INTERNATIONAL HEALTH TERMINOLOGY
STANDARDS DEVELOPMENT ORGANISATION

SNOMED CT® Style Guide: Observable Entities and Evaluation Procedures (Laboratory)

(US English)

Draft IHTSDO Standard v1.0

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SNOMED CT Style Guide: Observables and Investigation Procedures (Laboratory)

Table 1: Document Properties

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Version	Date	Editor	Comments
0.01	20090728	Kent Spackman	Initial draft.
0.02	20091127	Kent Spackman	Revised process attribute examples based project group feedback
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1.0	20100630	Kent Spackman	Promotion of the document to Draft IHTSDO Standard; revision of title to reflect scope limited to laboratory observables and procedures

Purpose of this document

This document describes the concept model and editorial policies for laboratory observable entities and laboratory procedures in SNOMED CT. Future extension of the model to cover non-laboratory observables and procedures is planned.

The document is intended to describe the editorial policies and decisions about meanings that are reflected in the current logic-based models. Application of the model to existing codes will require ongoing editing work that is still incomplete.

Status

This document is a Draft IHTSDO Standard.

Revision Date

According to routine IHTSDO processes, this document is scheduled to be reviewed and revised on or before June 30, 2012.

Chapter 1

Observable Entities and Evaluation Procedures

Topics:

- *Observable Entities*
- *Evaluation Procedures*

The concept models for observable entities and evaluation procedures are tightly linked. They employ the same set of attributes, with the exception that evaluation procedures also use METHOD. In terms of creation of codes, there will not necessarily be a one-to-one correspondence between the two hierarchies. Not every evaluation procedure will have a corresponding observable entity, and neither will every observable entity have a corresponding evaluation procedure.

Observable Entities

The observable hierarchy is currently at the top level, with several immediate groupers as children:

- SNOMED CT Concept
  - observable entity
    - age AND/OR growth period
    - body product observable
    - clinical history/examination observable
    - device observable
    - drug therapy observable
    - environment observable
    - feature of entity
    - function
    - general clinical state
    - hematology observable
    - identification code
    - imaging observable
    - interpretation of findings
    - molecular, genetic AND/OR cellular observable
    - monitoring features
    - population statistic
    - process
    - radiation therapy observable
    - sample observable
    - social / personal history observable
    - substance observable
    - temporal observable
    - tumor observable
    - vital signs

Observables are considered to be partial observation results, where there is a defined part of the observation missing. In many cases, what is missing is a numeric value, or a numeric value with units. In other cases, the observable is like a question, and what is missing can be regarded as the answer.

Among the immediate children of observable entity, some of the categories are now regarded as not fitting this definition and therefore should be moved. At a minimum, |function| and |process| are in this group that clearly needs to be moved.

Evaluation Procedures

The evaluation procedure hierarchy is currently classified under "procedure by method", with several immediate groupers as children::

- Procedure by method
  - evaluation procedure

- measurement
- physical examination
- monitoring
- imaging
- spectroscopy

Evaluation procedures can be defined by METHOD = evaluation - action in the general case. Subtypes of evaluation - action are used to define other subtypes of evaluation procedure according to a few action values: measurement, physical examination (in the medical sense of using direct inspection, palpation, percussion or auscultation), monitoring (a set of temporally repeated evaluations), imaging (the creation and evaluation of an image), or spectroscopy (the detection and evaluation of a spectrum).

Chapter 2

Attributes for observable entities and evaluation procedures

Topics:

- *Observable entity and evaluation procedure attributes: overview*
- *Property Type*
- *Inheres In*
- *Inherent Location*
- *Inherent Ingredient*
- *Characterizes*
- *Process agent*
- *Process duration*
- *Process output*
- *Toward*
- *Relative To*
- *RelTo Part of*
- *Precondition*
- *Scale type*
- *Units*
- *Technique*
- *Direct Site*

