LABO: an ontology for laboratory test prescription and reporting

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Abstract

LABO is an ontology formalizing laboratory tests prescriptions and reporting documents. It is built according to the OBO Foundry methodology, and is a component of a core ontological model that aims to enable interoperability between various clinical data sources in the context of a Learning Health System.

Keywords:

laboratory test; OBO Foundry; information content entity

Introduction

Learning Health Systems (LHS) analyze health information generated from patients in order to provide secondary use of clinical data and decision support. They rely on access to a wide range of clinical data, such as drug prescriptions or laboratory test prescriptions and results, usually scattered across numerous heterogeneous information systems (1).

Applied ontologies can support a common, source-independent representation of these data, thus helping to solve the "Tower of Babel problem" in medical informatics. An ontology has already been developed for drug prescriptions: the Prescription of DRugs Ontology (PDRO, read "Pedro") (2). This abstract presents the creation of an ontology using a similar methodology for representing laboratory tests prescriptions and reporting documents: LABO (for LABoratory Ontology).

Methods

LABO has been developped according to a realist approach based on the Basic Formal Ontology. It represents informational entities directing and reporting on laboratory tests as subclasses of IAO:*Information content entity* ("ICE") (3).

Results

A central class in LABO is *Laboratory test directive item*, which is a subclass of IAO:*Action specification*, and is defined as: “An action specification that directs one or several laboratory tests and such that none of its proper parts directs some but not all of those laboratory tests.” This definition is motivated by the fact that some instructions ("complete blood count", for example) direct several distinct tests (more than a dozen for the complete blood count: hematocrit, hemoglobin, etc.; but no part of the ICE 'complete blood count' does specifically directly a hematocrit test, a hemoglobin test, etc.). We define a *Directed laboratory test group* as the mereological sum of laboratory tests directed by a *Laboratory test directive item*. In our example, the item 'complete blood count' written on a laboratory test prescription directs an instance of *Directed laboratory test group* composed by an instance of *Hematocrit test*, an instance of *Hemoglobin test*, etc.

A *Laboratory result* is a specified output of a OGMS:*Laboratory test*, and LABO represents several subclasses of *Laboratory result* to allow the representation of ratio, scalar, textual or range results.

A *Laboratory test result item* is about a OGMS:*Laboratory test* and has as part a *Laboratory result*, as well as ICEs specifying the time and specimen characteristic. It is a part of a *Laboratory test reporting group*, which also encompass the corresponding *Laboratory test directive item*.

Conclusions

The LABO ontology formalizes laboratory test prescriptions, results and reporting, as well as their parts. Along with PDRO, it is a part of a core ontological model to enable interoperability between various clinical data sources in a LHS context.

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