Sharing Ontology between ICD 11 and SNOMED CT will enable seamless re-use and semantic interoperability?

Jean-Marie Rodrigues, Stefan Schulz, Alan Rector, Kent Spackman, Bedirhan Üstün, Christopher Chute, Vincenzo Della Mea, Jane Millar, Kristina Brand Persson

rodrigues@univ-st-etienne.fr
Plan

- SNOMED CT and ICD11
- Why a common ontology
- Conditions or Situation
- Common Ontology and multilayered ICD 11
- Is_a relations
- Non Is_a relation
- Conclusion
SNOMED CT and ICD11

- **SNOMED CT**
  - standardized health terminology that provides clinical terms for health records.
  - SNOMED CT concepts provide standardized meaning by logic descriptions

- **ICD11**
  - a multi-purpose disease classification system.
  - Its novel architecture distinguishes two levels:
    - Foundation Component, Common ontology plus queries
    - Purpose-specific linearizations (mortality, morbidity, primary care) with jointly exhaustive and mutually exclusive classes
Why(1)

- if the class of particular entities in the extension of a SNOMED CT concept $X$ coincides with the members of an ICD class $Y$, we have an ideal map $X \equiv Y$.
- in many cases, there is no exact match. It is time consuming to interpret each class / concept so that the mapper has a clear picture of their extensions.
Why (2)

- To reduce the variability of the inter different mapping systems (IHTSDO, UK, UMLS, Kayser, ICD10CM)
- Or intra different mapping systems (validation by reviewers)
- 73 % of agreement between IHTSDO and UK
- Agreement between the 2 on NC (3 %)
Two diverging interpretations of disorder terms in both SNOMED CT and ICD:

- They denote patient-borne **Conditions** such as body processes, states, dispositions, or (patho-) anatomical structures, which are reportable in the context of medical records.

- They denote Clinical **Situations**, which are defined as phases of a patient’s life, during which he/she is bearer of (some combination of) pathological conditions.
Example: **Closed fractures with spinal cord injury**

ontologically,

1 **CONDITION**

Complex of closed fracture and spinal cord injury is a kind of Complex, and not a kind of either Closed fracture or Spinal cord injury.

2 **SITUATION**

the conjunction of Closed fracture and Spinal cord injury in a patient period of life.
ICD 11 Revision Architecture
Multi-layer system

Foundation Component
(Clinical knowledge: signs, symptoms, causes, …)

Ontology Component
(kinds / class definitions)

SOMED CT
Common Ontology Subset

Mortality
Morbidty
Primary Care

Linearizations

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ICD 11 Revision Architecture: Linkage

SNOMED CT
Common Ontology Subset

Foundation Component
...

+ Links via queries

Ontology Component (kinds)

SELECT ?X WHERE
{?X subclassOf A
&
not (?X subclassOf B)}

Morbidity
Linearization code
FC non in CO

- Headers that aggregate entities of vocabulary, typically using plurals ("Diseases of...")

- Fine-grained parts of ICD, more specific than SNOMED CT and vice versa

- Exclusion statements, only to be interpreted in linearizations

- Non Otherwise Specified

- Non-ontological content
  • (signs, symptoms, diagnostic criteria)
In ICD / SNOMED common ontology (CO)
IN SNOMED, not in CO
In ICD, not in CO
Not Elsewhere Classified (NEC)
exclusion

Nodes:

is-a
Alignment of hierarchies

- (i) each class in the ICD-11 ontology core of the Foundation Component (FC) has to correspond to exactly one class in SNOMED CT.

- (ii) the set of all parents (transitive closure of Is_a relations) in Common Ontology must be included in the transitive closure of Is_a relations in SNOMED CT.

- (iii), the equivalence in meaning between aligned classes, as understood by users, will be assured by having common text definitions and descriptions, in addition to the formal axioms in description logic.
Is_a relationships?

➢ Common Ontology not in linearizations
SELECT ?CN WHERE (?CN SubclassOf Hypertension) MINUS (?CN SubclassOf Prenatal Disorder)

ICD Hypertension i : Excl: Hypertension in Prenatal period

Hypertension
Prenatal Disorder

Hypertension in Prenatal period

SNOMED CT Subset

Hypertension
Prenatal disorder

Hypertension in Prenatal period

COMMON ONTOLOGY

ICD11 FC

Hypertension
Prenatal Disorder

Hypertension in Prenatal period

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Non Is_a relationships

- Linearizations not in common ontology
Non Is_a relations

Hypertensive Diseases
- 3 MI as child of Ischemia
- 4 Pericarditis included in diseases of circulatory system
Common ontology
there is not heart failure meaning by usage pumping function failure
There is no hypertension as a permanent pathological process but transient elevated blood pressure by stress
3 Common ontology:
MI is a consequence of ischemia and can be caused by other agents as virus
4 Common ontology:
in anatomy pericardium is not part of the cardio vascular system but it is in physiopathology
Conclusion

SNOMED CT codes or on ICD 11 ontology based linearisations codes will give the same result in Common ontology

- Ability to reproduce exclusions by queries
Questions?

Tak

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Thank you

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rodrigues@univ-st-etienne.fr