HL7
Clinical Document Architecture

Today and Tomorrow
CDA - Today and Tomorrow

- HL7, Home of the CDA
- CDA, What is it?
- Mayo’s use of CDA
- Acceptance of CDA World Wide
- CDA Release 2 – What is planned?
What is Health Level 7?

Health Level 7 or HL7 is one of several ANSI-accredited Standards Developing Organizations responsible for national standards used by the health care industry today.

Its name is taken in part from the OSI model which represents the 7 layers of a communication stack.

HL7 has focused on the application layer or layer 7 of healthcare applications.
HL7 is a Global Standard!

- Argentina
- Canada
- Czech Republic
- Denmark
- Finland
- Germany
- Greece
- India
- Ireland
- Korea (Sth.)
- Poland
- Switzerland
- The Netherlands
- Australia
- China
- Croatia
- Finland
- France
- Greece
- Italy
- Lithuania
- Southern Africa
- Spain
- Taiwan
- The Netherlands
- USA
- Brazil
- NZ
- Japan
- Turkey

HL7 Organizations in 27 Countries!
What sort of standards?

- **HL7 Messaging Standards**

<table>
<thead>
<tr>
<th>Chapter Title</th>
<th>Chapter Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Introduction</td>
<td>Overview of HL7</td>
</tr>
<tr>
<td>2 Control</td>
<td>Message Definitions, Interchange Protocols</td>
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<tr>
<td>3 Patient Administration</td>
<td>Admit, Discharge, Transfer, and Demographics</td>
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<td>4 Order Entry</td>
<td>Observations, Pharmacy, Dietary, and Supplies</td>
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<td>5 Query</td>
<td>Rules applying to queries and to their responses</td>
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<td>6 Financial Management</td>
<td>Patient Accounting and Charges</td>
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<td>8 Master Files</td>
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<td>9 Medical Records /</td>
<td>Document Management Services and Resources</td>
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<tr>
<td>Information Management</td>
<td></td>
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<td>10 Scheduling</td>
<td>Appointment Scheduling and Resources</td>
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<tr>
<td>11 Patient Referral</td>
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<tr>
<td>12 Patient Care</td>
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<td>13 Laboratory Automation</td>
<td>Equipment status, specimen status, equipment inventory, equipment</td>
</tr>
<tr>
<td></td>
<td>comment, equipment response, equipment notification, equipment test</td>
</tr>
<tr>
<td></td>
<td>code settings, equipment logs/service</td>
</tr>
<tr>
<td>14 Application Management</td>
<td>Application control-level requests, transmission of application</td>
</tr>
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<td></td>
<td>management information</td>
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<tr>
<td>15 Personnel Management</td>
<td>Professional affiliations, educational details, language detail,</td>
</tr>
<tr>
<td></td>
<td>practitioner organization unit, practitioner detail, staff</td>
</tr>
<tr>
<td></td>
<td>identification</td>
</tr>
</tbody>
</table>
What sort of standards?

- HL7 Messaging Standards and …
- Clinical Context Management (CCOW)
- Arden Syntax for Medical Logic Systems
- Reference Information Model (RIM)
- Clinical Document Architecture (CDA)
- Electronic Healthcare Records (EHR)
My area of focus…

- HL7 Messaging Standards
- Clinical Context Management (CCOW)
- Arden Syntax for Medical Logic Systems
- Reference Information Model (RIM)
- Clinical Document Architecture (CDA)
- Electronic Healthcare Records (EHR)
Clinical Document Architecture

An XML markup standard that specifies the structure and semantics of "clinical documents" for the purpose of exchange.

Originally presented at the HL7 Plenary meeting in Sept of 1998, CDA Release 1.0 was approved as an ANSI standard on November of 2000.
Structured Documents TC

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Document Exchange Standard

Local Document Management System

Document Repository

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Key Aspects of CDA

- CDA documents are encoded in Extensible Markup Language (XML).

- CDA documents derive their meaning from the HL7 Reference Information Model (RIM) and use the HL7 Version 3 Data Types.

- The CDA specification is richly expressive and flexible. Document-level, section-level and entry-level templates can be used to constrain the generic CDA specification.
What is XML?

