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SNOMED CT to ICD-10 Mapping Technical Guide

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This document describes the mapping use cases and technical procedures applied to the co-development of a SNOMED CT to ICD-10 map by SNOMED International and the World Health Organization (WHO). This document provides guidance on the intended purposes and practical use of the mapping files produced from this development.

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1. Introduction

Document Purpose

This document describes the mapping use cases and technical procedures applied to the co-development of a SNOMED CT to ICD-10 map by SNOMED International and the World Health Organization (WHO). This document provides guidance on the intended purposes and practical use of the mapping files produced from this development.

Business Application

The integration of a clinical terminology such as SNOMED CT into computer-based patient records systems provides a comprehensive and functional terminology of clinical terms, supporting interoperable transmission of patient-related data between information systems. The map from SNOMED CT to the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (© World Health Organization 1994) 2016 Version is created to support the epidemiological, statistical and administrative reporting needs of the SNOMED International Member countries and WHO Collaborating Centers.

The business application principles of relevance to the deployment of this map include:

- Re-use of clinical data for additional statistical purposes
- Rapid submission and response to national reporting requirements
- Saving time and improving efficiency for the coding professional
- Improved accuracy and reproducibility of code mapping
- Promulgation of widespread comparable epidemiological data and statistical data
- Cost saving for SNOMED International member countries which maintain ICD-10 derivative product maps

This document references the data sets, algorithms, and intellectual products of the SNOMED CT to ICD-10 map as the Map.

Use of Language

The ICD-10 map and related documentation are maintained and distributed in US English.

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2. ICD-10 Map Overview

Purpose of the Map

- To provide a semi-automated coding of ICD-10 statistical classification data from a clinical record which is clinically encoded in SNOMED CT
- To aid in the development of ICD-10 classification codes from SNOMED CT-encoded records for use in registries and diagnosis groupers
- To serve as a SNOMED CT to ICD-10 map validated and sanctioned by the WHO and SNOMED International and as a source for the development of maps to ICD-10 extensions developed and maintained by a member country

What the Map is Not

- A completely automated ICD-10 coding from a SNOMED CT source
- Support for social, cultural, ethical or financial constraints on ICD-10 coding required by members or other organizations
- A map that supports management of context beyond that found in the coded record and ICD-10 conventions and rules as noted in this document
- A map that optimizes or manipulates ICD-10 codes for reimbursement purposes

Audience for the Map

The ICD-10 map is intended to provide support within the specified mapping use case for SNOMED International Members and Affiliates that:

- have deployed, or are deploying, SNOMED CT in clinical information systems; and
- use the 2016 edition of ICD-10 in systems for purposes of statistical reporting, epidemiology, cancer, injury and other registries, quality reporting, safety reporting, and research.

The ICD-10 map is also intended to support use by WHO Collaborating Centers in interested countries where SNOMED CT is deployed or is being deployed.

Supported Use Case

Map with patient context management

Patient Jones is being discharged from the hospital. The attending physician has maintained a diagnosis and health-related problem list coded in SNOMED CT during the stay and updates the entries at discharge. The vendor software employs the MAP, which uses a knowledge-based algorithm of sequential computable Map Rules. These rules evaluate context (data recorded about the patient in the electronic health record) and co-morbidities in the electronic record to identify the most appropriate candidate ICD-10 code list based on ICD-10 exclusion / inclusion guidance and other conventions. Vendor software which cannot employ these knowledge-based features can employ the helpful mapAdvice to provide a readable and understandable list of step-by-step instructions for the physician to support a choice of an ICD-10 code. The ICD-10 coding professional later reviews and edits the classification code list prior to submission for statistical morbidity reporting. The mapAdvice data further guides them with information regarding additional WHO rubrics and requirements.

Authoritative Resources

The SNOMED CT mapping is constructed using the latest version of the SNOMED CT International Release as distributed by SNOMED International and the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (© World Health Organization 1994) ICD-10 2016 version published and maintained by the World Health Organization. The MAP will be reviewed and updated for each new release of SNOMED CT and every three years for ICD-10 major updates.

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3. Scope and Procedures

This mapping is a tabular, knowledge-based cross-link from SNOMED CT to ICD-10 in which the most accurate ICD-10 target code or codes that best represents the SNOMED CT concept are linked. The ICD-10 map is a link directed *from* the source SNOMED CT concept *to* the target ICD-10 statistical classification.

Map relationships

The granularity and purpose of ICD-10 is different from that of SNOMED CT. SNOMED CT is a comprehensive reference terminology that supports both general and highly specific concepts. Each concept is defined by a set of attribute-value pairs (relationships) which uniquely define it distinct from all other concepts. SNOMED CT supports a model of meaning which specifies correct attributes and value sets for each domain of meaning.

ICD-10 is a classification of diseases and related health problems with granularity of definition that has been chosen to provide utility for purposes of epidemiology and statistical reporting of mortality and morbidity. ICD-10 was created to classify a clinical concept by defining the classes (or 'buckets' of meaning) which contain the concept within the universe of ICD-10 classes.

Only domains of SNOMED CT which overlap in meaning with those of ICD-10 will be mapped. Due to differences in granularity, purpose and rubrics, assignment of a mapping equivalence between the SNOMED CT source and ICD-10 target code is usually not appropriate. Instead, the ICD-10 map will link a SNOMED CT source concept to the ICD-10 code which contains the meaning of the SNOMED CT concept as conceptualized by ICD-10.

All pre-coordinated concepts issued by SNOMED International within the current international release of SNOMED CT with active status within the following SNOMED CT domains *may* be mapped:

- Clinical finding (disorders and findings) Concept.id 404684003 and descendants
- Event Concept.id 272379006 and descendants
- Situation with explicit context Concept.id 243796009 and descendants

Target domain context and scope

All chapters of ICD-10 are considered within scope for this ICD-10 map. The Morphology of Neoplasms, which is a nomenclature of codes designed for use in conjunction with Chapter 11 Neoplasms, is out of scope for this ICD-10 map.

The scope of ICD-10 is described in WHO's Volume 2 as follows: "The ICD-10 is primarily designed for the classification of diseases and injuries designated as a formal diagnosis. ICD-10 also classifies signs, symptoms, abnormal findings, complaints, and social circumstances that may appear in a health record. Thus ICD-10 is used to classify data recorded under headings such as 'diagnosis', 'reason for admission', 'conditions treated', and 'reason for consultation'."

Many SNOMED CT concepts within the source domains may be normal findings or other concepts not intended for classification by ICD-10. See Exemplar: NotClassifiable, #1-19 for examples. Throughout the rest of this document, exemplar references will be abbreviated "Exemplar: [reference to the specific worksheet], [reference to the numbers for the example(s)].

Mapping Cardinality

The ICD-10 map has cardinality of one SNOMED CT source concept to zero-to-many ICD-10 classification codes. Zero target codes are appropriate if the source concept is not classifiable or is awaiting editorial review for guidance. In all other cases, one or more map targets will be assigned. This is usually no more than three. One or more Map members will be required for the knowledge-based mapping to each ICD-10 classification code target. These Map members will be coordinated in mapGroups each yielding at most one target.

