The Cross-Validation of Samsung Medical Center's Clinical terminology to KCD-7 and SNOMED to ICD-10 Mappings

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Introduction

This poster shows the cross-validation between the ICD-10 codes from SNOMED CT comparing KCD-7 codes (the Korean version of ICD-10) and interface clinical terminology in Samsung Medical Center may enhance the completeness of mapping between SNOMED CT and ICD-10.

Abstract

SNOMED CT is the most comprehensive international clinical terminology designed for clinical documentation in electronic health records. On the other hand, ICD is a medical classification created for epidemiology, health management and clinical purposes. Mapping of SNOMED CT and ICD-10 started as collaboration between IHTSDO and WHO in 2008. [1] Although several studies have revealed the application of ICD-10 mapping from SNOMED CT [2] [3], its completeness has never been assessed.

The purpose of this study is to evaluate the completeness of mapping between SNOMED CT and ICD-10 by using Samsung Medical Center's interface clinical terminology mapped to both SNOMED CT and the Korean version of ICD-10 (KCD-7).

Methods

SNOMED CT

Concept
- ID: 50325005

Description
- ID: 788101014
- FSN: Alcoholic fatty liver (disorder)

SAMSUNG MEDICAL CENTER

Alcoholic fatty liver

KCD-7
- Code: K70.0 (Alcoholic fatty liver)

Equivalent

SNOMED CT

Concept_1
- ID: 50325005

Description_1
- ID: 83834016
- Term: Alcoholic fatty liver

ICD-10
- Code: K70.0
- Diagnosis: Alcoholic fatty liver

*Comparison

ICD-10
- Code: K70.0
- Diagnosis: Alcoholic fatty liver

*Relations
- ·····▶ SNOMED CT to ICD-10 Code Mapping Code
- ───▶ Mapping Code
- ↕ Comparison (Comparison of ICD-10 Code)
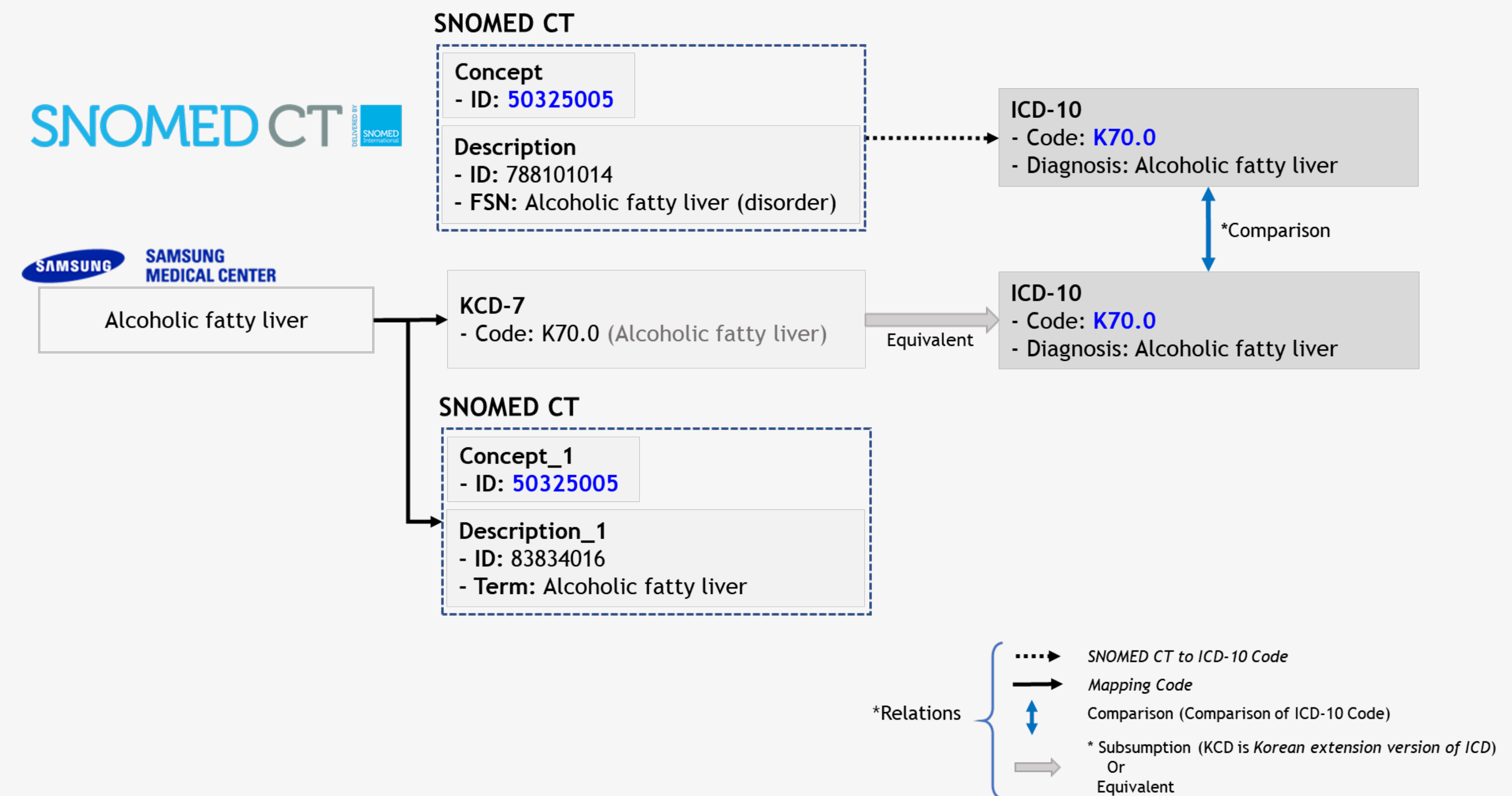- ⇨ * Subsumption (KCD is *Korean extension version of ICD*) Or Equivalent

