

SNOMED CT: The Clinical Data Standard

Overview and Application to eHRs



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SNOMED CT

The Systematized NOmenclature of MEDicine


SNOMED

Clinical Terms

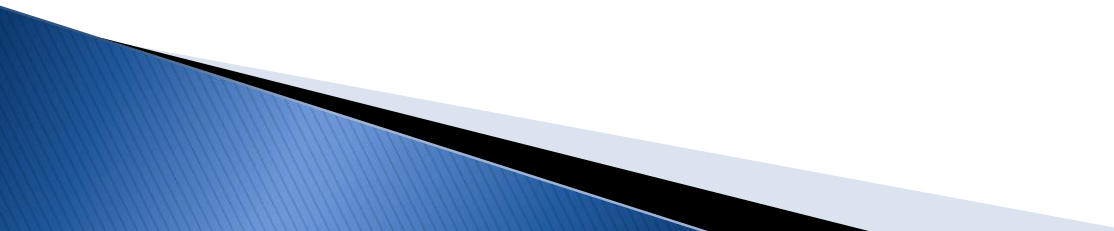
CT



Objectives

- ▶ To DESCRIBE the background and importance of SNOMED CT as a global healthcare data standard
 - ▶ To DEMONSTRATE how SNOMED CT represents clinical data and how it differs from classification systems (e.g. ICD9CM, ICD10)
 - ▶ TO DISCUSS the components of SNOMED CT and how they relate to one another
 - ▶ To ILLUSTRATE how it is applied to eHRs
 - ▶ To PROPOSE recommendations for how to successfully implement SNOMED CT
- 

Outline

- ▶ Definition
 - ▶ Background
 - ▶ Features
 - ▶ Importance
 - ▶ SNOMED CT structure and contents
 - ▶ Application to eHRs
- 

SNOMED Clinical Terms

- ▶ *“SNOMED Clinical Terms (SNOMED CT) is a comprehensive clinical terminology that provides clinical content and expressivity for clinical documentation and reporting. It can be used to code, retrieve, and analyze clinical data.”*

SNOMED Clinical Terms® User Guide
January 2013 International Release

- ▶ A clinical reference terminology– machine readable, uniquely identified concepts

SNOMED CT = Systematized Nomenclature of Medicine

A clinical reference terminology–
....not just a list of diagnoses or procedures

complaining of cough (finding) ← symptom
on examination – pain over mastoid (finding) ← physical finding


More robust, more granular..... allows for better representation of clinical events

Background

- ▶ 1965: Systematized Nomenclature of Pathology (SNOP) (**College of Am. Pathologists**)
- ▶ 1974: SNOMED First Edition
- ▶ 1979: SNOMED Second Edition
- ▶ 1993: SNOMED International Version 3.0
- ▶ 1998: SNOMED International Version 3.5
- ▶ 1999: SNOMED Int. agreement w/UK NHS
- ▶ 2000: SNOMED Reference Terminology
- ▶ **2002: SNOMED CT (SNOMED RT + CTV3)**
- ▶ 2002: SNOMED CT Spanish Edition
- ▶ 2003: SNOMED CT German Edition
- ▶ 2003: Agreement with NLM
- ▶ 2007: **IHTSDO** established– SNOMED CT intellectual property –registered and headquartered in Denmark

Background: SNOMED CT

SNOMED RT + CTV3






















Body structure
Organism
Substance
Morphology

Finding
Disorder
Procedures

Categories and related concepts

138875005 SNOMED CT Concept

+ 	123037004	body structure	Blood vessel structure 59820001
+ 	404684003	clinical finding	Hypertension 8341003
+ 	308916002	environment or geographical location	
+ 	272379006	event	
+ 	106237007	linkage concept	
+ 	363787002	observable entity	Blood pressure 75367002
+ 	410607006	organism	
+ 	373873005	pharmaceutical / biologic product	Antihypertensive agent 1182007
+ 	78621006	physical force	
+ 	260787004	physical object	Blood pressure cuff, device 70665002
+ 	71388002	procedure	Blood pressure monitoring (regime/therapy) 135840009
+ 	362981000	qualifier value	
+ 	419891008	record artifact	
+ 	243796009	situation with explicit context	Family history: Hypertension 160357008
+ 	48176007	social context	
+ 	370115009	special concept	
+ 	123038009	specimen	
+ 	254291000	staging and scales	
+ 	105590001	substance	Antihypertensive agent 372586001

SNOMED CT: a global healthcare data standard



The most comprehensive, multilingual clinical
healthcare terminology in the world