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4. Map Data Sets

Release data structures for the MAP are compliant with SNOMED CT Release Format 2 (RF2) datasets as defined in the SNOMED CT Release File Specification. SNOMED CT Release Files relevant to the MAP structures and definitions important to MAP deliverables identified below include:

Reference Set (Refset): which is defined as a standard format for maintaining and distributing a set of references to SNOMED CT components.

- The structure of reference sets is documented in the Reference Set Release Files Specification.
- For details of the mapping reference set used for the ICD-10 map, see Extended Map Reference Set.

Map member: a single Refset MAP data record which assembles knowledge-based data required to validate the link between a single SNOMED CT concept and at most one ICD-10 classification code. The Map member includes a link to the source SNOMED CT concept identifier, a mapGroup integer, a mapPriority integer, a mapCategoryId status concept reference, a mapRule, mapAdvice, and link to at most one mapTarget ICD-10 classification code.

mapGroup**:** an integer assigned to each set of Map members which are coordinated to specify one target ICD-10 code for the map, or the null map if the source concept does not require an additional ICD-10 code for proper classification. Each mapGroup collates and orders the rules, which are sequentially evaluated to yield at most a single target code. The first mapGroup designates the set of records used to specify the first (primary) target code. The second mapGroup identifies the set of data records for the second target code. These are repeated as required to specify a complete set of mapping target codes.

mapPriority**:** an integer which designates the sequence of run-time Map member processing within each mapGroup. Each data record may include a rule which is designed to be processed in order to provide knowledge-based mapping. Only the first Map member meeting the run-time criteria is taken for the target code within the mapGroup data records.

mapCategoryId**:** a SNOMED CT foundation metadata concept identifier which indicates the process state for run-time use including the editorial status of the Map member:

- Outside of the scope of ICD 10 (447636002 |Map source concept is outside of the scopeof target classification |), no mapping is possible. Due to validation issues encountered related to lack of reproducibility of selection, this mapCategoryId has been demoted and replaced by "cannot be classified".
- The map source concept is properly classified (447637006 |Map source concept is properlyclassified|) within the target ICD 10 classification for this Map member, so no additional data is necessary for selection of this target code of the map (Exemplar: One to one: #1-10).
- The map source concept cannot be classified (447638001 |Map source concept cannotbe classified with available data|) and cannot be assigned a target. This may be chosen when the source concept is not appropriate for assignment of an ICD-10 classification. (Exemplar: NotClassifiable: #1-19), when the source concept cannot be assigned a granular classification specified by ICD-10, as a default map when context must be employed for an accurate map or when the source concept must specify gender or age for assignment of an ICD-10 classification and context is not specified (Exemplar: Gender: #3-5).

There are additional Map Categories that identify editorial process states but are published as a single Map member for the source concept for completeness, auditability and transparency of the MAP:

- The source concept is ambiguous (447640006 |Source SNOMED CT concept is ambiguous|) in its SNOMED CT definition; ambiguity is undergoing resolution before map classification can be concluded. See definition of ambiguity in 6.1.
- Guidance from WHO is ambiguous (447635003 |Mapping guidance from WHO is ambiguous|) relative to the map target; awaiting clarification from WHO.

mapRule**:** A machine-processable truth statement created to evaluate to "true" or "false" at run-time, which determines whether the Map member should be validated as the correct link to the associated map target for the mapGroup being evaluated.

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Formatting of the mapRule is specified in Augmented Bacchus Naur Form (ABNF) in Appendix A but generally is one of three forms:

1. IFA Concept.id [= VALUE]: a mapRule which evaluates for the existence of one or more SNOMED CT concept instances including their descendant concepts, or an observable and value found in the patient record. The concept is designated by the SNOMED CT Identifier for a clinical finding or observable entity and the SNOMED CT fully specified name. In the case of rules for age at onset of clinical finding or current chronological age, it may include a range of allowable "VALUES". If such an instance is found in the patient record at the time of rule evaluation, the rule is evaluated as "true" and the associated map target is selected for that mapGroup. Otherwise the rule evaluates as "false" and the run-time evaluation proceeds to the next Map member within the mapGroup. The mapAdvice for the record will include a readable statement relating the rule and map target.
2. TRUE: applied when a mapRule is not relevant for evaluation of the Map member and the Map member should always be accepted as valid.
3. OTHERWISE TRUE: employed as the rule in the final mapPriority record when a series of rules must be evaluated to determine the valid map target. This is the case when none of the rules are satisfied or when there is no additional patient context information available. A default target code may or may not be specified with this value for mapRule depending whether the mapCategoryId is properly classified (447637006 |Map sourceconcept is properly classified (foundation metadata concept)|) or non-classifiable ().

mapAdvice **:** human-readable textual advice that a software vendor may employ to inform the clinician user or the classification expert during a semi-automated mapping session. The mapAdvice has three components separated by vertical bar ("|"):

- A summary statement of the mapRule logic in readable terms for the clinical user
- Supplementary metadata guidance intended to clarify the map for the coding professional. Metadata advice supported in the MAP includes:
    - FIFTH CHARACTER REQUIRED TO FURTHER SPECIFY THE SITE
    - MAPPED FOLLOWING SNOMED GUIDANCE
    - MAPPED FOLLOWING WHO GUIDANCE
    - POSSIBLE REQUIREMENT FOR ADDITIONAL CODE TO FULLY DESCRIBE DISEASE OR CONDITION
    - POSSIBLE REQUIREMENT FOR AN EXTERNAL CAUSE CODE
    - POSSIBLE REQUIREMENT FOR CAUSATIVE AGENT CODE
    - POSSIBLE REQUIREMENT FOR MORPHOLOGY CODE
    - POSSIBLE REQUIREMENT FOR PLACE OF OCCURRENCE
    - THIS CODE IS NOT TO BE USED IN THE PRIMARY POSITION
    - THIS CODE MAY BE USED IN THE PRIMARY POSITION WHEN THE MANIFESTATION IS THE PRIMARY FOCUS OF CARE
    - THIS IS AN EXTERNAL CAUSE CODE FOR USE IN A SECONDARY POSITION
    - USE AS PRIMARY CODE ONLY IF SITE OF BURN UNSPECIFIED, OTHERWISE USE AS SUPPLEMENTARY CODE WITH CATEGORIES T20-T29 (BURNS)
    - THIS MAP REQUIRES A DAGGER CODE AS WELL AS AN ASTERISK CODE
    - MAP IS CONTEXT DEPENDENT FOR GENDER (obsolete)
    - DESCENDANTS NOT EXHAUSTIVELY MAPPED (obsolete)
- A summary statement reporting the mapCategoryId for readability of Map members which do not have a Map Target:
    - 447638001: "MAP SOURCE CONCEPT CANNOT BE CLASSIFIED WITH AVAILABLE DATA"
    - 447635003: "MAPPING GUIDANCE FROM WHO IS AMBIGUOUS"
    - 447640006: "SOURCE SNOMED CT CONCEPT IS AMBIGUOUS"

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5. Mapping Assumptions

The following subjections state the assumptions that are central to the construction of the ICD-10 map.

