

# **The use of ICD and SNOMED in HL7**

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# HL7's Assumption

- Automation of systems that deal with health information and requires data that:
  - Is recorded at the appropriate level of detail
    - Not too general or too specific
  - Is consistent over time & across jurisdictions
  - Can be transmitted without loss of meaning
  - Can be aggregated at more general levels
  - Can be interpreted by automated systems

# How does HL7 represent patient data?

Typically via:

- Reference Terminologies
  - e.g., SNOMED CT®, LOINC®
- High Level Classifications (Taxonomies)
  - e.g., ICD-9, ICD-10, ICF
- Taxonomies with a specific purpose
  - e.g., DPG – Day Procedure Group
  - e.g., CMG – Case Mix Groups
- Within the context of *information models*
  - ISO, HL7, openEHR, ...etc.

***The exact set varies by country and the requirements of the HL7 User and interoperating business partners (e.g., reference lab)***

# HL7

- Does not create its own or itself attempt to modify vocabularies, reference terminologies, taxonomies, etc.
- HL7 does have largely internal and not normally visible internal code sets (i.e., “meta data”) that identifies HL7 components (e.g., message segments, data type names, information model pieces such as classes, actors, etc.)

# HL7

- HL7 relies on terminology standards development organizations (e.g., IHTSDO, WHO/ISO), etc. to supply and support the terminology standards necessary to unambiguously represent the content of an exchanged message, document, etc.
- Over the years HL7 has made significant investments in its standards so that they can properly accommodate the major coded international classification and terminology sets that are needed by our customers (e.g., CTS-2, Data Types R2).

# Types of Clinical Terminologies & Taxonomies

• **De facto standards for grouping hospital patients with similar diagnoses and similar treatment requirements**

## **Classification System Groups** (thousands of groups)

**DPG, CMG (Case Mix Groupers – used in Canada)**

Example: CMG 137 Respiratory Infections & Inflammations

These Groups help healthcare facilities predict a patient's length of stay and resource use for utilization management ( for example, hospital funding formulae and billing codes) and other purposes.

• **Classification schemas provide coherent systems for coding and classifying data valuable for many stakeholders**

## **Reference Classifications** (over 10,000 codes)

**ICD-10-CA, CCI, ICHI, ICF, ICD-0-3, etc.**

Example: U04 Severe acute respiratory syndrome (SARS)

These Classifications are used for general epidemiological, many health management purposes and clinical use, including analysis of general health situation of population groups and monitoring of Incidence and prevalence of diseases and other health problems.

• **EHR terminology requirements are of a high level of granularity necessary to meet the needs of care providers and are useful in expressing clinical information about patients**

## **Clinical Reference Terminologies** (over 100,000 terms)

**LOINC®** Example: SARS L-30014

**SNOMED CT®** Example: Associated Coronavirus disease ID 243608008

**UCUM** Example: Gram = g (UCUM)

These standardized Clinical Reference Terminologies are used to enable effective quality communication about patients' data, hence facilitating semantic interoperability.

# Cross-walking between ICD-9 and ICD-10

- The National Center for Health Statistics (NCHS) has developed what is known as a “General Equivalence Mappings” (GEMs) for the diagnosis codes. The Centers for Medicare & Medicaid Services (CMS) have developed the GEMs for the procedure codes. The GEMs are considered to be the authoritative source for cross-walking between ICD-10 and ICD-9.

# From NCHS and GEMS

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## The following table gives the percentages of the different types of matches between ICD-10 and ICD-9.

Mapping Categories	ICD-10 to ICD-9	ICD-9 to ICD-10
No Match	1.2%	3.0%
1-to-1 Exact Match	5.0%	3.0%
1-to-1 Approximate Match with 1 Choice	82.6%	49.1%
1-to-1 Approximate Match with Multiple Choices	4.3%	18.7%
1-to-Many Match with 1 Scenario	6.6%	2.1%
1-to-Many Match with Multiple Scenarios	0.2%	2.9%

In general, the assumption is that ICD-10 to ICD-9 mapping is Many to one  
And ICD-9 mapping is one to many.

