



LOINC Challenges: CAP's Experience

IHE Lab Meeting

February 4, 2013

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www.cap.org v. #

Agenda

- LOINC Drivers
- LOINC Requirements
- Implementing LOINC
 - LOINC Mapping Approaches
 - LOINC Sources
 - Maintenance and Versioning
 - LIS Architecture and Functionality
- LOINC and SNOMED CT
 - Impacts on IHE Profiles
- Questions and Answers (Q&A)

Why LOINC? Why Now? What are the Drivers?

24 Objectives of Meaningful Use	19 Objectives Required in Stage 1
<ol style="list-style-type: none"> 1. CPOE for Medications 2. Drug-drug/drug-allergy checks 3. Record demographics 4. Structured problem list 5. Structured medication list 6. Structured medication allergy list 7. Record and chart changes in vital signs 8. Record smoking status 9. 1 clinical decision support rule 10. Report clinical quality measures 11. Electronic health info to patients 12. Electronic copy of discharge instructions 13. Exchange key clinical information (capability) 14. Protect electronic health information 	<ol style="list-style-type: none"> 1. CPOE for Medications 2. Drug-drug/drug-allergy checks 3. Record demographics 4. Structured problem list 5. Structured medication list 6. Structured medication allergy list 7. Record and chart changes in vital signs 8. Record smoking status 9. 1 clinical decision support rule 10. Report clinical quality measures 11. Electronic health info to patients 12. Electronic copy of discharge instructions 13. Exchange key clinical information (capability) 14. Protect electronic health information
<ol style="list-style-type: none"> 15. Drug-formulary checks 16. Record advanced directives 17. Incorporate structured clinical-lab data 18. Generate patient lists by condition 19. Identify patient-specific education resources 20. Medication reconciliation 21. Summary care record transitioned or referred patients 	<ol style="list-style-type: none"> 15. Option 1 16. Option 2 17. Option 3 18. Option 4 19. Option 5 20. Public Health reporting option

14 Core Objectives Required of All Hospitals

Choose 5 from Menu Set

Choose at least 1 Public Health Option

LIC Grant Focus
23. Submit lab results to public health

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

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Figure Courtesy of American Hospital Association.

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MU and the Laboratory: Electronic Laboratory Reporting (ELR)

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

Stage 2 & 3 MU
 (Required)

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



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.

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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

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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

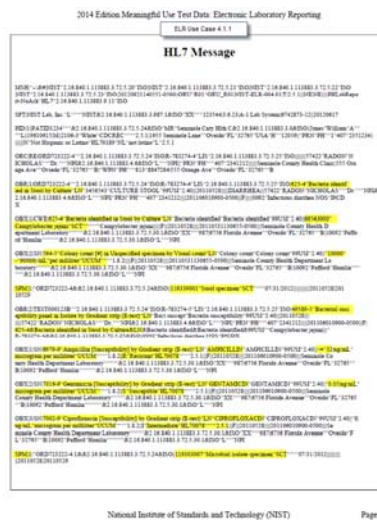
- Implementation Guides (MU Stage)
 - Electronic Laboratory Reporting (ELR) to Public Health (1, 2, 3)
 - Laboratory Results Reporting Initiative (LRI-2, 3)
 - Electronic Directory of Service (eDOS-3)
 - Laboratory Orders Initiative (LOI-3)
- Details on HL7 fields, required elements, etc
- Uses HL7 v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

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ELR Use Cases: MU Stage II Vendor Certification

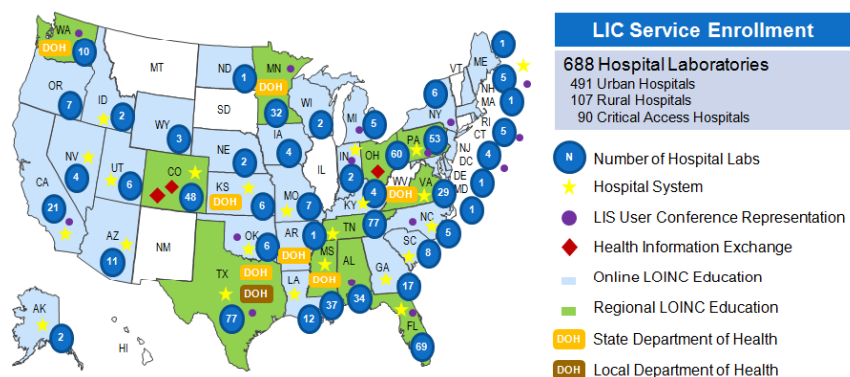
- LIS & EHR Vendors add functionality
- Certify for Stage I and now Stage II requirements
- Release certified version
- Labs install/upgrade to certified version
- LOINC, SCT, HL7 mapping
- Oct 1, 2013 EH/EP begin collecting data



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/CLIA requirements

LIC Status January 2013



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Figure courtesy of Surescripts.