Exclusion of Implied Context

The SNOMED CT concept or statement taken from the health care record will be evaluated for meaning within the guidelines of the *SNOMED CT Editorial Guide*. No assumed context or modifying semantics will be inferred beyond the definition asserted by the fully specified name and the SNOMED CT defining relationships, excluding qualifiers. Identification of inconsistency between the fully specified name and the synonyms, or between the fully specified name and the defining relationships will constitute a case for ambiguity. This will cause a Map member to be flagged for editorial review by the SNOMED International terminology staff. An understanding of the meaning (semantics) of the SNOMED CT concept is a necessary first step to an understandable, reproducible, and useful map.

Reference Terminologies and Classifications

The organization, structure, and conventions of the ICD-10 classification are different than SNOMED CT, and meaning (semantics) within the classification is specified by the order and relationship of the chapters, blocks and categories. The position of a classification code within the axis, the title of the code and the associated conventions and guidance provided by the authoritative source further contribute to the specification of meaning of a classification code. Finally, since ICD-10 is an exhaustive classification, the semantic space of a particular classification code depends upon the definition of sibling codes and others within the same category. Since ICD-10 is designed for statistical and epidemiological purposes, one ICD-10 classification code may include many SNOMED CT concepts within its semantic space.

SNOMED CT is a reference terminology that expresses the semantics of concepts within its domain by means of a controlled vocabulary and use of an extensive set of defining relationships. The relationships are employed in concept definition within a constrained and defined model of meaning applicable to each SNOMED CT semantic root. Understanding the meaning of a SNOMED CT concept requires evaluation of the vocabulary term as well as the defining relationships.

Full Semantic Mapping of Concepts

The goal of the mapping process is to identify the meaning of a SNOMED CT concept, determine the best location of that concept in the ICD-10 semantic space as identified by one or more ICD-10 classification codes, and to create a link between the SNOMED CT concept identifier and the correct ICD-10 code(s). Since SNOMED CT is a reference terminology, this process cannot proceed reproducibly using only naming (terms or descriptions) conventions. A full understanding of both SNOMED CT and ICD-10 semantics, as specified in Section 6 Mapping Heuristics, is required for success.

As an example, the SNOMED CT concept 235991007 |Peritoneal eosinophilia (disorder)|, may be identified as a type of blood disorder by some lexical (terming) coding tools and mapped to D72.8, *Other specified disorders of white cells,* in ICD-10. However, the concept 235991007 |Peritoneal eosinophila (disorder)| has defining relationships 213293008 |is a (attribute)| = 213293008 |Aseptic peritonitis(disorder)| with 116676008 |associated morphology (attribute)| = 23583003 |Inflammation(morphologic abnormality)| and 363698007 |finding site (attribute)| = 15425007 |Peritoneum(serous membrane) structure|. From these relationships, the Map Terminologist identifies that the SNOMED CT concept is an inflammation of the peritoneum and appropriately maps the concept to the ICD-10 semantic space K65.8, *Other peritonitis*.

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6. Mapping Heuristics

6.1. Evaluation of Source Meaning

The Map Terminologist will initiate the mapping process by evaluating the source SNOMED CT concept employing a context-free assumption: SNOMED CT concepts mapped are presumed to "speak for themselves". The concept definition as asserted in the Fully Specified Name (FSN) and the concept's defining relationships are presumed to encompass all information available for definition of the concept and interpreted as explained in the *SNOMED CT Editorial Guide*. This information alone will be employed by the Map Terminologist in assessing the source meaning and researching target code(s) for the Map.

If the meaning of the SNOMED CT concept is judged to be ambiguous by the Map Terminologist, the concept will be managed as follows.

Definition of ambiguity

Two cases for concern or question of ambiguity in the SNOMED CT source concept definition will include:

1. Discrepancy between the FSN and associated defining relationships.
2. Discordance between the SNOMED CT definition and the term descriptions/synonyms.

Discrepancies will be assessed relative to standard medical references and compared to guidance and definitions provided in the ICD-10 authoritative source. These two cases are described in more detail below:

Case #1 constitutes fundamental ambiguity in the meaning of the SNOMED CT concept and cannot be mapped pending clarification. These concepts will be assigned a Map member with mapCategoryId of 447640006 |Source SNOMED CT concept is ambiguous|. The editorial notes field will be populated with any information on the map accrued by the Map Terminologists during their research. The concept will be referred to the SNOMED CT Editors. Once the ambiguity is resolved, the map will be completed and mapCategoryId will be updated with the appropriate assignment.

Case #2 represents a confusing issue for the Map Terminologist using only lexical tools to review SNOMED CT and ICD-10. However, the SNOMED CT definition is not truly ambiguous, and the map for this concept will be completed as described herein. The SNOMED CT term which is the source of the confusion will be flagged by the Mapping Team in the notes for editorial review with the expectation that the confusing term will be marked for inactivation as a non-synonymous lexical tag.

Examples of Case #2, Discrepancy in synonyms:

- SNOMED CT 95531001 |Hemorrhagic duodenitis (disorder)| has a synonym 95531001 |multiple duodenal erosions| (Description.id: 512170014) and definition as a hemorrhagic inflammation of duodenal structure. The synonym implies ulceration and not hemorrhage and should likely be defined and classified as a type of duodenal ulcer.
  95531001 |Hemorrhagic duodenitis(disorder)| maps to ICD-10 classification K29.8, *Duodenitis*. Discrepancy with concept definition will cause the Map Terminologist to report the concept 95531001 |Hemorrhagic duodenitis (disorder)| as confusing and in need of editorial review.

The context-free assumption will require agreement regarding procedures for the map when certain elements of mapping context are asserted in either the SNOMED CT source or the ICD-10 target reference. These context issues, along with mappings to multiple target codes, are detailed in the following section. In all discussions, *source* refers to the SNOMED CT concept and *target* refers to the ICD-10 classification.

6.2. Choosing Initial Target Codes

Once the Map Terminologists review and understand the SNOMED CT source concept to be mapped, they employ the ICD-10 alphabetic index to search and select candidate ICD-10 target codes for the map. They research the Fully Specified Name from the SNOMED CT source concept searching the best textual references in the alphabetic index

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that capture the meaning of the SNOMED CT concept. The WHO alphabetic index lists multiple term modifiers that can be considered as specifications or qualifiers of the primary term, and the Map Terminologist will search through the specifications looking for the relevant terms of interest.

This review may identify matching ICD-10 terms or may require searching through related cross-references. Two types of cross-reference in the ICD-10 alphabetic index must be considered before assignment of a tentative target code(s). These are: '-see…', and '-see also…'.

-see...

This is an explicit direction to look elsewhere in the index, and no codes are found alongside this reference. The Map Terminologist will review the directed descriptions in searching for target candidates.

Example

Nodule(s), nodular
- subcutaneous - *see* Swelling, localized

-see also...

This reference instructs the user to look elsewhere if the detail (s)he is looking for cannot be determined from the current reference.

