LOINC Challenges: CAP’s Experience
IHE Lab Meeting February 4, 2013
Andrea Pitkus, PhD, MLS(ASCP)CM

Agenda

• LOINC Drivers
• LOINC Requirements
• Implementing LOINC
  o LOINC Mapping Approaches
  o LOINC Sources
  o Maintenance and Versioning
  o LIS Architecture and Functionality
• LOINC and SNOMED CT
  o Impacts on IHE Profiles
• Questions and Answers (Q&A)
Why LOINC? Why Now? What are the Drivers?

- Meaningful Use (MU)
  - Stage I
  - Stage II
  - Stage III
- Loss of Outreach Business
- Insurance

MU and the Laboratory: Electronic Laboratory Reporting (ELR)

**Stage 1 MU**
(One of three Public Health (PH) Reporting options)

Perform one successful transmission of ELR to PH in accordance with applicable law and practice using LOINC in HL7v 2.5.1.

**Stage 2 & 3 MU**
(Required)

Successful ongoing submission of ELR to PH, except where prohibited, and in accordance with applicable law and practice using SNOMED CT and LOINC in HL7v 2.5.1.
MU and the Laboratory: Structured Results

Stage 1 MU
(One of five menu options)
More than 40% of all clinical lab test results ordered by the Eligible Provider (EP) or by an authorized provider of the Eligible Hospital (EH) that are in a pos/neg or numerical format are incorporated in certified EHR technology as structured data.

Stage 2 & 3 MU
(Required)
Provide structured electronic laboratory results (55% (2) / 80% (3) of pos/neg or numeric format) to EP with LOINC and SNOMED CT in HL7 v 2.5.1

MU and the Laboratory: Ambulatory Reporting

Stage 2 MU
(Required)
More than 20% of all clinical lab test results ordered by the Eligible Provider (EP) for ambulatory testing that are in a pos/neg or numerical format are incorporated in certified EHR technology as structured data.

Stage 3 MU
(Required)
More than 20% of all clinical lab test results ordered by the Eligible Provider (EP) for ambulatory testing that are in a pos/neg or numerical format are incorporated in certified EHR technology as structured data.
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MU LOINC & SNOMED CT (SCT) Requirements

• Implementation Guides (MU Stage)
  o Electronic Laboratory Reporting (ELR) to Public Health (1, 2, 3)
  o Laboratory Results Reporting Initiative (LRI-2, 3)
  o Electronic Directory of Service (eDOS-3)
  o Laboratory Orders Initiative (LOI-3)
• Details on HL7 fields, required elements, etc
• Uses HL7 v 2.5.1
• Certified LIS/EHR technology
**ELR Use Cases: MU Stage II Vendor Certification**

- LIS & EHR Vendors add functionality
- Certify for Stage I and now Stage II requirements
- Release certified version
- Labs install/upgrade to certified version
- LOINC, SCT, HL7 mapping
- Oct 1, 2013 EH/EP begin collecting data

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**Laboratory Needs for LOINC Implementations**

- Implementation/Upgrade of Certified LIS or EHR
  - Budgeting & Resourcing
  - Multiple upgrades (MU1, MU2, MU3)
- Mapping
  - Most laboratory professionals have no LOINC experience
    - LIC Education, Regenstrief LOINC Education
  - Resources. Laboratory professional shortages
  - Time. Mapping doesn’t happen overnight
- Technical
  - Upgrade to HL7 2.5.1 messaging
  - Interface checks/CUA requirements
LIC Status January 2013

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### LOINC - Orders vs. Results & Panels

<table>
<thead>
<tr>
<th>Department</th>
<th>Order Mnemonic</th>
<th>Order Name</th>
<th>Order LOINC</th>
<th>Result Mnemonic</th>
<th>Result Name</th>
<th>Result LOINC</th>
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<td>Urine leucocyte esterase</td>
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<tr>
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<td>Umisc</td>
<td>Urine Miscellaneous</td>
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### LOINC - Generic vs. Specific

**NAME**: 32293-3  Albumin [Mass/volume] in Unspecified specimen

<table>
<thead>
<tr>
<th>Fully-Specified Name</th>
<th>Component</th>
<th>Property</th>
<th>Time Aspect</th>
<th>System</th>
<th>Scale</th>
<th>Method</th>
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</thead>
<tbody>
<tr>
<td>Albumin</td>
<td>Mic</td>
<td></td>
<td></td>
<td>S225</td>
<td>Qn</td>
<td></td>
</tr>
</tbody>
</table>

**NAME**: 43605-5  Microalbumin [Mass/volume] in 4 hour Urine

<table>
<thead>
<tr>
<th>Fully-Specified Name</th>
<th>Component</th>
<th>Property</th>
<th>Time Aspect</th>
<th>System</th>
<th>Scale</th>
<th>Method</th>
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<tbody>
<tr>
<td>Microalbumin</td>
<td>Mic</td>
<td></td>
<td>4H</td>
<td>Urine</td>
<td>Qn</td>
<td>Detection limit &lt;= 20 mg/L</td>
</tr>
</tbody>
</table>

