Mapping local terminology to SNOMED CT for eHR in Hong Kong

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Audience

Health care providers who have established their own clinical terminology dictionary and who are planning to implement the use of SNOMED CT would find this experience useful.

Objectives

- To share the experiences of mapping local clinical vocabulary to SNOMED CT.
- To illustrate the use of lexical tools for syntactic manipulations.
- To share the experiences of performing post-coordination in SNOMED CT.

Abstract

Background

The Hong Kong SAR government is establishing the electronic health record (eHR) sharing system, providing a territory-wide sharing platform among health care providers. To facilitate interoperability of the clinical information, the Hong Kong Clinical Terminology Table (HKCTT) is being built as the terminology standard.

The Hong Kong Hospital Authority (HA), as the key player in the project, is building the HKCTT with reference to its own clinical vocabulary table (HACVT) which has accumulated more than 39000 concepts for diagnoses and procedures. To achieve interoperability with international terminology standards, HA is mapping the HKCTT to the Systematized Nomenclature of Medicine, Clinical Terms (SNOMED CT). With this mapping, the future eHR clinical records captured and stored using HKCTT could be translated on-the-fly into SNOMED CT. The private health care providers could also directly use SNOMED CT for capturing and storing their own clinical records, and for transmitting their records to the eHR sharing system.

SNOMED CT is ideal for eHR use for its comprehensive collection of concepts with varied levels of granularity. The synonyms, multi-hierarchy relationships and concept definitions using attributes enabled efficient concept searching during information capture. Post-coordination and the use of qualifying attributes also enabled easy extension of the terminology while preserving the semantic hierarchy for information retrieval and analysis.

Mapping

The mapping exercise is conducted in two phases – exact matching and post-coordination. Verification mechanisms are included to ensure the mapping quality.

Exact Matching

Exact matching involves comparison of the descriptive meanings between the HKCTT and SNOMED CT concepts, ignoring word form differences like spelling and grammar.

Exact match mappings are performed by reviewers with clinical knowledge background, and double-checked by a second reviewer. More than 18600 HKCTT concepts are mapped to SNOMED CT by exact matching.

Verification is performed using automated methods. The Lexical Variant Generator (LVG) from the Unified Medical Language System (UMLS) is used for lexical normalization of the mapped HKCTT and SNOMED CT concept pair. The pair is considered "exact matched" if the two normalized lexical forms are exactly the same. 58% of the exact match mappings have the same normalized lexical forms.

Post-Coordination

Post-coordination is representation of the HKCTT concept using one or more SNOMED CT concepts, following the SNOMED CT editorial guidelines. HKCTT concepts with no exact matching SNOMED CT concepts are mapped by post-coordination.

Among the post-coordination mappings, common patterns are identified. The patterns are categorized, reviewed and refined, referencing existing pre-coordinated SNOMED CT core concepts. The mapping team has endeavoured to apply the same patterns to the post-coordination of similar HKCTT concepts, to maintain the mapping quality and consistency, and to improve the mapping efficiency.

From more than 10200 post-coordination mappings, a random sample of 500 mappings and 90 post-coordination patterns are verified by international experts. For 60% of the patterns and 56% of the mapping sample, either the experts agree with the HA mappings or the expert advice is taken. The verified patterns are then re-applied to the post-coordination of similar concepts in the HKCTT.

HKCTT concepts requiring post-coordination mapping are also submitted to the International Health Terminology Standards Development Organisation (IHTSDO) for addition to the SNOMED CT international core release.

Way forward

The HKCTT to SNOMED CT mapping will enable the future eHR records to be captured, stored, transmitted, searchable, retrievable and analysable using SNOMED CT. HKCTT is also being enriched by the linkage with semantic definitions and relationship hierarchies, enabling semantic and hierarchical analysis of the eHR records in the future. Moreover, the mapping has uncovered problem concepts accumulated but hidden in the vocabulary table, including concepts that are duplicated, ambiguous or inconsistent, providing an easy and efficient method for cleansing.