National Release Centers



Denmark: Health Information Standards Office



NZ: Ministry of Health



US: National Library of Medicine



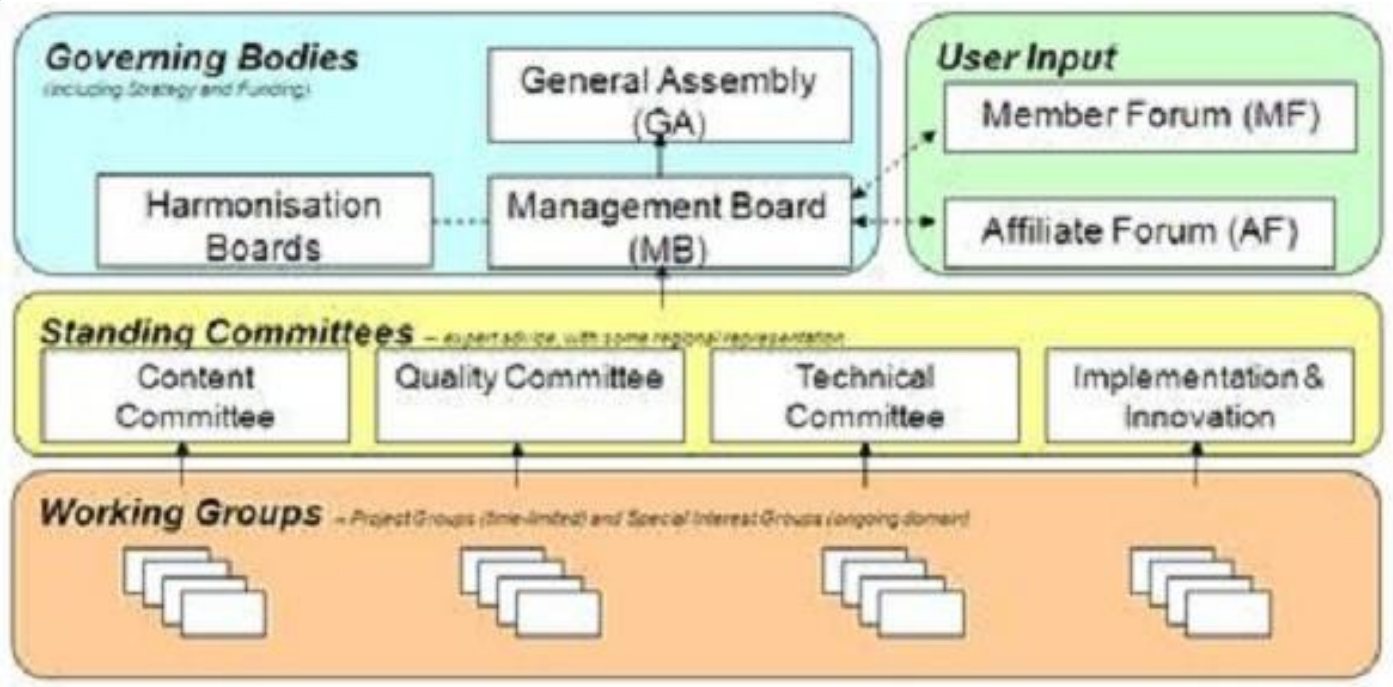
Australia: National E-Health Transition Authority



UK: National Health Service

IHTSDO

Organization



<http://www.ihtsdo.org>

Collaboration with WHO and standardization bodies to facilitate harmonization and interoperability of the terminology ICD-11 (2015)

What is produced

- ▶ 2 international (core) releases per year
- ▶ Distributed by the National Release centers
- ▶ Includes: Terminology (core tables), Crossmaps, Refsets, Subsets, different formats, documentation

Now all guides are online at:

<http://www.SNOMED.org>



BROWSER LIST

CliniClue: <http://www.cliniclue.com>

ITS: <http://www.itserver.es/ITServer/common/index.faces>

MedTalk:

<http://www.pyebrook.com/medtalk%E2%84%A2-snomed-ct%C2%AE-browser>

HealthTerm: <http://www.healthterm.com/>

SNOB: <http://snob.eggbird.eu>

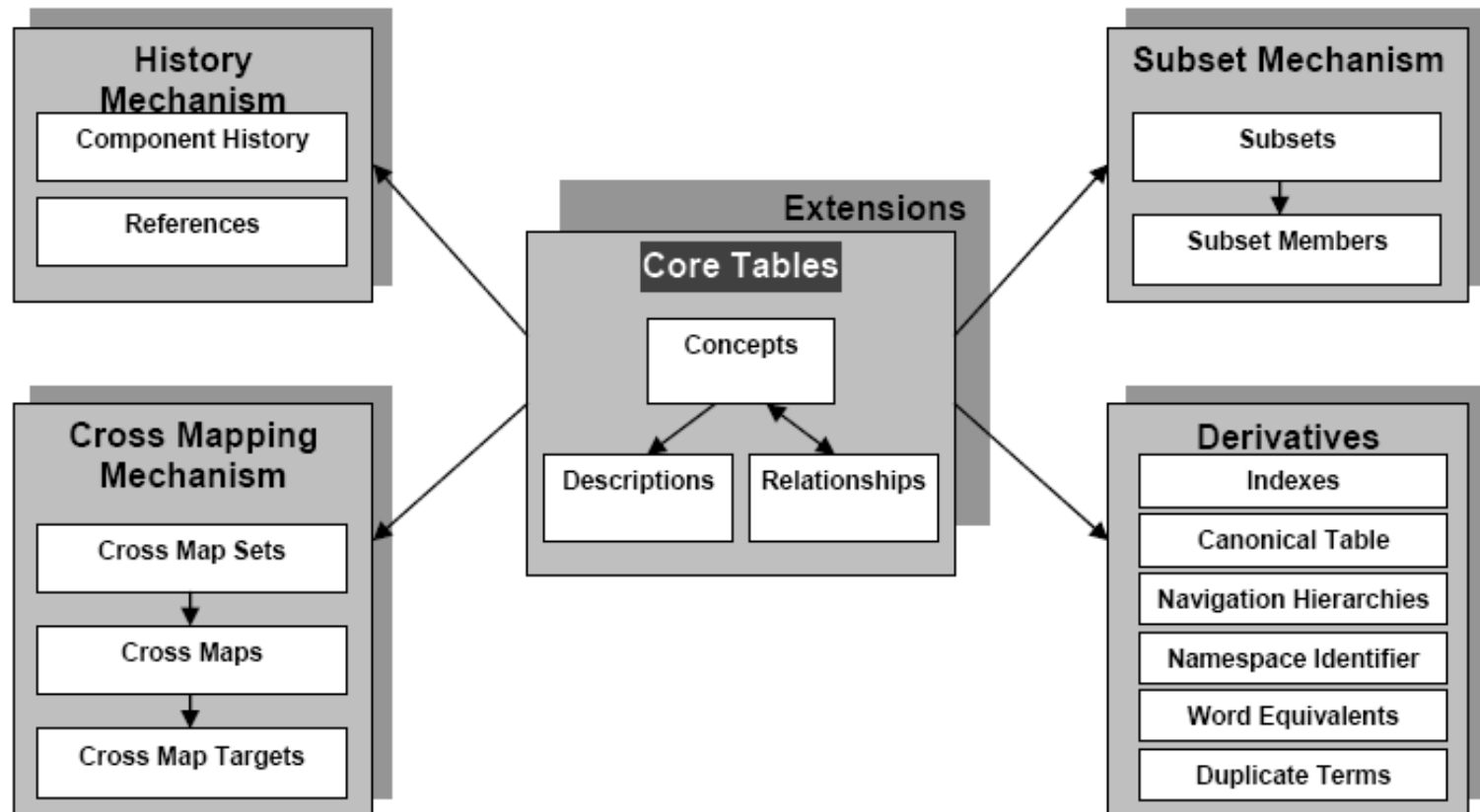
Snoflake: <http://snomed.dataline.co.uk>