Examples

Hyperbilirubinemia
- neonatal (transient) (*see also* Jaundice, fetus or newborn) P59.9

When a code is given alongside the term showing the '-see also…' appearing in parentheses as in the above example, it may or may not be necessary to look under the alternative term.

When no code is given, the instruction does not appear in parentheses as it is essential for the user to look under the alternative lead term. In the following example with reference to the term "Enlargement", the Map Terminologist must also evaluate the alpha references for "Hypertrophy" for relevant target classifications.

Enlargement, enlarged
- *see also* Hypertrophy

The Map Terminologist will create preliminary Map members employing the candidate target records resulting from these searches. If specializations are noted in targets selected from the alphabetic index and there exist sub-headings for the term selected, these will be considered for exclusion rules as documented in section 6.9. Mapping Context - Exclusions, Alpha Modifiers and Co-morbidities. For source concepts that represent examples of poisonings caused by drugs or chemicals, the Map Terminologist will use section III of the *Alphabetic Index: Table of Drugs and Chemicals* to research the default maps and essential modifiers. An example of this is provided in section 6.9.

The Map Terminologist will proceed from this source concept analysis to research the tabular guidance for the candidate targets and evaluate for issues of mapping context which may alter the Map members as explained in the following sections 6.3. through 6.11.

6.3. Mapping Context - Gender

If the source concept asserts a gender restriction, a target will be selected including the restriction. If no targets with restriction apply, a more general target will be chosen. The mapCategoryId will indicate that the source is properly classified (447637006 |Map source concept is properly classified (foundation metadata concept)|) in ICD-10, the mapRule will default to TRUE and mapAdvice will be NULL. The first IF A rule applied should be female; the latter should be male. This will prevent any sequencing discrepancies from resulting.

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- 6738008 |Female infertility (disorder)| maps to N97.9, *Female infertility, unspecified* (Exemplar: Gender: #1)
- 2904007 |Male infertility (disorder)| maps to N46, *Male infertility* (Exemplar: Gender: #2)

If the source concept does not assert gender, yet only gender restricted target codes are found within ICD-10, the map will be considered CONTEXT DEPENDENT. The Map Terminologist will create three Map members for this source concept, including rules for mapping to female and male record context as appropriate to the ICD-10 structures, and a default record indicating that the concept is not classifiable in the absence of gender information.

- 8619003 |Infertile (finding)| will be mapped within a single mapGroup employing sequential rules for female and male gender patients and exclusion rules as appropriate. The Map Target for each record will link to the appropriate classification code for that gender context; females map to N97.9, *Female infertility, unspecified* and males map to N46, *Male infertility*. The mapCategoryId for each will indicate that the record is context dependent (447639009 |Map of source concept is context dependent|), the mapRule will be "IFA 248152002 Female (finding)" or "IFA 248153007 Male (finding)". A final default Map member will also be created should rule processing for gender not be supported by vendor software. This will include a mapCategoryId indicating the Map is not classifiable (447638001 |Mapsource concept cannot be classified with available data|), requiring patient data. (Exemplar: Gender: #3)
- 430556008 |Malignant neoplasm of genital structure (disorder)| has a similar mapping. In this case, the map for females is C57.9 *Malignant neoplasm, female genital organ, unspecified*. The mapping for males is C63.9 *Malignant neoplasm, male genital organ, unspecified* (Exemplar: Gender: #4)
- 410070006 |Herniated urinary bladder (disorder)| also requires gender restrictions; the map for female is N81.1 *Cystocele*, and the map for male is N32.8 *Other specified disorders of bladder.* (Exemplar: Gender: #5)

6.4. Mapping Context - Patient Age

If the source concept asserts an age or phase of life for onset of the disorder, a target will be selected first including the restriction or, if none is available, then a more general classification target (mapCategoryId="Properly classified", mapRule =TRUE, mapAdvice=NULL) that is inclusive of the source concept. No mapRule restrictions for age will be applied in cases where there is a properly classified ICD-10 Map target. If the authoritative sources include specifications for employment of age, those will be used. Otherwise, these definitions for common phases of life will be employed:

- "Neonatal": birth to completion of 28 days of life
- "Perinatal": 22 weeks of gestation to completion of 7 days of life
- "Childhood": birth until 19th birthday
- "Adult": 19th birthday until death
- "Infant (infancy)": birth until 2nd birthday
- "Juvenile": 2nd birthday until 19th birthday
- "Adolescence": 12th birthday until 19th birthday
- "Pre-senile": birth until 65th birthday
- "Senile": 65th birthday onwards

If the source concept does not assert age or time of life and only restricted targets are within scope, the map will be considered CONTEXT DEPENDENT and the Map Terminologist will assemble two or more Map members including Map Rules to properly classify to each ICD-10 target classification.

Exemplar: Age: #1

- 32398004 | Bronchitis (disorder)| will be flagged for age context using the Age of Onset map rule, because WHO advises that Bronchitis (without further specification) should map to J20.9, *Acute bronchitis*, for a patient under age 15, and map to J40, *Bronchitis not specified as chronic or acute,* for patients above this age.

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Notes and Exceptions

Juvenile-onset and adult-onset diabetes will be considered archaic terminology and treated as type 1 and type 2 diabetes respectively.

6.5. Mapping Context - Acquired Versus Congenital

A source concept which identifies origination as a congenital or acquired condition will be mapped to a target of congenital or acquired classification should one exist (mapCategoryId= 447637006 |Map source concept is properly classified|, mapRule=NULL).

If a source concept is general (i.e. does not specify congenital or acquired) and only specific targets exist, the ICD-10 authoritative index will be searched for a default Map member, either "congenital" or "acquired". When a default is provided, this context will be employed to create one appropriate Map member and mapCategoryId will be (447637006 |Map source concept is properly classified|), mapRule=NULL, mapAdvice = "MAPPED FOLLOWING WHO GUIDANCE".

6.6. Multiple Targets - Poisonings

Source concepts representing a poisoning from a drug or noxious substance may be mapped to one, two, or three target classification codes depending upon the specificity of the source concept. The poisoning code for the drug or substance will be designated as the primary target code (mapGroup = 1), ICD-10 codes T36-T50. WHO guidance dictates that the sole exception to this rule occurs when the manifestation is a neoplastic disorder. Neoplasms are always mapped as the first target code.

Should the source concept specify the symptoms or findings resulting from the poisoning, the appropriate target code will be mapped as the second map (mapGroup = 2) except in cases of neoplastic complications when the poisoning code will occur second.

When the SNOMED CT concept specifies the action intent/site of injury involved within the event, a specific ICD classification code from range X40-X49, X60-X84, Y10-Y34, or Y40-Y59 will be employed as the second or third target code (mapGroup = 2 or 3). If the source concept does not specify intent, WHO guidance will be reviewed for a default map which will be assigned a mapCategoryId of "Properly classified" with mapAdvice of "MAPPED FOLLOWING WHO GUIDANCE".

Examples

Exemplar: Poisoning: #1

767146004 |Toxic effect of arsenic and its compounds (disorder)| maps to T57.0, *Toxic effects of arsenic compounds*. No symptoms are specified. WHO guidance specifies the default intent as *accidental* poisoning.

