Clinical Document Architecture (CDA)
The Foundation for Clinical Data Exchange
June 15, 2006
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Blue Cross Blue Shield Association
Spring Technology and Architecture Workshop
St. Louis, MO
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    • Industry-leading EMR and RHIO solution vendors
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  - Co–author, CDA & CRS Quick Start Guides
  - Member, HL7 Board of Directors
  - HL7 IHE Liaison
  - past Chair, KEG & XML SIG & HL7 Marketing Committee
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Healthcare IT

• Largely a failed endeavor
• IOM perspective
  – Institute of Medicine, To Err Is Human
  – 98,000 preventable deaths each year
• MOM perspective
  – Post discharge
  – What meds?
  – Office visit: no value
• Problems known
• Why not fixed?
Outline

- The HL7 CDA
- CDA for Health Information Exchange
- CDA + CCR = CCD
- CDA Document Types
- CDA for Personal Health Records
- Summary, Resources & Questions
Health Level Seven (HL7.org)

- Standards Development Organization
- Developing standards for interoperability
  - Patient care
  - Public health
  - Clinical trials
  - Reimbursement
- HIPAA DSMO
- 20 years, 2000 members
- 30+ international affiliates
- “A model community”: building standards to a single information model
Committees & Special Interest Groups

- Anatomic Pathology
- Anesthesia
- Architecture Review Board**
- Arden Syntax
- Attachments
- Cardiology
- Common Message Element Types***
- CCOW*
- Clinical Decision Support*
- Clinical Genomics
- Clinical Guidelines
- Community Based Health Services
- Conformance
- Infrastructure & Messaging*
- Education**
- Electronic Health Records*
- Electronic Services**
- Emergency Dept.
- Financial Management*
- Government Projects (US)
- Imaging Integration
- Implementation**
- International Affiliates**
- Java
- Laboratory
- Health Care Devices
- Marketing**
- Medical Records/Information Management*
- Modeling & Methodology*
- Orders & Observations*
- Organization Review**
- Outreach for Clinical Research*
- Patient Administration*
- Patient Care*
- Patient Safety
- Pediatric Data Standards
- Personnel Management*
- Pharmacy
- Process Improvement**
- Public Health & Emergency Response
- Publishing**
- Regulated Clinical Research Information Management (RCRIM)*
  (formerly Clinical Trials)
- Scheduling & Logistics*
- Security*
- Service Oriented Arch.
- Structured Documents*
- Technical Steering Committee**
- Templates
- Tooling**
- Vocabulary*
- XML

* Technical Committees, ** Board Committees, ***Task Force
HL7 for messaging

• It’s all about the interface:

- Census
- Demographics
- Eligibility
- Registration
- Medical Records
- Claims
- Claim Payments
- Discharge
- Orders
- Results
- Images
- Credit
- Security
- Scheduling
- Transfer
- Utilization Review
- Purchasing
- Receiving
- Outcomes Management
- Master File Updates
- Immunizations

• Hospital–centric view of HIT
HL7 beyond the hospital interface

Enterprise

Region

Facility

Network

National
HL7 beyond the messaging interface

- CCOW: multi-application context management, single sign-on
- Arden Syntax: decision support, guidelines
- Electronic Health Record: functional, system and interoperability models
- Reference Information Model (RIM)
- Clinical Document Architecture
CDA

• Clinical Document Architecture
• ANSI/HL7 CDA R1.0–2000
• ANSI/HL7 CDA R2.0–2005
• A specification for document exchange using
  – XML,
  – the HL7 Reference Information Model (RIM)
  – Version 3 methodology
  – and vocabulary (SNOMED, ICD, local,...)
CDA: A Document Exchange Specification

- This is a CDA
- and this
- and this
- and this
- and this
- and this
- and this
CDA: electronic documents

- eDocuments for Interoperability
  - Many CDA documents comprise an individual electronic medical record
  - 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
Good Health Clinic Consultation Note

Patient: Henry Levin, the 7th
Birthdate: September 24, 1932
Consultant: Robert Dolin, MD

History of Present Illness

Henry Levin, the 7th is a 67-year-old male with a 25-year history of asthma in his teens. He had been able to be weaned off steroid medications in his 50s.

Past Medical History

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

Medications

- Theodur 200mg BID
- Proventil inhaler 2 puffs QID PRN
- Prednisone 20mg qam

- Header
  - Readable: required
- Body
  - Computable: optional
CDA Header: Metadata

- Identify
  - Patient
  - Provider
  - Document type...