Observable entity and evaluation procedure attributes: overview

Table 3: Observable entity and evaluation procedure attributes summary

|DEFINING ATTRIBUTE|	**Permissible Values (Concepts listed and their descendants)**
|PROPERTY TYPE|	|Property| |{new}| |Measurement property| 118598001|Measurement property|
|INHERES IN|	|Body structure| 123037004|Body structure| |Organism| 410607006|Organism| |Substance| 105590001|Substance| |Specimen| 123038009|Specimen| |Physical object| 260787004|Physical object| |Pharmaceutical / biologic product| 373873005|Pharmaceutical / biologic product| |Record artifact| 419891008|Record artifact|
|INHERENT LOCATION|	|Body structure| 123037004|Body structure| |Organism| 410607006|Organism| |Physical object| 260787004|Physical object|
|INHERENT INGREDIENT|	|Substance| 105590001|Substance|
|CHARACTERIZES|	|Process| 415178003|Process|
|PROCESS AGENT|	|Body structure| 123037004|Body structure| |Organism| 410607006|Organism|
|PROCESS DURATION|	|Time frame| 7389001|Time frame|
|PROCESS OUTPUT|	|Substance| 105590001|Substance|

|DEFINING ATTRIBUTE|	**Permissible Values (Concepts listed and their descendants)**
|TOWARDS|	|Body structure| 123037004|Body structure| |Organism| 410607006|Organism| |Substance| 105590001|Substance| |Specimen| 123038009|Specimen| |Physical object| 260787004|Physical object| |Pharmaceutical / biologic product| 373873005|Pharmaceutical / biologic product| |Record artifact| 419891008|Record artifact|
|RELATIVE TO|	|Substance| 105590001|Substance|
|REL-TO PART-OF|	|Body structure| 123037004|Body structure| |Organism| 410607006|Organism| |Substance| 105590001|Substance| |Specimen| 123038009|Specimen| |Physical object| 260787004|Physical object| |Pharmaceutical / biologic product| 373873005|Pharmaceutical / biologic product| |Record artifact| 419891008|Record artifact|
|PRECONDITION|	|Clinical finding| 404684003|Clinical finding| |Precondition value| |{new}|
|SCALE|	|Quantitative| 30766002|Quantitative| |Qualitative| 26716007|Qualitative| |Ordinal value| 117363000|Ordinal value| |Ordinal or quantitative value| 117365007|Ordinal OR quantitative value| |Nominal value| 117362005|Nominal value| |Narrative value| 117364006|Narrative value| |Text value| 117444000|Text value|
|UNITS|	|Unit| 258666001|Unit|
|TECHNIQUE|	|Techniques values (qualifier value)| 272394005|Techniques|

|DEFINING ATTRIBUTE|	**Permissible Values (Concepts listed and their descendants)**
|DIRECT SITE|	|Body structure| 123037004|Body structure| |Organism| 410607006|Organism| |Physical object| 260787004|Physical object| |Specimen| 123038009|Specimen|

Note:

Permissible values for these attributes include the concepts listed and their descendants.

Property Type

This attribute is used to specify the type of inherent quality or process that is to be observed. Its values are abstract types of quality (length, odor, concentration) or abstract types of process features (rate, speed), and do**not**include qualities that are located (length of arm, odor of urine), or given a value (elevated concentration).

Table 4: Permissible values for Property Type

Concept Values	**Examples**
|Property type (qualifier value)| |{new}|	
|Measurement property| 118598001|Measurement property|	|Blood glucose mass concentration (observable entity)| • |PROPERTY TYPE| |mass concentration (property)| • |TOWARDS| |glucose (substance)|

Note:

In a coming release of SNOMED CT, |Measurement property| will become a subtype of a new general concept |Property type (qualifier value)|

Inheres In

This attribute specifies the independent continuant in which the quality inheres, and on which the dependent quality (of this observable) depends.

Table 5: Permissible values for Inheres In

Concept Values	Examples
|Body structure| 123037004|Body structure|	|catalytic activity content of alpha-L-iduronidase in fibroblasts (observable entity)| • |PROPERTY TYPE| |catalytic activity content| • |INHERES IN| |fibroblast (cell)| • |TOWARDS| |L-Iduronidase (substance)| • |DIRECT SITE| |fibroblast specimen|
|Organism| 410607006|Organism|	|moxalactam susceptibility MLC (observable entity)| • |PROPERTY TYPE| |susceptibility| • |INHERES IN| |bacterium| • |TOWARDS| |moxalactam (substance)| • |TECHNIQUE| |minimum lethal concentration (technique)|
|Substance| 105590001|Substance|	|glutamine substance concentration in plasma (observable entity)| • |PROPERTY TYPE| |substance concentration| • |INHERES IN| |plasma (substance)| • |TOWARDS| |glutamine (substance)|
|Specimen| 123038009|Specimen|	|volume of 24-hour urine sample (observable entity)| • |PROPERTY TYPE| |volume| • |INHERES IN| |24 hour urine sample (specimen)|
|Physical object| 260787004|Physical object|	|warming-cooling mattress temperature (observable entity)| • |PROPERTY TYPE| |temperature| • |INHERES IN| |warming-cooling mattress (physical object)|
|Pharmaceutical / biologic product| 373873005|Pharmaceutical / biologic product| |Record artifact| 419891008|Record artifact|	

Guidance for the use of INHERES IN

This attribute defines a dependent quality, and represents the independent continuant in which the quality inheres. The quality depends for its existence on the entity that is the value of INHERES IN, or in other words, the quality is manifest in that entity.