- XML - eXtensible Markup Language is a simplified subset of SGML that has been optimized for use on the World Wide Web.
  - HTML is an example of an SGML compliant specification, where the tags are predefined.
  - XML is extensible, in that it allows you to define your own vocabulary or <tags> which can be used to describe the abstract structure of a document.
Why use XML?

• If you carefully define your tags, in the future you can go back and read those documents.

  • Word changes file format with each release.

  • RTF is owned by Microsoft and expresses only presentation format not meaning.

  • XML allows you to define a document format that expresses meaning that can last!
XML is composed of two types of tags:

One tag which can contain content:

```
<tag-name attr1=“value1” attr2 =“value2”> content </tag-name>
```

Attributes

End Tag

Start Tag

The other tag has no content:

```
<tag-name attr1=“value1” attr2 =“value2”/>
```

Attributes

Empty Tag

Content can contain text and or other tags.
Document VS Message

• **Persistence**
  • A clinical document continues to exist in an unaltered state, for a time period defined by local and regulatory requirements.

• **Stewardship**
  • A clinical document is maintained by a person or organization entrusted with its care.

• **Potential for authentication**
  • A clinical document is an assemblage of information that is intended to be legally authenticated.
Document VS Message

- **Wholeness**
  - Authentication of a clinical document applies to the whole and does not apply to portions of the document without the full context of the document.

- **Human readability**
  - A clinical document is human readable, guarantees that a receiver of a CDA document can readily display the clinical content of the note on a standard Web browser.

- **Context**
  - A clinical document establishes the default context for its contents.

(Release 2.0)
The CDA Header is derived from the HL7 Reference Information Model (RIM) and contains:

- Document information
- Encounter data
- Service actors (such as providers)
- Service targets (such as patients)
- Local markup
CDA Release 1.0

• CDA Release 1.0 specifies a highly structured header, yet utilizes generic clinical document body markup.

  • Supporting
    • Multiple sections containing:
      • Tables
      • List
      • Paragraphs
      • Sections

Which can contain text, links to other documents or images, coded_entries and local markup.
CDA Release 1.0
at Mayo

MICS Notes Editor
Goals for MICS Notes

- Strong desire to maintain:
  - Templated document entry
  - Entry automation
  - Digital dictation compatibility
  - Standards compliance

- Support to work with HL7 on Structured Documents Standards (CDA).

- Replacement of Notes-I & CDM Reports with a integrated document management system.
MICS Notes Editor

• **MICS Notes Editor [xmlIDP]**
  - Co-developed with Pen!etics Development Inc [www.penetics.com](http://www.penetics.com)
  - Java-based text editor
  - Derived from a history of PDA and tablet entry
  - Writes “pure” XML documents (Unicode)
  - Powerful knowledge base (KB) and KB manager behind editor
MICS Notes Editor

• Use case analysis identified a need to support both:
  • Transcriber
  • Self-entry provider

• 3 Usability & Process labs for Notes-II XML editor were used to refined the design.
Hurt, John T., Mr.
3-982-540

DOB: 8 Jul 1935        Note Date: 26 Nov 2003        Service: ONCL
Age: 69 years        Type/Desc: SV        Facility: MCR
Sex: M        Provider: Takuya Nakagawa (mhl7030)

Referral Source

Chief Complaint / Reason for Visit

Mr. Hurt returns for reassessment of his clinical stage II (T2 N1 NO) grade 3 squamous carcinoma of the lung.

History of Present Illness

Mr. Hurt has done quite well since we saw him a year ago and denies any new problems. He and his wife spent the winter in Las Vegas and are planning to return to that area sometime within the next several weeks. He denies any new respiratory symptoms figuring he has not had any chest discomfort, cough, breathlessness. He has had no bowel or bladder problems since we last saw him. He does take one aspirin a day and that is basically his only medication.

