Enabling Joint Commission Medication Reconciliation Objectives with the HL7 / ASTM Continuity of Care Document Standard

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Abstract

We sought to determine how well the HL7 / ASTM Continuity of Care Document (CCD) standard supports the requirements underlying the Joint Commission medication reconciliation recommendations.

In particular, the Joint Commission emphasizes that transition points in the continuum of care are vulnerable to communication breakdowns, and that these breakdowns are a common source of medication errors. These transition points are the focus of communication standards, suggesting that CCD can support and enable medication related patient safety initiatives.

Data elements needed to support the Joint Commission recommendations were identified and mapped to CCD, and a detailed clinical scenario was constructed. The mapping identified minor gaps, and identified fields present in CCD not specifically identified by Joint Commission, but useful nonetheless when managing medications across transitions of care, suggesting that a closer collaboration between the Joint Commission and standards organizations will be mutually beneficial.

The nationally recognized CCD specification provides a standards-based solution for enabling Joint Commission medication reconciliation objectives.

Introduction

Current and evolving healthcare communication standards have a growing role in supporting national and other important patient safety initiatives. In this manuscript, we illustrate this point by describing how the HL7 / ASTM Continuity of Care Document (CCD) standard supports and enables Joint Commission medication reconciliation recommendations.

The Institute for Safe Medication Practice (ISMP) issued a series of medication error scenarios in 2005, noting that “each error is the direct result of failed communication about prescribed medications during vulnerable transition points in the continuum of healthcare”. The Joint Commission’s recommendations further emphasize that medication errors “typically occur at the interfaces of care - when a patient is admitted to, transferred within, or discharged from a health care facility”. It has been suggested that standards, deployed at these critical junctures, can decrease the risk for error. These transition points, when accurate communication is critical, are the focus of healthcare communication standards.

CCD is the product of collaboration between two prominent healthcare standards organizations (Health Level 7 (HL7), www.hl7.org/; ASTM International, www.astm.org/), and has been recommended for adoption in the US by the Department of Health and Human Service’s American Health Information Community (AHIC, www.hhs.gov/healthit/community/background/) and Healthcare Information Technology Standards Panel (HITSP, www.ansi.org/hitsp/). One of the driving objectives behind CCD was to standardize the communication of medication information in support of care transitions.

It should be noted however that Joint Commission recommendations include many requirements, some of which are not formally addressed in CCD. Closer collaboration between those creating the initiatives and those creating the standards, ensuring that requirements are fed in to the standards development process, will help resolve these gaps on an ongoing basis.

Background

The Joint Commission defines medication reconciliation as “the process of comparing a patient’s medication orders to all of the
medications that the patient has been taking. [...] It should be done at every transition of care in which new medications are ordered or existing orders are rewritten. [...] This process comprises five steps: 1) develop a list of current medications; 2) develop a list of medications to be prescribed; 3) compare the medications on the two lists; 4) make clinical decisions based on the comparison; and 5) communicate the new list to appropriate caregivers and to the patient.”

Of the five steps, the first and fifth are amenable to communication standards-based solutions, while the second through fourth are more application dependent. Step one requires that existing sources of medication information are obtained and converged into a single list of current medications. This convergence of often conflicting medication information from various sources is enabled both by indicating the source of information and by indicating whether the source is reporting intended or actual medication use. For instance, a physician may intend for a patient to be on a particular dose, but the patient may actually be taking a different dose; a pharmacy may fill a prescription for a particular dose only to then have the patient’s physician lower the dose without notifying the pharmacy. Step five entails communicating the medication list from one party to another.

CCD is the product of collaboration between HL7 and ASTM, and represents an implementation of the ASTM Continuity of Care Record (CCR) specification as a set of constraints layered atop the HL7 Clinical Document Architecture (CDA) specification. The ASTM CCR is a core data set of the most relevant administrative, demographic, and clinical information facts about a patient’s healthcare, covering one or more healthcare encounters. It provides a means for one healthcare practitioner, system, or setting to aggregate all of the pertinent data about a patient and forward it to another practitioner, system, or setting to support the continuity of care. The HL7 CDA is a document markup standard that specifies the structure and semantics of clinical documents for the purpose of exchange. From its inception, CDA has supported the ability to represent professional society recommendations, national clinical practice guidelines, and standardized data sets. From the perspective of CDA, the CCR is a standardized data set that can be used to constrain CDA specifically for summary documents. The resulting specification is the CCD.