Snow Owl: <http://www.b2international.com/portal/snow-owl>

Visual Read: <http://www.visualread.com>

VTSL browser: <http://vtsl.vetmed.vt.edu/>

SNOMED CT data structure files



Features

- 19 upper-level hierarchies
- more than 297,000 active concepts
- more than 777,000 descriptions
- more than 890,000 logically-defining relationships
- several cross mappings/integrations

January 2013 release



Features of SNOMED CT




















- ▶ Composed of concepts, descriptions, hierarchies and relationships
- ▶ Concept-based: Each code represents a single meaning and can have multiple descriptions (terms)
- ▶ Has associated computer-readable codes
(422504002 Ischemic Stroke)
- ▶ Has description logic (“built-in” medical info)
- ▶ Special features (multi-axial, attributes)



Systematized Nomenclature of Medicine
Clinical Terms[®] (SNOMED CT)

Categories and related concepts

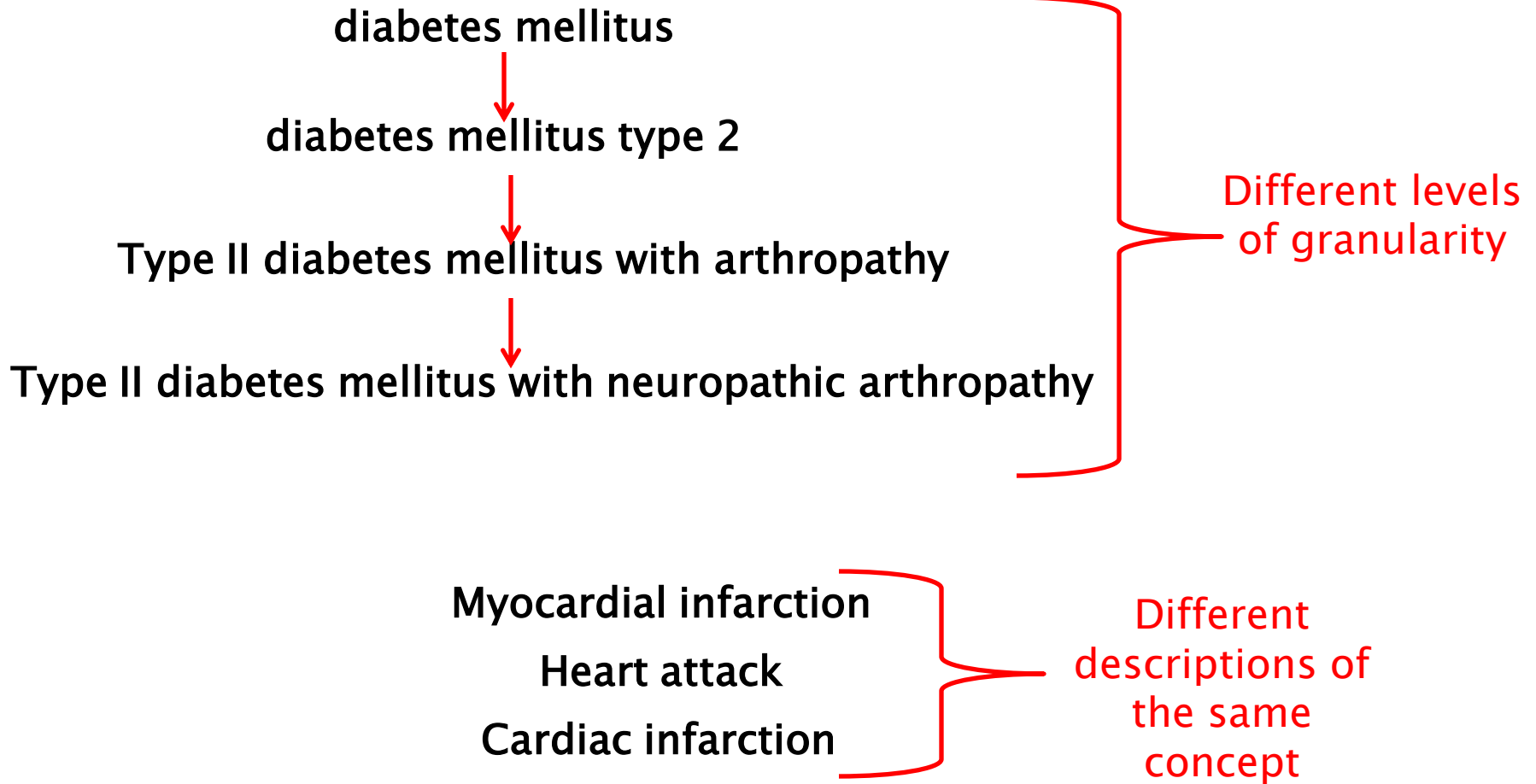
138875005 SNOMED CT Concept

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+ 	105590001	substance	Antihypertensive agent 372586001

Importance

- ▶ Ability to capture clinical ideas or expressions at the appropriate level of detail (machine-readable)
- ▶ Useful for clinical documentation, data re-use, information retrieval (research), reporting, surveillance
- ▶ Interoperability between systems for clinical data
- ▶ Data integration across systems...for aggregation, analysis and standardized reporting
- ▶ Clinical decision support (CDS)–patient safety, medical decision making
- ▶ Integration with other code sets required for billing (insurance)
- ▶ Aims to reduce medical errors, avoid duplication of tests, reduce costs, improve clinical outcomes
- ▶ Required for clinical data reporting from EHRs (government recommendation for quality measures, reimbursement, etc.)

