The HL7 CDA: What’s New?

or, CDA, it's not just for transfer of care...

HIMSS 2008
Liora Alschuler
www.alschulerassociates.com
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

- liora@alschulerassociates.com
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)
  – …
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)   |
| Pulse      | 86 / minute         |
| Rhythm     | Regular             |
| Respirations| 16 / minute, unlabor | 14 / minute |
| Systolic   | 132 mmHg            |
| Diastolic  | 88 mmHg             |
| Position / Cuff | Left Arm | Left Arm |

Skin Exam

Erythematous rash, palmar surface, left index finger.

© Alschuler Associates, LLC 2008
CDA XML Body: processible

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

```xml
<title>Past Medical History</title>
- <text>
  - <list>
    - <item>
      <content ID="a1">Asthma</content>
    </item>
  </list>
- <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" />
```
CDA Implementation Guides

- The CDA itself is generic
  - `<section>` not `<HPI>`
  - all clinical information optional, none required
- To define specific requirements, CDA is constrained through Implementation Guides (IGs)
  - specific use case, audience, application
  - for example:
    - Continuity of Care, transfer of care
    - H&P, US realm, history-taking
    - Healthcare Associated Infection Reports, US CDC, National Healthcare Safety Network
CDA IGs Constraints

- The keywords shall, shall not, should, should not, may, and need not are described in the HL7 V3 Publishing Facilitator’s Guide: example:
  - CONF-HP-53: At least one ClinicalDocument/templateId element SHALL be present with the value 2.16.840.1.113883.10.20.2.
- Conformance statements can be associated with a templateld:
  - `<templateId root=2.16.840.1.113883.10.20.2'/> <!-- conforms to the DSTU -->
- TemplateIds can be asserted at the document, section and entry level
Validating CCD

- Schemas can validate conformance to the IG constraints, triggered by reading a templateId
  - TemplateId asserts conformance with the constrains in the IG
  - Today, we use Schematron/XPath schemas which can validate specific aspects of the XML instance
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
- We’ll take a closer look at these…
CDA4CDT

- Reuse CCD templates from sub-document level
- Add constraints required for common types of documents
CDA4CDT Project Members

- Founders:
  - M*Modal
  - AHiMA
  - AHIMA

- Benefactors:
  - Spheris
  - MedQuist
  - InterFix
  - 3M
  - Precyse Solutions
  - webmedx
  - mdintouch
  - QuadraMed
  - ImageTek
  - A-Life Medical
  - MISYS

- Management:
CDA4CDT: bridging the gap between EMRs and eDocuments

- CDA4CDT will:
  - Establish consensus on content, eDocument format
  - Propagate support for CDA within the dictation/transcription industry
  - Create consistent electronic documents for importation into EMR, document repositories and for use with health information exchanges (HIEs)
  - Increase EMR adoption

- Highest potential:
  - Massively increase amount of data in fledgling exchange networks because minimally disruptive to current workflow

- Success:
  - At least 25% of RFPs for transcription, EMRs, integration and information exchange cite compliance as a requirement
CDA4CDT Consult Note

• Consult-specific requirements:
  – This standard specifies constraints on CDA R2 for Consultation Notes. It re-uses section and entry-level templates created for CCD and for the History and Physical DSTU[1].

• as defined by CMS:
  – “... a Consultation Note must be generated as a result of a physician or non-physician practitioner’s (NPP) request for an opinion or advice from another physician or NPP. Consultations must involve face-to-face time with the patient or fall under guidelines for telemedicine visits.

• the note:
  – “... must include the reason for the referral, history of present illness, physical examination, and decision-making component (assessment and plan).”
<table>
<thead>
<tr>
<th>Section Category</th>
<th>R/O</th>
<th>Code</th>
<th>Component Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason for Referral/Reason for Visit</td>
<td>R</td>
<td>42349-1</td>
<td>REASON FOR REFERRAL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29299-5</td>
<td>REASON FOR VISIT</td>
</tr>
<tr>
<td>History of Present Illness</td>
<td>R</td>
<td>10164-2</td>
<td>HISTORY OF PRESENT ILLNESS</td>
</tr>
<tr>
<td>Physical Examination</td>
<td>R</td>
<td>29545-1</td>
<td>PHYSICAL FINDINGS</td>
</tr>
</tbody>
</table>

Optional Subsections

<table>
<thead>
<tr>
<th>Code</th>
<th>Component Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>10210-3</td>
<td>GENERAL STATUS, PHYSICAL FINDINGS (optional, must be subsection)</td>
</tr>
</tbody>
</table>

See Appendix D—List of Additional Physical Examination Subsections.