For example, the color of a lesion inheres in the lesion. The length of a body part inheres in the body part. The concentration of sodium in plasma inheres in plasma. The taxon of an organism inheres in the organism. The susceptibility of an isolate of Staphylococcus aureus to penicillin inheres in the organism(s).

The color of a lesion is an inherent quality of the lesion. The length of a body part is an inherent quality of the body part. The concentration of sodium in plasma is an inherent quality of plasma. The susceptibility of an isolate of Staphylococcus aureus to penicillin is an inherent quality of the organism(s).

Inherent Location

This attribute is used to specify a body site or other location of the independent continuant in which the property inheres.

Table 6: Permissible values for Inherent Location

Concept Values	Examples
|Body structure| 123037004|Body structure|	|DNA taxon of mycobacterium from bronchial secretions (observable entity)| • |PROPERTY TYPE| |Organism DNA taxon| • |INHERES IN| |Genus Mycobacterium (organism)| • |INHERENT LOCATION| |bronchus| • |DIRECT SITE| |bronchial secretion specimen|
|Organism| 410607006|Organism|	
|Physical object| 260787004|Physical object|	

Inherent Ingredient

This attribute is used to specify the ingredient substance type of the independent continuant in which the property inheres.

Table 7: Permissible values for Inherent Ingredient

Concept Values	Examples
|Substance| 105590001|Substance|	|millimoles of lactose administered per os (observable entity)| • |PROPERTY TYPE| |Substance amount| • |INHERES IN| |dose of pharmaceutical/biologic product| • |INHERENT INGREDIENT| |lactose| • |PRECONDITION| |post administration of dose per os| • |UNITS| |millimole|

Characterizes

This attribute specifies the process which the property describes, and on which the property (of this observable) depends. The process can be very general (e.g. "excretion").

Table 8: Permissible values for Characterizes

Concept Values	Examples
|Process| 415178003|Process|	|mass concentration ratio of silver to creatinine in 24 hour urine (observable entity)| • |PROPERTY TYPE| |mass concentration ratio| • |CHARACTERIZES| |excretion process| • |PROCESS DURATION| |24 hours| • |PROCESS OUTPUT| |silver| • |RELATIVE TO| |creatinine| • |DIRECT SITE| |24 hour urine sample|

Process agent

This attribute is used to specify the continuant (such as a body structure or organism) that is causally active in the process on which the property depends. It appears to have the same meaning as 'has_agent' in the OBO Relations Ontology. It may specialize the meaning of the process named as the value of CHARACTERIZES, or it may simply recapitulate the meaning that is already there. The PROCESS AGENT can be left unspecified.

Table 9: Permissible values for Process agent

Concept Values	Examples
|Body structure| 123037004|Body structure| |Organism| 410607006|Organism|	|substance rate of secretion of somatotropin by pituitary following clonidine per os (observable entity)| • |PROPERTY TYPE| |substance rate| • |CHARACTERIZES| |secretion process| • |PROCESS AGENT| |pituitary gland| • |PROCESS OUTPUT| |somatotropin| • |PRECONDITION| |post clonidine administration per os|

Process duration

This attribute specifies the duration of the process characterized by the observable property type.

Table 10: Permissible values for Process duration

Attribute Values	Examples
|Time frame (qualifier value)| 7389001|Time frame|	|mass rate of excretion of cortisone in 24 hour urine (observable entity)| • |PROPERTY TYPE| |mass rate| • |CHARACTERIZES| |excretion process| • |PROCESS OUTPUT| |cortisone| • |PROCESS DURATION| |24 hours| • |DIRECT SITE| |24 hour urine sample|

Process output

This attribute specifies the substance produced by the process characterized by the observable property type.

