ROLE OF STANDARDS IN QUALITY MEASUREMENT

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CEO, Health Level 7

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Outline

- Big picture view
- Relevant standards
  - CDA
  - Templated CDA
  - CDA Implementation Guides
    - CCD
    - QRDA
  - GreenCDA
  - eMeasure
- Putting it all together
Big Picture View
Big Picture View

popHealth: An open-source quality measure
Big Picture View
CDA

HL7 Clinical Document Architecture
What is the CDA?

- The CDA is a document markup standard for the structure and semantics of an exchanged "clinical document".
- A clinical document is a documentation of observations and other services with the following characteristics:
  - Persistence
  - Stewardship
  - Potential for authentication
  - Context
  - Wholeness
  - Human readability
- A CDA document is a defined and complete information object that can exist outside of a message, and can include text, images, sounds, and other multimedia content.
CDA Business Case

- **CDA hits the “sweet spot”** – CDA encompasses all of clinical documents. A single standard for the entire EHR is too broad. Multiple standards and/or messages for each EHR function may be difficult to implement. CDA is “just right”.

- **Implementation experience** - CDA has been a normative standard since 2000, and has been balloted through HL7's consensus process. CDA is widely implemented.

- **Gentle on-ramp to information exchange** - CDA is straight-forward to implement, and provides a mechanism for incremental semantic interoperability.

- **Improved patient care** - CDA provides a mechanism for inserting evidence-based medicine directly into the process of care (via templates), making it easier to do the right thing.

- **Lower costs** – CDA’s top down strategy let’s you implement once, and reuse many times for new scenarios.
Key Aspects of the CDA

- CDA documents are encoded in Extensible Markup Language (XML).
- CDA is derived from HL7's central Reference Information Model (RIM), thereby enabling data reusability - with lab or pharmacy messages, with claims attachments, clinical trials, etc.
- The CDA specification is richly expressive and flexible. Templates, conformance profiles, and implementation guides can be used to constrain the generic CDA specification.
CDA Guiding Principles

- Give priority to documents generated by clinicians involved in direct patient care.
- Minimize the technical barriers needed to implement the Standard.
- Promote longevity of all information encoded according to this architecture.
- Promote exchange that is independent of the underlying transfer or storage mechanism.
- Enable policy-makers to control their own information requirements without extension to this specification.
CDA is based on a principle of *Incremental Interoperability*

- *Incremental Interoperability* means that an implementer can begin with a simple CDA, and then add structured data elements over time.

- CDA R2 consists of a single CDA XML Schema, and the “architecture” arises from the ability to apply one or more “templates” which serve to constrain the richness and flexibility of CDA.

- Professional society recommendations, national clinical practice guidelines, standardized data sets can be expressed as CDA templates.

- There are many kinds of templates that might be created. Two are particularly relevant for documents:
  - Those that constrain the document sections based on the type of document (section-level templates);
  - Those that constrain the entries within document sections (entry-level templates).
TEMPLATED CDA
What is Templated CDA?
What is Templated CDA?

<table>
<thead>
<tr>
<th>History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of wheezing:</td>
</tr>
<tr>
<td>☐ Daily and continual.</td>
</tr>
<tr>
<td>☐ Daily but not continual.</td>
</tr>
<tr>
<td>Episodes per week :: ____________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Flow :: __________ l/min.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Asthma, Intermittent.</td>
</tr>
<tr>
<td>☐ Asthma, Mild Persistent.</td>
</tr>
<tr>
<td>☐ Asthma, Moderate Persistent.</td>
</tr>
<tr>
<td>☐ Asthma, Severe Persistent.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Pneumococcal Vaccine</td>
</tr>
<tr>
<td>☐ Complete PFTs with lung volumes.</td>
</tr>
<tr>
<td>☐ Provide education on peak flow self-monitoring.</td>
</tr>
<tr>
<td>☐ Environmental and Occupational screening questionnaire.</td>
</tr>
<tr>
<td>☐ Teach inhaler/spacer/holding chamber technique.</td>
</tr>
<tr>
<td>☐ Discuss environmental control measures to avoid exposure to known allergens and irritants.</td>
</tr>
<tr>
<td>☐ Teach self-monitoring.</td>
</tr>
</tbody>
</table>

CDA Template Library
What is Templated CDA?
Templated CDA business case

- Streamlined standards development
  - Reusable building blocks.
- Streamlined standards implementation
  - Implement once, deploy often.
- Modular and reusable
  - Templates (e.g., blood pressure, discharge diagnosis) can be repackaged with other templates in any number of CDA implementation guides.
- Core component of CDA’s “incremental interoperability” strategy
  - Begin with simple CDA, and add templates as they are prioritized.
CDA Templates

Template use particularly relevant for CDA:

- Those that constrain the document sections based on the type of document (e.g. an H&P must have a Vital Signs section)
- Those that constrain the entries within document sections (e.g. a Vital Signs section must have a Blood Pressure entry)
- Those that define the entries (e.g. a Blood Pressure must be represented with particular LOINC codes, and must be expressed in mm Hg).
Templated CDA Overview

CDA Implementation Guides

- CDA (CCD)
- CDA (QRDA)
- CDA (Discharge Summary)
Templated CDA Overview

Template Library

- Purpose
- Plan
- Problems
- ...

