Health Level Seven Clinical Document Architecture CDA Release 2.0

> Liora Alschuler Alschuler Associates, LLC February 2006, HIMSS



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- HL7 IHE Liaison
- past Chair, KEG & XML SIG & HL7 Marketing Committee
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Health Level Seven (HL7.org)

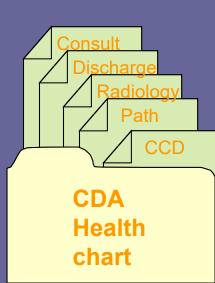


- Standards Development Organization
- Since 1985
- 2000 members: clinical, commercial, government
- 30+ international affiliates
- HL7 Version 2 messaging: workhorse of the industry
- HL7 is more than V2:
 - "A model community": building standards to a single information model
 - Reference Information Model (RIM): basis for next generation, inter-enterprise information exchange



HL7's CDA

- Clinical Document Architecture
 - ANSI/HL7 R1-2000
 - ANSI/HL7 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





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CDA: A Document Exchange Specification

• This is a CDA • and this and this and this • and this and this • and this

SIEMENS Soarian -- Web Page Dialog

m PT#10020037 MR# 547037 MP## IP Siem

Service Name: Continuity of Ca Value:

Good Health Cl

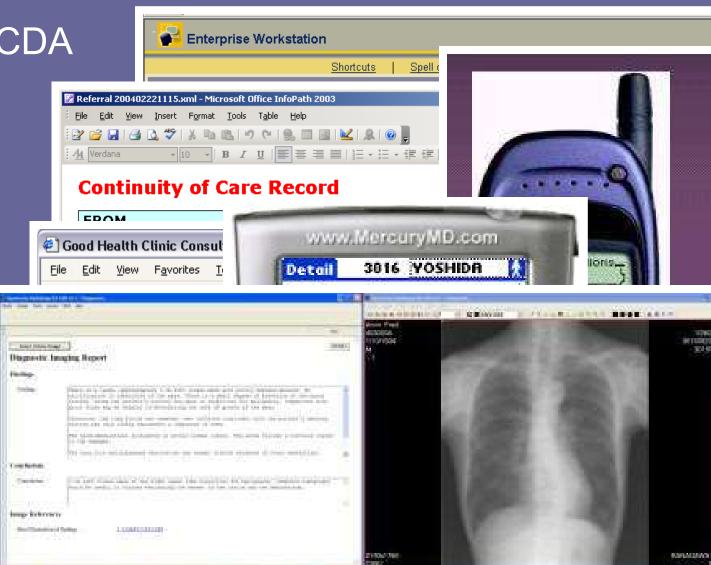
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Borck, Clifford B.

Result



CDA: A Document Exchange Specification

• A CDA can be a

- Discharge Summary
- Care Record Summary/Continuity of Care Document (CCD)
- Progress Note
- H&P
- Public health report
- ... any content that carries a signature
- Built for interoperability
 - XML (Extensible Markup Language, W3.com)
 - HL7 Reference Information Model (RIM)
 - and vocabulary (CPT, SNOMED, ICD, local,...)



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CDA header

• Required fields:

- Globally-unique document ID
- Document type code (H&P, Discharge Summary, Path report...)
- Timestamp
- Confidentiality code
- Patient
- Author
- Custodian
- Optional:
 - Realm, template, title, language, set & version, data enterer, informant, recipient, authenticators, participants, order number, procedure, related documents, consents, encounter



CDA header

• Information sufficient to

- Locate
- Retrieve
- Manage
- Extensible
- RIM-based

	AssignedEntity daseCode" <= ASS/GNED id" SET <i> [1, 1] code CE CWE [0, 1] <= RoieCode addr. SET<ad> [0, 1] telecom: SET<tel> [0, 1]</tel></ad></i>	0.* assignedEntity authenticator typeCode* <= AU/THEN inne* TS [1,1] signatureCode*. CS CNE [1,1] <= ParticipationSignature 0.1 assignedEntity legalAuthenticator typeCode* <= LA contextControlCode*. CS CNE [1,1] <= *0P* time* TS [1,1] signatureCode*. CS CNE [1,1] <= *0P*	ClinicalDocument classCode* ← DOCCLIN moodCode* ← EVN Id* IR[1,1] code* CE CWE [1,1] ← DocumentType Ide ST [0,1] effectiveTime* TS [1,1] confidentiallyCode* CE CWE [1,1] ← s_BasicConfidentiallyFond languageCode: CS CNE [0,1] ← HumanLanguage	0.* parentDocument typeCode*: <= x ActRelationshipDocument 0.* serviceEvent documentationOf	ParentDocument classCode* <= DOCCLIN moodCode* <= EVW id* SET <ip>[1, 7] code CD CWE [0, 1] <= DocumentType text: ED [0, 1] endd: II [0, 1] versionHumber: INT [0, 1] ServiceEvent classCode* <= ACT moodCode* <= EVN</ip>	perfo typeCi functio
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CDA Body: non-XML

