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1. Two mapping styles for the LOINC to Condition table

The LOINC to Condition mappings are distributed in two Excel files:
- LOINC to Condition Style A.xls
- LOINC to Condition Style B.xls

These two files are almost identical – they differ only in how they map LOINC tests to HIV infections and Syphilis. This difference is due to the fact that the NNDSS Event Code List contains three HIV conditions and eight Syphilis conditions:
- 10560 AIDS
- 10561 HIV Infection, pediatric
- 10562 HIV Infection, adult

- 10316 Syphilis, congenital
- 10313 Syphilis, early latent
- 10314 Syphilis, late latent
- 10318 Syphilis, late with clinical manifestations other than neurosyphilis
- 10311 Syphilis, primary
- 10312 Syphilis, secondary
- 10315 Syphilis, unknown latent
- 10317 Neurosyphilis

In most cases LOINC test names for HIV tests do not contain enough information to map them to pediatric or adult HIV infection, or to AIDS. The same applies to mapping LOINC syphilis tests to the eight syphilis conditions. This forces the Mapping Table Manager to choose one of two different styles of mapping for these tests:

Style A:
- Map all HIV tests to one of the three HIV conditions (AIDS)
- Map all syphilis tests on CSF to Neurosyphilis
- Map all non-CSF syphilis tests to one of the other conditions (Primary syphilis)

Style B:
- Map all HIV tests to all three HIV conditions
- Map all syphilis tests on CSF to Neurosyphilis
- Map all non-CSF syphilis tests to all of the other syphilis conditions

Both of these mapping styles produce incorrect mappings. This situation is sub-optimal but temporary. The list of notifiable conditions is being transformed into a hierarchical coding system, which will make it possible to map all non-specific HIV and syphilis tests to non-specific conditions like "HIV infection" and "Syphilis." This should be in place by 2005. Until then users must choose either Style A mapping or Style B mappings.

Note: See Example 1 at the end of this document for a demonstration of Style A and Style B mappings.

2. Part1 and Part 2 of the LOINC to Condition table

The LOINC to Condition mapping files are divided into two spreadsheet tables:

Part 1
- These are mappings of LOINC tests that map one-to-one to notifiable conditions.
- Reporting Criteria for these tests are either "Positive" or an Organism List.

Part 2
- LOINC includes many non-specific test names, such as *"Microorganism identified"* or *"Microscopic observation."*
- Part 2 of the LOINC to Condition Table is for these non-specific LOINC tests.
- Reporting Criteria for all rows in Part 2 rows are Organism Lists.
- These are many-to-many mappings *("Could be"* mappings*).*
- These mappings show all the notifiable conditions that can be indicated by a particular non-specific LOINC test.

Examples of Part 1 and Part 2 mappings can be seen at the end of this document.

3. LOINC test naming conventions

LOINC is a system for naming lab tests. LOINC lab test names all contain six pieces of information (six fields), as shown below.

Component – *The analyte or the thing which is tested.*
Examples: Cefoperazone, Norwalk virus, Plasmodium falciparum Ag, Lead, etc.

Property – The property of the Component that is measured.
Examples: Susceptibility, Presence or Identity, Mass concentration, Arbitrary concentration, etc.

Time aspect – The duration of the test period.
Examples: Usually "Point in time" but can be 1 hr, 12 hrs, 24 hrs, etc.

System – The specimen type
Examples: Isolate, Stool, Serum or Plasma, Blood, etc.

Scale type – This determines how the test result is expressed and the type of units used.
Examples: Quantitative, Nominal, Ordinal (Positive, Negative, Intermediate, Resistant, etc.)

Method type – The method used in the test procedure.
Examples: Agar diffusion, Electron microscopy, Immunofluorescence, etc.

Component	Property	Time Aspect	System	Scale Type	Method Type
Norwalk virus	PrId	Pt	Stl	Nom	Microscopy.Electron
	PrId = presence or identity	*Pt = Point in time*	*Stl = Stool*	*Nom = Nominal*	

In the above table the six LOINC fields are in separate columns. LOINC test names are usually displayed in their *concatenated* form:

Norwalk virus : PrId : Pt : Stl : Nom : Microscopy.Electron

The table below shows some LOINC codes and names.