CDA Implementation Guides

- CDA (CCD)
- CDA (QRDA)
- CDA (Discharge Summary)
CDA Template Library

- Support for standards development

- Support for standards implementation

- greenCDA XML
  - Data Entry Form
  - CDA Instance Validation
  - Runtime API
CDA Template Development

Thousand flowers bloom

Active harmonization

Gradual increase in templates, per new use cases

today
Standard EHR Interface

- Quality Measure
- Decision Support

CDA Template Library
Templated CDA Interoperability Roadmap

**Draft Patient Document: Discharge Summary**

**Patient:** Booboo, Larry
**Admit:** 12/30/97
**Account:** 1234567

**Discharge Medications:**
1. **Aspirin 325 mg po daily** (new)
2. **Bicam 10 mg po daily** (new)
3. **Atenolol 100 mg po daily** (new)
4. **Glipizide 5 mg po daily**
5. **Diphenhydramine 50 mg po daily**

**Discharge Diagnosis:**
1. Acute Myocardial Infarction S/p CABG.
2. Cardiogenic shock
3. Hypertension, NOS
4. Diabetes Mellitus, Type II
5. Severe Allergies

**Procedure:**
- CABG, 12/30-1/1, 12/30-1/2, 12/30-1/3, 12/30-1/4

**History of Present Illness:**
This is a 41 year history of hypertension and diabetes admitted for chest pain, and hypertension. Please see the chart details of admission. He was noted to have new onset of symptoms on presentation and details are listed above.

**HL7 CDA Structured Documents**

**Coded Data Elements via Templates**

**SNOMED CT**
- Disease, DF-00000
- Metabolic Disease, D6-00000
- Disorder of carbohydrate metabolism, D6-50000
- Disorder of glucose metabolism, D6-50100
- Diabetes Mellitus, DB-61000
- Neonatal, DB-75110
- Carpenter Syndrome, DB-02324
- Insulin dependant type IA, DB-61020

**Narrative Text**

**EHR Repository**

**Clinical Applications**
Templated CDA Interoperability Roadmap: 2012

- Template tooling
- Template harmonization
- Template prioritization
  - ONC-sponsored HL7/IHE/Health Story CDA Implementation Guide Consolidation Project templates
- CDA Release 3
- Templates vs. Archetypes vs. Detailed Clinical Models vs. Domain Analysis Models vs. …
QRDA

HL7 Quality Reporting Document Architecture
QRDA

- **QRDA Category I – Single Patient Report**
  - Draft Standard for Trial Use
  - Reuses CDA templates where possible
- **QRDA Category II – Patient List Report**
  - Not yet officially balloted
- **QRDA Category III – Calculated Report**
  - Not yet officially balloted
Heuristic for QRDA Category I design: What data would a Quality Improvement Organization need in order to compute a quality measure and report on it?

- Includes data elements to compute eMeasure population criteria
- Includes data elements to slice and dice the data (e.g. by facility type)
greenCDA
Implementation challenge

• Creation of an instance conforming to a particular CDA Implementation Guide may require knowledge of:
  • CDA R2 base specification;
  • HL7 Version 3 data type specification;
  • CDA templates defined in the particular IG;
  • CDA templates referenced by the particular IG;
  • Terminology code lists defined/referenced by the particular IG;

• Validation of an instance conforming to a particular CDA IG may require:
  • W3C Schema validation;
  • Schematron validation;
A Solution

• Create an “authoring schema” that simplifies the creation and processing of a particular CDA IG:
  • Clinically meaningful XML element and attribute names;
  • 100% transformable into conformant CDA IG;
  • Hides certain CDA complexities (such as moodCodes, fixed attributes, etc).

