

Using LOINC and SNOMED CT Together without Overlap

In July 2013, the [Regenstrief Institute](#) and [IHTSDO](#) signed a landmark long-term collaboration agreement to align how [LOINC](#) and [SNOMED CT](#) represent laboratory tests and some types of clinical measurements.

The goals of [the agreement](#) are to build closer links between SNOMED CT and LOINC, minimize duplication between them, and ultimately make electronic health record systems more effective at improving health care. The first [products of the collaboration have already been published](#).

In the agreement, the organizations also committed to providing guidance on how to implement the two terminologies together.

Users would like to leverage the strengths of each terminology and know which to use for what purpose. They'd prefer to sing in harmony with what the international community is doing and what the SDOs endorse rather than stand out for being off-key.





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At the SNOMED CT Expo 2015 in Montevideo, Uruguay I joined Suzanne Sanataria from the IHTSDO in presenting a session called *Using LOINC and SNOMED CT in the EHR without overlap*. (My slides are [available here](#)).

Here I'll summarize the key messages.

Using LOINC and SNOMED CT together is a good thing

The [collaboration agreement](#) endorses using both terminologies:

IHTSDO endorses the use of LOINC Codes for representation of orders and observations in countries where LOINC has been adopted.

Likewise, the agreement describes the most common pattern for how the terminologies can work together:

LOINC provides codes that represent the names of information items (e.g. questions) and SNOMED CT provides codes that may represent nominal and ordinal values (e.g. answers) for these named information items.

Recommendations for specific uses

IHTSDO (with input from Regenstrief) has been working on a *Guidance on use of SNOMED CT and LOINC together* document that is currently in draft form (available on the IHTSDO Collabnet site). The primary recommendations are organized by specific uses.

The new collaborative work is producing a map of LOINC terms to post-coordinated SNOMED CT expressions. New SNOMED CT concepts are explicitly **not** being created from LOINC terms, but rather associated with post-coordinated expressions according to the new SNOMED CT concept model for observables. I'll illustrate some example uses of you can put these new expressions associations to use.

Vital signs

Recommendation: Use LOINC to identify the vital sign observable.

LOINC codes are widely used to identify vital sign observations. LOINC contains codes for all the usual individual vital sign observables. It also has several collections of them, including:

- [\[34566-0\] Vital signs with method details panel](#)



- [\[34565-2\] Vital signs, weight and height panel](#)
- [\[67795-5\] Vital signs, weight, height, head circumference and oximetry panel HITSP](#)
- [\[74728-7\] Vital signs, weight, height, head circumference, oximetry, BMI, and BSA panel – HL7.CCDAr1.1](#)
- [\[72513-5\] Vital signs with smoking status and pain scale \[VSP\]](#)

Recommendation: Use SNOMED CT for vital sign coded result values.

SNOMED CT is a good source of codes for categorical answers to LOINC observables. For example, here are some SNOMED CT codes that could make up a value set of result values for the LOINC code [\[8361-8\] Body position](#):

- [Sitting position \(finding\) \[33586001\]](#)
- [Unsupported standing position \(finding\) \[404927005\]](#)
- [Supine body position \(finding\) \[40199007\]](#)

Putting this to work using the LOINC – SNOMED CT Expression Associations



The associations between LOINC codes and SNOMED CT expressions can be used queries for aggregation, data retrieval, quality improvement, etc. For example, imagine you wanted to create a user display that grouped all cardiac-related observations and measurements.

Your database has observation for heart rate recorded with LOINC code [\[8867-4\] Heart rate](#). From the expression association, the feature being assessed is [Heart rate \(observable entity\) \[364075005\]](#), which has a *is a* relationship to [Cardiac feature \(observable entity\) \[364072008\]](#). You could use this relationship to organize this LOINC code or any others that had relationships to SNOMED CT codes under this parent term:

- [Cardiac end-diastolic volume \[408719002\]](#)
- [Characteristic of heart sound \[364077002\]](#)
- [Heart murmur \[421493004\]](#)
- [Heart rate \[364075005\]](#)
- ...