- Simplest CDA header + non-XML body
- Preferred non-XML document types:
 - o text/rtf
 - o text/html
 - o text/plain
 - o application/pdf
 - image/g3fax
 - o image/gif
 - o image/tiff
 - image/jpeg
 - image/png



CDA body XML

Narrative block

- paragraph
- list
- table
- caption
- link
- content
- revise (delete/inse
- subscript/supersci
- special characters
- emphasis
- line break
- renderMultiMedia



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	History of Present Illness section				

	>				
	- <component></component>				
	- <section></section>				
	<title>History of Present Illness</title>				
	<text>Henry Levin, the 7th is a 67 year old male referred for further asthma management. Onset of asthma in his</text>				
	twenties. He was hospitalized twice last year, and already				
Э	twice this year. He has not been able to be weaned off				
r	steroids for the past several months.				
S	 - </th				

	Past Medical History section				

(>				
	- <component></component>				
	- <section></section>				
	<title>Past Medical History</title> - <text></text>				
nc					

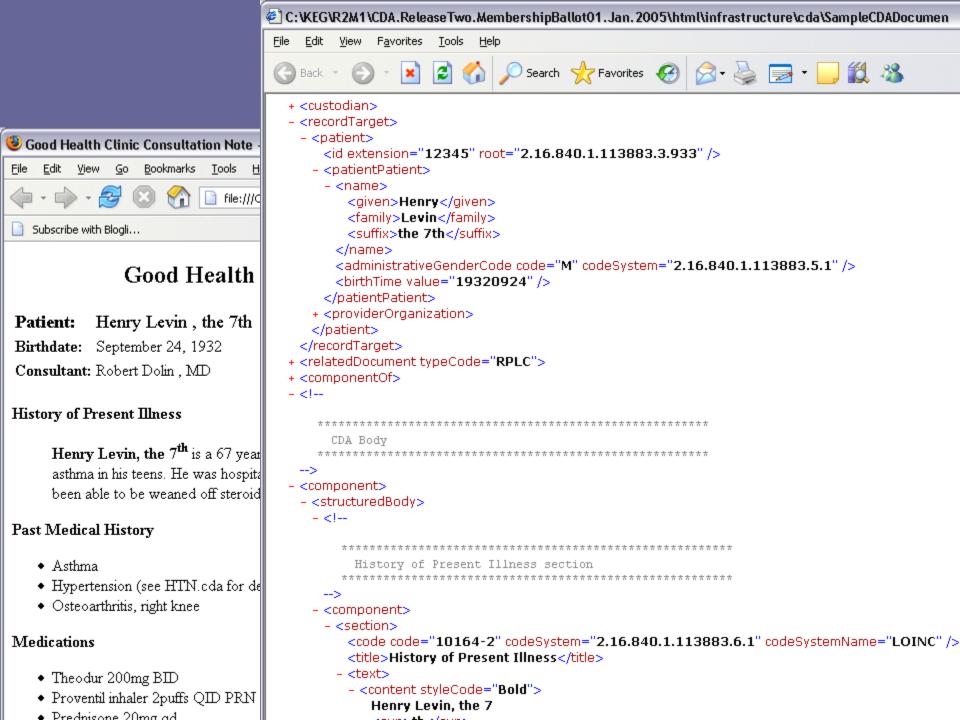
<item>Asthma</item> <item>Hypertension</item>

XML

• XML is about investing in information

- information design should outlive system design
- documents outlive the system on which they are created
- Platform and vendor independent
- Data in XML persists over time
- Data in XML can move between applications





and why XML alone isn't enough

- With a few simple tags, and controlled vocabulary, XML can describe anything
- but...
- the tags need to be defined:
 <orderNum> : HL7: order placed
 <orderNum> : CDISC: visit sequence
- CDA tags are defined by the HL7 Reference Information Model (RIM) and use standard controlled vocabulary



Why isn't XML + SNOMED enough?