LOINC Num	LOINC Name
101-6	Cefoperazone : Susc : Pt : Islt : OrdQn : Agar diffusion
10912-4	Lead : MCnc : Pt : Ser/Plas : Qn :
10709-4	Plasmodium falciparum Ag : ACnc : Pt : Bld : Qn : IF

LOINC uses numeric codes, called the LOINC Number. Each LOINC Number consists of 3-5 digits followed by a hyphen and then a check digit.

LOINC contains numerous abbreviations, which makes it challenging to read. In order to make the LOINC to Condition Table more readable these abbreviations have all been unabbreviated. The unabbreviated expressions are shown in separate columns (below). The abbreviated LOINC names can be found in the *Concatenated Name* column.

Concatenated Name	Component	Property	Time Aspect	System	Scale Type	Method Type
Plasmodium falciparum Ag : ACnc : Pt : Bld : Qn : IF	Plasmodium falciparum Ag	Arbitrary concentration	Point in time	Blood, Whole blood	Quantitative	Immune fluorescence
Lead : MCnc : Pt : Ser/Plas : Qn **:**	Lead	Mass concentration	Point in time	Serum or Plasma	Quantitative	[Method not specified]

Missing Method types

Labs often do not specify the methods by which tests are done. In such cases the LOINC name is "methodless" – the *Method Type* field is shown with nothing in it. This can be seen above in LOINC 10912-4, which ends with a colon. The trailing colon means "The *Method Type* is not specified for this test." Because this can be confusing, the PHIN NCMTs insert the string "[Method not specified]" into these null method fields.

4. Table format

Hidden columns

There are 17 columns of information in the LOINC to Condition Table. Since this makes them difficult to browse they are distributed with nine columns showing and eight columns hidden. Users who want to see the information in the hidden columns can unhide them easily.

To show a hidden column:

1. Highlight the visible columns before and after the hidden column.

2. Right-click the highlighted columns, and choose "Unhide."

3. To see all columns, highlight all columns, right-click, and choose "Unhide."

4. To hide a column again, highlight it, right-click, and select "Hide."

Columns A-E

A	B	C	D	E
LOINC Num	**Class**	**LOINC Status**	**Map to**	**Concatenated LOINC Name**
10648-4	Micro			Babesia sp identified : PrId : Pt : Bld : Nom : Thin film
22858-5	Micro			Babesia sp identified : PrId : Pt : Tiss : Nom : Giemsa stain
20691-2	Micro	Deleted	11469-4	Bacillus anthracis : ACnc : Pt : xxx : Ord : Organism specific culture

This table sample shows Columns A-E, with all columns unhidden.

Column A –   This is the LOINC number for the test in Column E.

Column B –   LOINC has various classes of tests. The tests in this example are all Microbiology tests.

Column C –   If a test has been deleted from LOINC it is indicated here. In this example, LOINC test 20591-2 was deleted.

Column D -   Most deleted LOINC tests have been replaced by other tests with different LOINC codes. These new codes are shown in Column D. Labs that have been using the deleted test should replace it with the new one 11469-4. *Note: Deleted tests are included in these tables because some labs use older versions of LOINC.*

Column E –   The concatenated LOINC test name.

Columns F-K

F	G	H	I	J	K
Component	**Property**	**Time Aspect**	**System**	**Scale Type**	**Method Type**
Babesia sp identified	Presence or identity	Point in time	Blood, Whole blood	Nominal	Microscopy, Thin film
Babesia sp identified	Presence or identity	Point in time	Tissue, Unspecified	Nominal	Stain, Giemsa
Bacillus anthracis	Arbitrary concentration	Point in time	[Specified in message]	Ordinal	Culture, Organism specific

These columns are the six unabbreviated fields that constitute each LOINC test name. Columns G, H, and J have been hidden because they are usually not relevant to the mappings. They can be unhidden as described above.

