1.4. SNOMED CT Features

Overview

This section contains a brief summary of key SNOMED CT features and explains how they may be useful in CDSSs.

Concepts

SNOMED CT concepts are used to represent clinical meanings. Every concept in SNOMED CT is uniquely identified by a distinct SNOMED CT Concept Identifier. For example, 195967001 |Asthma|is the concept identifier for the concept 195967001 |Asthma|.

SNOMED CT concepts play an important role in CDS by enabling actions to be triggered based on the meaning of data recorded in the patient records.

Descriptions

SNOMED CT descriptions provide the human-readable terms associated with SNOMED CT concepts. A concept may have one or more descriptions, which act as synonyms for the same clinical meaning. This is also how SNOMED CT supports different dialects and languages.

SNOMED CT descriptions allow common CDS rules to be consistently applied across patient records recorded using different synonyms, dialects and languages.

Relationships

SNOMED CT relationships link concepts together to formally define the meaning of each concept. For example, one type of relationship is the 116680003 |is a|relationship which relates a concept to a parent or supertype. These 116680003 |is a|relationships define the subtype hierarchy of SNOMED CT concepts.

For example, the concepts 53084003 |Bacterial pneumonia|and 75570004 |Viral pneumonia|both have an 116680003 |is a|relationship to 312342009 |Infective pneumonia|which has an 116680003 |is a|relationship to the more general concept 233604007 |Pneumonia|. Subtype relationships can be used by CDS rules to refer to codes in an EHR that are any specific type of a relevant clinical concept.

Additional attribute relationships help to define the meaning of a concept. For example, the concept 75570004 |Viral pneumonia|has a 246075003 |Causative agent|relationship to the concept 49872002 |Virus|and a 363698007 |Finding site|relationship to the concept 39607008 |Lung structure|.

Attribute relationships can be used by CDS rules to refer to codes recorded in an EHR that have a specific meaningful relationship with a concept of interest.

Concept Model

The SNOMED CT concept model is a set of rules that govern the ways in which SNOMED CT concepts are permitted to be modeled using relationships to other concepts. It defines the types of relationships that may be used on each type of concepts, and the permitted values for each relationship type. The Machine Readable Concept Model (MRCM)represents the rules in the SNOMED CT concept model in a form that can be read by a computer and applied to test that concept definitions and expressions comply with these rules.

The SNOMED CT concept model plays an important role in CDS by providing the rules by which the clinical meaning of SNOMED CT encoded health records can be queried. The MRCM makes it possible to process these rules in a machine-processable way.

Expressions

SNOMED CT provides a mechanism which enables clinical phrases to be represented by a computable expression, when a single concept does not capture the necessary level of detail. For example, the following expression represents a right hip:

```
182201002 |Hip joint| :
    272741003 |Laterality|  =  24028007 |Right|
```

SNOMED CT expressions enable additional clinical meanings to be captured in a health record, without requiring the terminology to include countless combinations and permutations of precoordinated concepts.

SNOMED CT expressions facilitate CDS over an expanded set of clinical meanings that extends beyond individual concepts. For more information about expressions, please refer to the Compositional Grammar - Specification and Guide.

Reference Sets

SNOMED CT reference sets are a flexible and standardized approach used to support a variety of requirements for the customization and enhancement of SNOMED CT. These include the representation of subsets, language preferences for use of particular terms, mapping from or to other code systems, and ordered lists.

Reference sets may be used in the following aspects of CDS:

- Representing subsets of SNOMED CT concepts that may trigger a CDS action
- Representing non-standard aggregations of concepts for specific CDS use cases
- Defining language or dialect specific sets of descriptions over which term searches can be performed

For more information about reference sets, please refer to the Practical Guide to Reference Sets.

Description Logic Features

Description Logic (DL) is a family of formal knowledge representation languages and used as the formal foundation of meaning in SNOMED CT. The way that concepts have been modeled in SNOMED CT permits them to be represented using Description Logic. DL helps computers to make useful inferences about concepts, and to classify SNOMED CT using a DL reasoner. Description Logic also helps by testing expressions for subsumption and equivalence.

The logical inferences supported by DL can be useful when executing CDS rules. For example, when a CDS rule requires an action to be performed when the patient has any type of 195967001 |Asthma|, a DL reasoner may be used to determine that 304527002 |Acute asthma|and 427603009 |Intermittent asthma|are both types of 195967001 |Asthma|and should therefore both trigger the action to be performed.