The ASTM/HL7 Continuity of Care Document

HIMSS 2008
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Liora Alschuler

- Consultant in healthcare IT 1997–present
  - Founded consulting firm in 2005
  - Background in electronic text, industry analyst with Seybold Publications, xml.com

- Volunteer standards work
  - Health Level Seven Board of Directors (2005–2008)
  - Co–chair Structured Documents Technical Committee
  - Co–editor Clinical Document Architecture (CDA)
  - Co–editor, Continuity of Care Document (CCD), H&P, Consult, Op Note

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Alschuler Associates, LLC

- Standards-based solutions for vendors, providers, standards developers
- CDA Implementations:
  - Military Health System
    - Enterprise-wide documents, files, images (DFIEA)
  - Centers for Disease Control and Prevention
    - Implementation Guide for Healthcare Associated infection Reports for the National Healthcare Safety Network
  - North American Association of Central Cancer Registries
    - Implementation Guide for cancer abstracts
  - Department of Health and Human Services
    - Supporting the Health IT Standards Panel (HITSP); Health Information Standards for Privacy and Confidentiality (HISPC); Assistant Secretary for Planning and Evaluation, prototype of the Minimum Data Set (MDS)
  - CDA4CDT
    - Co-founder & Project Management
  - Private, commercial clients: Fortune 100 and startups
Health Level Seven (HL7)

• Non-profit ANSI Standards Development Organization
• 20 years old
• 2000+ members
  – individual, corporate
• 30 affiliates
  – US affiliate in near future
• “A model community”: building standards to a single information model
HL7 Standards

- Version 2.x
- Version 3
  - Messages
  - CDA: Clinical Document Architecture
- Others
  - EHR Functional Model
  - CCOW: Clinical Context Object Working Group (= Desktop Integration)
  - Arden Syntax (Decision Support)
  - ...

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CDA: Clinical Document Architecture

• An HL7 Version 3 specification
  ‒ ANSI/HL7 CDA R1.0–2000
  ‒ ANSI/HL7 CDA R2.0–2005

• Created & maintained by HL7 Structured Documents Technical Committee (SDTC)

• A specification for document exchange using
  ‒ Extensible Markup Language (XML)
  ‒ the HL7 Reference Information Model (RIM)
  ‒ Version 3 methodology
  ‒ and vocabulary (SNOMED, ICD, local,...)
The CDA Defined

CDA Release 2, section 2.1:

A clinical document ... has the following characteristics:

- Persistence
- Stewardship
- Potential for authentication
- Context
- Wholeness
- Human readability

- therefore, CDA documents are *not*:
  - data fragments, unless signed
  - birth–to–death aggregate records
  - electronic health records
CDA = Header + Body

- CDA Header
  - Metadata required for document discovery, management, retrieval

- CDA Body
  - Clinical report
    - Discharge Summary
    - Care Record Summary
    - Progress Note
    - H&P
    - Public health report
  - ... any content that carries a signature
CDA Body: human-readable

- Any type of clinical document
  - Discharge Summary
  - Care Record Summary
  - Progress Note
  - H&P
  - Public health report
  - ... potential for signature
- Format: non-XML...tif, PDF, HTML,
- Format: XML
  - Paragraph
  - List
  - Table
  - Caption
  - Link
  - Content
  - Presentation

Vital Signs

Date / Time  April 7, 2000 14:30  April 7, 2000 15:30
Height       177 cm (69.7 in)
Weight       194.0 lbs (88.0 kg)
BMI          28.1 kg/m2
BSA          2.05 m2
Temperature  36.9 °C (98.5 °F)  36.9 °C (98.5 °F)
Pulse        88 / minute  84 / minute
Rhythm       Regular  Regular
Respirations 16 / minute, unlabored  14 / minute
Systolic     132 mmHg  135 mmHg
Diastolic    88 mmHg  88 mmHg
Position / Cuff Left Arm  Left Arm

Skin Exam

Erythematous rash, palmar surface, left index finger
CDA XML Body: processible

- Clinical statement: Model–based computable semantics
  - Observation
  - Procedure
  - Organizer
  - Supply
  - Encounter
  - Substance Administration
  - Observation Measurement
  - Region Of Interest
  - Act

```xml
<title>Past Medical History</title>
- <text>
  - <list>
    - <item>
      <content ID="a1">Asthma</content>
    </item>
    + <item>
      + <item>
    </item>
  </list>
</text>
- <entry>
  - <observation classCode="COND" moodCode="EVN">
    <code code="39154008" codeSystem="2.16.840.1.113883.6.96"
    codeSystemName="SNOMED CT" displayName="clinical diagnosis" />
    <effectiveTime value="1950" />
    - <value xsi:type="CD" code="195967001" codeSystem="2.16.840.1.113883.6.96"
      codeSystemName="SNOMED CT" displayName="Asthma" />
    - <originalText>
      <reference value="#a1" />
  </observation>
```

Optional
HL7’s CDA

- Clinical Document Architecture
  - ANSI/HL7 R1–2000, R2–2005
- eDocuments for Interoperability
  - Key component for local, regional, national electronic health records
  - Gentle on-ramp to information exchange
    - Everyone uses documents
    - EMR compatible, no EMR required
    - All types of clinical documents
ASTM’s CCR

Designation: E 2369 – 05

Standard Specification for Continuity of Care Record (CCR)\(^1\)

This standard is issued under the fixed designation E 2369; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 The Continuity of Care Record (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.\(^2\) 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.