PFH & CVI Dates

PFH Date: _______    CVI Date: _______

Current Medications

Allergies
Medication:
ERYTHROMYCIN - Nausea and Vomiting
AMOXICILLIN - Nausea and Vomiting
CAFFEINE - hyperactivity
CEPHALOSPORINS
ASPIRIN - SHA complete
CODEINE - itching, Pruritis
PENICILLINS - stomach upset
ANTI-BIOTICS - Fever, itching, bloating

Non-Medication / Food:
LOBSTER - vomiting
FISH - GI Upset
DUST - Contact Dermatitis
CAT HAIR - Itching, Pruritis
LOBSTER - Shortness of Breath
MILK - Increased Heart Rate, Palpitations
PEANUTS - Anaphylaxis
MORE THEN 16 ALLERGIES EXIST - see Clinical Note

Allergies above current as of Thursday, February 5, 2004 at 09:11 AM
Hurt, John T., Mr.
3-982-540

**Vital Signs**

- **Height:** 169 cm
- **Weight:** 38 kg
- **BMI:** 24.42 kg/m²
- **Temp:** 37 °C
- **BSA:** 1.71 m²

**Pulse**
- Regular
- Irregular

**SBP/DBP**
- 148 / 76
- 148 / 76

**Position**
- Sitting

**Date/Time**
- 28Nov2003 / 00:00

**Physical Exam**

**Exam Text**

Laboratory studies today showed a hemoglobin of 14 g with a white blood count of 5200 and a platelet count of 225,000. His chemistries showed a minimal elevation of his glucose of 101 mg/dL with normal alkaline phosphatase, ST, creatinine levels. His total cholesterol was 200 mg/dL with an HDL cholesterol of 49 mg/dL and a calculated level of 131 mg/dL. Triglycerides were 101 mg/dL. Chest x-ray showed postop changes from his previous right thoracotomy, but it was otherwise negative and was unchanged compared to his film from a year ago.

Rectum: The prostate was small with rather prominent lateral edges but symmetrically so with a well defined central sulcus. There were no palpable nodules within the substance of the gland.

Except as noted above, the following were examined and were normal or unremarkable: Abdomen, Breasts, ENT, Extremities, Eyes, Gait, Genitalia, Head, Heart, Joints, Lungs, Lymph, Mental, Neuro, Skin, Spine, Thyroid, and Vessels.
New Approaches

• Generating Structured Content

• One of the significant challenges in creating structured documents is the development of an efficiently means to create content.

• For the MICS Notes editor, a mixture of custom dialogs and an integrated knowledge base are our principle solutions to this problem.
Vital Signs Panel

- MICS Editor uses panels like these to capture highly structured content.

Vital Signs data is needed for Growth Charts.
The Act and Observation classes are found in the HL7 Reference Information Model (RIM). These classes are used to model findings in the RIM and are useful references when considering the modeling of clinical findings within the Vital Signs table.
RIM - Act & Observation

Required Act Attributes:

1. **activity_time**  
The time when the action happened.
2. **availability_dttm**  
The time at which a receiving system obtained information.
3. **confidentiality_cd**  
A code that limits disclosure of information about this act.
4. **critical_time**  
The biologically relevant time of the action.
5. **id**  
The instance identifier for the act.
6. **interruptible_ind**  
Indicates if an act can be interrupted by asynchronous events.
7. **max_repeat_nmr**  
This is the maximum number of repetitions of an act.
8. **mood_cd**  
Set for observation mood, as opposed to ordered, master reference or goal.
9. **orderable_ind**  
Used in master reference mood for orderable acts.
10. **priority_cd**  
Specifies the urgency under which an act is scheduled or performed.
11. **status_cd**  
State of an action, pending, active, completed, cancelled or deleted.
12. **txt**  
Description of the act.
13. **type_cd**  
A code to specify the act conceptually.
RIM - Act & Observation

Required Observation Attributes:

- 1. body_site_cd  
  Focus on a particular anatomic site, body part or body system.

2. derivation_expr  
  Supports construction of associative expression based relationships.

3. interpretation_cd  
  Allows for a very rough interpretation of the course or outcome.

- 4. method_cd  
  Several methods maybe used to obtain results, this says which was used.

5. value  
  The result value of an observation action, finding.