Clinical data capture



Clinical data capture

Myocardial infarction

Heart attack

Cardiac infarction

Different
descriptions of
the same
concept

COLD

Cold

Cold



Same
descriptions of
different
concepts

COLD	chronic obstructive lung disease (disorder)
Cold	common cold (disorder)
Cold	Cold sensation quality (qualifier value)

..... still not like natural language



Hospital System

XXX123 myocardial infarct



ABC444 cardiac infarction



22298006
myocardial infarction
(disorder)

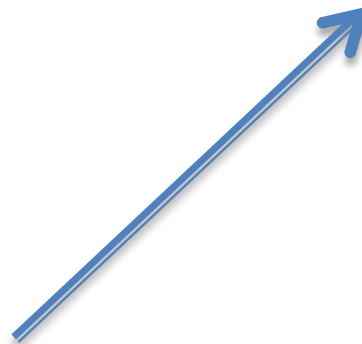
SNOMED CT



Doctor's Office



Outpatient Dept. 56789X heart attack



SNOMED CT enables the
integration of clinical data
from disparate systems

Shows interoperability and
enabling of data integration
across disparate systems

Integrating data electronically



Abdominal pain
21522001

Hemorrhagic diarrhea
95545007

Hemolytic anemia
61261009

Serum creatinine
raised
166717003
(SNOMED CT)

Patient signs and
symptoms

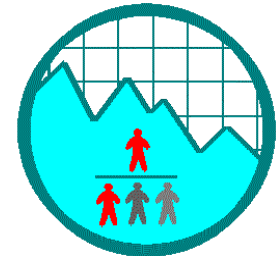


Stool culture + e.coli 0157
(Lab Code)

Lab Result

Hemolytic uremic
syndrome (disorder)
111407006
(SNOMED CT)

Diagnosis



Notifiable Disease

Hemolytic-uremic
Syndrome
283.11
(ICD9CM)

Billing



Integrating with other code systems

Polyneuropathy in rheumatoid arthritis (193180002)

SNOMED CT



M053D: Rheumatoid arthritis with involvement of other organs and systems

G636A: Polyneuropathy in other musculoskeletal disorders

ICD10

714.0: RHEUMATOID ARTHRITIS

357.1: POLYNEUROPATHY IN COLLAGEN VASCULAR DISEASE

ICD9CM

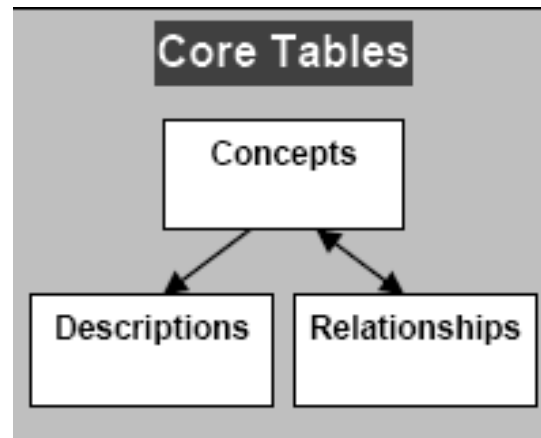
Required by governments

- ▶ * big driver
- ▶ The ways we measure quality are changing...from chart review to electronic data capture
- ▶ Tied to reimbursement
- ▶ Aims to improve outcomes and lower costs
- ▶ Government priorities vary ..affects SNOMED CT data (ICD10CM transition in US, sexual orientation codes for NHS etc.)

SNOMED CT Structure

- ▶ Hierarchies
- ▶ Concepts
- ▶ Descriptions
- ▶ Relationships

CORE TABLES



SNOMED CT structure and components

19 top-level categories

Table 1. Top Level Concepts

<ul style="list-style-type: none">* Clinical finding * Procedure * Observable entity * Body structure • Organism • Substance • Pharmaceutical / biologic product • Specimen • Special concept • Linkage concept 	<ul style="list-style-type: none">• Physical force • Event • Environment or geographical location • Social context * Situation with explicit context • Staging and scales • Physical object • Qualifier value • Record artifact
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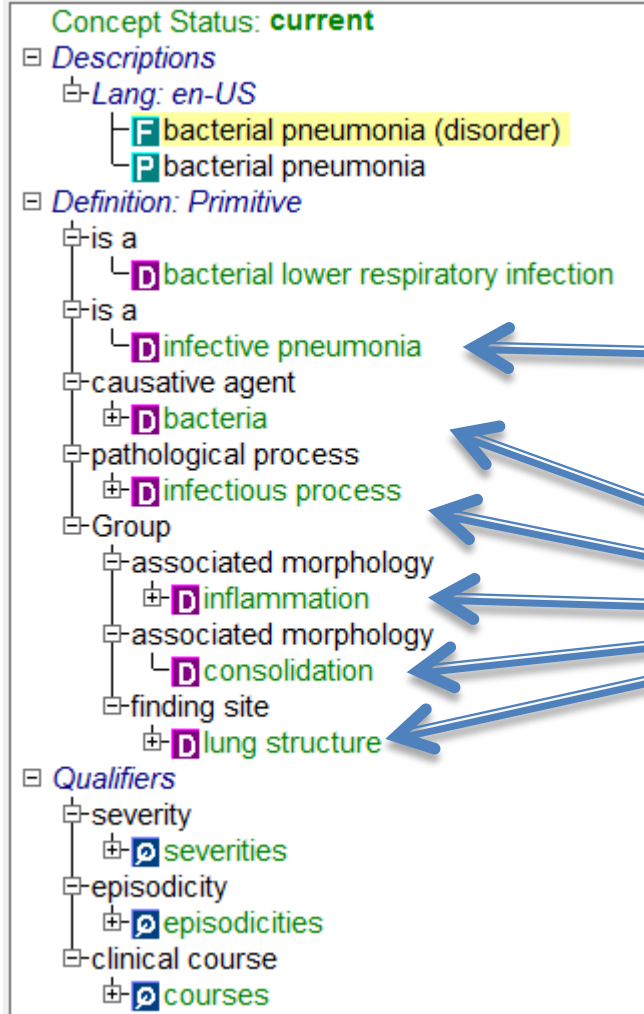
How they relate to one another