1.1.1 The CCR data set includes a summary of the patient’s health status (for example, problems, medications, allergies) and basic information about insurance, advance directives, care documentation, and the patient’s care plan. It also includes identifying information and the purpose of the CCR. (See 5.1 for a description of the CCR’s components and sections, and Annex A1 for the detailed data fields of the CCR.)

1.3 To ensure interchangeability of electronic CCRs, this specification specifies XML coding that is required when the CCR is created in a structured electronic format.\(^5\) This specified XML coding provides flexibility that will allow users to prepare, transmit, and view the CCR in multiple ways, for example, in a browser, as an element in a Health Level 7 (HL7) message or CDA compliant document, in a secure email, as a PDF file, as an HTML file, or as a word processing document. It will further permit users to display the fields of the CCR in multiple formats.

1.3.1 The CCR XML schema or .xsd (see the Adjunct to this specification) is defined as a data object that represents a snapshot of a patient’s relevant administrative, demographic,
CDA & CCR

- CCR
  - Paper or electronic, but always XML if electronic
  - XML: per annex or “other XML representation made possible through joint efforts of ASTM and other Standards Development Organizations…”
  - “This specified XML coding provides flexibility that will allow users to prepare, transmit, and view the CCR in multiple ways, for example, in a browser, as an element in a Health Level 7 (HL7) message or CDA compliant document,…”
ASTM CCR vs. HL7 CDA

- Conflicting?
- Overlapping?
- What if you could have both!#*?!!!
  - What if you could have your data elements
  - And send them in a common exchange framework?
ASTM CCR + HL7 CDA = CCD

- CDA is designed to support professional society recommendations, national clinical practice guidelines, standardized data sets, etc.
- From the perspective of CDA, the ASTM CCR is a standardized data set that can be used to constrain CDA specifically for summary documents.
- The resulting specification, known as the Continuity of Care Document (CCD), is being developed as a collaborative effort between ASTM and HL7.
Continuity of Care Document

- CCD maps the CCR elements into a CDA representation.

<table>
<thead>
<tr>
<th>CCR data element</th>
<th>CDA R2 correspondence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results</td>
<td>Section</td>
</tr>
<tr>
<td>Result</td>
<td>Observation</td>
</tr>
<tr>
<td>Date Time</td>
<td>Observation.effectiveTime</td>
</tr>
<tr>
<td>Type: Values include: Hematology, Chemistry, Serology, Virology, Toxicology, Microbiology, Imaging – X-ray, Ultrasound, CT, MRI, Angiography, Cardiac Echo, Nuclear Medicine, Pathology, Procedure</td>
<td>Draw values from observation.code (e.g. by looking at the LOINC class for a LOINC code).</td>
</tr>
<tr>
<td>Description</td>
<td>Observation.code</td>
</tr>
<tr>
<td>Status</td>
<td>Observation.statusCode</td>
</tr>
<tr>
<td>Procedure</td>
<td>Observation.methodCode; Procedure</td>
</tr>
<tr>
<td>Test</td>
<td>Observation</td>
</tr>
</tbody>
</table>
### Good Health Clinic Continuity of Care Document

**Patient:** Henry Levin, the 7th  
**Birthdate:** September 24, 1932  
**Consultant:**  

---

### Advance Directives

**Directive** | **Description** | **Verification** | **Status**
--- | --- | --- | ---
Resuscitation status | Do not resuscitate | Dr. Robert Dolin, Nov 07, 1999 |  

### Functional Status

**Functional Condition** | **Effective Dates** | **Condition Status**
--- | --- | ---
Dependence on cane | 1998 | Active  

### Problems

**Condition** | **Effective Dates** | **Condition Status**
--- | --- | ---
Asthma | 1950 | Active  
Pneumonia | Jan 1997 | Resolved  
Myocardial Infarction | Jan 1997 | Resolved  

### Family history

**Member:** Father, Status: deceased  
**Diagnosis** | **Age At Onset**
--- | ---
Myocardial Infarction | 57  
Hypertension | 40
Continuity of Care Document

Project will develop basis for automated translation

<Results>
  <Result>
    <CCRDataObjectID>
      2.16.840.1.113883.19.1
    </CCRDataObjectID>
    <DateTime>
      <Type>
        <Text>Assessment Time</Text>
      </Type>
      <ExactDateTime>
        2000-04-07T14:30Z
      </ExactDateTime>
    </DateTime>
    <Type>
      <Text>Hematology</Text>
    </Type>
    <Description>
      <Text>CBC WO DIFFERENTIAL</Text>
    </Description>
    <Status>
      <Text>Final Results</Text>
    </Status>
  </Result>
</Results>

