

LOINC: Cracking the Code for B2B Clinical Data

LOINC is an important free technology for sharing clinical data within and among care delivery organizations and between these organizations and payers. It will be key to implementing the HIPAA standard for claims attachments.

Core Topic

Industry Applications: Underlying Technologies in Healthcare

Key Issue

What impact will the evolving mix of standards have on healthcare applications, the underlying technology and the ability to deliver value to healthcare stakeholders?

Key Facts:

- LOINC identifies the question, whereas coding systems such as SNOMED are used to provide the answer
- The Regenstrief Institute has a six-year track record of keeping the database up to date
- LOINC is achieving substantial traction in the United States as a standard for sharing lab data
- LOINC has been expanded to cover other kinds of clinical observations

Note 1

The Regenstrief Institute

Regenstrief Institute for Health Care is a joint enterprise of the Regenstrief Foundation, the Indiana University School of Medicine and the Health and Hospital Corporation of Marion County, Indiana.

Note 2

IDS Adopters of LOINC

Some of the IDSs adopting LOINC for lab data are Intermountain Health Care, Kaiser Permanente, Partners Healthcare System of Boston, Mayo Medical Group and the U.S. Department of Defense.

In the lab systems of most care delivery organizations (CDOs), test results are identified by ad hoc codes created by lab personnel. This idiosyncratic approach becomes untenable as CDOs begin to use HL7 messages to pool clinical observations from multiple sources, such as the hospital lab, the nursing home lab and a commercial lab. Without a standard set of codes, each such interface requires a laborious and error-prone process of building and maintaining translation tables. This problem is amplified as the scope of sharing increases. State health departments, research organizations and health plans that have medical management, medical review or utilization review programs cannot make full use of structured clinical data without a common nomenclature for identifying the data being transmitted.

In 1995, the Regenstrief Institute (see Note 1) began to fill this gap by publishing Logical Observation Identifier Names and Codes (LOINC), a free database of codes that identify lab test results with sufficient specificity to permit the clinical data to be pooled. During the past six years, the institute has expanded its database to include codes for many other kinds of clinical observations.

LOINC is used by large integrated delivery systems (IDSs) that need to pool data from laboratory systems that are administered separately (see Note 2). Operators of systems that are inherently B2B, such as referral laboratories (see Note 3) contributed to the development of LOINC and have been early adopters, translating to LOINC as results are sent to trading partners. A few leading-edge health plans have adopted LOINC in support of initiatives for medical management and medical review (see Note 4). LOINC is beginning to see adoption by the federal government, public health agencies and similar overseas entities (see Note 5

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Note 3**Representative Laboratories That Use LOINC**

The American Clinical Laboratory Association, an association of large referral laboratories whose members are responsible for more than 60 percent of U.S. outpatient laboratory test volume, has recommended LOINC for adoption by its members. Quest Diagnostics and LabCorp have adopted LOINC as their code system for reportable test results, as has Associated Regional and University Pathologists. All U.S. veterinary medicine laboratories have committed to the use of LOINC.

Note 4**Health Plan Use of LOINC**

As part of its managed care product for selected national accounts, Empire Blue Cross accepts lab data from Quest Diagnostics, SmithKline, LabCorp and Clinical Diagnostics (a regional lab) using SeeBeyond's DataGate product. It uses this data with nurse reviewer information and claims data (including pharmacy) for screening. It passes the combined data on selected patients to Active Health Management for further screening and recommended interventions. Without the common LOINC language, exchanging lab results among the five trading partners would not be possible. Empire sees this program, which began to operate in 1997, as a significant competitive advantage.

Note 5**Federal and Public Health Adoption of LOINC**

LOINC has been incorporated in HCFA's quality assurance testing pilot programs and by the Centers for Disease Control and Prevention/Council of State and Territorial Epidemiologists' project for electronically reporting/transmitting communicable disease information as well as by the North American Association of Central Cancer Registries for its tumor registry variables.

Note 6**International LOINC Use**

Ontario and British Columbia, Canada, are adopting LOINC codes provincewide; Newfoundland is considering it. Switzerland is adopting LOINC for quality assurance mandates. Germany has adopted LOINC for national use.

Note 7**Representative Clinical Observations**

LOINC codes have been assigned for direct observations such as blood pressure, temperature, EKG wave amplitudes for each lead and the circumference of the head of a fetus measured using ultrasound. It also includes findings such as the chief complaint, diagnosis, history of allergies, physical findings about various body parts and systems, discharge summaries and clinic visit notes.

and Note 6). Some lab IS vendors (e.g., Cerner and Sunquest) have architected their products to facilitate translation to and from LOINC and are considering providing it pre-loaded in future software releases.

LOINC is not limited to lab results. The database has been expanded to identify most clinical observations (see Note 7). However, virtually all production usage so far is confined to lab data.

LOINC Explained

LOINC codes are simple integers with check digits that are assigned sequentially as new concepts are presented to the LOINC committee.