- mapGroup = 1, mapCategoryId="Properly classified", mapRule=TRUE. mapAdvice is "ALWAYS T57.0". Map Target = "T57.0"
- mapGroup = 2, mapCategoryId = "Properly classified", mapRule = TRUE, Map Target =X48 "Accidental poisoning by and exposure to pesticides". mapAdvice will be "ALWAYS X48" and "POSSIBLE REQUIREMENT FOR PLACE OF OCCURRENCE" and "MAPPED FOLLOWING WHO GUIDANCE"

Exemplar: Poisoning: #2

296934007 |Accidental warfarin overdose (disorder)| maps to:

- T45.5 "Poisoning by anticoagulant" (mapGroup 1, mapCategoryId="Properly classified", mapRule=TRUE, mapAdvice= "ALWAYS T45.5", Map Target = "T45.5"
- X44 "Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances" (mapGroup 2, mapRule=TRUE. mapAdvice is "ALWAYS X44" and "POSSIBLE REQUIREMENT FOR PLACE OF OCCURRENCE", Map Target = "X44".

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Exemplar: Poisoning: #3

403742006 |Arsenic-induced skin malignancy (disorder)| maps to:

- C44.9 "Malignant neoplasm of skin unspecified" (mapGroup 1, mapCategoryId="Properly classified", mapRule=TRUE. mapAdvice is "ALWAYS C44.9" and "POSSIBLE REQUIREMENT FOR MORPHOLOGY CODE". Map Target = "C44.9"

  This code is mapped first since the manifestation is a neoplasm.

- T57.0 "Toxic effects of arsenic compounds" (mapGroup 2, mapCategoryId="Properly classified", mapRule=TRUE, mapAdvice is "ALWAYS T57.0" Map Target ="T57.0"
- X48 "Accidental poisoning by and exposure to pesticides" (mapGroup 3, mapCategoryId = "Properly classified", mapRule = TRUE. mapAdvice is "ALWAYS X48" and "POSSIBLE REQUIREMENT FOR PLACE OF OCCURRENCE" and "MAPPED FOLLOWING WHO GUIDANCE" Map Target = "X48"

Exemplar: Poisoning: #4

7248001 |Poisoning by salicylate (disorder)| maps to:

- T39.0 "Toxic effects of salicylates" (mapGroup 1), mapCategoryId="Properly classified", Map Rule=TRUE; MapAdvice= "ALWAYS T39.0" Map Target = "T39.0"
- X40 "Accidental poisoning by non-opioids" (mapGroup 2), mapCategoryId = "Properly classified", Map Rule = TRUE. MapAdvice is "ALWAYS X40" and "POSSIBLE REQUIREMENT FOR PLACE OF OCCURRENCE" and "MAPPED FOLLOWING WHO GUIDANCE" Map Target = " X40"

Exemplar: Poisoning: #5

216471009 |Accidental poisoning by salicylates (disorder)| maps to:

- T39.0 "Toxic effects of salicylates" (mapGroup 1) mapCategoryId="Properly classified", Map Rule=TRUE; MapAdvice= "ALWAYS T39.0" Map Target = "T39.0"
- X40 "Accidental poisoning by non-opioids" (mapGroup 2) mapCategoryId = "Properly classified", Map Rule = TRUE. MapAdvice is "ALWAYS X40" and "POSSIBLE REQUIREMENT FOR PLACE OF OCCURRENCE" Map Target = " X40"

Exemplar: Poisoning: #6

295830007 |Overdose of antidepressant drug (disorder)| maps to:

- T43.2 "Poisoning by other and unspecified antidepressants" as the default target code. The alphabetic reference for poisoning by antidepressants lists three essential modifiers for subclasses of antidepressants which are found as descendants of the source concept and qualify for mapping but this is a high level concept and so these exclusions are not mapped. mapAdvice is "ALWAYS T43.2" Map Target = "T43.2"
- X41 "Accidental poisoning by psychotropic drug" mapGroup 2, mapCategoryId = "Properly classified", Map Rule = TRUE. mapAdvice is "ALWAYS X41" and "POSSIBLE REQUIREMENT FOR PLACE OF OCCURRENCE" and "MAPPED FOLLOWING WHO GUIDANCE" Map Target = "X41"

6.7. Multiple Targets - External Causes

External causes can be found within multiple hierarchies including the event, disorder, and situation hierarchies. The corresponding maps vary according to the hierarchy in which the external causes are found and any other conditions represented within the SNOMED concept. Below are a few ways external causes may be mapped.

Exemplar: External cause: #1

Source concepts denoting a condition with an identifiable cause within scope of ICD-10 Chapter XX (20) will be mapped to two target classification codes. The external cause classification will be assigned to the second target record (mapGroup=2).

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242012005 |Thermal burns from lightning (disorder)| maps to:

- T30.0 "Burn of unspecified region" mapGroup 1, mapCategoryId="Properly classified", mapRule=TRUE, mapAdvice= "ALWAYS T30.0", Map Target = "T30.0"
- X33 "Victim of lightning" mapGroup 2, mapCategoryId = "Properly classified", mapRule = TRUE. mapAdvice is "ALWAYS X33" and "POSSIBLE REQUIREMENT FOR PLACE OF OCCURRENCE" Map Target = "X33"

Exemplar: External cause: #2

If the external cause or location is not explicit in the SNOMED CT concept, the generic external cause code will not be listed as a target ICD-10 code, as illustrated below. mapAdvice will be used instead to communicate to the end user the necessity to add an external cause code.

371162008 |Closed fracture of skull (disorder)| maps to:

- S02.90 "Fracture of skull and facial bones, part unspecified, closed" mapGroup 1, mapCategoryId="Properly classified", mapRule=TRUE. mapAdvice is "ALWAYS S02.90" and "POSSIBLE REQUIREMENT FOR AN EXTERNAL CAUSE CODE" Map Target = "S02.90" The ICD-10 code X59.0, *Exposure to unspecified factor causing fracture* will not be listed as a second target ICD-10 code.

Exemplar: External cause: #3

SNOMED CT concepts which are descendants of 272379006 | Event (event)| will be mapped as either *External causes* or as *Factors influencing health status* when these are within the scope of ICD-10.

414189000 |Fall down steps (event)| maps to:

- W10 "Fall on or from stairs or steps, unspecified place: mapCategoryId="Properly classified", mapRule=TRUE. mapAdvice is "ALWAYS W10" and "POSSIBLE REQUIREMENT FOR PLACE OF OCCURRENCE" and "THIS IS AN EXTERNAL CAUSE CODE FOR USE IN A SECONDARY POSITION" Map Target = "W10"

Exemplar: External cause: #4

5193003 |Lightning (event)| maps to:

- X33 "Victim of lightning" mapCategoryId="Properly classified", mapRule=TRUE, mapAdvice="ALWAYS X33", "POSSIBLE REQUIREMENT FOR PLACE OF OCCURRENCE" and "THIS IS AN EXTERNAL CAUSE CODE FOR USE IN A SECONDARY POSITION" Map Target = "X33"

6.8. Multiple Targets - Dagger and Asterisk

Source concepts which map to ICD-10 chapters with dagger and asterisk conventions will often be mapped to two target classification codes. The asterisk classification will be the second target record (mapGroup=2). The asterisk code will have applied advice of THIS CODE MAY BE USED IN THE PRIMARY POSITION WHEN THE MANIFESTATION IS THE PRIMARY FOCUS OF CARE.