In addition to the act / observation attributes identified, a number of classes related to Act are required to define the context of the observation. They include:

has service target  for Patient
has a service actor  for Originator
has a service actor  for Legal Authenticator
Vital Signs Elements

- **Id**: Instance Identifier
- **Value**: The quantity or text associated
- **Activity time**: The time of the observation
- **Type code**: LOINC concept code
- **Patient**: Context required
- **Authentication**: Context required
  - **Confidentiality**: Level One
  - **Originator**: Level One
Table Caption Code

\[\text{<caption_cd>}\] - The caption code element

- The caption code in the CDA / Notes II DTD is used to identify the concept associated with a container in the document. At CDA Level 1, no safe context can be assume, outside human readability.

- For Notes II, a locally defined table caption_cd will be assigned to the Vital Signs table. This code will identify Vital Sign tables and by policy, establish the Patient and Authenticator context.
  - For the Vital Signs table, the patient and authenticator contexts will assumed to be the document’s.

- In addition, assignment of this code to a table stipulates that the table honor the XPATH constraints that have been defined for later machine processing.
Vital Signs Markup

<section>
  <caption>
    <caption_cd V="12345-0" S="LOINC-OID-value"/> VITAL SIGNS
  </caption>
  <table>
    <caption_cd V="2000-1" S="MAYO-OID-value"/>
    <tr><th>Date / Time</th><th>18-Apr-2000 14:30</th></tr>
    <tr><th>Height</th><td>177.0 cm (69.7 in)</td></tr>
    <tr><th>Weight</th><td>88.0 kg (194.0 lbs.)</td></tr>
  </table>
</section>
Identifiers

<id> - The identifier element

- The <id> element is not required if the observation was originally entered into this document. In these cases, the identifier is assumed to be the document’s identifier.

- If the content of the observation was obtained from another source – such as a findings table in the LastWord system, then the <id> could be assigned the key value for the observation in the LastWord relational database.
Vital Signs Markup

<section>
  <caption>
    <caption_cd V="12345-0" S="LOINC-OID-value"/> VITAL SIGNS
  </caption>
  <table>
    <caption><caption_cd V="2000-1" S="MAYO-OID-value"/></caption>
    <tr><th>Date / Time</th><td>18-Apr-2000 14:30</td></tr>
    <tr><th>Height</th><td><id EX="id-value" RT="OID-value"/> 177.0 cm (69.7 in)</td></tr>
    <tr><th>Weight</th><td><id EX="id-value" RT="OID-value"/> 88.0 kg (194.0 lbs.)</td></tr>
  </table>
</section>
Value

<value> - The value element

- The <value> element is used to provide a structured representation of the observations found within the Vital Signs table. Value is derived from the Observation class in the RIM and is used when the content of the observation is a Quantity, I.E. a measure with a unit. The reference for units is taken from “The Unified Code for Units of Measure”, which can be obtained from: http://aurora.rg.iupui.edu/UCUM/

- In the situation where the observation is free text, we propose that we use PCDATA within the <content> element.

- When English measures and units are to be depicted within the table, a second optional <value> element will be included for its representation.
```
<section>
  <caption>
    <caption_cd V="12345-0" S="LOINC-OID-value"/> VITAL SIGNS
  </caption>
  <table>
    <caption><caption_cd V="2000-1" S="MAYO-OID-value"/></caption>
    <tr><th>Date / Time</th><td>18-Apr-2000 14:30</td></tr>
    <tr><th>Height</th><td><value V="177.0" U="cm"/> 177.0 cm<br/>
<value V="69.7" U="[in_i]"/> 69.7 in</td></tr>
    <tr><th>Weight</th><td><value V="88.0" U="kg"/> 88.0 kg<br/>
<value V="194.0" U="[lb-av]"/> 194.0 lbs.</td></tr>
  </table>
</section>
```
Activity Time

<activity_tmr> - The activity time

- The Vital Signs table will be defined with date / time entries running across the top, in the first row. The date and time specification is the activity time associated with the individual reading. The activity times will run in chronological order, with oldest entries occurring in the second column, just after the heading entries for each of the vitals and proceeding to the most current entry recorded in the right most column.