Certain columns in the LOINC database specify attributes of the observation identified by a code:

- Component (observed phenomenon) — e.g., potassium, hepatitis C antigen, respiration. This column includes the physiologic or pharmacologic challenges that are part of the test (e.g., 75 grams of glucose PO, 2.5 hours before the observation)
- Property measured — e.g., a mass concentration (such as milligrams per deciliter), enzyme activity (catalytic rate), rate (of breaths)
- Time aspect — whether the measurement is made at a moment of time, or over an extended duration of time (e.g., 24-hour urine)
- The type of sample or body part (e.g., urine, blood, heart)
- The type of scale — e.g., whether the measurement is quantitative (a true measurement), a set of names (E. coli; Staphylococcus aureus), or narrative (dictation results from x-rays)
- Where relevant, the method used to produce the observation (e.g., ultrasound or test strip)

Figure 1 shows some examples.

Figure 1
Representative Rows From a Table of LOINC Codes

LOINC Code	Component	Property	Time Aspect	System	Type of Scale	Type Of Method
2339-0	Glucose	MCNC	PT	BLD	QN	
2341-6	Glucose	MCNC	PT	BLD	QN	Test Strip Manual
2349-9	Glucose	ACNC	PT	UR	ORD	
2350-7	Glucose	MCNC	PT	UR	QN	
2351-5	Glucose	MRAT	24H	UR	QN	
5914-7	Glucose	ACNC	PT	BLD	ORD	Test Strip
10966-0	Glucose 2.5H Post 75G Glucose PO	ACNC	PT	UR	ORD	Test Strip
15076-3	Glucose	SCNC	PT	UR	QN	
22705-8	Glucose	SCNC	PT	UR	QN	Test Strip

Source: Regenstrief Institute and Gartner Research

The logical “name” of the observation is constructed by stringing the contents of these columns together so that the name of the test identified by LOINC code 2341-6 is “GLUCOSE:MCNC:PT:BLD:QN:TEST STRIP MANUAL.”

This systematic, multicolumn approach has several benefits:

- It provides a rule for determining when a new code is necessary — if a new concept is introduced that is different in at least one of the columns, a new LOINC code is created
- It helps prevent the assignment of duplicate codes for the same concept
- It is easily translated to other languages
- Advanced clinical systems that have stored observations identified with LOINC codes can easily make use of the information in the columns to construct rules

LOINC vs. Other Coding Systems

LOINC is unique because it addresses the names that are given to clinical observations, rather than expressing what is observed. A general comparison to SNOMED is that LOINC identifies the questions and SNOMED provides the answers. SNOMED RT includes comprehensive cross-references to LOINC.

There have been attempts to use CPT-4 for this nomenclature, but its codes are too general. They would lump clinically different findings under the same code because they are treated the same for billing.

HIPAA Claims Attachments

Early proof-of-concept studies for HIPAA claims attachments revealed that the codes available for claims processing were not sufficiently specific to support precise communications between payer organizations and CDOs. The LOINC committee worked with the joint X12N/HL7 claims attachments committee to add codes so that LOINC could be used for this purpose. When DHHS releases the notice of proposed rule making for HIPAA claims attachments it will require the use of LOINC to specify the requests that a health plan sends to the CDO, such as 26439-0 (surgical pathology studies) or 18682-5 (the full ambulance service claims attachment). LOINC also will be used to identify the discrete answers that the CDO sends back, such as 26439-0, a complete dictated surgical pathology study, 15515-0 (EMS transport, medical reason for unscheduled trip) and 8335-2 (body weight — estimated; see Note 8).

Getting LOINC

The LOINC database is available for free download at www.regenstrief.org/loinc, along with a comprehensive user manual and a Microsoft Windows-based mapping utility program, Regenstrief LOINC Mapping Assistant (RELMA). Updates are released approximately once every six months after review by an international committee of informaticists.

How and When to Use LOINC

Any time HCOs are defining an interface for clinical observations they should choose LOINC to identify the observations. The interfaced systems will generally translate between LOINC and the idiosyncratic identification codes in their master files.

Bottom Line: LOINC is comprehensive, rigorous and free. There is no reason to use anything else when creating a lab interface or configuring a new lab system. It has the potential to provide the same benefits for other clinical observations. Don't reinvent the wheel, spin LOINC.

Note 8

Information on HIPAA Claims Attachments

This use of LOINC is detailed in the draft implementation guides "277/275: Health Care Claim Request for Additional Information and Response" available for free download at hipaa.wpc-edi.com.

Acronym Key

24H	24-hour period
ACNC	Arbitrary concentration
B2B	Business-to-business
BLD	Blood
CPT-4	Current Procedural Terminology, fourth edition
DHHS	U.S. Department of Health and Human Services
EMS	Emergency medical service
EKG	Electrocardiogram
HCFA	Health Care Financing Administration
HIPAA	Health Insurance Portability and Accountability Act
HL7	Health Level-Seven
MCNC	Mass concentration
ORD	Ordinal
PO	By mouth
QN	Quantitative
SCNC	Substance concentration
SNOMED	Systematized Nomenclature of Medicine
SNOMED RT	Systematized Nomenclature of Medicine Reference Terminology
UR	Urine
X12N	Accredited Standards Committee X12, Subcommittee N, Insurance