

SNOMED EXTENSION — FILLING MAPPING GAPS FOR OMOP CONDITIONS

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1. BACKGROUND

In the OMOP Standardized Vocabularies, Conditions are encoded through a large number of different coding systems: ICD-9-CM, ICD-10, ICD-10-CM, Read, CIEL, OXMIS, MeSH. ICD-9-CM, ICD-10-CM, SNOMED-CT and ICD-O-3. In different countries exist different modifications of ICD-10 (German, Belgium, etc. editions), UK has used Read codes.

Currently, these coding systems are mapped to SNOMED standard concepts. SNOMED, even though it contains a very comprehensive ontology, does not contain an equivalent for every possible code used in the source data. In those cases, the SNOMED concept a source code is mapped to, can only partially preserve the same semantic content. Here, we are presenting various categories of partial disagreement, and a solution to overcome this loss of information:

How does ICD10 gets mapped to SNOMED today

1) 1 to 1 full equivalence mapping:



ICD10CM M00.0 Staphylococcal arthritis and polyarthritis
Maps to 4009329 Staphylococcal arthritis

2) Decomposing

a) mapping to several concepts that together share the same semantic content



ICD10 M00.04 Staphylococcal arthritis and polyarthritis, Hand – describing attributes of the same condition
Maps to 4009329 Staphylococcal arthritis
Maps to 4177365 Infective arthritis of joint of hand

b) mapping to a condition and co-occurrent condition



ICD10 E10.0 "S06.6X1 Traumatic subarachnoid hemorrhage with loss of consciousness of 30 minutes or less" – describing co-occurring conditions
Maps to 4134162 (Traumatic intracranial subarachnoid hemorrhage)
Maps to 381135 (Brief loss of consciousness)

3) Mapping to more general concept (uphill):

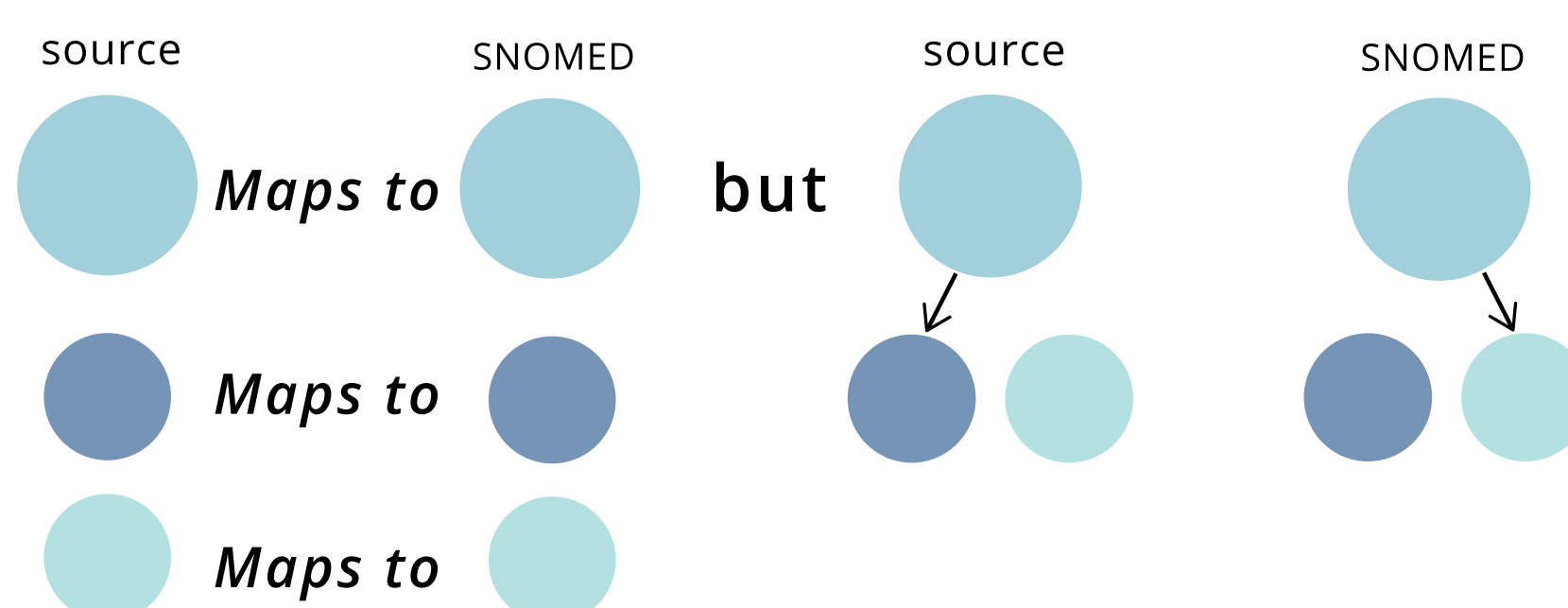


G96.11 "Dural tear"
Maps to 436101 "Disorder of meninges"

4) 1 to 1 mapping, but target and source concepts have different hierarchical trees

This problem arises if the source concept system is hierarchical, and the semantic meaning of a source code is derived from its description and that of its descendants. In such cases, the mapped concepts may appear to agree, but the hierarchical trees of the source hierarchy and SNOMED are not congruent.

