Comparing existing national and international classification systems of surgical procedures with the CEN/ISO 1828 ontology framework standard

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A standard to QA existing coding systems of surgical procedures

- 1 CEN ISO Ontology Framework or Categorial structure
- 2 CEN ISO 1828 : Categorial structure for Terminological systems of surgical procedures
- 3 The main existing coding systems of surgical procedures
- 4 Comparing their compliance to the standard
Definitions (1)

Bio Médical Informatics Ontology: a representation of a domain of reality

1. reflects the properties of the entities within the domain in such a way that it obtains a systematic or according to rule correlation between reality and the representation itself and the non ambiguous comparison between different representations of the reality

2. is intelligible to a health care domain expert,

3. is formalised in a way that allows it to support automatic (and logical) knowledge processing (entities and relations).
Definitions (2)

Bio Médical Informatics Ontology: a representation of a domain of reality

- 2. Domain Ontology: FMA for anatomy
- 3. Application Ontology ex SNOMED CT and CIM 10 is formalised in a way that allows it to support automatic (and logical) knowledge processing (entities and relations).
Definitions (3)

Healthcare Terminology and health care
Terminological system

1. Set of designations within the domain of health care with, when appropriate, any associated rules, relationships and definitions.
2. Used to analyse the reality from instances of universals (entities invariant in time and space) known or to know.
3. Used by humans with flexibility and ambiguity.
Definitions (4)

Categorial structure for healthcare terminological systems:

Minimal set of domain constraints to represent a healthcare terminology in a precise domain with a precise goal.

- a) list of semantic categories
- b) goal of the categorial structure
- c) list of semantic links authorised with their associated semantic categories,
- d) set of minimal constraints necessary to comply with the standard (DL/like).
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CEN EN 1828 Categorial structure for terminological systems of surgical procedures

1. a list of semantic categories
   surgical deed, human anatomy, lesion, device

2. the goal of the terminological system represented by the categorial structure

3. the list of semantic links between semantic categories authorised with their associated semantic categories
   (ex hasObject, hasSite, hasMeans, hasSubsurgicaldeed)

4. the minimal constraints
Minimal constraints (1)

1. Each surgical procedure terminological phrase shall, as a minimum, consist of a **surgical deed** and have the semantic link ‘**hasObject**’.

2. Each surgical procedure terminological phrase shall contain the **category human anatomy** in relation with the semantic link ‘**hasObject**’ or ‘**hasSite**’. It can also have both.

3. The surgical procedure terminological phrase shall include the category **lesion** when the surgical deed is applied to a modified human anatomy structure without mention of the disease cause of the lesion.
Minimal constraints (2)

4 Each surgical procedure terminological phrase may need more than one surgical deed. One surgical deed shall be chosen as a main deed and the others as subprocess deeds related to the main deed by the semantic link `hasSubsurgicaldeed'.

5.5 Each surgical procedure sub-process terminological phrase shall as a minimum, consists of a **surgical deed**, the semantic link `hasObject` (4.4.1) and of the category **human anatomy** in relation with the semantic links `hasObject` (4.4.1) or `hasSite` (4.4.2).
UML diagram for EN/ISO1828 for Terminological systems of surgical procedures
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Main existing coding systems of surgical procedures(1)

- ACHI Australian Classification of Health Intervention: http://www3.fhs.usyd.edu.au
- CCHI Canadian Classification of Health Intervention: http://secure.cihi.ca/cihiweb/dispPage.jsp
Main existing coding systems of surgical procedures (2)

- PCS Procedure Coding System: www.cms.hhs.gov/ICD9ProviderDiagnosticCodes/08_ICD10.asp
<table>
<thead>
<tr>
<th>ENISO 1828 Categorial structure</th>
<th>SNOMED CT</th>
<th>ICHI</th>
<th>CCAM</th>
<th>CCI</th>
<th>ACHI</th>
<th>ICD10 PCS</th>
<th>Japan Surgical Society Procedure Code</th>
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<td>action</td>
<td>Action axis 2 and 3</td>
<td>Field 3</td>
<td>Axis 3</td>
<td>Axis 1 and 3</td>
<td>Acts</td>
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<td>Target Body structure</td>
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<td>Axis 6</td>
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Comparing the compliance to the standard (1)

- The coding systems of surgical procedures are based on the semantic categories of the standard except for the category Lesion. (SNOMED CT and the Japan Surgical Society system)

- For the semantic links all the studied systems use has_object but only 4 out of 7 (SNOMED CT, ICHI, CCAM and the Japan Surgical Society) are based on all the semantic links.
Comparing the compliance to the standard

- Only SNOMED CT and ICHI explicitly define the list of domain constraints.
- None of the systems prescribe the list of minimal domain constraints.
Conclusion 1

- To increase semantic interoperability to level 2 (understanding the terms with the meaning of the sender) conformance to the EN/ISO 1828 ontology framework standard is an opportunity which has started to be used by the most advanced classification systems and the international ICHI initiative.

- It can be used in the EHR as a filter to CDA or 13606 archetype
Conclusion 2

- To increase semantic interoperability to level 3 when the receiver or final user can process the data as safely as he can do with his own terms and meaning it is recommended
  - 1 To generalise the use of the standard by explicitly associating the Categorial Structure ontology framework to biomedical terminologies exchanges protocols.
  - 2 To develop a full shared biomedical ontology based on an upper level ontology.
ENDE
Vielen Dank für Ihre Aufmerksamkeit

Thank you
Merci
Tag
Gracias
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ARIGATO GOZAIMASU

Multumesc.