LOINC Mapping: Managing LIS Test Catalogues

Lessons Learned

The mapping of the Laboratory Information Systems (LIS) test catalogue to the pan Canadian LOINC Observation Code Database (pCLOCD) requires extensive preparation of the catalogue
data. The pCLOCD is published in Excel or Access format, it is expected that mapping projects have access to a mapping tool (see Lessons Learned LOINC Mapping – Planning Stage document). LIS data preparation takes time and should be planned for during the initial stages of a Repository project.

Considerations:

Has a mapping strategy been identified? Are there defined and approved mapping criteria?

- Has the approval process been defined?
- What format is the LIS data extract in? What format is required by the mapping tool?
- What elements are provided in the LIS data extract? Do they align with the mapping criteria?
- What can be done to clean up the data to prepare it for mapping?
- Are there elements in the data that will not be required for mapping, such as punctuation?
- Can it be removed?
- Are there acronyms or abbreviations that could be spelled out to improve mapping?
- Are there words that can be removed such as ‘stat’ or ‘routine’?
- LOINC code mapping requires a minimum of 3-4 key pieces of information for each lab test, the test name, the specimen being tested, the timing of the test if it is a timed test such as 24 hour and the units of measure reported for a quantitative test.
- Additional information about specific tests may be required to identify the correct LOINC code.
- Where are the specifics of each test located and who has access to the information?
- Can the LIS test list be subdivided into specific groups to make the tests within it more meaningful? For example Chemistry, Hematology etc.
- Does the LIS test list contain tests that are ordered and resulted? Or is it confined to resulting tests? If the LIS test list contains both orders and resulting tests (e.g. CBC and Hemoglobin), is there an association between the two?
- Are there inactive or deprecated terms included in the extract? How are they identified?
- Does each test have a unique identifier?
- Are there organization specific tests that may not have meaning outside of the organization? (e.g. Dr Smiths Chemistry Panel)
- Are the same tests used in different areas? If so, are they used differently in each area?
- Can the associated LOINC codes be imported into the LIS once the mapping is complete?
- Check to see if the LIS has a specific field for the LOINC code and if so, how many characters does it accommodate?
    - Has a Change Management strategy been developed to provide ongoing updates to the LIS extract information based on changes to the LIS system?

Recommended Actions:

- It is important to develop a mapping strategy to determine if tests will be mapped at a generic or granular level. The specificity of the codes chosen will impact how tests are grouped together and used for trending and graphing. If tests are grouped incorrectly, it creates a clinical risk for tests that may be erroneously compared or tests that should be compared but are missed. The strategy that is developed may not be specific to one method or another and may require a balance between generic and very granular or specific tests. This will depend on various factors such as the test itself, the use of the test outside the lab system or the specific discipline or department the test is completed in. A key requirement for developing the mapping strategy is to understand how the lab data will be used and then develop a strategy to support that model.
- Defined match criteria should be established early so clear guidance can be provided to resources that will be doing the mapping. Criteria should be vetted and approved by a Clinical review team. LOINC codes contain up to 6 specific data attributes. Some examples of criteria that could be considered:
    - 4 point match is the minimum match that is accepted (that means 4 attributes from the LIS test must match with 4 elements of the LOINC code), 5 is ideal;
    - Include one of the following:
        - When available, test method should be included in map
        - Test method should only be included when the method is included in the final report or when more than one test is available in the LIS;
    - Include one of the following:
        - Mapping will be done at the most granular level
        - Mapping will be done at the most generic level
        - Mapping will be done according to the strategy developed;
    - Determine a process to handle when there are insufficient attributes present to create a match between the LIS test and the LOINC code. This will need to be completed by each implementation and will describe the investigation process to close the gap between what is defined in the criteria and what is available; and
    - Determine a process for capturing additional mapping information that will be required; this may be mapping notes or email or other documentation identified by the implementation project.
- Identify resources that may provide additional information on specific tests as well as a process for the mapper to contact the resource with specific questions.