Figure 1 : The Comparing process of mapping codes of Samsung Medical Center and SNOMED CT

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METHODS

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Methods

Samsung Medical Center launched its new information system, DARWIN, on July 2, 2016. DARWIN Clinical Terminology System (DARWIN CT) was established by integrating clinical terms (e.g., diagnosis and procedure) used in each medical department.

DARWIN CT includes mapping from KCD-7 and SNOMED CT. The Korean Classification of Diseases (KCD), modified from the ICD, has been used as the classification of medical diagnoses in Korea since 1952. [4] The KCD-7 is the latest version of Korean Standard Classification of Diseases based on the ICD-10th revision.

A total of 39,495 diagnosis terms of DARWIN CT were compared with SNOMED CT terms. Among these, 7,257 perfectly matched terms of DARWIN CT were selected.

And then, ICD-10 codes from SNOMED CT reference set released on January 2020 were compared to KCD-7 codes from DARWIN CT. [5] For the comparison between KCD-7 and ICD-10, we converted KCD-7 to ICD-10. In case that a KCD-7 code is more detail than ICD-10 codes, we converted the KCD-7 code to the ICD-10 code by eliminating last one or two digits. The converted KCD-7 code was defined as 'conversion code'. For example, Acute otitis media with effusion was mapped to H65.100 by KCD-7 in DARWIN CT. Therefore, H65.100 by KCD-7 was changed to a conversion code of H65.1. A conversion code of KCD-7 was compared with an ICD-10 code from the SNOMED CT reference set.
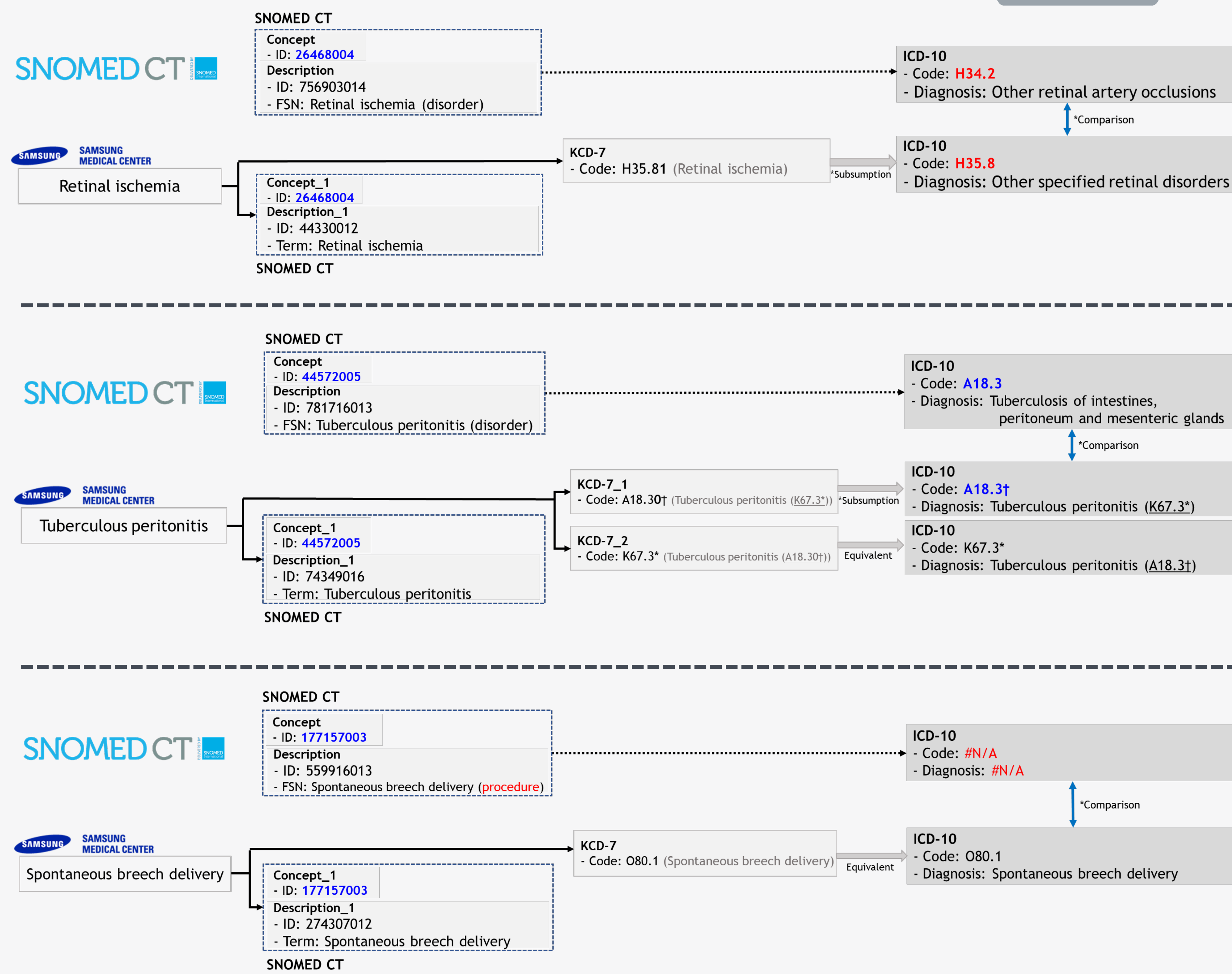

Figure 2 : Examples of mismatched codes

Results

Matched between KCD-7 codes from DARWIN CT and ICD-10 codes from SNOMED CT

· **Agreement between KCD-7 codes and ICD-10 codes: 72.22%**

· **Agreement between 'conversion codes' of KCD-7 and ICD-10 codes: 13.38%**

   1) Agreement between 'conversion codes' that cut out the last 1 number of decimal place
      and ICD-10 codes: 13.08%