- Sufficient for
  - Medical records management
  - Document management
  - Registry/repository
  - Record locator service
  - Store, query, retrieve

Good Health Clinic Consultation Note

Patient: Henry Levin, the 7th
Birthday: September 24, 1932
Consultant: Robert Dolin, MD
MRN: 12345
Sex: Male
Created On: April 7, 2000
CDA Body: Human-readable report

- Any type of clinical document
  - H&P
  - Consult
  - Op note
  - Discharge Summary...

- Format: tif, PDF, HTML, XML
  - Paragraph
  - List
  - Table
  - Caption
  - Link
  - Content
  - Presentation

Vital Signs

<table>
<thead>
<tr>
<th>Date / Time</th>
<th>04/07/2000 14:30</th>
<th>04/07/2000 15:30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>177 cm (69.7 in)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>194.0 lbs (88.0 kg)</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>28.1 kg/m2</td>
<td></td>
</tr>
<tr>
<td>BSA</td>
<td>2.05 m2</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>36.9 °C (98.5 °F)</td>
<td>36.9 °C (98.5 °F)</td>
</tr>
<tr>
<td>Pulse</td>
<td>86 / minute</td>
<td>84 / minute</td>
</tr>
<tr>
<td>Rhythm</td>
<td>Regular</td>
<td>Regular</td>
</tr>
<tr>
<td>Respirations</td>
<td>16 / minute, unlabored</td>
<td>14 / minute</td>
</tr>
<tr>
<td>Systolic</td>
<td>132 mmHg</td>
<td>135 mmHg</td>
</tr>
<tr>
<td>Diastolic</td>
<td>86 mmHg</td>
<td>88 mmHg</td>
</tr>
<tr>
<td>Position / Cuff</td>
<td>Left Arm</td>
<td>Left Arm</td>
</tr>
</tbody>
</table>

Skin Exam

Erythematous rash, palmar surface, left index finger.
CDA Body: Machine Processible

- Model-based computable semantics:
  - Observation
  - Procedure
  - Organizer
  - Supply
  - Encounter
  - Substance Administration
  - Observation Media
  - Region Of Interest
  - Act
CDA: Incremental Computability

- Standard HL7 metadata
- Simple XML for point of care human readability
- RIM semantics for reusable computability ("semantic interoperability")
Investing in Information

- CDA can be simple
- CDA can be complex
- Simple encoding relatively inexpensive
- Complex encoding costs more
- You get what you pay for:
  - like charging a battery,
  - the more detailed the encoding
  - the greater the potential for reuse
Outline

• The HL7 CDA
• CDA for Health Information Exchange
• CDA + CCR = CCD
• CDA Document Types
• CDA for Personal Health Records
• Summary, Resources & Questions
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: Federal Health Architecture/CHI
  - CMS Notice of Proposed Rule Making
    - Claims attachments using CDA + X12
    - First pilot concluded, others underway
  - VA/DoD bi-directional exchange
- US: Document format for NHIN pilots, RHIO design
  - NHIN Pilots: preliminary architecture
  - HITSP: preliminary choice
  - IHE Medical Summary – CDA for NHIN/RHIO exchange
Major Implementations (outside US)

- PICNIC (European Union)
- SCIPHOX (Germany)
- HYGEIAnet/WebOnColl (Greece)
- Aluetietojärjestelmä (Finland)
- Health Information Summaries (New Zealand)
- Referrals (Australia)
- MERIT–9 (Japan)
- NHS (Wales)
- Buenos Aires HMO project (Argentina)
- Plus projects in France, Italy, Russia, Estonia, Taiwan, Korea…
CDA: an international standard
CDA: Investing in Information

• CDA at the Mayo Clinic
  – Initiated in 1999
  – About 50,000 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
XML Value Chain