Additional optional subsections include those in section 3.3.3 (Provider Unspecified History and Physical Note) of the “Additional Information Specification 0004: Clinical Reports Attachment”.

<table>
<thead>
<tr>
<th>Section Category</th>
<th>R/O</th>
<th>Code</th>
<th>Component Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment and Plan</td>
<td>R</td>
<td>AAPLN-X</td>
<td>ASSESSMENT AND PLAN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASSMT-X</td>
<td>ASSESSMENT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18776-5</td>
<td>PLAN</td>
</tr>
<tr>
<td>Past Medical History</td>
<td>O</td>
<td>11348-0</td>
<td>HISTORY OF PAST ILLNESS</td>
</tr>
<tr>
<td>Medications</td>
<td>O</td>
<td>10160-0</td>
<td>HISTORY OF MEDICATION USE</td>
</tr>
<tr>
<td>Allergies</td>
<td>O</td>
<td>48765-2</td>
<td>ALLERGIES, ADVERSE REACTIONS, ALERTS</td>
</tr>
<tr>
<td>Social History</td>
<td>O</td>
<td>29762-2</td>
<td>SOCIAL HISTORY</td>
</tr>
<tr>
<td>Family History</td>
<td>O</td>
<td>10157-6</td>
<td>HISTORY OF FAMILY MEMBER DISEASES</td>
</tr>
</tbody>
</table>
CDA for Reporting: HAI

- Healthcare Associated Infection Reports
  - Division of Healthcare Quality Promotion, National Center for Preparedness, Detection, and Control of Infectious Diseases (NCPDCID), and Centers for Disease Control and Prevention (CDC)
  - National Healthcare Safety Network
  - Single patient and population summary reports
- Regulatory and Business drivers
  - mandated reporting -- state by state
  - infection control vendors want submission channel
  - goal: optimum compatibility, reuse of information from electronic records
- Draft Standard for Trial Use (March, 2008)
  - Blood Stream Infection
  - Surgical Site Infection
  - Procedure Denominator Report
  - Denominator for Intensive Care Unit (ICU)/Other Locations (not NICU or SCA) Report
  - more in planning
CDA for Reporting: Quality

- Quality Reporting Document Architecture
  - To develop an electronic data standard for exchange of patient-level quality measurement data between healthcare information systems.
- HL7 CDA Implementation Guide
  - Collaboration with wide range of quality measure stakeholders
  - HITSP, NQF HITEP, Collaborative for Performance Measure Integration with EHR Systems, IHE
- Initial proof of concept:
  - Joint Commission asthma measure — Pediatric, inpatient
    - CAC-1
    - CAC-2
  - DOQ-IT CAD-1–7 — Adult, ambulatory
    - Single or multiple visits
    - With evidence that test ordered; with test result
Participants: A Private Collaborative

Founders

Primary Benefactor
For Phase One

HL7 Sponsor

Project Management

www.kidsquality.org
Feedback to clinicians

**Data Entry**
100% manual process: data abstraction and data mining

**Prepare data for analysis**

**Requestors of Quality Data**
- Quality Improvement Organizations
- Accrediting Organizations, Medical Societies, The Alliance
- Payers

**Paper Medical Records**
- Key-boarding or manual entry

**Electronic Health Records**
- Complete?

**QRDA**

**Point of Care clinicians**
**QRDA Patient Report: CAC-1 and CAC-2**

*Created On: August 20, 2007*

<table>
<thead>
<tr>
<th>Problem List</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrinsic Asthma, with Status Asthmaticus</td>
<td></td>
</tr>
<tr>
<td>Hypoxemia</td>
<td></td>
</tr>
</tbody>
</table>