The screenshot displays a medical ontology interface with three main panels:

- Find:** A search bar containing "joint pain". Below it, a list of results shows "Clinical finding" expanded, with "P joint pain" highlighted. A link "... more matches ..." is visible.
- Hierarchy:** A dropdown menu set to "Subtype hierarchy". Below it, a list of concepts is shown: "musculoskeletal pain", "finding of sensation of joint", and "joint pain" (highlighted with a green arrow). Under "joint pain", several subtypes are listed: "acromioclavicular joint pain", "ankle joint pain", "arthralgia of the ankle and/or", "arthralgia of the lower leg", "arthralgia of the pelvic region", and "arthralgia of the upper arm".
- Concept Status: current:** A detailed view of the "joint pain" concept. It includes:
 - Descriptions:** A list of descriptions for "joint pain" in English (en-US), including "joint pain (finding)", "joint pain", "arthralgia", "articular pain", and "painful joint".
 - Definition: Fully Defined as ...:** A hierarchical definition showing "joint pain" is a "musculoskeletal pain", which is a "finding of sensation of joint", which is a "finding site", which is a "joint structure". The "joint structure" node is circled in red.
 - Qualifiers:** A list of qualifiers including "severity" (with "severities"), "episodicity" (with "episodicities"), and "clinical course" (with "courses").
 - Codes:** The "Original SNOMED Id" is F-13100 and the "Read Code (Ctv3Id)" is XE1EY.

Two red arrows point from the "joint structure" node in the definition panel to the "Clinical finding" and "Body structure" categories in the right-hand list. The right-hand list also includes "Procedure", "Observable entity", "Organism", "Substance", "Pharmaceutical / biologic product", "Specimen", "Special concept", and "Linkage concept".

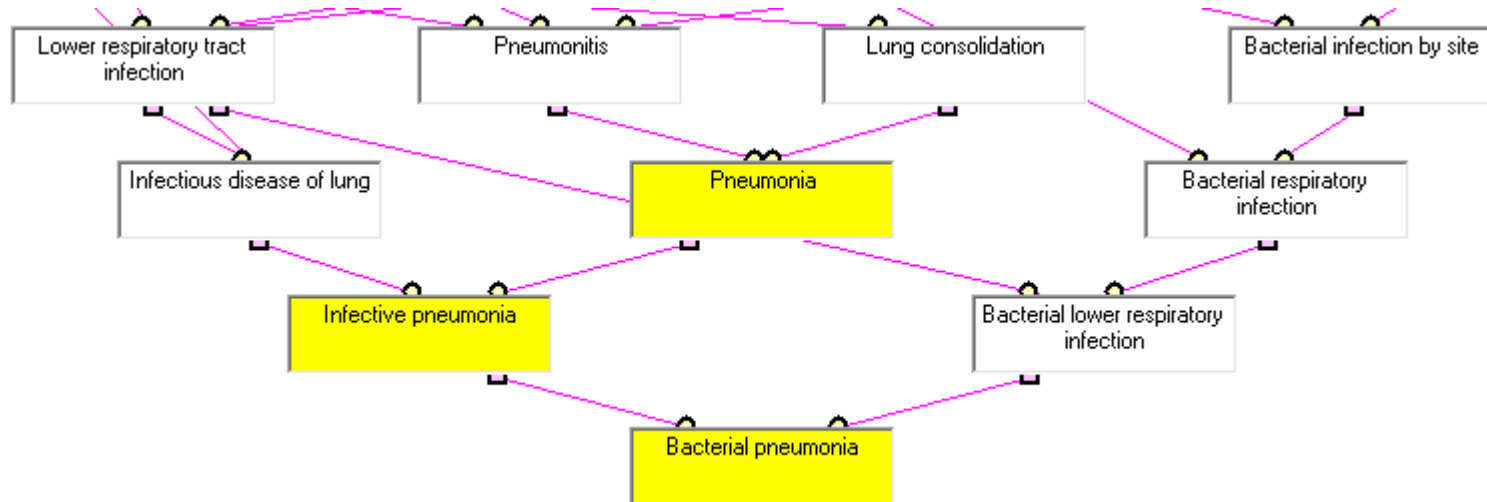
SNOMED CT concepts .



Are MULTI-AXIAL
....may have more
than one parent

Have ATTRIBUTES
....relationships to other
concepts in other
categories

SNOMED CT is different from ICD10



53084003 | bacterial pneumonia |

**Multiple parents
SNOMED CT**

J15 Bacterial pneumonia, not elsewhere classified
J15.9 Bacterial pneumonia, unspecified

**1 parent term
ICD10**

Categories with Single Parents

ICD-9-CM Vol. 1 Diagnostic Codes

7. DISEASES OF THE CIRCULATORY SYSTEM (390-459)

CEREBROVASCULAR DISEASE (430-438)

433 Occlusion and stenosis of precerebral arteries

433.0 Occlusion and stenosis of; basilar artery

433.00 - Occlusion and stenosis of; basilar artery; without mention of cerebral infarction

433.01 - Occlusion and stenosis of; basilar artery; with cerebral infarction

433.1 Occlusion and stenosis of; carotid artery

433.10 - Occlusion and stenosis of; carotid artery; without mention of cerebral infarction

433.11 - Occlusion and stenosis of; carotid artery; with cerebral infarction

433.2 Occlusion and stenosis of; vertebral artery

433.20 - Occlusion and stenosis of; vertebral artery; without mention of cerebral infarction