Table 11: Permissible values for Process output

Attribute Values	Examples
|Substance| 105590001|Substance|	|substance rate of excretion of pregnanediol in micromoles per day (observable entity)| • |PROPERTY TYPE| |substance rate| • |CHARACTERIZES| |excretion process| • |PROCESS OUTPUT| |pregnanediol| • |UNITS| |umol/day| • |DIRECT SITE| |urine specimen|

Toward

This attribute is used to specify the third element of a relational quality, the first two elements being the type of property and the entity in which the quality inheres.

Table 12: Permissible values for Toward

Concept Values	Examples
|Body structure| 123037004|Body structure| |Organism| 410607006|Organism|	|arbitrary concentration of Varicella-Zoster virus (observable entity)| • |PROPERTY TYPE| |arbitrary concentration| • |INHERES IN| (not specified) • |TOWARDS| |Human herpesvirus 3 (organism)| • |DIRECT SITE| |specimen|

Concept Values	Examples
|Substance| 105590001|Substance|	|mass concentration of sodium in plasma (observable entity)| • |PROPERTY TYPE| |mass concentration| • |INHERES IN| |plasma| • |TOWARDS| |sodium|
|Specimen| 123038009|Specimen|	
|Physical object| 260787004|Physical object|	
|Pharmaceutical / biologic product| 373873005|Pharmaceutical / biologic product|	
|Record artifact| 419891008|Record artifact|	

Relative To

This attribute is used to specify the denominator of a relational property type, such as a ratio or proportion.

Table 13: Permissible values for Relative To

Concept Values	Examples
|Substance| 105590001|Substance|	|Urine alpha aminobutyrate to creatinine ratio (observable entity)| • |PROPERTY TYPE| |substance (concentration) ratio| • |INHERES IN| |urine| • |TOWARDS| |alpha aminobutyrate| • |RELATIVE TO| |creatinine| • |DIRECT SITE| |urine sample|

RelTo Part of

This attribute specifies the independent continuant which the value of "relative to" is part of, if different from the independent continuant in which the property type inheres. Its main use is for relative substance concentrations, where the same substance has a concentration in two different fluids. In this case, TOWARDS and RELATIVE TO will have the same substance value, and the two fluids will be represented as values of INHERES IN and REL-TO PART OF.

Table 14: Permissible values for Rel To Part of

Concept Values	Examples
|Body structure| 123037004|Body structure|	
|Organism| 410607006|Organism|	

Concept Values	Examples
|Substance| 105590001|Substance|	|Relative substance concentration of cerebrospinal fluid IgM to plasma IgM (observable entity)| • |PROPERTY TYPE| |relative substance concentration| • |INHERES IN| |cerebrospinal fluid| • |TOWARDS| |immunoglobulin M| • |RELATIVE TO| |immunoglobulin M| • |REL TO PART OF| |plasma|
|Specimen| 123038009|Specimen|	
|Physical object| 260787004|Physical object|	
|Pharmaceutical / biologic product| 373873005|Pharmaceutical / biologic product|	
|Record artifact| 419891008|Record artifact|	

Precondition

This attribute is used to specify body state, timing, challenges, and other situations that must be true of the entity to be observed.

Table 15: Permissible values for Precondition

Concept Values	Examples
|Precondition value| |{new}|	|Plasma creatinine concentration 7 days post challenge| • |PROPERTY TYPE| |substance concentration| • |PRECONDITION| |7 days post challenge| • |TOWARDS| |creatinine| • |INHERES IN| |plasma|
|Clinical finding| 404684003|Clinical finding|	|Lying blood pressure| • |PRECONDITION| |supine body position|

Note:

In a coming release of SNOMED CT, |Precondition value (qualifier value)| will be added with a set of precoordinated values for this attribute.

Scale type

This attribute refers to the scale of the result of an observation or a diagnostic test (i.e., quantitative, qualitative, semi-quantitative).

Table 16: Permissible values for Scale type

Attribute Values	Examples
|Quantitative (qualifier value)| 30766002|Quantitative|	
|Qualitative| (qualifier value) 26716007|Qualitative|	
|Ordinal value| (qualifier value) 117363000|Ordinal value|	
|Ordinal or quantitative value| (qualifier value) 117365007|Ordinal OR quantitative value|	
|Nominal value (qualifier value)| 117362005|Nominal value|	
|Narrative value (qualifier value)| 117364006|Narrative value|	
|Text value| (qualifier value) 117444000|Text value|	

Units

This attribute represents the units used in assigning a value to an observation.

Table 17: Permissible values for Units

Attribute Values	Examples
|Unit| 258666001|Unit|	

Technique

This attribute links concepts in the |Observable entity| hierarchy to their related |Technique|.