# ICD-9 $\leftrightarrow$ ICD10 Mappings

- With one-to-one approximate matches, some have one ICD-9 code that crosswalks to one ICD-10 code. Others have one ICD-9 code that crosswalks to more than one ICD-10 codes and more than one ICD-9 code that crosswalks to one ICD-10 code.
- In other words the mapping process could produce many-to-one and one-to-many results. Without specific software application and or data management planning, it is not correct to assume that any of these operations are commutative (i.e., without pre-planned actions, they will be they will be not commutative/reversible).

# ICD-9 ↔ ICD10 Mappings

- Meaningful Use Stage 2 creates an opportunity for significant use of coded clinical data in SNOMED, LOINC and other standards for uses such as Consolidated CDA and uses derived from required Consolidated CDA Template Documents, Laboratory Results Interface, Syndromic Surveillance, Immunization registry, etc.

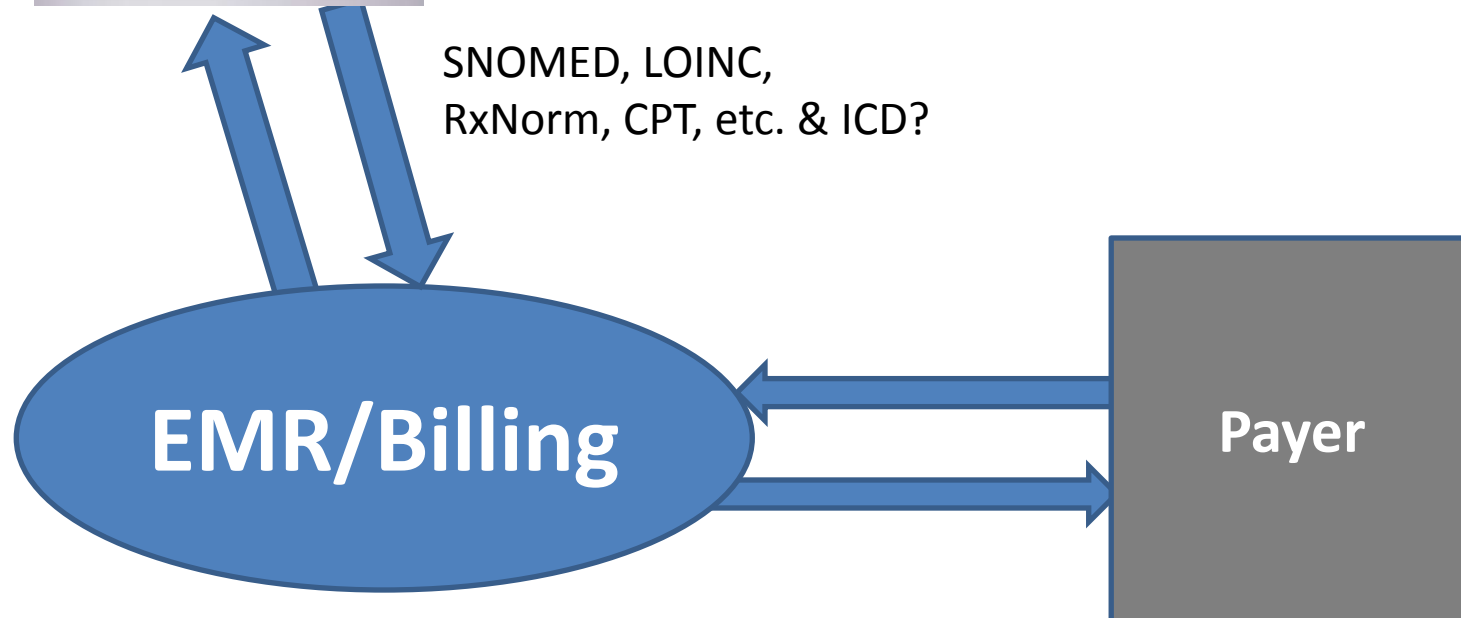
# ICD-9 ↔ ICD10 Mappings

- An example of a challenge in Public Health is that the current Meaningful Use Stage 1 and 2 biosurveillance activities could map the existing ICD-9 syndrome and sub-syndrome classification to ICD-10. However, as the use of SNOMED becomes more widespread the sub-syndrome categories will likely become SNOMED instead of ICD. This will link better with the coded data in the EMR and biosurveillance will likely come to rely on the EMR data rather than the claims data as it does now.