433.21 - Occlusion and stenosis of; vertebral artery; with cerebral infarction

433.3 Occlusion and stenosis of; multiple and bilateral arteries

433.30 - Occlusion and stenosis of; multiple and bilateral arteries; without mention of cerebral infarction

433.31 - Occlusion and stenosis of; multiple and bilateral arteries; with cerebral infarction

433.8 Occlusion and stenosis of; other specified precerebral artery

433.80 - Occlusion and stenosis of; other specified precerebral artery; w/o mention of cerebral infarction

433.81 - Occlusion and stenosis of; other specified precerebral artery; with cerebral infarction

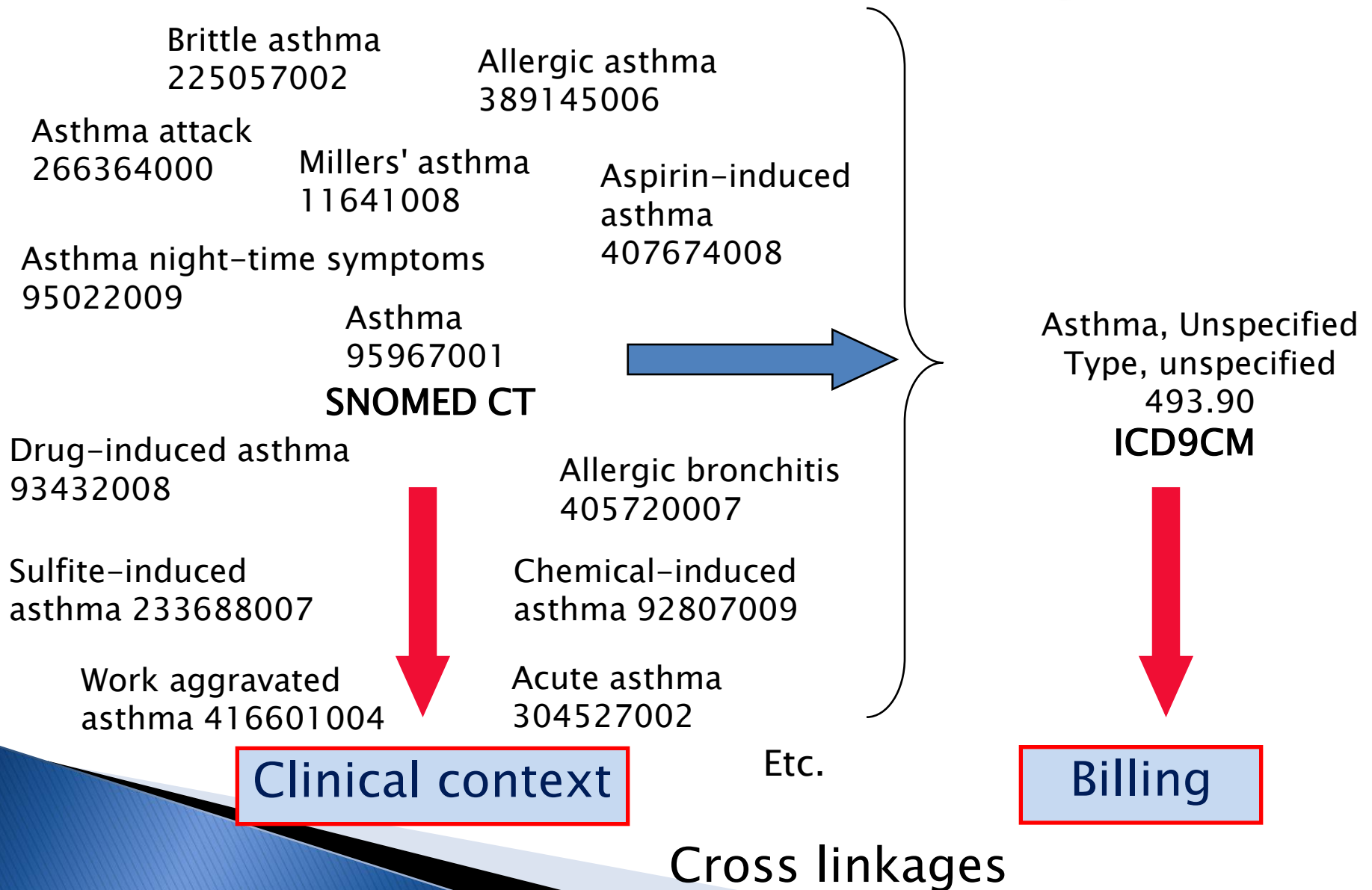
433.9 Occlusion and stenosis of; unspecified precerebral artery

433.90 - Occlusion and stenosis of; unspecified precerebral artery; without mention of cerebral infarction

433.91 - Occlusion and stenosis of; unspecified precerebral artery; with cerebral infarction

Ischemic Stroke

SNOMED CT vs ICD9 for diagnoses



Words - any order

Find

Clinical finding

- asthma
 - bakers' asthma
 - mild asthma

Hierarchy **Subtype hierarchy**

- disorder of respiratory system
 - asthma
 - acute asthma
 - allergic asthma
 - asthma attack
 - asthma without status as
 - asthmatic bronchitis
 - brittle asthma
 - chemical-induced asthma
 - childhood asthma
 - cough variant asthma
 - exacerbation of asthma
 - exercise-induced asthma
 - intermittent asthma
 - intrinsic asthma
 - late onset asthma
 - mild asthma
 - mixed asthma
 - moderate asthma
 - occasional asthma

Concept Status: current

Descriptions

Lang: en-US

- asthma (disorder)
- asthma
- bronchial asthma
- bronchial hypersensitivity
- bronchial hyperresponsiveness
- bronchial hyperreactivity
- asthmatic
- airway hyperreactivity
- hyperreactive airway disease
- BHR - Bronchial hyperreactivity

Definition: Primitive

is a

- disorder of respiratory system

finding site

Qualifiers

- severity
 - severe
- episodicity
 - episodicities
- clinical course
 - courses

Codes

- Original SNOMED Id : D2-00036
- Read Code (Ctv3Id) : H33..