Table 18: Permissible values for Technique

Attribute Values	Examples
|Techniques values (qualifier value)| 272394005|Techniques|	

Note:

In a coming release of SNOMED CT, |Techniques values (qualifier value)| will have a number of new values added.

Guidance for the use of TECHNIQUE

What is the difference between technique and a procedure that is done by a technique?

A technique is a formalized way to do something, whereas a procedure is the doing of it.

For example, take the "Fosbury flop", a technique for the high jump. In this case, high jumping is the procedure, and Fosbury flop is the technique by which the high jumping is accomplished.

EN1614 quotes the ISO9000 definition of a procedure as "a specified way to carry out an activity or a process." This use of the word |procedure| corresponds more closely to the SNOMED use of the word "technique," whereas the EN1614 use of the words "activity" and "process" correspond more closely to the SNOMED use of the word "procedure."

The METHOD attribute, used to define procedures, will ordinarily take the value |Measurement - action| in the logic definitions of most laboratory tests.

Direct Site

Direct site represents the specific entity on which the observation is directly made, and is used when the observation is indirect, such as when a direct observation is not possible to be done on the entity in which the observable inheres.

Table 19: Permissible values for Direct Site

Attribute Values	Examples
|Body structure| 123037004|Body structure|	
|Organism| 410607006|Organism|	
|Physical object| 260787004|Physical object|	
|Specimen| 123038009|Specimen|	

Chapter 3

Naming conventions for test observable entities

Topics:

- *Convention for the FSN for test observable entities:*
- *Guidance for content submitted using LOINC or IFCC-IUPAC names*

Naming conventions are described for the fully-specified name (FSN) for observable entities, and for naming evaluation procedures or observable entities that are submitted with names from the LOINC or IFCC-IUPAC NPU systems.

Convention for the FSN for test observable entities:

General naming pattern: Property, Toward, System

- First component: Property

  The property (the |PROPERTY TYPE| of the observable) is named first when possible.

  - Modifier of the first component: Scale Method

    Scale Method refines the Property, and therefore will precede the action in the naming order. (Scale Method, Property)

  - Naming pattern: (Scale Method, Property), Toward, System

- Second component: Toward

  Where possible, the property is named first followed by the entity that is the value of |TOWARDS|.

- Third component: System

  - Modifier of third component: Timing

    Timing provides information about the specimen, and will therefore precede it in the naming order. (Timing, System)

Measurements done by screening should be specified with “by screening method” added at the end of the term

Example:

Level of substance X in Y specimen by screening method

Guidance for content submitted using LOINC or IFCC-IUPAC names

Naming pattern for LOINC parts: (Scale Method, **Action**), **Analyte**, (Timing, **Specimen**)

Naming pattern for IFCC-IUPAC parts:

- Mandatory terms: System (similar to specimen), Component, Kind-of-property
- Order of terms does not seem to matter due to the multilingual origin and use.

  Example: Substance concentration of glucose in blood plasma

  Substance concentration (= Kind-of-property) of glucose (= Component) in blood plasma (= System)

Examples of SNOMED CT FSNs for content submitted as LOINC names. For the patterns and the resulting FSNs below, (a) is for the observable, and (b) is for the procedure:

1. Ethylene glycol:MCnc:Pt:Urine:Qn

LOINC name:	Ethylene glycol:MCnc:Pt:Urine:Qn
Long common name:	Ethylene glycol [Mass/volume] in Urine

(a) Pattern:	Property X of analyte Y in system Z (observable entity)
(a) FSN:	Mass concentration of ethylene glycol in urine (observable entity)

(b) Pattern: Measurement of property X of analyte Y in specimen Z (procedure)

(b) FSN: Measurement of mass concentration of ethylene glycol in urine specimen (procedure)

Comments:

Observables do not necessarily specify the type of specimen obtained for making an observation, but rather may only specify the "system", in this case the body substance in which the property inheres. It is therefore the default pattern in the observables hierarchy not to mention specimens (they are mentioned when necessary of course). However, it has been the pattern in the procedure axis to name the specimen, and it may be argued that each measurement action necessarily takes place on a specimen. It is therefore the default pattern in the procedure hierarchy to mention specimens.