- Provide a clear process for any LIS test that cannot be mapped, ensuring the reason is captured (e.g. no appropriate LOINC code can be found, insufficient LIS test information etc.) and what steps the mapper should take to resolve (e.g. will a local X code be created to support this test and if so, define who will be creating the X codes).
- If the format of the LIS extract will not align with the mapping tool, the data will need to be enhanced and manipulated to be usable by a tool. Define the tool requirements and see if there is a standardized format to have the LIS data in.
- Typically LIS data extracts provide very little of the information required for mapping. Typically, the test name needs to be provided in a meaningful form (e.g. Monospot test should be represented by the antibody being tested rather than the name of the test). Some enhancements to data to be considered include:

    - Identifying the specimen tested (in terms of a body system and not a co ntainer type), some typical LOINC specimens include: Bld, Ser /Plas, Urine, Body fld etc.);
    - The timing of the test is critical; if the test is not timed (such as 24 hour, 12 hour etc.) then the test is collected as a point in time test. Timing only measures the duration of the collection, not the duration of the test;
    - Units of measure are a requirement for all quantitative tests;
    - An understanding of how all non-quantitative tests are reported (for example, Positive/Negative or Cloudy, Clear, Opaque) is required for all non-quantitative tests; and
    - Method information is needed in less than 20% of the tests that will be mapped and is difficult to get in a format that is usable in a mapping tool. Therefore, it is recommended that the test method not be included with the other LIS information prior to loading the data into the mapping tool. Method information should be available to the mapping resource tests as needed.
- Data clean-up is key to successful mapping. Typical clean up includes the following:
    - Removing all unnecessary punctuation, words and abbreviations, spell out acronyms;
    - Ensuring inactive tests are removed prior to loading the data in the mapping tool;
    - Looking for tests that are not reported on the final report, Quality control tests and workload measurements and remove them;
    - Aligning data according to the tool requirements, typically different data should be in different fields (e.g. test name in the first field, specimen in the second field etc.) as defined by the tool;
    - Specimen, when not serum or plasma, is often included as part of the LIS test name. If this is the case, the specimen should be removed from the test name and placed in the correct field (e.g. Ur Sod would become Sodium Urine and separated into two fields);
    - Aligning terms with how they are found in LOINC (Serum would be Ser, whole blood would be Bld, test names such as K, Na would be spelled out to Potassium, Sodium); and
    - Test timing is either Pt (for point in time) or contains a specific time such as 24H. Again, this is often combined in a test name and should be separated into two fields.
- It is easier to map similar tests together. If possible find a clear way to group tests. Using the department is very helpful (Chem, Hem, Sero, Micro etc). This improves the ability of the mapping resource to maintain their focus, reuse supporting documentation that may already be open and accessible and leverage what they have learned from a previous mapping.
- The association between order tests and result tests is essential to mapping. Typically order tests are very generic and difficult to map unless the result test is understood. Often this association is maintained outside of the mapping tool, in a separate spreadsheet, but is available when the mapper needs to reference it. This spr eadsheet can be created separately or may be an outcome of the original LIS extract.
- Each term needs to be identified by a unique identifier. Each unique test in the LIS may be used in multiple places, but must be used in the same way (e.g. a test for hemoglobin can't be used in Hematology to report a quantitative (Qn) test and in Urinalysis to report a pos/neg result on a test strip, as these are two different tests. The same test for hemoglobin may be used in Hematology to report a Qn test and in Blood Ga ses to report a Qn test).
- If the LOINC code will be maintained in the LIS with the test catalogue make sure it can accommodate Canadian extension LOINC codes from pCLOCD that have an alpha-numeric format. (e.g. XCA01374-8) Check to see if the LOINC code is included in your outbound HL7 message, as not all v2.X messages have been set up to include the LOINC/pCLOCD code.
- Change Management is critical to the ongoing success of the mapped tests. LIS tend to change, add or delete tests on a regular basis. There must be a change management process in place to support the uptake and implementation of these changes to keep the mapping current and aligned to the LIS information.

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