Exemplar: Dagger & Asterisk: #1

111900000 |Pneumonia in aspergillosis (disorder)| maps to B44.1 *Other pulmonary aspergillosis* (dagger code) and J17.2 *Pneumonia in mycoses* (asterisk code):

- B44.1 "Other pulmonary aspergillosis" mapGroup 1, mapCategoryId="Properly classified", mapRule=TRUE, mapAdvice="ALWAYS B44.1", Map Target = "B44.1"
- J17.2 "Pneumonia in mycoses" mapGroup 2, mapCategoryId="Properly classified",mapRule=TRUE, mapAdvice= "ALWAYS J17.2" and "THIS CODE MAY BE USED IN THE PRIMARY POSITION WHEN THE MANIFESTATION IS THE PRIMARY FOCUS OF CARE" Map Target = "J17.2"

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Exemplar: Dagger & Asterisk: #2

20735004 |Syphilitic aortitis (disorder)| maps to A52.0, *Cardiovascular syphilis* and I79.1, *Aortitis in diseases classified elsewhere*:

- A52.0 "Cardiovascular syphilis" mapGroup 1, MapPriority 2, mapCategoryId="Properly classified", mapRule=TRUE, mapAdvice="ALWAYS A52.0", Map Target = "A52.0"
- I79.1 "Aortitis in disease classified elsewhere" mapGroup 2, mapCategoryId="Properly classified", mapRule=TRUE, mapAdvice="ALWAYS I79.1" and "THIS CODE MAY BE USED IN THE PRIMARY POSITION WHEN THE MANIFESTATION IS THE PRIMARY FOCUS OF CARE" Map Target = "I79.1"

Exemplar: Dagger & Asterisk: #4

307726001 |Anemia in ovarian carcinoma (disorder)| maps to C56, *Malignant neoplasm of ovary,* and D63.0, *Anemia in neoplastic disease*:

- C56 "Malignant neoplasm of ovary" (mapGroup 1, mapCategoryId="Properly classified", mapRule=TRUE. mapAdvice is "POSSIBLE REQUIREMENT FOR MORPHOLOGY CODE" and MAPPED FOLLOWING WHO GUIDANCE" Map Target = "C56"
- D63.0 "Anemia in neoplastic disease" (mapGroup 2, mapCategoryId="Properly classified", mapRule=TRUE, mapAdvice= "ALWAYS D63.0" and "THIS CODE MAY BE USED IN THE PRIMARY POSITION WHEN THE MANIFESTATION IS THE PRIMARY FOCUS OF CARE", Map Target = "D63.0")

Dagger codes identified during tabular review which do not have a corresponding asterisk are called "virtual dagger" references. These do not require second target addition.

There may be instances where only an asterisk is provided in a map because the dagger information is unavailable in the SNOMED CT concept. In this instance, mapAdvice THIS MAP REQUIRES A DAGGER CODE AS WELL AS AN ASTERISK CODE is appended to the map to communicate to the end user the need to add an additional corresponding code.

6.9. Mapping Context - Exclusions, Alpha Modifiers and Co-morbidities

Exclusion guidelines from WHO coding publications will be evaluated as a last step in mapping context evaluation.

Review of alpha modifiers:

There are two types of modifiers which appear in the ICD-10 Alphabetical Index, Volume 3. These are non-essential and essential modifiers.

Non-essential modifiers appear in parentheses following the terms they modify and **do not** affect the target code selection for a given condition, sign or symptom but are considered as alternatives to the expression of the term.

Polyuria (nocturnal) R35

Essential modifiers appear next to a lead term or as subterms indented below lead terms in the alphabetical index and **do** affect the selection of target code. They describe essential differences in site, etiology or type of disorder and must appear in the clinical statement for the code to be assigned. When an essential modifier denotes an alternative map target to the source term statement, the modifier will be considered as a possible exclusion to the initial map target selected.

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Encephalopathiahyperbilirubinemica, newborn P57.9

- due to isoimmunization (conditions in P55.-) P57.0

Polyuria (nocturnal) R35

- psychogenic F45.3

The Map Terminologist will review the WHO *ICD-10 Alphabetical Index to Diseases and Nature of Injury* Volume 3 to identify any essential modifiers which represent SNOMED CT concepts that are descendants of: a) the source concept to be mapped, or b) the source concept etiology SNOMED CT code when dagger and asterisk guidance requires a separate target for cause of the disorder. The Map Terminologist will add new Map members with the associated target specific to the alpha reference as context dependent maps with a mapRule.

Examples (Etiology and Manifestation):

Exemplar: Dagger & Asterisk: #3

420485005 |Herpetic iridocyclitis (disorder)| maps to:

- B00.5, *Herpes viral ocular disease,* and H22.0, *Iridocyclitis in infectious and parasitic diseases classified elsewhere*, with mapAdvice THIS CODE MAY BE USED IN THE PRIMARY POSITION WHEN THE MANIFESTATION IS THE PRIMARY FOCUS OF CARE appended to H22.0.

Upon reviewing the WHO alphabetic index, the Map Terminologist notes the following codes:

Iridocyclitis
-herpes, herpetic (simplex) B00.5† H22.0*

OR

Herpes, Herpetic
-iridocyclitis (simplex) B00.5† H22.0*

Example

414924006 |Obstructed incisional ventral hernia (disorder)| maps to

- K43.0, *Ventral hernia with obstruction, without gangrene*.

Upon reviewing the WHO alphabetic index, the Map Terminologist notes **Hernia, incisional** has a reference to "see Hernia, ventral". To determine the target, the Map Terminologist follows the 'see' reference and checks under "Hernia, ventral". ICD-10 code K43.0 is listed under **Hernia**, ventral, with, obstruction. In addition, there are essential and nonessential modifiers to consider:

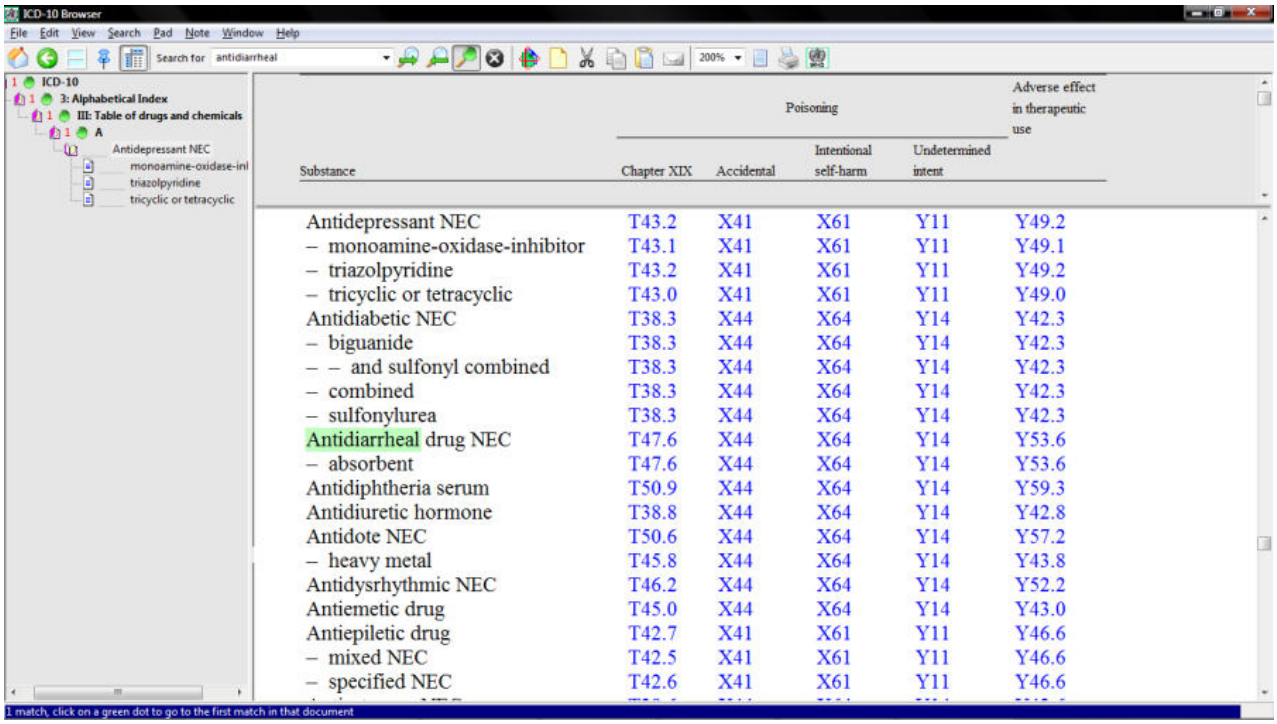
Hernia, hernial (acquired) (recurrent) K46.9
-incisional — see Hernia, ventral

Hernia, hernial (acquired) (recurrent) K46.9
-ventral K43.9
--with
---gangrene (and obstruction) K43.1
---obstruction K43.0

Mapping for concepts of poisoning and overdose will require analysis of the Alphabetic Index's Table of Drugs and Chemicals. This table organizes drugs or chemicals along with the corresponding codes for adverse situations including accidental events, intentional self-harm, poisoning of undetermined intent, and adverse effects in therapeutic use. This table also may include essential modifiers which require attention for possible exclusion rules.

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For example, when mapping the SNOMED CT source concept 295830007 |Overdose of antidepressant drug (disorder)| a review of the drugs table will expose these entries for antidepressant poisoning:



Substance	Poisoning				Adverse effect in therapeutic use
	Chapter XIX	Accidental	Intentional self-harm	Undetermined intent	
Antidepressant NEC	T43.2	X41	X61	Y11	Y49.2
– monoamine-oxidase-inhibitor	T43.1	X41	X61	Y11	Y49.1
– triazolpyridine	T43.2	X41	X61	Y11	Y49.2
– tricyclic or tetracyclic	T43.0	X41	X61	Y11	Y49.0
Antidiabetic NEC	T38.3	X44	X64	Y14	Y42.3
– biguanide	T38.3	X44	X64	Y14	Y42.3
– – and sulfonyl combined	T38.3	X44	X64	Y14	Y42.3
– combined	T38.3	X44	X64	Y14	Y42.3
– sulfonylurea	T38.3	X44	X64	Y14	Y42.3
Antidiarrheal drug NEC	T47.6	X44	X64	Y14	Y53.6
– absorbent	T47.6	X44	X64	Y14	Y53.6
Antidiphtheria serum	T50.9	X44	X64	Y14	Y59.3
Antidiuretic hormone	T38.8	X44	X64	Y14	Y42.8
Antidote NEC	T50.6	X44	X64	Y14	Y57.2
– heavy metal	T45.8	X44	X64	Y14	Y43.8
Antidysrhythmic NEC	T46.2	X44	X64	Y14	Y52.2
Antiemetic drug	T45.0	X44	X64	Y14	Y43.0
Antiepiletic drug	T42.7	X41	X61	Y11	Y46.6
– mixed NEC	T42.5	X41	X61	Y11	Y46.6
– specified NEC	T42.6	X41	X61	Y11	Y46.6

Figure 6.9-1: WHO ICD-10 Browser - Alphabetic Index; Table of Drugs and Chemicals

In this case, the default target code for mapping of Antidepressant poisoning is T43.2 for mapGroup one and X41 for mapGroup two based upon WHO advice to assume accidental when intent of poisoning is unspecified. Note that required modifiers are identified for this map for agents MAO inhibitors, triazolpyridine, tricyclic and tetracyclic antidepressants.

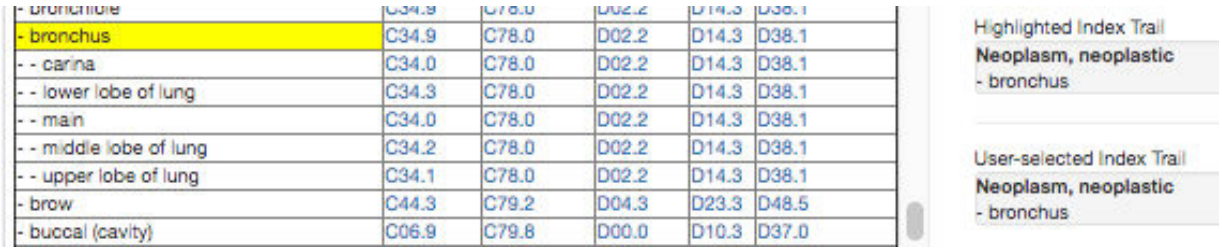
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6.10. Neoplasms

All source concepts representing neoplastic disorders will be mapped. Map Groups will specify the ICD10 code(s) from Chapter II for the concept. Morphology mapping with ICD-O is out of scope for this MAP. The mapAdvice, POSSIBLE REQUIREMENT FOR MORPHOLOGY CODE, signifies the need to add a morphology code if required by the end user.

Exemplar: Neoplasms: #1

32398004 |Primary malignant neoplasm of bronchus (disorder)|



- bronchiole	C34.9	C78.0	D02.2	D14.3	D38.1
- bronchus	C34.0	C78.0	D02.2	D14.3	D38.1
- - carina	C34.3	C78.0	D02.2	D14.3	D38.1
- - lower lobe of lung	C34.0	C78.0	D02.2	D14.3	D38.1
- - main	C34.2	C78.0	D02.2	D14.3	D38.1
- - middle lobe of lung	C34.1	C78.0	D02.2	D14.3	D38.1
- - upper lobe of lung	C44.3	C79.2	D04.3	D23.3	D48.5
- brow	C06.9	C79.8	D00.0	D10.3	D37.0
- buccal (cavity)					

Figure 6.10-1: SNOMED International Mapping Tool Index Viewer

Map to C34.9, *Malignant neoplasm, bronchus or lung, unspecified*, with mapAdvice POSSIBLE REQUIREMENT FOR MORPHOLOGY CODE.