Map **100046: ICD-9-CM**

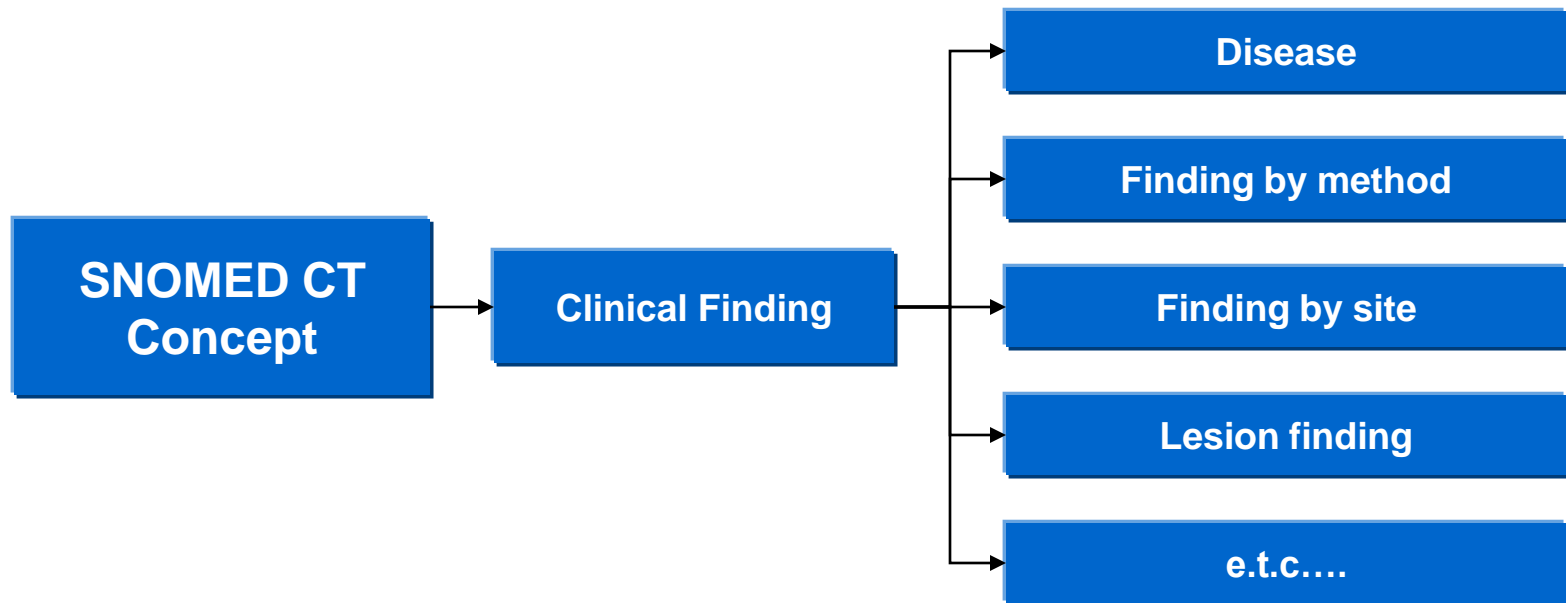
ICD-9-CM

- 195967001 asthma
 - Maps to...
 - 493.90 Asthma, unspecified type, unspecified severity

Asthma and many of its descendants map to ONE ICD9 code

SNOMED CT	ICD10 or ICD9
Reference terminology	Classification system
Multi-hierarchy	Single hierarchy
Grouped by one or more characteristics (IS_ A and attributes)	Grouped into categories (single IS_A relationships)
More clinically granular (detailed) (more clinical terms)	Less granular– grouping of diseases (less clinical terms)
More robust data retrieval/ Inheritance	Limitations to data retrieval/ No inheritance/
Used for clinical data capture at the point-of-care	Used for statistical purposes/billing/administrative use, usually aftercare

May have multiple subhierarchies

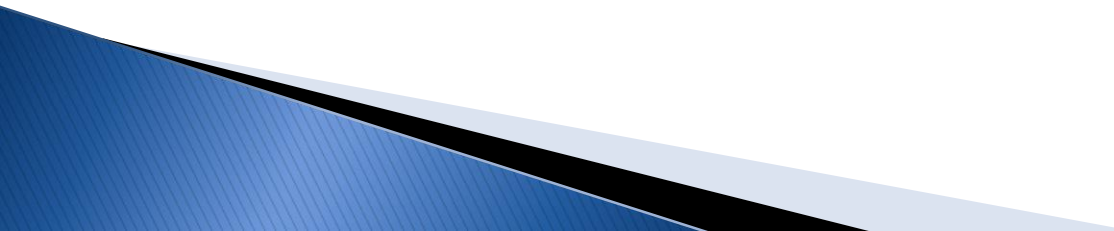


Many subhierarchies

Disease is a
sub hierarchy
of clinical
findings

Hierarchy	Subtype hierarchy
138875005	SNOMED CT Concept
404684003	clinical finding
307824009	administrative statuses
405533003	adverse incident outcome categories
313413008	calculus finding
250171008	clinical history and observation findings
80631005	clinical stage finding
3415004	cyanosis
417893002	deformity
64572001	disease
69449002	drug action
419026008	effect of exposure to physical force
424017009	enzyme activity finding
441742003	evaluation finding
106112009	fetal finding
118240005	finding by method
118234003	finding by site
384740007	finding of grade
127357005	finding related to physiologic substance
418799008	finding reported by subject or history provider
365860008	general clinical state finding
18165001	jaundice
217020008	medical and surgical procedures as the cause
102957003	neurological finding
267038008	edema
365858006	prognosis/outlook finding
285153007	sequelae of external causes and disorders
65124004	swelling
225552003	wound finding