2. Hemoglobin F:ACnc:Pt:Amnio fld:Ord

LOINC name: Hemoglobin F:ACnc:Pt:Amnio fld:Ord

Long common name: Hemoglobin F [Presence] in Amniotic Fluid

(a) Pattern: Ordinal level of analyte X in system Y (observable)

(a) FSN: Ordinal level of hemoglobin F in amniotic fluid (observable)

(b) Pattern: Ordinal measurement of analyte X in specimen Y (procedure)

(b) FSN: Ordinal measurement of hemoglobin F in amniotic fluid specimen (procedure)

Comments:

Both LOINC and NPU use a property type of arbitrary concentration (ACnc) combined with a scale type of ordinal (Ord) to indicate tests that are reported as either the presence or absence of an entity. Absence/presence is an ordinal scale with only two levels (e.g. absent=0 and present=1), but the combination of ACnc with Ord also allows ordinal scales with more levels (e.g absent=0, small amount=1, large amount=2). As a result, we do not follow the LOINC long common name pattern of calling this [Presence], but instead call it an "ordinal level" (in the observable), and an "ordinal measurement" (in the procedure).

3. Tricyclic antidepressants:MCnc:Pt:Ser/Plas:Qn

LOINC name: Tricyclic antidepressants:MCnc:Pt:Ser/Plas:Qn

Long common name: Tricyclic antidepressants [Mass/volume] in Serum or Plasma

(a) Pattern: Property of analyte in system (observable)

(a) FSN: Mass concentration of tricyclic antidepressant in plasma (observable)

(b) Pattern: Measurement of property of analyte in specimen (procedure)

(b) FSN: Measurement of mass concentration of tricyclic antidepressants in serum or plasma specimen (procedure)

Comments:

The names of analytes are given in singular tense. The system is plasma when the specimen is serum or plasma.

4. Creatinine:MRat:24H:Urine:Qn

LOINC name: Creatinine:MRat:24H:Urine:Qn

Long common name: Creatinine [Mass/time] in 24 hour Urine

(a) Pattern: Rate property X of process Y over duration Z period (observable)

(a) FSN: Mass rate of creatinine excretion in urine over 24 hour period (observable)

(b) Pattern: Measurement of rate property of process Y in duration Z specimen (procedure)

(b) FSN: Measurement of mass rate of creatinine excretion in 24 hour urine specimen (procedure)

Comments:

Rates are given per unit time, and describe processes.

5. Creatinine:MCnc:XXX:Urine:Qn

LOINC name: Creatinine:MCnc:XXX:Urine:Qn

Long common name: Creatinine [Mass/volume] in unspecified time Urine

(a) Pattern: Property X of analyte Y in specimen Z collected over a time period (observable)

(a) FSN: Mass concentration of creatinine in urine specimen collected over a time period (observable)

(b) Pattern: Measurement of property X of analyte Y in specimen Z collected over a time period (procedure)

(b) FSN: Measurement of mass concentration of creatinine in urine specimen collected over a time period (procedure)

Comments:

Since the property is not a rate, the observable needs to mention the urine specimen and the time period of its collection.

6. Cortisol^6 AM specimen:MCnc:Pt:Ser/Plas:Qn

LOINC name: Cortisol^6 AM specimen:MCnc:Pt:Ser/Plas:Qn

Long common name: Cortisol [Mass/volume] in Serum or Plasma --6 AM specimen

(a) Pattern: Property X of analyte Y in system Z at time W (observable)

(a) FSN: Mass concentration of cortisol in plasma at 6 A.M. (observable)

(b) Pattern: Measurement of property X of analyte Y in specimen Z obtained at time W (procedure)

(b) FSN: Measurement of mass concentration of cortisol in serum or plasma specimen obtained at 6 A.M. (procedure)

7. Serum ascites albumin gradient

LOINC name: Serum ascites albumin gradient

Long common name: ? not found in LOINC

(a) Pattern: Analyte X property Y difference between system Z1 and system Z2 (observable)

(a) FSN: Albumin mass concentration difference between serum and peritoneal fluid (observable)

(b) Pattern: Measurement of analyte X property Y difference between system Z1 and system Z2 (procedure)

(b) FSN: Measurement of albumin mass concentration difference between serum specimen and ascitic fluid specimen (procedure)

8. Apoliporotein A-I/Apolipoprotein B:MCrto:Pt:Ser/Plas:Qn

LOINC name: Apoliporotein A-I/Apolipoprotein B:MCrto:Pt:Ser/Plas:Qn

Long common name: Apolipoprotein A-I/Apolipoprotein B [Mass ratio] in Serum or Plasma