- The choice between ACT.activity_time Vs ACT.critical_time needs to be discussed. For now we will specify activity time, however critical time maybe more appropriate. I will review at HL7 with other experts.
<section>
  <caption>
    <caption_cd V="12345-0" S="LOINC-OID-value"/> VITAL SIGNS
  </caption>
  <table>
    <caption cd V="2000-1" S="MAYO-OID-value"/>
    <tr><th>Date / Time</th><th><activity_tmr V="20000418T1430"/>
    18-Apr-2000 14:30</th></tr>
    <tr><th>Height</th><td><id EX="id-value" RT="OID-value"/>
    <value V="177.0" U="cm"/>177.0 cm
    <value V="69.7" U="[in_i]"/> 69.7 in</td></tr>
    <tr><th>Weight</th><td><id EX="id-value" RT="OID-value"/>
    <value V="88.0" U="kg"/>88.0 kg
    <value V="194.0" U="[lb-av]"/>194.0 lbs.</td></tr>
  </table>
</section>
Vital Type

<caption_cd> - The type specification

• Within the Vital Signs table the <caption_cd> element is used to identify the concept of the observation that is recorded in the following <td> cells of the table row. The concept will be encoded using the LOINC coding system.

• This carries the concept of the container encoding to its lowest level. The container that is being coded is the <tr> or table row.

• The presentation name for the concept is displayed redundantly as PCDATA in the <th> element. Although, not absolutely required, it simplifies the task of viewing the caption text within the editor that we are using to create and update the document.
<section>
...
<table>
  <caption><caption_cd V="2000-1" S="MAYO-OID-value"/></caption>
  <tr><th>Date / Time</th><td><activity_tmr V="20000418T1430" />
18-Apr-2000 14:30</td></tr>
  <tr><th><caption_cd V="3137-3" S="LOINC-OID-value" DN="BOD\y HEIGHT"/>
Height</th><td><id EX="id-value" RT="OID-value"/>
<value V="177.0" U="cm"/>177.0 cm
<value V="69.7" U="[in_i]"/>69.7 in</td></tr>
  <tr><th><caption_cd V="3141-9" S="LOINC-OID-value" DN="BOD\y WEIGHT"/>
Weight</th><td><id EX="id-value" RT="OID-value"/>
<value V="88.0" U="kg"/>88.0 kg
<value V="194.0" U="[lb-av]"/>194.0 lbs</td></tr>
</table>
</section>
<section>
  <caption_cd V="12345-0" S="LOINC-OID-value"/> VITAL SIGNS
</caption>
<table>
<tr><th>Date / Time</th>
  <td><activity_tmr V="20000418T1430"/>
     18-Apr-2000 14:30</td></tr>
<tr><th>Height</th>
  <td><id EX="id-value" RT="OID-value"/>
     <value V="177.0" U="cm"/>177.0 cm
     <value V="69.7" U="[in_i]"/> 69.7 in</td></tr>
<tr><th>Weight</th>
  <td><id EX="id-value" RT="OID-value"/>
     <value V="88.0" U="kg"/>88.0 kg
     <value V="194.0" U="[lb-av]"/>194.0 lbs.</td></tr>
</table>
</section>
# Vital Signs - Presentation

**Vital Signs**

<table>
<thead>
<tr>
<th>Date / Time</th>
<th>18-Apr-2000 14:30</th>
<th>18-Apr-2000 15:30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>177 cm (69.7 in)</td>
<td>177 cm (69.7 in)</td>
</tr>
<tr>
<td>Weight</td>
<td>88.0 kg (194.0 lbs.)</td>
<td>88.0 kg (194.0 lbs.)</td>
</tr>
<tr>
<td>BMI</td>
<td>28.1 kg/m²</td>
<td>28.1 kg/m²</td>
</tr>
<tr>
<td>BSA</td>
<td>2.05 m²</td>
<td>2.05 m²</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>Head Circ</td>
<td>61 cm</td>
<td>61 cm</td>
</tr>
<tr>
<td>Pulse</td>
<td>76 /minute</td>
<td>74 /minute</td>
</tr>
<tr>
<td>Rhythm</td>
<td>Regular</td>
<td>Regular</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>

**Activity time use to record the ACT.Activity_time of the service act.**

**Caption code used to record Act.type_cd for the vital entries on current row.**

**Value use to encode the Observation.value (finding) of the activity.**

**Id use to identify the Act.id of the vital in an external source.**
Vital Signs - Conformance

XPATH Access Methods

- To ensure proper machine processing of the Vital Signs entries within tables with `caption_cd = 2000-1`. A series of XPATH expressions have been created as a conformance specification.

