SNOMED CT: Ontologies in support of global interoperation of the EHR
SNOMED CT Showcase

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Interoperation Use Case

- US tourist in Australia stricken with acute febrile illness presents to local physician, providing a CDA record summary to the physician for medical history.

- November 1 Session 2:
  - What are the patient’s problems?
  - Does the patient have history of infections?
  - Has the patient had a low white count?
  - Is the patient on an immunosuppressant medication?
  - Is the diabetes under good control?
  - Has the patient been screened for diabetic kidney disease?

These questions require interoperation of laboratory and testing results!
LOINC: 4548-4
Hemoglobin A1c/
Hemoglobin .total in Blood
SNOMED CT Observable entities

- Representation of the results that can be observed or measured in health care
- Based on work from the areas of ontology and metrology
- From 2008, introduced in SNOMED CT in Jan 2017
Observables areas developed and in use

- Large areas of laboratory medicine, pathology, molecular and genomic testing
- “Functioning” together with SNOMED CT Functioning project and Nursing CRG/SIG
- Vital signs
- ...and smaller scale experiments in many areas
Observables model as of today

- All-in-all 20 attributes used to define Observable entities
- Model is stable, but application to new domains requires re-evaluation and changes are made to accommodate for new use cases
- Four classes of Observables:
  - Quality observable (includes quantitative!)
  - Process observable
  - Function observable
  - Disposition observable
Quality Observables model principles
LOINC: 17856-6 Hemoglobin A1c/ Hemoglobin.total [Mass fraction] in Blood by HPLC(Observable entity)

**WHAT MEASURED?**
Blood sample

**FEATURE**
Glycosylated hemoglobin

**RELATIVE TO**
Total hemoglobin

**PROPERTY**
Mass fraction

**HOW**
HPLC

**WHEN?**
Single point in time

**SCALE**
Quantitative
Quality Observables model principles
NPU: 27300 B-Hæmoglobin beta kæde(B)—N-(1-deoxyfructos-1-yl)hæmoglobin beta kæde; stoffr. = ? mmol/mole

WHAT MEASURED?
Blood sample

FEATURE
Glycated hemoglobin

RELATIVE TO
Total hemoglobin

PROPERTY
Substance fraction

HOW
HPLC

WHEN?
Single point in time

SCALE
Quantitative
Process Observables model principles
LOINC: 9279-1 Respiratory rate (Observable entity)

**PROCESS**
**OUTPUT?**
Ventilatory cycle

**PROCESS**
Inspiratory process

**PROPERTY**
Number rate

**WHEN?**
Single point in time

**SCALE**
Quantitative
Disposition Observables model principles
LOINC: 12-5 Amikacin [Susceptibility] of bacterium by Minimum inhibitory concentration (Observable entity)

WHAT MEASURED?
Bacterium

PROPERTY
Susceptibility

TOWARDS
Product containing Amikacin

HOW
MIC

WHEN?
Single point in time

SCALE
Ordinal or Quantitative
Observables model principles

**WHAT**

- Procedure information is needed for interpretation of value
- Multiple ways (observation procedures) of observing the same (or sufficiently similar) “thing” lead to different types of results
- New methods of observation will evolve over time

**HOW**

- Multiple ways (observation procedures) of observing the same (or sufficiently similar) “thing” lead to different types of results
Defining LOINC and NPU using SNOMED CT concept model

- Mapping of LOINC parts done by SNOMED International in collaboration with LOINC; published as refset
- IFCC-IUPAC NPU Terminology
  - NPU = Nomenclature Properties and Units
- A selection of common NPU terms were defined with the SNOMED CT concept model in a PoC IUPAC project 2015-2016
- Modelling made by subgroup of the NPU Scientific Committee
Defining LOINC and NPU through SNOMED CT

- NPU03024 P—Paracetamol; subst.c. = ? µmol/L
- NPU01710 U—Codeine; arb.c.(proc.) = ?
- NPU54368 Syst—Amikacin; threshold mass c. = ? mg/L
Interoperation...have a White blood cell count recently?
Interoperability Use Case

...taking an Immunosuppressant?
Interoperation Use Case
...have a urine albumin screen?
Interoperation Use Case

...have a glycohemoglobin check?
QUESTIONS?

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