(a) Pattern: Mass ratio of substance X to substance Y in specimen Z (observable)

(a) FSN: Mass ratio of apolipoprotein A to apolipoprotein B in plasma (observable)

(b) Pattern: Measurement of mass ratio of substance X to substance Y in specimen Z (procedure)

(b) FSN: Measurement of mass ratio of apolipoprotein A to apolipoprotein B in serum or plasma specimen (procedure)

9. Amprenavir^peak:MCnc:Pt:Ser/Plas:Qn

LOINC name: Amprenavir^peak:MCnc:Pt:Ser/Plas:Qn

Long common name: Amprenavir [Mass/volume] in Serum or Plasma--peak

(a) Pattern: Peak property of analyte X in system Y (observable)

(a) FSN: Peak mass concentration of amprenavir in plasma (observable)

(b) Pattern: Measurement of peak mass concentration of analyte X in specimen Y (procedure)

(b) FSN: Measurement of peak mass concentration of amprenavir in serum or plasma specimen (procedure)

10. Amino acids:Imp:Pt:Urine:Nar

LOINC name: Amino acids:Imp:Pt:Urine:Nar

Long common name: Amino acids [interpretation] in Urine Narrative

(a) Pattern: Pattern of analyte X in system Y (observable)

(a) FSN: Pattern of amino acids in urine (observable)

(b) Pattern: Interpretation of pattern of analyte X in specimen Y (procedure)

(b) FSN: Interpretation of pattern of amino acids in urine (procedure)

Comments:

In this case the pattern necessarily involves multiple amino acids, so singular would not be correct. An observable that is modeled by LOINC with an impression property and a narrative scale type may need creative naming.

11. Lutropin^baseline:MCnc:Pt:Ser/Plas:Qn

LOINC name: Lutropin^baseline:MCnc:Pt:Ser/Plas:Qn

Long common name: Lutropin [Mass/volume] in Serum or Plasma --baseline

(a) Pattern: Property X of analyte Y in baseline specimen Z (observable)

(a) FSN: Mass concentration of lutropin in baseline plasma (observable)

(b) Pattern: Measurement of property X of analyte Y in baseline specimen Z (procedure)

(b) FSN: Measurement of mass concentration of lutropin in baseline serum or plasma specimen (procedure)

12. Erythrocyte Ab:ACnc:Pt:Ser:Qn

LOINC name: Erythrocyte Ab:ACnc:Pt:Ser:Qn

Long common name: Erythrocyte Ab [Units/volume] in Serum

(a) Pattern: Property of analyte X in system Y (observable)

(a) FSN: Concentration of erythrocyte antibody in plasma (observable)

(b) Pattern: Measurement of concentration of analyte X in specimen Y (procedure)

(b) FSN: Measurement of concentration of erythrocyte antibody in serum specimen (procedure)

Comments:

In the case of red cell antibodies, serum is routinely used, but the system is still plasma. When the LOINC property type is ACnc and the scale type is Qn, we use only the word “concentration”, rather than spelling out “arbitrary concentration”.

Chapter 4

Converting LOINC or NPU codes into observable entities

Topics:

- *Rules for converting LOINC names into observable entities*
- *Rules for converting NPU codes into observable entities*