- Implementations at Mayo will need to be validated using these expressions and certified before being allowed to create Vital Sign tables.
# Vital Signs - Conformance

<table>
<thead>
<tr>
<th>Entries</th>
<th>XPath Expression</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitals Table</td>
<td>/table[caption/caption_cd/@V = &quot;2000-1&quot;]</td>
<td>Only one vital signs table is assumed.</td>
</tr>
<tr>
<td>Activity Time</td>
<td>tr/th[n]/@activity_tmrs</td>
<td>n = vitals column + 1</td>
</tr>
<tr>
<td>Observation(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>tr[th/caption_cd/@V=&quot;3137-3&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
<tr>
<td>Weight</td>
<td>tr[th/caption_cd/@V=&quot;3141-9&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
<tr>
<td>BMI</td>
<td>tr[th/caption_cd/@V=&quot;????-?&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
<tr>
<td>BSA</td>
<td>tr[th/caption_cd/@V=&quot;????-?&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
<tr>
<td>Temperature</td>
<td>tr[th/caption_cd/@V=&quot;8310-5&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
<tr>
<td>Respiratory</td>
<td>tr[th/caption_cd/@V=&quot;????-?&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
<tr>
<td>Pulse</td>
<td>tr[th/caption_cd/@V=&quot;????-?&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
<tr>
<td>Rhythm</td>
<td>tr[th/caption_cd/@V=&quot;????-?&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
<tr>
<td>Systolic</td>
<td>tr[th/caption_cd/@V=&quot;????-?&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
<tr>
<td>Diastolic</td>
<td>tr[th/caption_cd/@V=&quot;????-?&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
<tr>
<td>Position / Cuff</td>
<td>tr[th/caption_cd/@V=&quot;????-?&quot;]/td[m]</td>
<td>m = vitals observation column</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ID / Value / Unit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>id/@id</td>
</tr>
<tr>
<td>Metric Value</td>
<td>value/@V[1]</td>
</tr>
<tr>
<td>Metric Unit</td>
<td>value/@U[1]</td>
</tr>
<tr>
<td>English Value</td>
<td>value/@V[2]</td>
</tr>
<tr>
<td>English Unit</td>
<td>value/@U[2]</td>
</tr>
</tbody>
</table>
Vital Signs Conformance

- **Id** Optionally in `<td>` elements.
- **Value** Found in `<td>` elements.
- **Activity time** Found in row = 1, column > 1
- **Type code** Found in column = 1, row > 1
- **Patient** Context taken from doc header
- **Authentication** Context taken from doc header
- **Confidentiality** Level One
- **Originator** Level One
Summary

• The Vital Signs representation at Release 1.0 is not directly supported by the CDA standard. Local markup was used to support our machine processing requirements defined at Mayo.

• XPath expressions can be used in defining conformance expectations for complex XML objects.

• Basing our extensions upon the HL7 – Reference Information Model, has assured us a means to transform our content from Release 1.0 to 2.0.
MICS Notes Editor

• In addition, to standardized panels, the new editor supports scripting similar to Shorthand™.

  • Support for End User scripting.
  • Scripting works for some areas.
  • Support placing codes within the text of a document.
  • Leverage KB scripts to enrich content of clinical documents.
MICS Notes Editor

- Notes-II XML Editor - Knowledge base
  - Nodes created in KB Admin
  - Each node represents atomic info for charting
  - Node links are parent : child
  - Node display = KB tree
  - Extensive keyboard automation
MICS Notes Editor

• Pilot release, supporting Clinical Notes entry:
  • Standard panels for: Vital Signs, Physical Exams
  • Transcription and Physician entry supported
  • Extensive keyboard automation
  • MS-Word™ like interface

• This year we will be incorporating:
  • Provider KB scripting support
  • Hospital Summaries entry
Regional Use of CDA

• Add graphic here...
Acceptance of CDA World Wide

- Since it’s approval in 2000, CDA release 1 has been used worldwide at a number of sites.

