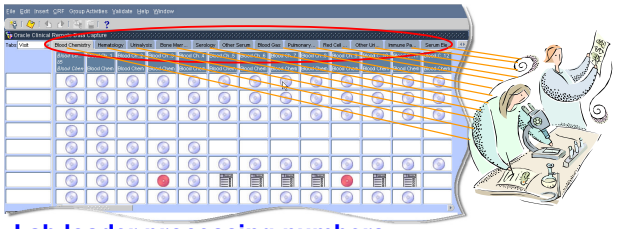
OCUG Laboratory Data Handling Focus Group

Logical Observations, Identifiers, Names and Codes (LOINC ®) Adoption for Lab Tests

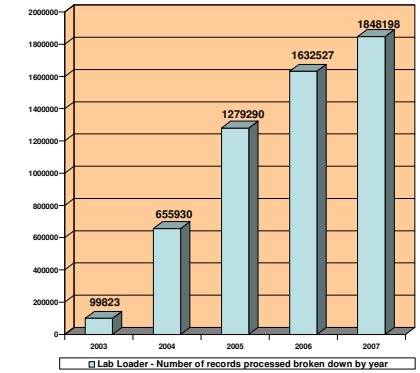
TERPSYS

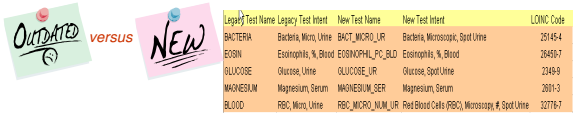
Problem Scenario: Through the Cancer Biomedical Informatics Grid (caBIG™) program, the National Cancer Institute (NCI) is helping cancer centers to standardize electronic data collection through its Cancer Central Clinical Database (C3D), which has Oracle Clinical as its primary underlying component. Given the dynamic research environment, the number and variations among the lab data sources, lab test names did not include enough descriptors in a number of cases to allow for consistent valid choices of labs. As a consequence, labs results did not always match to the correct lab test name. Therefore, NCI needed to find a robust and efficient standard for laboratory tests so that the original content would be mapped correctly.

Patient data coming from laboratory and is batch loaded in to Oracle Clinical for viewing via Remote Data Capture (RDC)

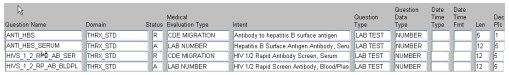


Lab loader processing numbers





Legacy Test Name	Legacy Test Intent	New Test Name	New Test Intent	LOINC Code
BACTERIA	Bacteria, Micro, Urine	BACT_MICRO_UR	Bacteria, Microscopic, Spot Urine	25145-4
EOSIN	Eosinophils, %, Blood	EOSINOPHIL_PC_BLD	Eosinophils, %, Blood	26450-7
GLUCOSE	Glucose, Urine	GLUCOSE_UR	Glucose, Spot Urine	2349-9
MAGNESIUM	Magnesium, Serum	MAGNESIUM_SER	Magnesium, Serum	2601-3
BLOOD	RBC, Micro, Urine	RBC_MICRO_NUM_UR	Red Blood Cells (RBC), Microscopy, #, Spot Urine	32776-7



Design of Laboratory DCM showing old test names versus new test names

Lab Test	Lab Test
SODIUM	SODIUM_SER
POTASSIUM	POTASSIUM_SER
CHLORIDE	CHLORIDE_SER
BICARB_SERUM	BICARB_SER
GLUCOSE_SER	GLUCOSE_SER
GLUC_FASTING	GLUCOSE_FAST_SER
GLUC_NONFASTING	GLUCOSE_NONFAST_SER
BUN	BUN_SER
ALBUMIN_SERUM	ALBUMIN_SER
CALCIUM	CALCIUM_SER
MAGNESIUM	MAGNESIUM_SER
PHOSPHATE_SER	PHOSPHATE_SER
ALK_PHOS	ALK_PHOS_SER

Solution / Standardization Plan

We started by investigating standards for laboratory test names / codes. The goal was to identify a standard set of codes that will be comprehensive enough to address the NCI lab test needs while retaining current lab test names. We understood that the efficient collection of clinical observations from many sources into single electronic system requires a standard code to which each source can map individual results. We realized we could meet our goal by adopting LOINC ® which has been adopted by large commercial laboratories and governmental organizations.

Implementation Strategy

In implementing LOINC ®, NCI reviewed existing lab test names in C3D that needed enhanced descriptors. We employ more than the mainstream chemistry, hematology and urinalysis panels because of the dynamic research environment. We used LOINC ® terminology to revise and improve test names. The LOINC ® standard itself was not adopted in favor of a more human readable and understood approach for clinicians.

NCI involved multiple teams to validate the correct and complete renaming of lab tests. We carefully coordinated efforts to ensure that the codes and methodologies align with what is expected. To facilitate the mapping of NCI lab tests to LOINC ® codes, we used the Regenstrief LOINC Mapping Assistant (RELMA) tool and mapped our lab test names to the LOINC® codes.

Lessons Learned (Ongoing…)

- It is important to do mapping carefully and correctly.
- Enlist the help of content experts to validate mapping and to verify that the correct code is selected.
- Including approximately 31,000 lab tests, LOINC ® is comprehensive in mapping approximately 500 lab test names.
- Renaming a lab test adds more specificity to the name and therefore increases the likelihood that the correct lab test name will be used in a panel.
- Knowing your organization structure will facilitate the LOINC ® adoption process. Involving teams and carefully coordinating their efforts will ensure correct mapping.
- The mapping process is very time consuming, however, we have found that establishing naming conventions and labeling information facilitates the loading process and improves quality.

Source: LOINC ® Background / Highlights, RELMA Version 3.22, Released: July 17, 2007

Process used in adopting LOINC ®

	Clinical Analyst ***Knowledge of good clinical practice***	**Global Librarian** ***Knowledge of LOINC ® naming conventions***	**Protocol Builder** ***Knowledge of the Oracle Clinical and back-end tables***	**Lab-load Specialist** ***Knowledge of lab data source files format***
Step 1 **Analyze the current lab data collection**	- Reviews existing lab responses -Identifies lab tests that potentially should be retired or moved to an obsolete domain -Recommends existing lab tests that are eligible for mapping	-Reviews recommendations from Clinical Analysts - Applies naming conventions to rename content using the guidelines from LOINC ®	- Analyzes impact of recommended changes on views and codes -Estimates level of effort to implement changes - Identifies constraints imposed by Oracle Clinical (e.g. Question name begins and ends with a letter and must be comprised only of up to 20 uppercase letters, numbers, underscores, or hashes)	-Evaluates potential impact of changes on previously loaded data -Investigates options for minimizing impact
Step 2 **Map lab test names to the LOINC ® standards**		-Identifies the lab test name, intent and other attributions and curates improve lab test names		-Crafts a solution to allow both old and new standards to coexist to minimize impact on existing data -Creates multiple versions of mapping for loading purposes
Step 3 **Implement standards in Oracle Clinical**	- Reviews new lab test names recommendations from the Global Librarian	- Maps lab test names to the LOINC ® codes	- Adjusts related repeat defaults (lparm) on lab panels -Performs mass change as appropriate - Adjusts data extract views and reports	-Confirms mapping of test names for load purposes -Tests mapping versions to verify results
Step 4 **Ongoing Maintenance**	- Confirms the matching of the new names with our source labs	- Adds laboratory test codes based on LOINC ® codes: one-to-one relationship	- Updates legacy studies over the long run	- Maintains and adds new mapping versions as needed

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