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LOINC – Orders vs. Results & Panels

Department	Order Mnemonic	Order Name	Order LOINC	Result Mnemonic	Result Name	Result LOINC
Microbiology	UA	Urinalysis	24356-8	Ucol	Urine color	5778-6
Microbiology	UA	Urinalysis	24356-8	Uclar	Urine clarity	20627-6
Microbiology	UA	Urinalysis	24356-8	Uspg	Urine specific gravity	2965-2
Microbiology	UA	Urinalysis	24356-8	UpH	Urine pH	5803-2
Microbiology	UA	Urinalysis	24356-8	Uprot	Urine protein	2887-8
Microbiology	UA	Urinalysis	24356-8	Ugluc	Urine glucose	2349-9
Microbiology	UA	Urinalysis	24356-8	Uketo	Urine ketones	2514-8
Microbiology	UA	Urinalysis	24356-8	Ubili	Urine bilirubin	1977-8
Microbiology	UA	Urinalysis	24356-8	Ublid	Urine blood	725-2
Microbiology	UA	Urinalysis	24356-8	Unit	Urine nitrites	
Microbiology	UA	Urinalysis	24356-8	Uleu	Urine leukocyte esterase	
Microbiology	UA	Urinalysis	24356-8	Uurob	Urine urobilinogen	
Microbiology	UA	Urinalysis	24356-8	Umicr	Urine microscopic	
Microbiology	UA	Urinalysis	24356-8	Umisc	Urine Miscellaneous	

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LOINC – Generic vs. Specific

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

NAME	Component	Property	Time Aspect	System	Scale	Method
Fully-Specified Name:	Albumin	MCnc	Pt	XXX	Qn	

No Specimen
No Method

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

NAME	Component	Property	Time Aspect	System	Scale	Method
Fully-Specified Name:	Albumin	MCnc	4H	Urine	Qn	Detection limit <= 20 mg/L

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

	Order Code	Result Code	Result Description	LOINC Code	UofM
58	0089370	0089370	CANNABINOIDS, S.A.M.	18282-4	
59	0090001	0090001	Acetaminophen	3298-7	ug/mL

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LOINC codes from ARUP website: www.arup.org.

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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

NAME						
Fully-Specified Name:	Component	Property	Time Aspe	System	Scale	Method
	Albumin	MCnc	Pt	Ser/Plas	Qn	BCG

- **Roche Integra 400 Albumin (BCP)**
 - http://www.cobas.com/content/dam/cobas/pdf/COBASINTEGRA400plustest_menu.pdf
 - <http://www.mayomedicallaboratories.com/test-catalog/Performance/8436>
- **Siemens Advia 1800 Albumin (BCG) & (BCP)**
 - <http://healthcare.siemens.com/clinical-chemistry/systems/advia-1800-chemistry-system/assays>

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

NAME						
Fully-Specified Name:	Component	Property	Time Aspe	System	Scale	Method
	Albumin	MCnc	Pt	Ser/Plas	Qn	BCP

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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?

Regenstrief LOINC Mapping Assistant (RELMA) - Map Local Terms for Regenstrief session file 1

File Tools HIPAA Lab Auto Mapper View Help

Search Mapping View All Working Set Terms Hierarchy & Search Limits Part Search Answer List Search

albumin ser

Use Standard Search No Comm

Row	LOINC	Property	Timing	System	Scale	Method	LongName
1	38180-0	MRef	2H	Ser	Qn		Deprecated Albumin
2	43712-9	ACnc	Pt	Ser/Plas	Ord		Albumin [Presence] in Serum or Plasma
3	1751-7	MCnc	Pt	Ser/Plas	Qn		Albumin [Mass/volume] in Serum or Plasma

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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?