Rules for converting LOINC names into observable entities

1. For antibiotic susceptibility: PROPERTY-TYPE= susceptibility, and INHERES-IN = Organism [or subtype of organism]
2. If the specimen is serum, INHERES-IN = plasma
3. If LOINC component ends with .RAST class, this represents a kind of score. It is still the technique, but it is not “radioallergosorbent technique”, rather it is “RAST scoring” technique.
4. For cell antigen measurements, if the PROPERTY-TYPE is arbitrary concentration, then InheresIn should take a value = population of cells (or population of the appropriate subtypes of cell, e.g. population of erythrocytes, population of neutrophils, etc.)
5. For fractions and ratios, the LOINC component is split into TOWARDS and RELATIVE-TO
6. When LOINC system = xxx, INHERES-IN has no value – it remains null, and DIRECT-SITE = specimen
7. Challenge information is extracted from Component, and put in PRECONDITION.
    a. The LOINC “xxx” is not included in the string for PRECONDITION values.
8. Ratios and fractions are split, the “numerator” substance is put in the TOWARDS field and “denominator” substance is put in the RELATIVE-TO field
    a. The values put into TOWARDS and RELATIVE-TO are the codes for substances, not the codes for concentrations of the substances
    b. For RELATIVE-TO values, “total amount” is assumed, and the word “total” need not be added to the substance term.
9. Impression/interpretation is a valid value of PROPERTY-TYPE, but the rest of the model does not fit and therefore these terms require an expanded model (i.e. they must remain incompletely modeled at present).
10. When PROPERTY-TYPE is a feature of a process, use CHARACTERIZES instead of INHERES-IN, and the value of CHARACTERIZES is a process.
    a. Catalytic activity (and catalytic activity ratio) is measured in the lab by a process of actual catalysis by the enzyme in the sample; but the observable is intended to characterize a specifically dependent continuant, which is in this case a disposition: the point-in-time catalytic disposition of the existing quantity of enzyme in the plasma at the point in time the sample is drawn. The observable is not intended to characterize a process of catalysis that extends over time in the patient (if it were, multiple samples over time would be necessary).
11. For coagulation, many subtleties can be avoided by simply naming the TECHNIQUE. For example, the International Normalized Ratio (INR) test has TECHNIQUE = INR.
12. When LOINC system = dose, the PROPERTY-TYPE (e.g. mass) INHERES-IN the LOINC component, (put the LOINC component value into the INHERES-IN field). This is the active ingredient of the substance that is administered, and it is the amount of the active ingredient which is the value of the observable.
13. When measuring the total of two types of cells, the TOWARDS should be a single value representing the disjunctive category (“cell type A or cell type B”).
14. HLA antigen measurements should modeled as INHERES-IN = 108353004 cell surface structure. If the test is done on leukocytes, then SPECIMEN = 258591005 white blood cell sample.
15. For microbiology organism presence/identity observables, the component is split into PROPERTY-TYPE = Linnaean taxon, INHERES-IN = organism (or bacterium, virus, fungus, protozoan, etc if known prior to testing), and INHERES-IN-LOCATION = site of the culture. PRECONDITION is used to specify which one of a series of organisms is being identified.
16. For titers (titres), the PROPERTY-TYPE is arbitrary concentration, and the TECHNIQUE is titration (or a subtype thereof).
17. If LOINC system = xxx, DIRECT-SITE = specimen, and INHERES-IN is null
18. For microbiology (cultures, etc) reported as arbitrary concentration, LOINC system always generates two values, one (a body structure) for INHERES-IN and another (a specimen) for DIRECT-SITE

19. For arbitrary concentration of a cross-reacting antigen, the value of TOWARDS should be the disjunction (inclusive OR) of the entities that cross-react.
20. Gene mutation analysis in the Component field is translated into a property called “gene taxon” which can take values that name various mutations
21. For microbiology sensitivity tests measuring sensitivity to combined drug products (e.g. sulfamethoxazole/trimethoprim), the TOWARDS should be a code for the combined substance (a “portion of a mixture of sulfamethoxazole with trimethoprim”), NOT two values of TOWARDS (ie. “TOWARDS sulfamethoxazole” AND “TOWARDS trimethoprim”) – this is wrong NOR a conjunction or disjunction of the two values : “TOWARDS (a portion of sulfamethoxazole OR a portion of trimethoprim)” – also wrong “TOWARDS (a portion of sulfamethoxazole AND a portion of trimethoprim)”. – also wrong The latter really means TOWARDS null because there is no portion of sulfamethoxazole that is also a portion of trimethoprim.

Rules for converting NPU codes into observable entities

1. NCCLS antigen codes in the “proc#” field (for example, NCCLS/f89 is the allergen code for mustard) defines the value of TOWARDS.
2. IRP (international reference plasma) defines the TECHNIQUE by which the assay is calibrated.
3. System spec. = fPt (fasting patient) is translated to PRECONDITION = fasting
4. Comp spec = administered with proc# = p.o. translates to INHERES-IN = dose and PRECONDITION = administered p.o.
5. For fractions and ratios, system becomes the value of RELATIVE TO. Total amount is assumed in the RELATIVE TO slot. A substance is used as the value of RELATIVE TO, rather than a property of the substance. (creatinine, not creatinine concentration).
6. When the RELATIVE TO value is located or inherent in something other than the value of INHERES-IN, then that other site/location/substance is represented as the value of REL-TO-INHERES-IN.
7. proc# = T23:30 means PRECONDITION = 11:30 PM specimen
8. fungal DNA is defined as DNA that part-of fungus
9. coagulum retraction: define as retracted coagulum vs full coagulum. Possibly could be hidden in a TECHNIQUE value without losing any interoperability.