E10.2 Type 1 diabetes mellitus with kidney complications
Belongs to E10 branch – diabetes mellitus type 1
Maps to 200687 Renal disorder associated with type 1 diabetes mellitus
Doesn't belong to 201254 (Type 1 diabetes mellitus) branch



	Patient_id	Source representation	OMOP representation	Standard OMOP querying
2) Decomposing	P1 M00.04 Staphylococcal arthritis and polyarthritis, Hand			Original: Find all patients with "Staphylococcal arthritis and polyarthritis, Hand" SNOMED: Finds both conditions within the same date – can't distinguish if there are two separate conditions or decomposed one
	P2 M00.0 Staphylococcal arthritis and polyarthritis; M00.94 Pyogenic arthritis, unspecified bacteria, hand			
	P3 Trauma and loss of consciousness			Original: find patients with trauma and loss of consciousness SNOMED: Cannot distinguish between loss of consciousness from different causes (without extra clauses like "at the same day")
	P4 Edema and loss of consciousness			
3) uphill	P5 G96.11 "Dural tear"			Original: find patients with dural tear. SNOMED: Finds all patients with other conditions belonging to category "disorder of meninges"
	P6 8810/0-C70.9 Fibroma of meninges (descendant of "disorder of meninges")			
4) different hierarchical trees	P7 E10.2 Type 1 diabetes mellitus with kidney complications			Original: find patients with diabetes – ill include diabetic kidney failure SNOMED: Will not include diabetic kidney failure
	P8 E10.4 Type 1 diabetes mellitus with neurological complications			

2. SOLUTION: BUILD SNOMED EXTENSION

We propose the following approach to building SNOMED Extension Concepts:

- 1) Categorize all mappings into 1) full equivalence, 2) "uphill" mapping, 3) decomposing mapping and 4) loss due to hierarchy inconsistency.
- 2) Fix category 2: decomposing mapping
 - Add Extension concept
 - Connect to the existing SNOMED hierarchy via "Is a" relationship, e.g. between the combined diabetic retinopathy/macular degeneration to the retinopathy and to the macular degeneration
 - Inherit all attributes
- 3) Fix category 3: "uphill" mapping.
 - Add Extension concept
 - Connect to the existing SNOMED hierarchy via "Is a" relationship
 - Inherit all attributes and create new attributes, potentially following existing branches of the SNOMED hierarchy e.g. from "Dura mater structure" to meninges
- 4) Fix category 4: Loss due to hierarchy inconsistency
 - Compare the hierarchies of Source concepts and their SNOMED and SNOMED Extension equivalents.
 - Create an "Is a" relationship where SNOMED misses a branch present in the source, e.g. make diabetic complications descendants of diabetes mellitus.