# ICD-9 ↔ ICD10 Mappings

- Considerable recent conversations have occurred about enabling the “bigdata”/data analytics promise of EMR sourced anonymized data...predicated on the availability of structured clinical documentation of patient complaints and observations.

# It gets more complicated



Claims transactions with ICD-10 CM but  
Attachments with (SNOMED... etc.?)

# Mapping SNOMED CT Clinical Terms to ICD-10-CM

NLM has created a document that organizes and presents the use cases and technical procedures for the development of a SNOMED CT to ICD-10-CM Map by the NLM for the US Realm. This document provides prescriptive guidance on the purposes, conduct and outcomes of that project and is the authoritative source for project execution.

- Mapping SNOMED CT to ICD-10-CM Technical Specifications (20120208 Version 1.06)  
[http://www.nlm.nih.gov/research/umls/mapping\\_projects/snomedct\\_to\\_icd10cm\\_tech\\_spec\\_20120614.pdf](http://www.nlm.nih.gov/research/umls/mapping_projects/snomedct_to_icd10cm_tech_spec_20120614.pdf)
- Mapping SNOMED CT to ICD-10-CM Final Release Notes (20120703 Version 1.0)  
[http://www.nlm.nih.gov/research/umls/mapping\\_projects/snomedct\\_to\\_icd10\\_cm\\_release\\_notes\\_20120703.pdf](http://www.nlm.nih.gov/research/umls/mapping_projects/snomedct_to_icd10_cm_release_notes_20120703.pdf)

# Mapping Purpose

- To support semi-automatic generation of ICD-10-CM classification codes from clinical data encoded in SNOMED CT. The ICD-10-CM codes can be used for reimbursement or other administrative purposes. Even though reimbursement is expected to be the main use case, the ICD-10-CM codes suggested by the Map are not guaranteed to be reimbursable, and the codes are not optimized to provide the highest level of reimbursement ...



# What the Map is not

- A completely automated ICD-10-CM coding from a SNOMED CT source
- A map that supports management of context beyond that found in the coded record and ICD-10-CM conventions and rules as noted in General approach and Heuristics

# Among the Mapping Assumptions

- Since ICD-10-CM is a 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-CM is designed for statistical, epidemiological and reimbursement purposes, one ICD-10-CM classification code may include many SNOMED CT concepts within its semantic space.
- *Does it make sense to assume that EMR systems software (or even payer systems software) will employ rules to take a given SNOMED coded concept to map it to a unique ICD-10-CM code?*

# Question?

- Even if we solved all of the apparent ambiguity, is it reasonable to assume that something between adequate-to-excellent semantically correct computer communications could occur between provider and payer?
  - The provider's understanding (will be) founded on base observations encoded in clinical coding systems (e.g., SNOMED CT, LOINC, etc.) and the payers will be based on a reference classification (ICD)!

# NLM Technical Specifications

## Document: Appendix A: FAQ 2

Can the Map be used to automatically generate ICD-10-CM codes?

- The Map is intended to be used in a semi-automatic manner. The Map will suggest candidate ICD-10-CM codes based on SNOMED CT codes and, if applicable, additional information obtained from the electronic patient record or direct user input. Review of the candidate ICD-10-CM codes by either the healthcare provider or professional coder is recommended.

The Map contains map rules and advice that can be used to highlight specific coding principles, or point to additional information required for coding. For the simple cases with one-to-one mappings, it is likely that a high proportion of the candidate ICD-10-CM codes will be adopted by the reviewer.

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