisitGroup	Date of Service
PatGender	VisitGroup	Patient Gender
PatDOB	VisitGroup	Patient Date of Birth
PatFirstName	VisitGroup	Patient First Name
PatMiddleName	VisitGroup	Patient Middle Name
PatLastName	VisitGroup	Patient Last Name
PatientVisitNr	Visit	Patient Visit Number
SiteCode	Visit	Site Code
PatMRN	Visit	Medical Record Number
PayerCode	Visit	Payer Code
PayerType	Visit	Payer Type
Doctor ID	Document	Physician Identifier
Doctor	Document	Physician Name
ReferringDoctorID	Document	Referring Physician Identifier
ReferringDoctor	Document	Referring Physician Name
Text	Document	Physician Documentation

Figure 1. Standard Document Fields

This type of Web Service allows CAC coding to be embedded within other applications, such as practice management or health information systems. This kind of interoperability is working now in certain outpatient specialties and is boosting the productivity of revenue cycle functions. Broad use of standard document types will allow these types of services to be used throughout healthcare.

```

<VisitGroup
  DateService="2004-05-04T00:00:00"
  PatGender="1"
  PatDOB="03/13/1987"
  PatFirstName="Michael"
  PatMiddleName="A"
  PatLastName="Tomato">

  <Visit
    PatMRN="109X32475"
    PatAccount="2AB78498934"
    PayerCode="213476"
    PayerType="MCARE">

    <Document      DoctorID="9876"
                   Doctor="CUCUMBER,CLAYTON MD"
                   ReferringDoctorID="80765"
                   ReferringDoctor="CARROT,JOHN R MD"
                   Text="Transcription #1"/>

    <Document      ...../>

    <Visit ...../>

</VisitGroup>

```

Figure 2. Example XML Document

When comparing sites that use standard versus non-standard document types, there is a clear difference in the amount of special programming to support document filtering. For standard document type using the CodeDirect Web Service, special programming is not required for the patient demographics. The only special programming necessary is for the normalization of the physician document. For non-standard document types, patient demographics must be extracted and normalized as well as the physician documentation.

To quantify this difference, we looked at two similar sites that use CAC for radiology and measure the number of lines in the special programming to implement document filtering. For the site with non-standard format, there are a total of 621 lines of special programming. For the site with the standard format, there are 120 lines, less than one-fifth of the line count for the non-standard format.

Discussion of Best Practices

The clinical document standards being defined by the Health Story project extend the XML markup into the content of the clinician documentation. These XML tags identify the sections with a narrative text document. This type of section tagging can be illustrated with a simple example. Figure 3 shows a radiology report in a non-standard format. The primary sections of the documents are denoted with labels in all capital letters followed by colons. While this layout is typical, there can be wide variation in the spelling, placement, punctuation and use of these labels. Understanding the sections of a document is critical to CAC because information in the report must be interpreted within the correct context. The section labels are one of the primary means of communicating that context.

Provider: ALLEN APPLE, M.D.
Referring Dr: MARY MANGO, M.D.

Exams:
R WRIST ROUTINE (3 OR MORE VIEWS) 2008/04/04 10:21:12

RIGHT WRIST, 4 VIEWS

HISTORY: Pain without known trauma.

FINDINGS: No fracture, dislocation or other significant bony abnormality is seen. Joint spaces are well preserved. Accessory ossicle present just distal to the distal ulna.

IMPRESSION: Negative right wrist.

Figure 3. Unstructured Radiology Report

Figure 4 shows the same document with XML tags identifying the sections. The type tags within each section represent standard categories with consistent semantics that define the kind of information in each section. The allowable categories of section types are defined by the documentation standard. Documents with this structure will not require special programming to normalize section labels or paragraph structure. Also, the content of each section will be consistent with the section type, reducing the possibility of misinterpretation while retaining the richness of narrative text.

```

<Document      DoctorID="7642"
                Doctor="APPLE,ALLEN MD"
                ReferringDoctorID="43915"
                ReferringDoctor="MANGO,MARY R MD"/>

<Body>
  <Section>
    <Type = Date_time>
    <Content>
      2008/04/04 10:21:12
    </Content>
  </Section>

  <Section>
    <Type = Exam>
    <Content>
      RIGHT WRIST, 4 VIEWS
    </Content>
  </Section>

  <Section>
    <Type = History>
    <Content>
      Pain without known trauma.
    </Content>
  </Section>

  <Section>
    <Type = Findings>
    <Content>
      No fracture, dislocation or other significant bony
      abnormality is seen.  Joint spaces are well preserved.
      Accessory ossicle present just distal to the distal ulna.
    </Content>
  </Section>

  <Section>
    <Type = Impression>
    <Content>
      Negative right wrist.
    </Content>
  </Section>
</Body>

```

Figure 4. Structured Radiology Report

Conclusion

We have discussed standard document types and their benefit for CAC. Users of CAC can look forward to simpler and faster implementations with standard document types, and can apply some of these lessons to today's CAC implementations:

1. Understand the consistency of your physician documentation and how it compares to standards.
2. Setup alerts to monitor for format changes or unexpected variations that affect coding outcomes.
3. Examine your current documentation process to see if information may be lost between systems. For example, CDA markup may be produced from clinical documentation systems but lost when stored in clinical repositories.

4. Test format changes and new document types with your CAC application to allow for programming updates.

References

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