<secion>
  <code code="30954-2" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC"/>
  <title>RESULTS</title>
  <text>
    CBC (04/07/2000): HGB 13.2; WBC 6.7; PLT 123*
  </text>
  <entry typeCode="DRIV">
    <observation classCode="OBS" moodCode="EVN">
      <id root="2.16.840.1.113883.19" extension="1"/>
      <code code="43789009" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="CBC WO DIFFERENTIAL"/>
    </observation>
    <statusCode code="completed"/>
    <effectiveTime value="200004071430"/>
CCR CDA correspondence

<observation classCode="OBS" moodCode="EVN">
  <id root="2.16.840.1.113883.19" extension="1"/>
  <code code="43789009" codeSystem="2.16.840.1.113883.6.96"
    codeSystemName="SNOMED CT" displayName="CBC WO DIFFERENTIAL"/>
</observation>

• Same Context:
  - CDA: observation, code, code system
  - CCR: description, code, value, coding system
• CDA: optional unique ID; code system ID; mood
• Different approaches to human-readable text
• There are differences, but an implementation guide can support interoperability

<Description>
  <Text>CBC WO DIFFERENTIAL</Text>
  <Code><Value>43789009</Value>
    <CodingSystem>SNOMED CT</CodingSystem></Code>
</Description>
Continuity of Care Document

- Did this come out of the blue?
- There is a history of collaboration
  - Many people have participated in both efforts
  - Presentation on CDA for continuity of care at ASTM CCR meeting, August, 2003
  - Memorandum of Understanding, 2004
  - Acapulco demo: CDA for CCR, October, 2004
    - HL7 partnered with Massachusetts Medical Society, Microsoft, Ramsey Systems (UK)
  - Initial HL7 Care Record Summary ballot, April, 2005:
    - Limited to CDA header, no detailed section coding
    - Anticipated: “Development of detailed (CDA Level 3) Implementation Guides for “continuity of care” (CCR) in collaboration with the ASTM E31 under the 2004 Memorandum of Understanding”
  - HL7 ballot on CCR, Spring 2005: incorporated changes required for bi-directional exchange and semantic interoperability
Continuity of Care Document

• “ASTM is dedicated and privileged to work in collaboration with HL7 on the expression of ASTM's Continuity of Care Record content within HL7's CDA XML syntax and the seamless transformation of clinical and administrative data between the two standards.”

• Rick Peters, MD, E31.28
CDA & CCR: differences

<table>
<thead>
<tr>
<th></th>
<th>CDA</th>
<th>CCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snapshot in time</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Simple rendering</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Legal part of record</td>
<td>Yes</td>
<td>Maybe</td>
</tr>
<tr>
<td>Model based</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Shared data types</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Extensibility</td>
<td>Defined</td>
<td>Undef.</td>
</tr>
<tr>
<td>Additional types</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Incremental Semantics</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
CDA: for the full patient record

HL7–balloted Implementation Guides:

- Continuity of Care Document (CCD) ASTM complete
- History & Physical (H&P) CDA4CDT complete*
- Consult Note CDA4CDT complete*
- Healthcare Associated Infection CDC/NHSN complete*
- Operative Note CDA4CDT May ’08**
- Diagnostic Imaging Reports DICOM May ’08**
- Personal Health Monitor Report Continua May ’08**
- PHR2PHR Summary AHIP/BCBSA May ’08**
- Quality Reporting Document Arch QRDA Sept ’08**
- others in development:
  - anesthesiology, anatomic pathology, lab, long term care, pediatrics

* = will be published shortly
** = first ballot
- constrain or reuse CCD templates
CDA: for the full patient record

US Dept. of Health & Human Services:
- Health Information Technology Standards Panel (HITSP)
  - Summary, Meds, Lab  2007–
  - Quality, ED  2008
- HIPAA Claims Attachments  HL7/X12  NPRM/complete
- Minimum Data Set (MDS)  HHS  proof of concept 08

Pilots/Prototypes:
- North American Association of Central Cancer Registries (NAACCR)  NAACCR  summer ’08
- Quality Reporting Document Architecture (QRDA)  summer ‘08
  - Alliance for Pediatric Quality, Children's Hospital Corporation of America, HL7 Pediatric Data Standards SIG
- DICOM SR 2 CDA Transformation Guide DICOM  summer ’08
- Integrating the Healthcare Enterprise  IHE  HIMSS 08
  - 7 Patient Care Coordination profiles using CCD

constrain or reuse CCD templates
Continuity of Care Document

• Benefits
  – Summaries for continuity of care
    • Interoperable with full range of document types
    • Interoperable with HL7 V3 messages, all RIM-based specifications (public health reporting, clinical trials, structured product labels and more)
More Information

- at HIMSS: **Wednesday, 3:15**, HERE: What’s New with CDA?
- **Wednesday, 5:30**, HERE: The CCD in National and International Activities

- JAMIA

- XML [http://www.w3.org/TR/xml](http://www.w3.org/TR/xml)

  - *these slides will be posted by ... 3/7/08*
  - Quick Start Guides
  - CDA Validator
  - CDA Gallery
  - liora@alschulerassociates.com
Thank you!
Questions?