   2) Agreement between 'conversion codes' that cut out the last 2 numbers of decimal
      place and ICD-10 codes: 0.30%

Not-matched between KCD-7 codes from DARWIN CT and ICD-10 codes from SNOMED CT

· **The discrepancy between KCD-7 codes and ICD-10 codes: 12.98%**

   1) Mismatching by the Dagger and Asterisk codes between KCD-7 codes from DARWIN CT
      and ICD-10 codes from SNOMED CT: 1.06%

   2) Other mismatching between KCD-7 codes from DARWIN CT and ICD-10 codes from
      SNOMED CT: 11.92%

· **SNOMED CT codes which semantic tag is not 'disorder', however, can be exactly
   mapped to ICD-10 codes: 1.42%**

Semantic tag	Number of mapped other SNOMED CT semantic tags	
	SNOMED CT_ID	Percent
Finding	5	0.07%
Morphologic abnormality	61	0.84%
Navigational Concept	2	0.03%
Organism	14	0.19%
Person	6	0.08%
Procedure	8	0.11%
Regime/Therapy	7	0.10%

* ICD-10 Code Structure
ex) Three characters : J20 – Acute bronchitis
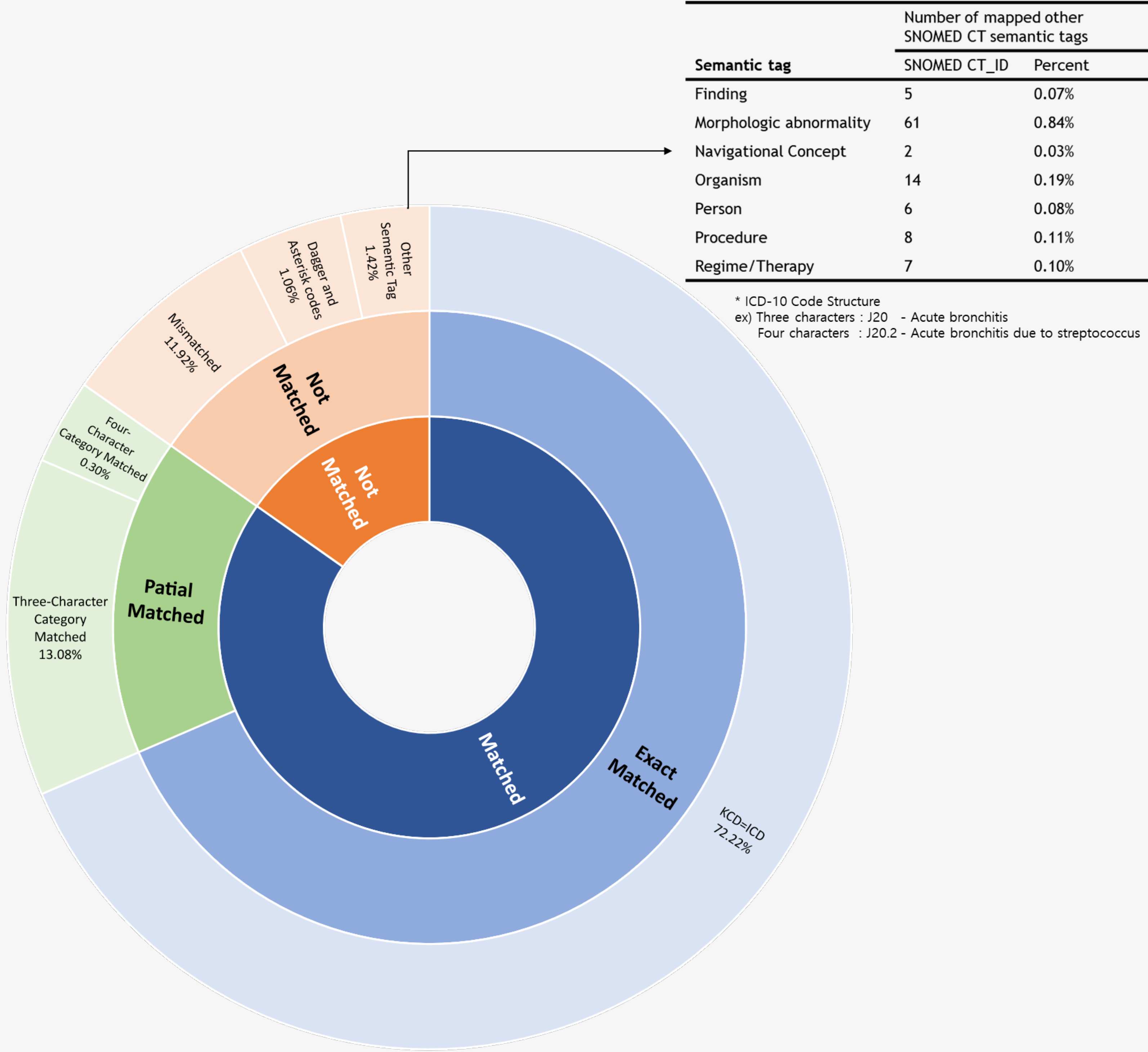   Four characters : J20.2 - Acute bronchitis due to streptococcus