Laboratory Orders

Recommendation: Use LOINC to identify the laboratory order (test or panel).

The current version of LOINC has more than 31,900 terms that could be used as order codes. In addition to single tests (e.g. [\[10368-9\] Lead \[Mass/volume\] in Capillary blood](#)), LOINC has a very detailed and flexible model for representing collections of tests (e.g. panels,



batteries, or profiles).

Laboratory Results

Recommendation: Use LOINC to identify the laboratory observable.

The current version of LOINC has more than 47,000 terms that represent laboratory observations. This is one of LOINC's most widespread uses among the 40,000+ users from 170 countries.

Recommendation: Use SNOMED CT to identify the coded laboratory observation value (i.e. result value).

Many laboratory test results are numeric values that don't require any coded concept. A number and unit of measure is all that's needed. But other laboratory observations have categorical answers. SNOMED CT works nicely for result values such as microorganism names, substances (allergens, antibodies), or ordinal results.

There are a few areas, such as in genetics, where a standard syntax (e.g. HGVS, ISCN, or the star allele notation) is more appropriate. But, in general, SNOMED CT is a good fit here.

One of the most common areas where LOINC and SNOMED CT are being used together in this way is for microbiology reporting. For example, SNOMED CT can be used as a standard coding for result values from LOINC code [\[600-7\] Bacteria identified in Blood by Culture](#):



- [Neisseria meningitidis \(organism\) \[17872004\]](#)
- [Brucella melitensis \(organism\) \[72829003\]](#)
- [Staphylococcus aureus \(organism\) \[761983013\]](#)
- ...

Putting this to work using the LOINC – SNOMED CT Expression Associations

The associations between LOINC codes and SNOMED CT expressions can be used in queries for aggregation, data retrieval, quality improvement, etc. For example, in quality improvement activities you may want to be able to find patients who have had an HIV Ab or Ag test.

Using the SNOMED CT expressions, you could query the electronic health record for any Lab tests whose LOINC code had the *Towards* attribute:

- [Human immunodeficiency virus antibody \[259855002\]](#) **OR**
- [Human immunodeficiency virus antigen \[116982009\]](#) **OR**
- Child concepts of either

This enable you to find lab tests (LOINC codes) whose analyte was anywhere in the HIV hierarchy under these nodes:

- [Human immunodeficiency virus antibody \[259855002\]](#)
 - [Human immunodeficiency virus type 1 antibody \[120841000\]](#)



- [Human immunodeficiency virus 1 protein 24 antibody \[444013004\]](#)
 - [\[43011-6\] HIV 1 p24 Ab \[Presence\] in Serum](#)
 - [\[40437-6\] HIV 1 p24 Ab \[Presence\] in Serum by Immunoassay](#)
 - [\[35448-0\] HIV 1 p24 Ab \[Presence\] in Saliva \(oral fluid\) by Immunoblot \(IB\)](#)
 - ...
- [Human immunodeficiency virus 1 protein 68 antibody \[445463006\]](#)
 - [\[12894-2\] HIV 1 p68 Ab \[Presence\] in Serum by Immunoblot \(IB\)](#)
 - ...

Specimen details

Recommendation: Use SNOMED CT for coded specimen source details

Most laboratory observation names (LOINC) include specimen type. But, in some situations it is helpful to communicate more specific details about the specimen and its collection. SNOMED CT can provide codes for these additional specimen details when they are conveyed in other parts of the message (e.g. the SPM segment of an HL7v2 message). For example:



- **Specimen type:** [Specimen hierarchy \[123038009\]](#)
- **Specimen source site:** [Body structure hierarchy \[123037004\]](#)
- **Specimen collection method:** [Procedure hierarchy \[71388002\]](#)

Conclusion

LOINC and SNOMED CT have complementary strengths. These recommendations illustrate an optimal way to use them together in the electronic health record.

Regenstrief and IHTSDO are still in the beginning stages of their long term collaboration, and the products of this work are still in draft form. As this work progresses, you'll have even greater opportunity to take advantage of the powers of each.

Acknowledgments

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