Good Health Clinic Consultation note

Consultant:	Robert Dolin, MD			
Date:	April 7, 2000			
Patient:	Henry Levin, the 7th	MRN:	12345	Sex: Male
Birthdate :	September 24, 1932			

History of Present Illness

Henry Levin, the 7th is a 67 year old male referred for further asthma management. Onset of asthma in his twenties teens. He was hospitalized twice last year, and already twice this year. He has not been able to be weaned off steroids for the past several months.

Past Medical History

- Asthma
- Hypertension (see HTN.cda for details)
- Osteoarthritis, right knee

Medications

- Theodur 200mg BID
- Albuterol inhaler 2puffs QID PRN
- Prednisone 20mg qd
- HCTZ 25mg qd

Allergies & Adverse Reactions

- Penicillin
- Aspirin Wheezing
- Codeine Itching and nausea

Family History

Father had fatal MI in his early 50's.



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"Dr. Dolin asserts that Henry Levin manifests hives as a previously-diagnosed allergic reaction to penicillin"

First: human readable

Allergies & Adverse Reactions

- Penicillin Hives
- Aspirin Wheezing
- Codeine Itching and nausea

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<!--

```
Allergies & Adverse Reactions section
-->
<component>
  <section>
    <code code="10155-0" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" />
    <title>Allergies and Adverse Reactions</title>
    <text>
       <list>
         <item>Penicillin - Hives</item>
         <item>Aspirin - Wheezing</item>
         <item>Codeine - Itching and nausea</item>
       </list>
                                                                      2006
    </text>
```

Next: series of coded "clinical statements" Hives manifests an allergic reaction to penicillin observation classCode="OBS" moodCode="EVN"> <code code="84100007" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="history taking (procedure)" / <value xsi:type="CD" code="247472004" codeSystem="2.16.840.1.113883.6.96"</pre> codeSystemName=CNOMED CT" displayName="Hives" /> <entryRelationship typeCode="MFST"> <observation classCode="OBS" moodCode="EVN"> <code code="84100007" codeSystem="2.16.840.1.113883.6.96"</pre> codeSystemName="SNOMED CT" displayName="history taking (procedure)">>> <value xsi:type="CD" code="91936005" codeSystem="2.16.840 1 113883 6 96"</pre> codeSystemName="SNOMED CT" displayName="Allergy to penicillin" </observation> </entryRelationship> </observation>

</entry>

Then: supply context

<!--

-->

```
<id extension="c266" root="2.16.840.1.113883.3.933" />
     <code code="11488-4" codeSystem="2.16.840.1.113883.6.1" displayName="Consultation note" />
     <title>Good Health Clinic Consultation Note</title>
     <effectiveTime value="20000407" />
     <confidentialityCode code="N" codeSystem="2.16.840.1.113883.5.25" />
     <setId extension="BB35" root="2.16.840.1.113883.3.933" />
     <versionNumber value="2" />
                                                                                                                                                                                           Globally-unique ID
+<legalAuthenticator>
+<author>
                                                                                                                                                                                           Document type code
+<custodian>
     <recordTarget>
                                                                                                                                                                                           Patient, provider, location
            <patient>
                   <id extension="12345" root="2.16.840.1.113883.3.933"</pre>
                                                                                                                                                                                           Order, encounter...
                             <patientPatient>
                                       <name>
                                                 <given>Henry</given>
                                                <family>Levin</family>
                                                <suffix>the 7th</suffix>
                                       </name>
                                       <administrativeGenderCode code="M" codeSystem="2.16.840.1.113883.5.1" />
                                       <br/>

                             </patientPatient>
                             <providerOrganization>
                                       <id extension="M345" root="2.16.840.1.113883.3.933" />
                             </providerOrganization>
                   </patient>
                                                                                                                                                                                                                                                                                                        006
            </recordTarget>
```

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CDA body

- Required:
 - Human readable narrative block
 - Paragraph, list, table...
- Optional: Machine processible "clinical statements"
 - Observation
 - Observation-media
 - Region of interest
 - Substance administration
 - Supply
 - Procedure
 - Encounter