**Results**

- Pulse Oximetry: 93% O₂ saturation at Room Air

**Medications**

- Respiratory medication administered by: Albuterol Inhalant Solution [Accuneb Inhalation Solution]
- Oxygen therapy
- Prednisolone (Orapred solution)

**Allergies, Adverse Reactions**

- Contraindication to Relievers (CAC-1): None
- Contraindication to Systemic Corticosteroids (CAC-2): None

**Medications**

- Albuterol (ALBUTEROL SULFATE - ACCUNEB INHALATION SOLUTION)
- Prednisolone (ORAPRED SOLUTION)

**Admission Source**

Emergency room

---

 Were relievers administered? Clinical and administrative formats

**Strawmen Samples**
CCD templates are EMR compatible

Single implementation for vendors
• if templateId =
  •  <templateId root="2.16.840.1.113883.3.117.1.2.4.3" displayable="Use of relivers for Inpatient Asthma (CAC-1)"/>

• and diagnosis =
  •  <value xsi:type="CD" code="493.01" codeSystem="2.16.840.113883.6.103" codeSystemName="ICD-9"
displayName="Extrinsic Asthma, with Status Asthmaticus"/>

• then QRDA SHALL contain
  •  <substanceAdministration> ... <code code="93.94" codeSystem="2.16.840.113883.6.103" codeSystemName="ICD-9"
displayName="Respiratory medication administered by nebulizer"/>

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<schema xmlns="http://www.ascc.net/xml/schematron"
   xmlns:cda="urn:hl7-org:v3">
  <title>Schematron schema for validating conformance to JACHO CAC1</title>
  <ns prefix="cda" uri="urn:hl7-org:v3" />
  <phase id='errors' > <active pattern='example'/>
    <pattern id='example' see='#example'>
      <title>Example</title>
      <rule
        context="*[cda:templateId/@root="2.16.840.1.113883.3.117.1.2.4.3"]
        *[//cda:observation[cda:value/@code="493.01"]
         [cda:value/@codeSystem="2.16.840.113883.6.103"]]">
        <assert test="/cda:substanceAdministration/cda:code[@code='93.94']
         [@codeSystem='2.16.840.113883.6.103']">If Extrinsic Asthma, with Status Asthmaticus
          is observed, respiratory medication must be administered by nebulizer</assert>
    </pattern>
  </phase>
</schema>
Key Findings

- **Clinical interoperability**
  - Feasible to re-use templates developed for EHR interoperability
    - Simplifies data collection processes
    - Simplifies vendor application development
  - Promotes flexible workflow
    - Single- or multiple-visit submissions with updates
    - Anonymized or patient-identifiable
    - Internal and/or external reporting

- **Point of care feedback**
  - Immediate validation that data set is complete
  - Can support guideline compliance
  - Reuse of clinical templates lays foundation for decision support

- **Fits well in interoperability landscape**
  - HL7 ballot project approved
  - HITSP and IHE likely to adopt; on track for CCHIT adoption
  - Supports AHIC and HITSP use cases
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

© Alschuler Associates, LLC 2008
CDA Document Types

• Common:
  – schema
  – header
  – display style sheet (although can specialize)

• Reuse: semantic patterns
  – HPI section template
  – Problem, medication entry templates

• Constraints/extensions for specific applications, populations

• End-game:
  – continuity of care, research, reporting all fed from same repository of clinical documents
  – document repository as most comprehensive view of care
More Information

• at HIMSS: Wednesday, 5:30, HERE: The CCD in National and International Activities


• NHSN HAI: [www.cdc.gov/ncidod/dhq/nhsn.html](http://www.cdc.gov/ncidod/dhq/nhsn.html)

• [www.AlschulerAssociates.com](http://www.alschulerassociates.com)
  - *these slides will be posted by ... 3/7/08*
  - Quick Start Guides
  - CDA Validator
  - CDA Gallery
  - liora@alschulerassociates.com
Thank you!

Questions?