Real Needs for a Real Time LOINC® Translation Application: Advancing Interoperability On-The-Fly

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Abstract

Health information exchange requires interfacing with diverse electronic medical record systems to make health care information available to providers. Integrating medical data is vital for primary usage in health care treatment and secondary usage in chronic disease management, reporting infectious disease, reporting hospital measures and in research repositories. [2]

One barrier to the integration of medical records is the existence of disparate lab test catalogs, which complicate the reporting of data. This poster discusses the application of a standard translation tool, LOINC®, to allow the merging of health information from different laboratory sources and proposes the development of an application using LOINC® to standardize lab reports on the fly.

Mapping lab reports to a standardized LOINC® nomenclature can be a challenge. The size and complexity of the lab file, familiarity with the data, and maintenance of the LOINC® mapping protocol across new releases contribute to the difficulties facing standardization of lab data. An application that will extract the data pre-coordinated for transmission in HL7 and standardize the records as they stream past is essential. The application will need to

- identify specific attributes: the analyte name, the specimen type; the appropriate test information and evaluate changes made to a test definition plus remain flexible with new LOINC®
- assess the attributes of the data to obtain the LOINC® code and insert the standardized code into the data stream to the health information exchange database.

Materials and Method

The Florida Agency for Health Care Administration recently participated in a federal Agency for HealthCare Research and Quality (AHRQ) pilot program in adding clinical data to statewide administrative data. [7] One of the discrete stages of the project was the translation of 30 data elements from five test catalogs to the vocabulary standard known as Logical Observation Identifiers Names and Codes (LOINC®). The sites pulled extracts from their own laboratory information systems for the defined data elements.

A laboratory test name doesn't display all of the information necessary to map to LOINC. Participation of well educated lab staff in the LOINC coding process is required. This is a very limited resource. The timeframe estimated to translate an entire catalog varies from two to eight weeks[6], with ongoing maintenance approximating several hours per month. Studies indicate that less than 800 codes often account for 99% of the annual lab volume.[5]

Shifting the LOINC® translation process from a manual, human labor intensive phase to being handled by a proposed software application dealing with both repetitiveness and variations in data entry alleviates the burdens from adopting a vocabulary standard defined by the Office of the National Coordinator for advancing Health Information Technology and data exchange.

In one study, five hospitals mapped their test catalogs to LOINC.[4] Both similarities and disparities by display names were found. 14,802 interface codes merged to 4051 unique LOINC® codes.

The application of LOINC® to test catalogs was equally adept at identifying similar lab tests with different display names and disparate assays with similar names. Embedding the LOINC® code when transmitting results allows for true interoperability.

Basis of LOINC® ATTRIBUTES[1]

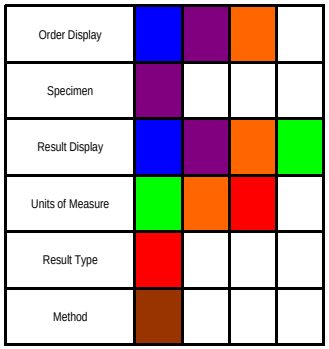
Serum Glucose reported in mg/dL

GLUCOSE:MCNC:PT:SER/PLAS:QN: = LOINC code 2345-7

Two common ways to map to LOINC; differentiated by site having HL7 messaging already in place or not.

A. Identification of attributes via test catalog extracts requires evaluation of multiple different fields (HL7 not in place):

- Order Display
- Result Display
- Result type
- Order Specimen
- Result units
- Method



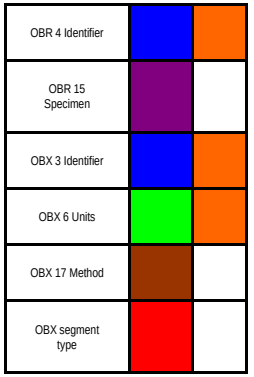
B. Identification of attributes via HL7 message segments (simplified for purpose of this poster):

OBR identifies test & specimen

OBR|1||004044890|CHEM3|||199908|||999||||199908|SERUM^^VENOUS |1912 ^ SMITH,D ||||||||| P|| 19990831113000 ^^ RT~||

OBX3 field holds LOINC code; may have multiple OBX rows in one HL7 record

OBX|1|NM|GLU||90 |MG/DL|60-190|||| F|||19990901120000||LABSTD JONES, MK
OBX|2|NM|CRT||1.2 |MG/DL|0.6-1.3|||| F|||19990901120000||LABSTD JONES, MK



Application has discrete fields to evaluate for attributes, and inserts LOINC in OBX-3

OBX|1|NM|2345-7^LN||90 |MG/DL|60-190|||| F|||19990901120000||JONES, MK
OBX|2|NM|2160-0^LN||1.2 |MG/DL|0.6-1.3|||| F|||19990901120000||JONES, MK

Results

- Currently, LOINC mapping can be translated either using a data source of full test extracts from the local laboratory information system, or by the grooming of existing HL7 messages to create a database.
- The graphs show that examination of many portions of the extracts are required to translate the LIS data elements to the LOINC® attributes. If the site first builds HL7 messaging capability, such as the highly constrained ELINCS format, the elements are discretely stored in portions of the messages.[3] A software application could view the outbound HL7 messages and insert the appropriate LOINC® code on the fly.
- LOINC® codes are available for lab results (OBX records) and lab orders (OBR records). The software would need different definitions on which codes are accessible and what data elements are necessary to translate.
- Scale is one attribute not easily tied to specific segment; more work is needed to understand how the application would handle it.
- Differentiation from intended use of a result field is achieved, if additional information is placed in the lab result. (e.g., a drug screen component is typically resulted as
  ANALYTE:ACNC:PT:UR:ORD:SCREEN
  When a positive is detected, a quantitation is made:
  ANALYTE:MCNC:PT:UR:QN:CONFIRM
  For the Opiates class, LOINC® 19295-5 = pos/neg answer while LOINC® 17384-9 = measurements in ug/dL
- Regenstrief Institute noted that Indiana Network for Patient Care (INPC) implemented half again as many terms as each hospital originally mapped. This demonstrates the dynamics of the lab catalog and the demands on local staff of keeping it in sync with LOINC®.[5]

Conclusion

By automating the LOINC® translation application to read the messaging format prior to sending the message out,

1. The site provides more consistent LOINC® mapping.
2. This also removes any delay in getting new assays or edits to existing assays from getting LOINC® re-evaluated prior to new assay results being released.
3. By reading the message values AFTER result validation, the most appropriate LOINC® code is produced for that individual message.
4. Florida AHCA added standardized clinical data in reporting to administrative patient data sets.
5. Quality databases, outcomes studies, infectious disease reporting all benefit from standardized data.

Literature Cited

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