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CDA Design

• Header

- All you need for document search & retrieval
- Body
 - Non-XML: simple, low-end point of entry
 - XML narrative block: simple, reusable, XML
 o Always human readable, single stylesheet
 - XML Clinical Statements
 - RIM-based
 - Controlled vocabulary (ICD, CPT, SNOMED, MEDCIN...)
 - Interchangeable with V3 messages



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CDA for Information Exchange

 International: basis of interoperability in most advanced national networks

 Finland, Greece, Canada, Germany, Japan, Korea, France, Italy, New Zealand, Australia, and more

• US: CMS Notice of Proposed Rule Making

- Claims attachments using CDA + X12
- First pilot concluded, others underway
- US: Integrating the Healthcare Enterprise
 - IHE Medical Summary CDA for NHIN/RHIO exchange



CDA for Information Exchange

• IHE choice for Medical Summaries

MediNotes	MediNotes e
NextGen Healthcare Information Systems	NextGen EMR
AllScripts	Touchworks EHR
GE Healthcare	Centricity [®] Enterprise Solution (formerly Carecast)
Philips Medical Systems	Xtenity
McKesson	Horizon Ambulatory Care
CapMed/IBM	Personal HealthKey
Eclipsys	Sunrise
Medical Informatics Engineering	Webchart
Dictaphone	Enterprise Workstation
Epic Systems	EpicCare
GE Healthcare	Centricity [®] Physician Office
Misys Healthcare Systems	Misys Connect
Siemens	Soarian



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CDA: Investing in Information

• CDA at the Mayo Clinic

- Initiated in 1999
- 10,000's of documents each week
- Clinical documents: Most important capital asset
- CDA at New York Presbyterian (was Col-Pres)
 - "CDA Philosophy"
 - Clinical notes contain critical information in narrative
 - Best format for information mining and aggregation across applications
 - 1/3 of all discharges summaries



CDA: Return on Investment

- Low end: Access to documents
 - o "please send referral letter to ... "
 - o "please get me the discharge summary..."
 - "what imaging reports are available from the last episode?"
- High end: Reuse
 - Decision supports
 - Send synopsis to tumor board
 - Attach to claim for automated adjudication of payment
 - Extract data for clinical research

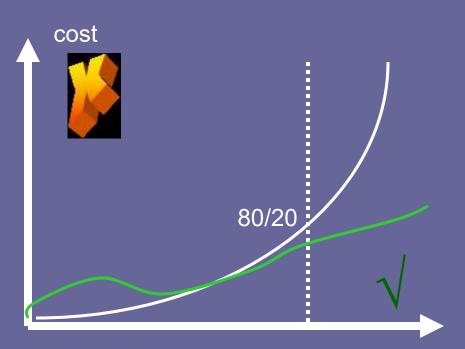


Investing in Information: phased approach

- Lay groundwork
 - CDA header metadata
 - XML or non-XML CDA body
- Build
 - Consensus on requirements
 - Understanding of modeling process
 - Vocabulary glossary
- Understand
 - Relationship of vocabulary to model
- Introduce interoperable semantic content as requirements and business drivers dictate



Investing in Information



benefit



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- Dissecting the curve
- What is easy:
 - Header
 - Human-readable body
 - Low degree of coding
- What is hard:
 - Concensus on semantic content requirements
 - Model/vocabulary interface

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CDA for complete interoperability

• CDA for clinical summaries

- Care Record Summary (CRS)
- Continuity of Care Document (CCD)
- CDA for clinical specialties
 - CDA Imaging reports
 - In conjunction with American College of Radiology/DICOM/HL7 Imaging Integration
 - CDA Pathology reports
 - In conjunction with College of American Pathology/HL7 Path SIG
 - CDA for anesthesiology, pediatrics, dental and more, all in development
 - CDA claims attachments
 - Six document types approved, more in development



CDA Resources

• HL7 Web site:

- CDA Normative Web Edition
- http://www.hl7.org/Special/committees/lists.cfm
 - o CDA: strucdoc@lists.hl7.org
 - CCD: ccd@lists.hl7.org
- JAMIA
 - Dolin RH, Alschuler L, Boyer S, Beebe C, Behlen FM, Biron PV, Shabo A. HL7 Clinical Document Architecture, Release 2. J Am Med Inform Assoc. 2006;13:30–39.
 - http://www.jamia.org/cgi/reprint/13/1/30
- Liora Alschuler Liora@alschulerassociates.com
 - CDA Quick Start Guide
 - CRS Quick Start Guide
 - EHRVA CDA/CRS Validator