**Timing = 4H**

**Specimen = Urine**

**Method = Detection limit <= 20 mg/L**
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Reference Laboratories and Vendors

• Include ARUP, Mayo, LabCorp, Quest, etc.
• Some diagnostic vendors provide LOINC codes
• Some LIS & EHR vendors may include LOINC in drop down menus
• Top National Library of Medicine LOINC Orders and/or Results
• All need to be validated for each lab’s test menu

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Result Code</th>
<th>Result Description</th>
<th>LOINC Code</th>
<th>Unit of Measure</th>
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<td>88/0089370</td>
<td>0089370</td>
<td>CANNABINOIDS S.A.M.</td>
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<td>89/0090001</td>
<td>0090001</td>
<td>Acetaminophen</td>
<td>3288-7</td>
<td>ug/mL</td>
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</table>

LOINC codes from ARUP website: www.arup.org.
Albumin by Bromocresol green (BCG) or Bromocresol purple (BCP)

61151-7 Albumin [Mass/volume] in Serum or Plasma by Bromocresol green (BCG) dye binding method

<table>
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<th>NAME</th>
<th>Fully-Specified Name</th>
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<th>Property</th>
<th>Time Assay System</th>
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<td>conc</td>
<td>Albumin</td>
<td></td>
<td>MOre Pt</td>
<td>SIr/Plas</td>
<td></td>
<td>BCG</td>
</tr>
</tbody>
</table>

- **Roche Integra 400 Albumin (BCP)**
  - [http://www.mayomedicallaboratories.com/test-catalog/Performance/8436](http://www.mayomedicallaboratories.com/test-catalog/Performance/8436)

- **Siemens Advia 1800 Albumin (BCG) & (BCP)**

61152-5 Albumin [Mass/volume] in Serum or Plasma by Bromocresol purple (BCP) dye binding method

<table>
<thead>
<tr>
<th>NAME</th>
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<tr>
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LOINC Maintenance & Versioning

- Deprecated and Discouraged codes
- Do you have deprecated and discouraged codes mapped in your data dictionary?
- What’s your maintenance plan for each LOINC release?

LOINC Maintenance & Versioning: HIV rapid

- MU (2) requires LOINC version 2.40 or later.
- LOINC 2.42 current version. Includes new HIV rapid codes & older codes in yellow.
- Which are mapped in your test data dictionary?
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Coding Implementation Functionality

• Dependent on how LIS & EHR functionality (MU 1)
  o Many have single field for LOINC mapping in data dictionary to results
  o Several can map to multiple LOINC codes
  o Several unable to map orders to LOINC
  o SNOMED CT rare in clinical laboratory. Common in AP.
  o Many microbiology, molecular reports not discrete fields; unable to code multiple organisms, findings
• Yet some are MU (1) certified. Bar raised much higher for MU (2) certification & functionality
MU (2) ELR Use Case (~20 LOINC, SCT, UCUM codes)

- One culture order (LOINC)
- Org identified result (LOINC)--3 orgs (SCT)
- Colony count (LOINC)--# (UCUM)
- Stool culture SPM (SCT)
- Susceptibility order (LOINC)
- Drugs (LOINC)--Conc (UCUM)--Interpretations (SCT)
- Isolate SPM (SCT)

Coding Implementation Functionality

- Where is LOINC mapping performed in the hospital?
  - From EHR CPOE Orders
  - In LIS data dictionary for orders
  - Diagnostic Analyzer Software?
  - Middleware
  - LIS data dictionary for results
  - EHR-POCT, Quality Measures, Statistics, etc
- Downstream at Health Information Exchange (HIE), Public Health, interface tables, other entities
- Research, Statistics, etc
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ELR Use Cases: MU Stage II Vendor Certification

- Hepatitis Panel Order
- Hepatitis A Virus IgM Ab
- SCT Negative (qualifier value)
- Hepatitis A virus Ab

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IHE Impacts: Tumor Markers

Clinical Laboratory LIS
- Chemistry, immunology, molecular, cytogenetics
- LOINC codes for orders, results
- SCT codes for qualitative values

Anatomic Pathology LIS
- Used for Pathology/Cancer Reporting
- How is LOINC used?
- How are coded results from LIS integrated?

IHE Impacts: Tumor Marker Results

- Prostate: Prostate Specific Antigen (PSA)
- Colon and Rectum: KRAS
- Bone Marrow: BCR-ABL1, Hgb, Ca, Urine Protein, IgA, IgG, t(15, 17), etc
- Testis: Alpha Fetoprotein (AFP), b-HCG, LDH
- Which AFP LOINC is mapped when used for OB and tumor testing?
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