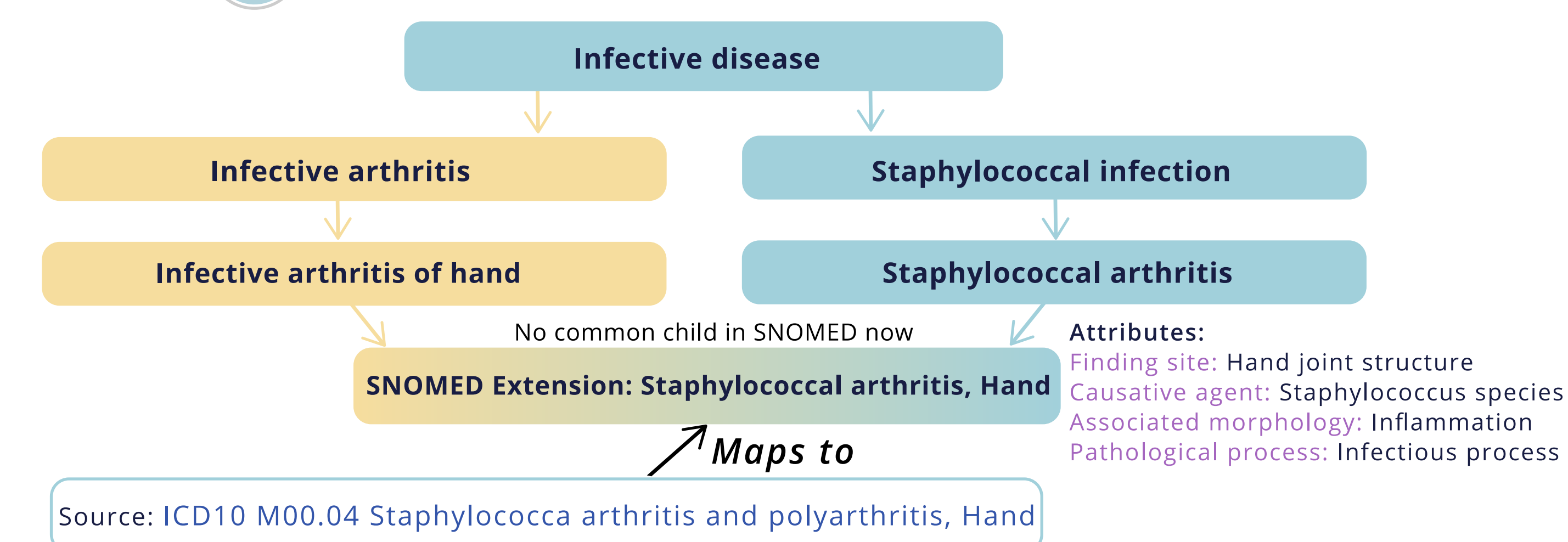
3. RESULTS

Mapping category	Count	Note
1 to 1 full equivalence	8390	Based on ICD10
Decomposing	3096	Based on ICD10
Uphill	3454	Based on ICD10
Mapping to concept with hierarchy inconsistency	12226	Based on ICD10CM mapped 1 to 1

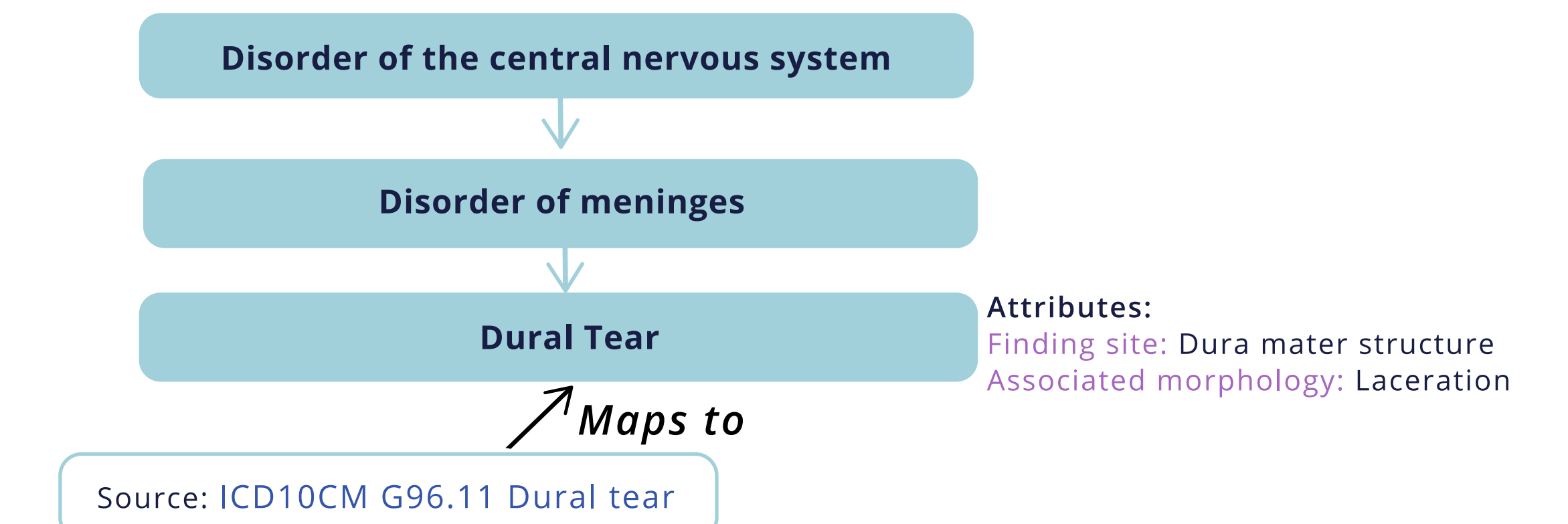
4. CONCLUSION

1. 4 categories of mapping were identified. 3 of them may lead to faulty data retrieval.
2. We are proposing to implement SNOMED Extension content to address this issue
3. SNOMED Extension concepts will be incorporated into the existing SNOMED hierarchy, including all required relationships.

2) Source concept was mapped to several concepts



3) Source concept was mapped to general target concept



4) Hierarchy inconsistency - solution