Dictation → Voice Recognized → QA Transcription → XML Markup

Anonymize → Data Mining → Clinical Trials

Clinically Useful Markup → NLP Engine → CDA Transformation

Data Mining → Coding

EMR

Coding → Billing

DSS

Clinical Trials → Clinical Guidelines

Clinical Guidelines → Billing

Anonymize → Coding

Billing → Clinical Guidelines

NLP Engine → CDA Transformation

PDA Access

XML Markup → CDA Transformation

Billing → Clinical Guidelines

Clinical Guidelines → Clinical Trials
CDA for Information Exchange

- IHE choice for Medical Summaries

<table>
<thead>
<tr>
<th>Company</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>MediNotes</td>
<td>MediNotes e</td>
</tr>
<tr>
<td>NextGen Healthcare Information Systems</td>
<td>NextGen EMR</td>
</tr>
<tr>
<td>AllScripts</td>
<td>Touchworks EHR</td>
</tr>
<tr>
<td>GE Healthcare</td>
<td>Centricity® Enterprise Solution (formerly Carecast)</td>
</tr>
<tr>
<td>Philips Medical Systems</td>
<td>Xtenity</td>
</tr>
<tr>
<td>McKesson</td>
<td>Horizon Ambulatory Care</td>
</tr>
<tr>
<td>CapMed/IBM</td>
<td>Personal HealthKey</td>
</tr>
<tr>
<td>Eclipsys</td>
<td>Sunrise</td>
</tr>
<tr>
<td>Medical Informatics Engineering</td>
<td>Webchart</td>
</tr>
<tr>
<td>Dictaphone</td>
<td>Enterprise Workstation</td>
</tr>
<tr>
<td>Epic Systems</td>
<td>EpicCare</td>
</tr>
<tr>
<td>GE Healthcare</td>
<td>Centricity® Physician Office</td>
</tr>
<tr>
<td>Misys Healthcare Systems</td>
<td>Misys Connect</td>
</tr>
<tr>
<td>Siemens</td>
<td>Soarian</td>
</tr>
</tbody>
</table>
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- The HL7 CDA
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  - CDA + CCR = CCD
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Agreements/MOUs

* Accredited Standards Committee X12 — ASC-X12
* American Dental Association — ADA
  o ADA Joint Project Statement
* American Society for Testing Materials — ASTM
* CEN/TC 251
* Clinical Data Interchange Standards Consortium — CDISC
* Digital Imaging and Communication In Medicine — DICOM
* eHealth Initiative — eHI
* Institute for Electrical and Electronic Engineers — IEEE
* Integrating the Healthcare Enterprise — IHE
* Medbiquitous
* National Council for Prescription Drug Program — NCPDP
* OASIS
* Object Management Group — OMG
* University of Nevada Las Vegas — UNLV
* College of American Pathologists – SNOMED International Division — SNOMED
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.³ 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, and clinical facts at a specific time and place. The CCR...
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.
ASTM’s CCR

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of use cases and workflows. Any examples offered in this specification are not to be considered normative.⁴

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 (HL-7) 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, clinical, and care content. For example, the CCR

¹The 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.

²See 1.1.1 for a description of the CCR’s components and sections, and Annex A1 for the detailed data fields of the CCR.

³The 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, clinical, and care content. For example, the CCR XML schema is a data object that represents a snapshot of a patient’s relevant administrative, demographic, clinical, and care content.
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>DateTime</td>
<td>Observation.effectiveTime</td>
</tr>
<tr>
<td>IDs</td>
<td>Observation.id</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>
• 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
“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
• 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)
Outline

• The HL7 CDA
• CDA for Health Information Exchange
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• CDA Document Types
• CDA for Personal Health Records
• Summary, Resources & Questions
Medication information in CDA