Regenstrief LOINC Mapping Assistant (RELMA) - Map Local Terms for Regenstrief session file 1

File Tools HIPAA Lab Auto Mapper View Help

Search Mapping View All Working Set Terms Hierarchy & Search Limits Part Search Answer List Search

hiv rapid

Use Standard Search No Common Limits

Row	LOINC	Property	Timing	System	Scale	Method	LongName
1	69668-2	Pnd	Pt	Ser/Plas	Nom	EIA.rapid	HIV 1 and 2 Ab [Identifier] in Serum or Plasma by Rapid immunoassay
2	68961-2	Pr	Pt	Ser/Plas/Bld	Ord	EIA.rapid	HIV 1 Ab [Presence] in Serum, Plasma or Blood Qualitative by Rapid immunoassay
3	49905-3	Pr	Pt	XXX	Ord	EIA.rapid	HIV 1 Ab [Presence] in Unspecified specimen Qualitative by Rapid immunoassay
4	49580-4	Pr	Pt	XXX	Ord	EIA.rapid	HIV 1+2 Ab [Presence] in Unspecified specimen Qualitative by Rapid immunoassay

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Coding Implementation Functionality

- **Dependent on how LIS & EHR functionality (MU 1)**
 - Many have single field for LOINC mapping in data dictionary to results
 - Several can map to multiple LOINC codes
 - Several unable to map orders to LOINC
 - SNOMED CT rare in clinical laboratory. Common in AP.
 - 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**

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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

OBR||ORD723222^EHR System^2.16.840.1.113883.3.0.0.0.1^ISO[R-511^LIS^2.16.840.1.113883.3.0.1.0.2^ISO|42191-7^Hepatitis A and B and C panel in Serum^LN^HepABC Panel^Hepatitis A B C Panel^L||20120628070100||||1234567890^Fine^Larry^Dr.^^^NPI&2.16.840.1.113883.4.6&ISO^L^^^NPI^Princeton Hospital&2.16.840.1.113883.3.0&ISO^WPN^PH^^609^9876543^1||||20120629132900-0500||F

OBX||CWE|22314-9^Hepatitis A virus IgM Ab [Presence] in Serum^LN^HAVM^Hepatitis A IgM antibodies (IgM anti-HAV)^L||260385009^Negative (qualifier value)^SCT^NEG^NEGATIVE^L||Negative||||F||20120628070100||||20120628080500||||Princeton Hospital laboratory^^^CLIA&2.16.840.1.113883.4.7&ISO^XX^^34D4567890|123 High Street^^Princeton^NJ^08540^USA^O^^34021|^Martin^Steven^M^Dr.

OBX||2|CWE|20575-7^Hepatitis A virus Ab [Presence] in Serum^LN^HAVAB^Hepatitis A antibodies (anti-HAV)^L||260385009^Negative (qualifier value)^SCT^NEG^NEGATIVE^L||Negative||||F||20120628070100||||20120628080500||||Princeton Hospital laboratory^^^CLIA&2.16.840.1.113883.4.7&ISO^XX^^34D4567890|123 High Street^^Princeton^NJ^08540^USA^O^^34021|^Martin^Steven^M^Dr.

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http://www.healthit.gov/sites/default/files/170_3144transmissionreportablelabs_fm_2014_approved_v1.3.pdf

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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?

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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?

Regenstrief LOINC Mapping Assistant (RELMA) - Map Local Terms for Regenstrief session file 1

File Tools IIPAA Lab Auto Mapper View Help

alpha fetoprotein ser ng/ml











Use Standard Search No Common Limits

Row	LOINC	Property	Timing	System	Scale	Method	LongName	ExUCU...	ExUnits
1	1834-1	MCnc	Pt	Ser/Plas	Qn		Alpha-1-Fetoprotein [Mass/volume] in Serum or Plasma	ng/mL	ug/L;ng/mL
2	53962-7	MCnc	Pt	Ser/Plas	Qn		Alpha-1-fetoprotein,tumor marker [Mass/volume] in Serum or Plasma	ng/mL	ug/L;ng/mL

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LOINC Languages-International Adoption*

Available Linguistic Variants		Display	Searchable	Documentation	Other Resources
	Chinese (China)				
	Estonian (Estonia)				
	English (United States) – <i>Official Distribution</i>				
	French (Canada)				
	French (France)				
	French (Switzerland)				
	German (Germany)				
	German (Switzerland)				
	Greek (Greece)				
	Italian (Italy)				
	Italian (Switzerland)				
	Korean (Korea, Republic of)				
	Portuguese (Brazil) – <i>Draft</i>				
	Spanish (Argentina)				
	Spanish (Mexico)				
	Spanish (Spain)				
	Turkish (Turkey)				

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* www.loinc.org

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