• We call this strategy: greenCDA
  • greenCDA schemas are modular, corresponding to CDA templates.
eMeasures

HL7 Health Quality Measures Format:
  eMeasures
eMeasure and QRDA

- eMeasure provides the rules for determining if a particular patient is included in a population:
  - Initial Patient Population (IPP)
  - Denominator Population (DENOM)
  - Numerator Population (NUM)

- The QRDA contains sufficient data elements to enable determining if the patient meets population criteria.
### eMeasure and QRDA: STK-3

% of inpatients diagnoses with ischemic stroke prescribed anticoagulation at discharge.

<table>
<thead>
<tr>
<th>eMeasure (criteria)</th>
<th>QRDA (patient data)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENOM</td>
<td>Age</td>
</tr>
<tr>
<td></td>
<td>Encounter type</td>
</tr>
<tr>
<td></td>
<td>Encounter admit date</td>
</tr>
<tr>
<td></td>
<td>Encounter d/c diagnoses</td>
</tr>
<tr>
<td></td>
<td>Problem list</td>
</tr>
<tr>
<td></td>
<td>Discharge medications</td>
</tr>
</tbody>
</table>

- **DENOM**
  - Discharge diagnosis of ischemic stroke
  - Age >= 18
  - Hx of Afib/Aflutter
- **NUM**
  - Anticoagulation prescribed at discharge

**eMeasure** (criteria)

**QRDA** (patient data)
Proportion Measure Populations
Data criteria are the building blocks for population criteria

Data Criteria
- Discharge diagnosis: Ischemic stroke
- Hx of: Afib/Aflutter
- Discharge medication: Anticoagulant

Population Criteria
- DENOM
  - AND: Discharge diagnosis: Ischemic stroke
  - AND: Hx of: Afib/Aflutter
- NUM
  - AND: Discharge medication: Anticoagulant
Many data criteria are built from the NQF HIT Expert Panel-defined Quality Data Elements (HITEP QDEs)

**Table:**

<table>
<thead>
<tr>
<th>HITEP Quality Data Element</th>
<th>Code List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge diagnosis</td>
<td>Ischemic stroke code list</td>
</tr>
<tr>
<td>History of</td>
<td>Afib/Aflutter code list</td>
</tr>
<tr>
<td>Discharge medication</td>
<td>Anticoagulant code list</td>
</tr>
</tbody>
</table>

**Data Criteria**
- Discharge diagnosis: Ischemic stroke
- Hx of: Afib/Aflutter
- Discharge medication: Anticoagulant

**Population Criteria**
- **DENOM**
  - **AND:** Discharge diagnosis: Ischemic stroke
  - **AND:** Hx of: Afib/Aflutter
- **NUM**
  - **AND:** Discharge medication: Anticoagulant
Quality Data Model (QDM)

- The QDM is a model of information used to express patient, clinical, and community characteristics as well as the basic logic required to express quality measure criteria.
- The QDM describes the data elements and the states, or contexts in which the data elements are expected to exist in clinical information systems.
QDM Element Structure

Value Set
- Taxonomy
- Individual codes

RxNorm
- 197374, 198461, ...

QDM Element
- Concept
- State
- Timing
- Actor
- Data Flow
- Concept Specific

EXEMPLARY
- Medication
- Administer

Start time: mm/dd/yyyy
Source: Patient
Recorded by: Physician
Recipient: Pharmacy System
Dosage: 300 mg
QDM Use of Value Sets

- **Aspirin**
  - RxNorm: 197374, 198461, ...

- **Diabetes**
  - ICD-9: 250.0, 250.00, 250.01, 250.02, ...
  - ICD-10: E10.36, E11.36, E11.9, E13.31, ...
  - SNOMED: 2751001, 4627003, 5368009, ...

- **ACEI / ARB**
  - RxNorm: 104370, 153750, 197436, 197437, ...
  - RxNorm: 206313, 206763, 206277, 207780, ...
  - RxNorm: 477130, 485471, 577776, 636042, ...

**Medication**
- Administered
  - Start date, End date, Source, Subject, Recorder, Sender, Receiver, Concept Specific

**Diagnosis/Condition**
- Active
  - Start date, End date, Source, Subject, Recorder, Sender, Receiver, Concept Specific

**Medication**
- Dispensed
  - Start date, End date, Source, Subject, Recorder, Sender, Receiver, Concept Specific
PUTTING IT ALL TOGETHER
Templated CDA

EHR Repository

Clinical Applications

SNOMED CT

Disease, DF-00000
Metabolic Disease, D6-00000
Disorder of carbohydrate metabolism, D6-50000
Disorder of glucose metabolism, D6-50100
Diabetes Mellitus, DB-61000
Neonatal, DB75110
Type 1, DB-61010
Carpenter Syndrome, DB-02324
Insulin dependant type IA, DB-61020
Quality Measurement

Measurement Schema
THANK YOU

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Chair, HL7