AHIC is a federal advisory body, chartered in 2005 to make recommendations to the Secretary of the U.S. Department of Health and Human Services on how to accelerate the development and adoption of health information technology. Since its formation, the AHIC identified four initial areas with potential for early breakthroughs in the advancement of standards that will lead to interoperability. The AHIC organized four workgroups to pursue recommendations in these areas, and delivered their first set of recommendations to the Secretary in May of 2006. One of these workgroups, the Consumer Empowerment workgroup, has focused much of its attention on medication-related use cases, and has since recommended CCD as the standard whereby such use cases would be enabled. The 2007 AHIC Medication Management use case has a particular focus on medication reconciliation.

While the use cases defined by the Consumer Empowerment workgroup and the requirements that went into the development of CCD overlap considerably with the requirements underlying the Joint Commission medication reconciliation recommendations, they are not identical.

**Methods**

The process used to map CCD against Joint Commission medication reconciliation recommendations included: [1] Starting with the Joint Commission report, and focusing on the first and fifth steps described above, define data elements needed to support the recommendations; [2] Map those data elements to CCD; [3] Build an example to illustrate.

**Results**

Table 1 summarizes the identified Joint Commission data elements, and the mapping to CCD.

The exact representation of medication compliance remains an open issue. The Consumer Empowerment workgroup noted that medication information “needed to analyze medication compliance and deliver patient education, are important, but are out of scope.” CCD currently supports the differentiation of
Table 1. Data elements (required and optional) to support use cases: [1] collect a complete list of current medications; [2] communicating the list to the next provider of care.

<table>
<thead>
<tr>
<th>Joint Commission Data element</th>
<th>Corresponding Continuity of Care Document field</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medication details</strong></td>
<td></td>
</tr>
<tr>
<td>Brand name</td>
<td>ManufacturedProduct / material / code / originalText</td>
</tr>
<tr>
<td>Generic name</td>
<td>ManufacturedProduct / material / name</td>
</tr>
<tr>
<td>Strength / Form / Concentration</td>
<td>ManufacturedProduct / material / code</td>
</tr>
<tr>
<td><strong>Dosing instructions</strong></td>
<td></td>
</tr>
<tr>
<td>Dose</td>
<td>SubstanceAdministration / doseQuantity</td>
</tr>
<tr>
<td>Frequency</td>
<td>SubstanceAdministration / effectiveTime</td>
</tr>
<tr>
<td>Route</td>
<td>SubstanceAdministration / routeCode</td>
</tr>
<tr>
<td>PRN criteria</td>
<td>SubstanceAdministration / precondition / criterion</td>
</tr>
<tr>
<td><strong>Administration details</strong></td>
<td></td>
</tr>
<tr>
<td>Compliance</td>
<td>Record of actual use (moodCode of EVN)</td>
</tr>
<tr>
<td>Time of last dose</td>
<td>SubstanceAdministration / effectiveTime</td>
</tr>
<tr>
<td>Intended vs. actual use</td>
<td>SubstanceAdministration / moodCode</td>
</tr>
<tr>
<td><strong>Dispense details</strong></td>
<td></td>
</tr>
<tr>
<td>Quantity</td>
<td>Supply / quantity</td>
</tr>
<tr>
<td><strong>Additional information</strong></td>
<td></td>
</tr>
<tr>
<td>Indication</td>
<td>SubstanceAdministration / entryRelationship / @typeCode=&quot;RSON&quot; (reason)</td>
</tr>
<tr>
<td>Source of information</td>
<td>Informant</td>
</tr>
<tr>
<td>Status (e.g. active, suspended)</td>
<td>SubstanceAdministration / statusCode</td>
</tr>
<tr>
<td>Setting (e.g. home, inpatient)</td>
<td>Separate document sections for admission meds vs. transfer meds</td>
</tr>
</tbody>
</table>

actual vs. intended medication use, and thus can indicate what the patient says they are actually taking.