- HL7 International CDA Conference cosponsored by HL7 Germany and HL7 Finland.

October 7-9, 2002
Conference Presentations

- **GMS PICNIC: Ireland, Denmark, Crete**
  - Pharmacy Patient Validation & Electronic Claims Reimbursement

- **Seamless Care and CDA: Finland**
  - Regional Electronic Patient Record System

- **SCIPHOX: Germany**
  - Standardization of Communication between Information Systems in Physician Offices and Hospitals using XML
Conference Presentations

- HL7 CDA in HYGEIAnet: Crete
  - Regional Health Information Network of Crete

- CDA at the University of Munster
  - Discharge Patient Documentation and more.

- CDA for MERIT-9: Japan
Conference Presentations

• CDA in Staffordshire EHR: UK
  • Clinical content for emergency care scenarios

• CDA in Taiwan
  • Discharge Summary Case Study

• CDA at the University of Heidelberg
  • XML based discharge letters in internal medicine using CDA Level One.

...
2004 Annual HIMSS Conference and Exhibition

• Dictaphone
  • CCR
  • Discharge Summary
  • Imaging Report / Release 1 / Level 1
  • Surgical Report / Release 1 / Level 1

• Epic
  • Discharge Summary

• Microsoft InfoPath
  • CCR referral for admission / Release 2
  • Pathology Report
Overall Interest in CDA continues to grow.

- Over 3000+ Google hits on “HL7 CDA”, the number of projects is growing worldwide.


- CDA Next Generation – Release 2.0
CDA Release 2

The basic model of CDA is essentially unchanged. A CDA document has a similar header, however it is the body which has been enhanced, it contains a much richer assortment of entries to use within CDA structures.

CDA, Release Two enables clinical content to be formally expressed to the extent that is it modeled in the RIM.
CDA Release 2.0

• New Features & Enhancements:
  • Greater structured content support
  • Transform document relationships
  • Authenticated content defined
  • Region of Interest support
  • Delete and Insert support  (Revisions)
  • Bold, Italic and Underline support
  • Greater V3 conformance (More RIM)
CDA – Refined Message
Information Mode (R-MIM)
## Release 1 $\iff$ Release 2

<table>
<thead>
<tr>
<th>Structured Header</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section w/ paragraphs, tables and lists containing text w/ coded entries</td>
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CDA Entries

- Coded Entry (Deprecated)
- ACT
  - FutureEncounter
  - Observation
  - ObservationMedia
  - Procedure
  - RegionOfInterest
  - SubstanceAdministration
CDA Entries

An ACT can be expressed in different tenses or MOODS: Order for, Plan to, Occurrence of, ...

- ACT
  - FutureEncounter
  - Observation
  - ObservationMedia
  - Procedure
  - RegionOfInterest
  - SubstanceAdministration

10 types of relationships exist between acts:
Summary of CDA Release 2.0
Goals in the Future...

- Support for a standardized means of modeling structured content for the purposed of exchange.
- Continued enhancement to the standard based upon demonstrated use cases.
Why CDA?

• Readable
  • CDA Level 1 - looked like our documents: narrative, multi-sectioned
  • Version 3 modeling approach promises machine processability

• Durable
  • Our documents needed to survive technology changes
  • Our paper based system has lasted 100 years

• Shareable
  • Standards based document exchange - $$ savings
  • Developing needs for Regional partners and others

• Flexible
  • Multi-media & web technology support - day one
  • An architecture to cover all the documentation needs of Mayo.
MICS Notes II Team

Development Team
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- Bolduan, Eric
- Huhn, Jeff
- Rosemark, Jim
- Nakagawa, Takuya
- Mohsin, Mohammad

Implementation Team
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- Krahn, Linda
- Voller, David
- Lucas, Tom
Thank You

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  - Document Oversight Chair

- Dr David Mohr
  - MICS Oversight Chair