Columns L-P

L	M	N	O	P
Condition Name	**NNDSS Code**	**NNDSS Status**	**Reporting Criteria**	Sort order
Babesiosis	12010	State	Babesia list	0001
Babesiosis	12010	State	Babesia list	0002
Anthrax	10350	NND	Bacillus anthracis list	0003

Column L –   This is the notifiable condition to which the LOINC test in this row is mapped. These conditions are from the NNDSS Event Code List.

Column M –   The NNDSS code for the condition in Column L. Some of the state-notifiable conditions do not have NNDSS codes. These conditions have "no code" in Column M.

Column N –   Conditions that are nationally notifiable are indicated by "NND" in Column N. Conditions that are notifiable in one or more states but not nationally are indicated by "State" in Column N.

Column O –   Contains the reporting criteria for all rows. In most cases the reporting criterion is a positive test and "Positive" appears in Column O. For some LOINC tests, such as cultures and microscopy tests that identify organisms, the reporting criterion is an Organism List.

Column P –   Users can sort the table in various ways in order to see the data differently. There isn't a single correct way to sort the tables but the *Sort order* column makes it easy to return the tables to a default or standard view. This default view sorts rows first by the *Condition name* column, then by *Component*, then by *System*.

5. Organism Lists and Reporting Criteria

In the example above the first row (LOINC 10648-4) is a microscopic exam of a blood thin smear to see if Babesia organisms can be found. If the lab identifies Babesia, the test result will be one of the following:

- Babesia identified
- Babesia sp identified
- Babesia microti identified
- Babesia divergens identified

These are the only four organisms in SNOMED that can cause babesiosis. The PHIN NCMTs contain a *Babesia Organism List* consisting of these four SNOMED organism names and codes. This Organism List makes it possible to describe the reporting criteria for LOINC 10648-4 as *any organism on the Babesia Organism List*. There is at least one Organism List in the PHIN NCMTs for every notifiable infectious disease.

Note: The Organism Lists are in the "SNOMED to Organism List" table (in SNOMED Organism Lists.xls).

6. Examples

Example 1a – Mapping Style A

A	F	I	K	L	M	O
LOINC Num	**Component**	**System**	**Method**	**Condition**	**NNDSS Code**	**Reporting Criteria**
33866-5	HIV 1 Ab	Blood.Capillary	Enzyme immunoassay	AIDS	10560	Positive

Example 1b – Mapping Style B

A	F	I	K	L	M	O
LOINC Num	**Component**	**System**	**Method**	**Condition**	**NNDSS Code**	**Reporting Criteria**
33866-5	HIV 1 Ab	Blood.Capillary	Enzyme immunoassay	AIDS	10560	Positive
33866-5	HIV 1 Ab	Blood.Capillary	Enzyme immunoassay	HIV infection, pediatric	10561	Positive
33866-5	HIV 1 Ab	Blood.Capillary	Enzyme immunoassay	HIV infection, adult	10562	Positive

These table samples demonstrate mapping styles A and B. In Example 1a LOINC test 33866-5 is mapped to a single condition (AIDS). In Example 1b the same LOINC test is mapped to three different conditions.

Example 2 — Re-sorting the tables to view the data

A	F	I	K	L	M	O	P
LOINC Num	Component	System	Method	Condition	NNDSS Code	Reporting Criteria	Sort order
33699-0	Microscopic observation	[System specified in message]	Stain.Malachite green	Anthrax	10350	Bacillus anthracis list	0181
33699-0	Microscopic observation	[System specified in message]	Stain.Malachite green	Botulism	10548	Clostridium (botulism) list	0243
33699-0	Microscopic observation	[System specified in message]	Stain.Malachite green	Tetanus	10210	Clostridium tetani list	2016

This example shows Part 2 of the *LOINC to Condition* table after it was sorted by Method, then by System, then by Condition. This sorting makes it possible to look at all of the conditions that are associated with each LOINC method in the tables. As the example above demonstrates, three notifiable conditions are associated with positive Malachite green tests.

Column P (above) shows that these rows were scattered throughout the table in the default sort order. Users can sort the tables in any number of ways to view the data. The tables can always be returned to the default sort order by sorting on Column P.