Figure 3 : Distribution of the mapping results of Samsung Medical Center and SNOMED CT

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DISCUSSION

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Discussion

This study shows the process discovering the potential inappropriate relationship between SNOMED CT and ICD-10 through cross-validating KCD-7 codes from DARWIN CT and ICD-10 codes from SNOMED CT.

SNOMED CT generally has more detailed granularity than ICD-10. In contrast, ICD-10 is built up of a mono-hierarchy that each code in ICD only has one parent or each code in ICD belongs to a single group or category. [6] SNOMED CT terminology can be more thorough in expression compared to ICD allowing the clinicians to record data at an apt level of granularity. This is the reason why it is difficult to map SNOMED CT to ICD-10. Additional contextual information is often needed to determine the most suitable ICD-10 code in code mapping from SNOMED CT to ICD-10 code in the health record. The health recorders use their expertise and skill to map the codes in the health record. Hence, when applying this mapping, the health recorders should be aware of how it is represented, have the knowledge of the properties, and review the mapping results. [7]

The attempt to compare KCD-7 codes from DARWIN CT and ICD-10 from SNOMED CT was made. The overall agreement rate between KCD-7 codes from DARWIN CT and ICD-10 from SNOMED CT was 85.60%. We observed that the discrepancy rate between KCD-7 codes and ICD-10 codes was 12.98%. The cases of some discrepancy mapping results for the dagger and asterisk codes were additionally reviewed. Most dagger and asterisk codes were identified by both, however in some cases (1.06%) they were only mapped by one, a dagger or an asterisk. Therefore, mapping both dagger and asterisk codes to ICD-10 code may be enhanced the completeness of the SNOMED CT to ICD reference set.
The most reason of other mismatching cases (11.92%) may be a divergence of mapping policy between institutions or code systems. In case (1.42%) of SNOMED CT codes which semantic tag is not 'disorder' could not identify suitable ICD-10 codes.
Every healthcare provider in Korea has to report KCD-7 codes to government agencies for billing and statistical purposes. This is the reason why even the diagnoses that not listed SNOMED CT's semantic tag as 'disorder' needs to be mapped on KCD-7 codes from DARWIN CT. Absence of mapping data ('SNOMED CT to ICD' reference set) of semantic tags on 'regime/therapy', 'person' or 'procedure' excluding 'disorder' can lose the information of appropriate KCD-7 codes.

In conclusion, comparison of mapping reference sets among multiple institutions may enhance the completeness of the SNOMED CT to ICD reference set.

References Documents

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