- Works for CCR
- Works for IHE
- Works for AHIC
- What about our requirements?
- Can CDA accommodate the AHIP Medication data elements?
- How expressive is CDA?
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>347</td>
<td>6.0.10</td>
<td>Alerts</td>
<td>- see comments -</td>
<td>Alerts are in a different section of CCD. Refer to Allergies and Adverse Reactions section.</td>
</tr>
<tr>
<td>348</td>
<td>6.0.11</td>
<td>Medication ID</td>
<td>SubstanceAdministration / id</td>
<td></td>
</tr>
<tr>
<td>349</td>
<td>6.0.20</td>
<td>Medication Name</td>
<td>SubstanceAdministration / consumable / manufacturedProduct / labeledDrug / name</td>
<td></td>
</tr>
<tr>
<td>352</td>
<td>6.0.23</td>
<td>Prescription Date</td>
<td>Supply / effectiveTime</td>
<td>The RIM distinguishes between a SubstanceAdministration and a Supply. The former has attribution relating to the administration act, whereas the latter has attribution relating to the dispensing act. A prescription includes both - instructions for administering the drug and instructions for dispensing.</td>
</tr>
<tr>
<td>356</td>
<td>6.0.36</td>
<td>Duration</td>
<td>SubstanceAdministration / effectiveTime</td>
<td></td>
</tr>
<tr>
<td>359</td>
<td>6.0.50</td>
<td>Dosage</td>
<td>SubstanceAdministration / doseQuantity</td>
<td>The dose may be precoordinated in the drug code itself, e.g. SNOMED code 318434003 is &quot;atenolol 25 mg tablet&quot;, in which case doseQuantity is a unitless number indicating how many tablets to give with each administration.</td>
</tr>
<tr>
<td>362</td>
<td>6.0.53</td>
<td>Unit of Measure</td>
<td>- see comments -</td>
<td>All HL7 V3 Physical Quantity data types require UCUM codes for unit of measure.</td>
</tr>
<tr>
<td>365</td>
<td>6.0.60</td>
<td>Form</td>
<td>SubstanceAdministration / consumable / manufacturedProduct / labeledDrug / code</td>
<td>The form is precoordinated in the drug code itself, e.g. SNOMED code 318434003 is &quot;atenolol 25 mg tablet&quot;.</td>
</tr>
<tr>
<td>368</td>
<td>6.0.70</td>
<td>Frequency</td>
<td>SubstanceAdministration / effectiveTime</td>
<td></td>
</tr>
<tr>
<td>371</td>
<td>6.0.80</td>
<td>Instruction</td>
<td>- see comments -</td>
<td>Instructions are expressed as plain text (in Section.text) and the instruction components are stored in different attributes - for frequency, number to dispense, strength, etc.</td>
</tr>
<tr>
<td>375</td>
<td>6.0.90</td>
<td>Quantity</td>
<td>Supply / quantity</td>
<td></td>
</tr>
<tr>
<td>378</td>
<td>6.0.93</td>
<td>Quantity Refused</td>
<td>Supply / quantity</td>
<td>The CCD Medications section is a summary of events. Therefore Supply.quantity refers to the quantity dispensed. In the Plan of Care section, quantity ordered can be expressed.</td>
</tr>
</tbody>
</table>
Medication information in CDA

• Works for CCD
• Works for IHE
• Works for AHIC
• What about our requirements?
• Can CDA accommodate the AHIP Medication data elements?
• How expressive is CDA?
  – As expressive as the HL7 RIM
The HL7 RIM

• Where did it come from and how is it developed?

• Requirements applied to RIM
  – From V2 and new applications
  – From other standards organizations
  – From users

• RIM harmonization is a continual process
  – But it doesn’t just grow...
Rise & fall & rise of the RIM
Document typology

- Type of service
  - E&M
    - Nursing home
  - E&M
    - Outpatient
  - E&M
    - ED
  - E&M
    - Outpatient
    - Cardiology
  - E&M
    - General Medicine

- Setting

- Clinical categorization

45
Role of Domain Experts and Users:
- Define requirements
- Provide resources

Role of Structured Documents TC:
- Assess scope
- Compare against existing Guides
- Quality control
- Sponsor ballot
Validating CDA document types

- XML
- Schematron
- XPath, XSL, XSD

Validates against generic schema

XPath validation of Implementation Guide requirements
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Requirements for a PHR:

Summary

- Patient-centric, patient-directed
- Open interface/data specs
- Comprehensive record
- Supports re-use
Requirements for a PHR: #1

• Patient-centric, patient-directed
  – “mine”, irrespective of Plan, provider, location
    • Plan can change
    • Providers compete, overlap, are replaced
    • US healthcare does not layout neatly along geographical boundaries
  – Patient controls access privileges
    • Confidentiality at document, section level
    • Within limits of HIPAA, within PTO
Requirements for a PHR: #2

• Universal, open interface, data format
  – All can contribute
  – Application independent
  – Vendor independent
• Data supplied from all sources
• Not proprietary, works with any vendor’s tools
Requirements for a PHR: #3

• Receives, catalogs, all aspects of health record
  – Provider notes
  – Lab and imaging
  – Pharmacy
  – Dental
  – CAM
  – Patient-provided information
Requirements for a PHR: #4

• Data available for re-use
  – Reimbursement, pay for performance
  – Practice management, decision support
  – Public health
  – Clinical trials

• (some restrictions will apply)
CDA PHR: Patient–centric, Patient–directed

• Each source record is a complete document with patient metadata sufficient to support eMPl
• Each encounter with the healthcare system results in one or more such documents
• Confidentiality can be specified for the document as a whole or pieces of it
CDA PHR: Open Interface