6.11. Location and Multiplicity at Birth

Source concepts which specify birth findings by location will be mapped to a specific ICD-10 target when such exists. SNOMED CT birth findings which do not specify numbers of children born will be assumed to be singleton births.

- 169813005 |Home birth (finding)| will map to Z38.1 *Singleton born outside hospital*
- 169814004 |GP unit birth (finding)| will map to Z38.0 *Singleton born in hospital*
- 169828005 |Twins - both live born (finding)| will map to Z37.2 *Twins both liveborn*

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7. Data Structure and Distribution Format

From January 2013, the SNOMED CT International Release includes a mapping table from clinical concepts in SNOMED CT to codes listed in ICD-10. SNOMED CT to ICD-10 Maps are represented as members of a single Reference Set called the ICD-10 Extended Reference Set (see Release File Formats: 5.2.10 Complex and Extended Map Reference Sets). This Reference Set contains all Map member data.

The World Health Organization will identify publication mechanisms as they see fit.

Agreed updated versions of ICD-10 released by the WHO Update and Revision Committee shall be subject to a revision of the MAP twice yearly and included in the next following SNOMED CT release. Incremental changes to the ICD-10 will be documented employing the versioning mechanism supported by the standard SNOMED CT Release File Specification.

SNOMED International welcomes the opportunity to work with organizations or institutions who are interested in undertaking usage validation of the SNOMED CT to ICD-10 Map. Please contact info@snomed.org for more information.

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Appendix A: mapRule Grammar and Formatting

```
Rule = TruthStatement / Clause
Clause = (ClauseFinding / ClauseObservable) [ ws ANDOP ws (ClauseFinding /
ClauseObservable) ] ws
TruthStatement = ws 1*1("true" / "otherwise true") ws
;;; A Rule is either a truth statement or a clause
;;; A truth statement is either "true" or "otherwise true"
;;; A clause is either a clause with a finding or a clause with an observable
;;; and value optionally followed by the AND operator and a clause with a finding or
observable and value.
ClauseObservable = "IFA" ws ( AttributeObservable ws NumericOperator ws Value )
;;; Observable clause has a mandatory value
ClauseFinding = "IFA" ws ( AttributeFinding )
;;;
AttributeObservable = ConceptObservable
;;; This could be removed and AttributeObservable changed to
;;; ConceptObservable without affecting the grammar
AttributeFinding = ConceptFinding
;;; This could be removed and AttributeFinding changed to
;;; ConceptFinding without affecting the grammar
NumericOperator = ("<" / ">=")
;;;Age at onset rules use greaterthanorequals for lower bounds and lessthan for upper
bound
Value = ConceptAny / Numeric / OtherText
;;; Added in ConceptAny, which allows any Concept to be used as a Value,
;;; although clearly not all concepts are suitable
ConceptObservable = SctId ws pipe ws FullySpecifiedNameObservable ws pipe
ConceptFinding = SctId ws pipe ws FullySpecifiedNameFinding ws pipe
ConceptAny = SctId ws pipe ws FullySpecifiedName ws pipe
SctId = 6*18( digit )
;;; The SctId must be a valid SNOMED CT Concept.id value
FullySpecifiedNameObservable = 1*nonwsnonpipe *( ( 1*SP "(" *SP
1*nonwsnonparennonpipe *SP ")" !( ws pipe ) ) / ( 1*SP 1*nonwsnonparennonpipe !( ws
pipe ) ) ) *SP 1*1( "(observable entity)" )
;;; The FSN of an observable must have a semantic tag = "observable entity"
;;; and may contain other embedded parenthesised strings. The ! (NOT)
;;; look-ahead operator serves to prevent the parser consuming the
;;; semantic tag when it's looking for words before the tag.
```

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```
FullySpecifiedNameFinding = 1*nonwsnonpipe *( ( 1*SP "(" *SP 1*nonwsnonparennonpipe
*SP ")" !( ws pipe ) ) / ( 1*SP 1*nonwsnonparennonpipe !( ws pipe ) ) ) *SP
1*1( "(finding)" / "(disorder)" )
;;; The FSN of a finding must have a semantic tag = "disorder" or
;;; "finding" and may contain other embedded parenthesised strings.
;;; The ! (NOT) look-ahead operator serves to prevent the parser consuming
;;; the semantic tag when it's looking for words before the tag.
FullySpecifiedName = 1*nonwsnonpipe *( ( 1*SP "(" *SP 1*nonwsnonparennonpipe *SP
")" !( ws pipe ) ) / ( 1*SP 1*nonwsnonparennonpipe !( ws pipe ) ) ) *SP 1*1( "("
SemanticTag ")" )
;;; Any FSN must have a semantic tag and may contain other embedded
;;; parenthesised strings. The ! (NOT) look-ahead operator serves to
;;; prevent the parser consuming the semantic tag when it's looking for
;;; words before the tag.
Numeric = 1*(digit) !( *ws /OtherText )
OtherText = 1*(nonwsnonsemicolonnonpipe) *( 1*SP 1*nonwsnonsemicolonnonpipe )
;;; OtherText is used in Value and may not contain a semicolon because
;;; semicolon is the AND operator and follows a Value. Note that FSNs in
;;; Values may containg semicolons.
SemanticTag = 1*(nonwsnonparennonpipe) *( 1*SP 1*nonwsnonparennonpipe )
;;; A Semantic Tag may consist of words separated by whitespace, but may contain
whitespace.
digit = %x30-39
ws = *( SP / HTAB / CR / LF )
SP = %x20
HTAB = %x09
CR = %x0D
LF = %x0A
pipe = %x7C
nonwsnonparennonpipe = %x21-27 / %x2A-7B / %x7D-7E / UTF8-2 / UTF8-3 / UTF8-4 ; no
parentheses
nonwsnonsemicolonnonpipe = %x21-3A / %x3C-7B / %x7D-7E / UTF8-2 / UTF8-3 / UTF8-4 ;
no parentheses
nonwsnonpipe = %x28-29 / nonwsnonparennonpipe
ANDOP = "AND" ;
UTF8-2 = %xC2-DF UTF8-tail
UTF8-3 = %xE0 %xA0-BF UTF8-tail / %xE1-EC 2( UTF8-tail ) / %xED %x80-9F UTF8-tail /
%xEE-EF 2( UTF8-tail )
UTF8-4 = %xF0 %x90-BF 2( UTF8-tail ) / %xF1-F3 3( UTF8-tail ) / %xF4 %x80-8F 2( UTF8-
tail )
UTF8-tail = %x80-BF
```

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Appendix B: Mapping Guide Examples

Examples of data distributed in the ICD-10 Extended Map Reference Set are provided in an online spreadsheet accessible from the link below. These examples illustrate key points explained in various chapters of this document.

- http://snomed.org/icd10mapexamples

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