The following scenario illustrates the use of CCD in support of Joint Commission recommendations. *Henry Levin the 7th is a 75 year old male with type 2 diabetes mellitus, coronary artery disease, stage 2 chronic kidney disease, and left ventricular diastolic dysfunction. He is admitted to hospital on Jan 12, 2007, with fever, volume depletion, left lower extremity cellulitis, and increase in baseline serum creatinine. Intravenous clindamycin is administered. Fever and cellulitis improve over the ensuing three days, and serum creatinine returns to baseline. He is transferred to a skilled nursing facility (SNF) on Jan 15, 2007 to complete a course of intravenous antibiotics. At the time of admission, his clinician obtains medication information from a pharmacy application and from the patient’s personal health record (PHR). Each of these is communicated to the clinician as CCD documents. Figure 1 shows an abbreviated CCD obtained from the pharmacy, and Figure 2 shows an abbreviated CCD obtained from the personal health record.

During the hospitalization, medications are adjusted. Figure 3 shows an abbreviated CCD generated at the time of transfer from the hospital to the skilled nursing facility, containing a section for medications on admission and a section for ongoing medication orders.

**Discussion**

We have found that CCD supports the data exchange requirements underlying the Joint Commission medication reconciliation recommendations. Minor gaps were identified (e.g. the representation of compliance). In addition, CCD provides fields not specifically identified by Joint Commission, but useful nonetheless when managing medications across transitions of care. These include adverse drug reaction observations and interventions, reasons for stopping or suspending medications, and series number (e.g. 2nd in a series of 3 vaccinations). These findings suggest not only

* The scenario is abbreviated due to space limitations. Contact RHD for complete CCD examples.
**Figure 1. CCD from Pharmacy to Hospital**

```xml
<section>
    <code code="10160-0">
        <codeSystem>
            2.16.840.1.113883.6.1
        </codeSystem>
        <title>Medications</title>
        <text>
            <list>
                <item>
                    Metformin (Glucophage) 500mg tablet, 2 tablets BID PO.
                </item>
                <item>
                    Clopidogrel (Plavix) 75mg tablet, 1 tablet a day PO.
                </item>
                <item>
                    Metoprolol (Lopressor) 50mg tablet, 1 tablet BID PO.
                </item>
                <item>
                    Lisinopril (Zestril) 10mg tablet, 1 tablet a day PO.
                </item>
            </list>
        </text>
    </section>
```

**Figure 2. CCD from PHR to Hospital**

```xml
<section>
    <code code="10160-0">
        <codeSystem>
            2.16.840.1.113883.6.1
        </codeSystem>
        <title>Medications</title>
        <text>
            <list>
                <item>
                    Glucophage 1 tablet BID.
                </item>
                <item>
                    Plavix 1 tablet a day.
                </item>
                <item>
                    Metoprolol 1/2 tablet BID.
                </item>
                <item>
                    Lisinopril 1 tablet a day.
                </item>
            </list>
        </text>
    </section>
```

**Figure 3. CCD from Hospital to SNF**

```xml
<section>
    <code code="10160-0">
        <codeSystem>
            2.16.840.1.113883.6.1
        </codeSystem>
        <title>Medications</title>
        <text>
            <list>
                <item>
                    Metformin (Glucophage) 500mg tablet, 1 tablet BID PO.
                </item>
                <item>
                    Clopidogrel (Plavix) 75mg tablet, 1 tablet a day PO.
                </item>
                <item>
                    Metoprolol (Lopressor) 50mg tablet, 1/2 tablet twice a day PO.
                </item>
                <item>
                    Lisinopril (Zestril) 10mg tablet, 1 tablet a day PO.
                </item>
            </list>
        </text>
    </section>
```
that a closer collaboration between the Joint Commission and standards developers will help resolve gaps on an ongoing basis, but also that Joint Commission may benefit from the existing work that has gone into standardizing medication-related use cases.

Segal’s Law states that “A man with a watch knows what time it is. A man with two watches is never sure”. Likewise, where there are multiple and conflicting sources of medication information, uncertainty can remain as to a patient’s exact regimen. Such uncertainty may not be wholly amenable to a standards-based solution, particularly where data is not available in electronic form. Still, as Poon, et al have shown, there is incremental benefit in going from narrative to fielded data to standards-based data. The nationally recognized CCD specification provides such a standards-based solution.

Acknowledgements

The CCD specification could never have been written without a close working relationship between HL7 and ASTM. CCD reflects an overlap of two complementary specifications (CCR, CDA) derived by different standards organizations, and shows what can be achieved when patient care is the driving priority.

References