• An open standard: all applications can import/export

• CDA can be the payload in any type of communication message
CDA PHR: Comprehensive

- CDA can be any type of clinical document
- With incremental approach, all can play
- *The CDA PHR can be the full chart*
CDA PHR: Re-use

- Manual re-use supported by all levels of CDA
  - Human review from the local desktop, eliminates sneaker/ “auto” net
- Automated re-use supported to the extent that coded data available
  - Pilots show effective for clinical trials, decision support
- We can get to automated re-use incrementally, as business drivers warrant
• Roles defined in CDA Header
  – Patient (subject, record target)
  – Author
  – Authenticator, legal authenticator
  – Custodian
• Document-based approach with unambiguous legal responsibility allows information sharing with clear lines of responsibility
CDA for PHR: Summary

• Patient–centric, patient–directed
  – Supports eMPI, patient identification across providers
  – Confidentiality can be specified for the document as a whole or pieces of it

• Open interface/data specs
  – Designed for broad–based interoperability
  – Header: the metadata required for content management

• Comprehensive record
  – All records, not just a summary
  – Everybody plays: benefits increase with better coding

• Supports re–use
  – Both manual and automated
CDA document–based network

- All transform to CDA
- Complete view of record
- No loss in computable semantics

- What is available?
- How do I get it?
- Can I read it?
- Can I import it into my EMR/PHR/CDR...?

- EHR
- V–EHR
- PHR
- Patient Portal
- Physician Portal
- Health Record Bank
AHIC Consumer Empowerment Use Case

• The following scenario is based on the American Health Information Community Consumer Empowerment Harmonized Use Case, with a focus on medication summary data.

• The Use Case calls for sufficient data exchange to enable the following activities:
  – Create medication history;
  – Update medication history;
  – View medication history;
  – Physician review of medication history with consumer;
  – Differentiate current from relevant past medications

• Everything shown in the scenario can be built today with existing or draft standards:
  – **Messaging**: IHE XDS or HL7 Medical Records;
  – **Summary data**: CCR or CCD;
  – **Vocabulary**: LOINC, SNOMED, HL7, RxNorm
Empowering medication summary data

- 1) Provider of PHR Services receives medication information, from a variety of sources.

- 2) Health Care Provider requests medication information from PHR Provider. PHR Provider authenticates the request.
  - IHE XDS or HL7 Medical Records query message.
  - Query parameters include patient, document type (e.g. CCD, procedure report, consultation), author, etc.

- 3) PHR Provider transmits requested medication information. Health Care Provider receives medication information.
  - IHE XDS or HL7 Medical Records message, carrying a CCD.
CDA document–based network

- 1) receive medication information
- 2) provider requests information
- 3) PHR transmits information

CDA–based PHR

AHIC CE scenario
<someAct>
  <code code="34133-9"
    codeSystem="&LOINC;" displayname="Summary note"/>
  <text type="multipart/related">
    MIME-Version: 1.0
    Content-Type: multipart/related; boundary="HL7-CDA-part"
    type="text/xml"; start="10.12.45567.43"
    Content-Transfer-Encoding: BASE64

    --HL7-CDA-part
    Content-Type: text/xml; charset="US-ASCII"
    Content-ID: &lt;10.12.45567.43>

    ... Base 64 of base CDA document, which contains ...
    ...
    <observationMedia classCode="OBS" moodCode="EVN">
      <id root="10.23.4567.345"/>
      <value mediaType="image/jpeg">
        <reference value="canned_left_hand_image.jpeg"/>
      </value>
    </observationMedia>
    ...

    --HL7-CDA-part
    Content-ID: &lt;10.23.4567.345>
    Content-Location: canned_left_hand_image.jpeg
    Content-Type: image/JPEG

    ... Base64 image ...

    --HL7-CDA-part--
  </text>
</someAct>
CDA in PHR: CapMed

• Screen captures from IHE (Integrating the Healthcare Enterprise) demonstration HIMSS 2006
• Patient can: enter data, send to insurer, provider
• Provider can export to PHR, view records on PHR
• Shown as example, not endorsement
CDA in PHR : CapMed/IHE Demo
CDA in PHR: CapMed/IHE Demo
CDA in PHR: CapMed/IHE Demo

**Patient-Generated Medical Summary**

- **Date Created:** Thu Feb 16, 2006 at 04:39 PM UTC
- **From:** ESTHER KHOURY
  - Personal Health Record by CapMed, A Division of Bio-Imaging Technologies, Inc. 4.8.1 HIMSS
- **To:**
- **Purpose:** Patient-generated Medical Summary.

### Patient Demographics

<table>
<thead>
<tr>
<th>Name</th>
<th>Date of Birth</th>
<th>Gender</th>
<th>Identification Numbers</th>
<th>Address/Phone</th>
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<tbody>
<tr>
<td>ESTHER KHOURY</td>
<td>1962-06-27</td>
<td>Female</td>
<td></td>
<td>Home: 100 Main St PORTLAND, OR</td>
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### Alerts

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### Advance Directives

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### Problems

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### Procedures

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### Medications

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<th>Quantity</th>
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<th>Indications</th>
<th>Instruction</th>
<th>Refills</th>
<th>Source</th>
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<tbody>
<tr>
<td>Advil</td>
<td></td>
<td>Capsule</td>
<td>2</td>
<td>as needed</td>
<td>ESTHER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The PHR as a bank account

• An account with access privileges
  – What goes in/out
  – Who sends it in/out

• Personal account holder
  – Makes cash deposits/withdrawals
  – Audits the account

• Third parties
  – Direct deposits
  – Wire transfers (at direction of account holder)
Project Springfield

- **Technical**
  - Use simple electronic clinical documents
  - Use existing infrastructure: SSL and the Web
  - Leverage existing tools and products: PHR

- **Business**
  - Springfield Health Information Exchange
    - SpringHIE, a new, for-profit entity
    - Hosting a Health Record Bank for the Springfield area
  - Business model
    - Aligns costs/benefits: Provider, patient participation subsidized by payers

- **Cultural**: patient-centric, patient-controlled
SpringHIE

• Initiates
  – Recruits technical partners
  – Raises funds
  – Develops technical architecture and business framework
  – Creates community presence

• Implements
  – Partnership with co-developers
  – Contracts for development, as required

• Oversees
  – Patient/bank interactions
  – Maintenance of technical standards
  – HIPAA business partner agreements
The Health Record Bank

- A commercial entity
- A technology partner holding a business agreement with SpringHIE
  - Standards of operation
- Operates and maintains a repository for patient records populated by providers under patient control
SpringHIE: Initiation

Patients open HRB accounts

Health Record Bank (HRB)

Providers deposit records in bank

Patients instruct providers to deposit records in bank
SpringHIE: Usage

Patients view records, grant viewing privileges

Providers view records with permission

Registry accesses records with permission

Payer views records with permission
SpringHIE: Privacy

- Patient sets access control
- Disadvantage: must justify access according to HIPAA
  - Treatment
  - Payment
  - Operations
- Advantage: trust
Outline

• The HL7 CDA
• CDA for Health Information Exchange
• CDA + CCR = CCD
• CDA Document Types
• CDA for Personal Health Records
• Summary, Resources & Questions
CDA for Interoperability

• HL7/ANSI specification based on
  – Reference Information Model (RIM)
  – Extensible Markup Language (XML)
  – Standard Terminology

• The spec:
  – Header+Human-readable report+(optional) computable semantics

• Industry acceptance:
  – Internationally implemented for 6 years
  – US: FHA, CHI, CMS, VA, DoD, NHIN, HITSP...
  – Vendor support: strong & growing

• Interoperability
  – Full patient record, not just the data that can be coded today
  – Full patient record – summaries and more, implementation guides in the works from multiple professional societies and agencies
Current Work

• HL7
  – Continuity of Care Document (with ASTM)
  – Medical Summary (with IHE, EHR Vendors Association)
  – Pathology reports (with CAP)
  – Imaging reports (with DICOM)
  – Claims attachments, migrate from R1 (with CMS)
  – Dental reports (with ADA)
  – Anesthesiology Reports (with Anes SIG)
  – Public health reports (with CDC)
  – ... What are your priorities?
References & More Info

www.HL7.org  Structured Documents Technical Committee web page
  All meetings, listservs, open to all

JAMIA
  http://www.jamia.org/cgi/reprint/13/1/30

Care Record Summary
  http://www.hl7.org/Library/Committees/structure/CareRecordSummary%5Fl2%5F2005SEP%2Ezip

CDA Release 2.0 Normative Edition: see HL7.org

AlschulerAssociates.com  liora@alschulerassociates.com
  Quick Start Guides
  CDA/CRS Validator
  CDA Gallery
Thank you!
Questions?