Concept

- ▶ “Unit of meaning” or clinical idea
 - ▶ Each concept is a collection of terms and relationships
 - ▶ Concepts are assembled in “logical definitions”
 - ▶ Synonyms can be added as long as the meaning of the concept does not change
 - ▶ Concepts are permanent (never deleted)
 - ▶ Concepts have unique identifiers and are free of hierarchical or other implicit meaning
 - ▶ The code numbers do not relate to a specific hierarchy – a concept can belong to more than one node
- 

Concept Id 41713005

Benedikt's syndrome

(Type:= clinical finding)

Description Id 69589010

**Only 1 concept ID
(unique)**

Multiple description IDs



Words - any order

72

Find hemipleg

Clinical finding

- P** 84272011 hemiplegia
- P** 87771014 hemiplegic gait
- P** 406583018 hemiplegic posture
- P** 98501012 hemiplegia
- P** 127247010 post-hemiplegic chorea
- P** 15809012 post-hemiplegic tremor
- P** 345262015 hemiplegia-hemiconvulsion-epilepsy sy

All are concept IDs

Procedure

Hierarchy Subtype hierarchy

- C** 7930004 necrosis of artery
- C** 20059004 cerebral artery occlusion
- C** 50582007 hemiplegia
- C** 60342002 movement disorder
- C** 95457000 brain stem infarction
- C** 95641009 disorder of midbrain
- C** 388980004 third cranial nerve weakness
 - C** 41713005 **Benedikt's syndrome**

Concept Status: current

Descriptions

Lang. en-US

- F** 778533016 Benedikt's syndrome (disorder)
- P** 69589010 Benedikt's syndrome
- S** 2838306017 Benedikt syndrome
- S** 493078011 Benedict syndrome
- S** 69591019 mesencephalic tegmental paralysis
- S** 69590018 tegmentum syndrome

Definition: Primitive

- 116680003** is a **D** 20059004 cerebral artery occlusion
- 116680003** is a **D** 388980004 third cranial nerve weakness
- 116680003** is a **D** 50582007 hemiplegia
- 116680003** is a **D** 60342002 movement disorder
- 116680003** is a **D** 7930004 necrosis of artery
- 116680003** is a **D** 95457000 brain stem infarction
- 116680003** is a **D** 95641009 disorder of midbrain
- 363698007** finding site **D** 56193007 oculomotor nerve structure
- Group**
 - 116676008** associated morphology
 - D** 26026004 obstruction

Concepts Table meaning

ConceptId	FullySpecifiedName	Concept Status	SNOMEDId	CTV3Id	IsPrimitive
236003	Incision of vein (procedure)	4	P1-38100	XUSTv	0
237007	Annona (organism)	0	L-D2100	XUA2a	0
238002	Heptachlor (substance)	0	C-23115	X8084	0
239005	Ophthalmologic (qualifier value)	0	G-B106	XUA53	0
240007	Biopsy of scent gland (procedure)	0	P1-40322	XUA6E	0
241006	Epilepsia partialis continua (disorder)	0	DA-30250	X007F	0
242004	Noninfectious jejunitis (disorder)	0	D5-41620	XUA8W	0
243009	Replacement of cerebral ventricular tube (procedure)	0	P1-91578	XUA9e	0

- ▶ Each row represents a single concept
- ▶ Each concept has 3 identifiers
- ▶ Each concept has a “status” (current or not)
- ▶ Each concept is either “primitive” or “fully defined”

Concepts Table summary

ConceptId	FullySpecifiedName	Concept Status	SNOMEDId	CTV3Id	IsPrimitive
236003	Incision of vein (procedure)	4	P1-38100	XUSTv	0
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240007	Biopsy of scent gland (procedure)	0	P1-40322	XUA6E	0
241006	Epilepsia partialis continua (disorder)	0	DA-30250	X007F	0
242004	Noninfectious jejunitis (disorder)	0	D5-41620	XUA8W	0
243009	Replacement of cerebral ventricular tube (procedure)	0	P1-91578	XUA9e	0

Key Fields

ConceptId The unique *SNOMED Clinical Terms Identifier* for this *Concept*.

Data Fields

ConceptStatus The status of a *Concept* indicates whether it is in active use and, if not, indicates the reason for withdrawal from current use.

FullySpecifiedName A unique phrase that describes a *Concept* in a way that is intended to be unambiguous. The *Fully Specified Name* is also present in the *Descriptions Table*. It is not the same as the *Preferred Term*, which is also in the *Descriptions Table*. The *Fully Specified Name* explains the meaning of the concept more fully than the *Preferred Term* to remove or reduce ambiguity.

CTV3ID The *Read Code* for this *Concept*.

SNOMEDID The *SNOMED* identifier for this *Concept*.

IsPrimitive Indicates whether a *Concept* is *Primitive* or *Fully defined* by its current set of *Defining characteristics*.

Description

- ▶ Human readable terms assigned to a concept
- ▶ Each concept has:
 - Fully Specified Name (FSN)
 - Preferred Name (display name)
- ▶ Many concepts have one or more synonyms

Concept Id 41713005

Benedikt's syndrome

(Type:= clinical finding)

DescriptionId 69589010

Words - any order

72

Find hemipleg

Fully specified name

Preferred name

Synonyms

Clinical finding

- P** 84272011
- P** 87771014
- P** 406583018 hemiplegic posture
- P** 98501012 hemiplegic
- P** 127247010 post-hemip
- P** 15809012 post-hemip
- P** 345262015 hemiplegia-hemiconvulsion-epilepsy sy

Procedure

Hierarchy Subtype hierarchy

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- C** 60342002 movement disorder
- C** 95457000 brain stem infarction
- C** 95641009 disorder of midbrain
- C** 388980004 third cranial nerve weakness
- C** 41713005 **Benedikt's syndrome**

Concept Status: **current**

Descriptions

Lang: en-US

- F** 778533016 Benedikt's syndrome (disorder)
- P** 69589010 Benedikt's syndrome
- S** 2838306017 Benedikt syndrome
- S** 493078011 Benedict syndrome
- S** 69591019 mesencephalic tegmental paralysis
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Definition: Primitive

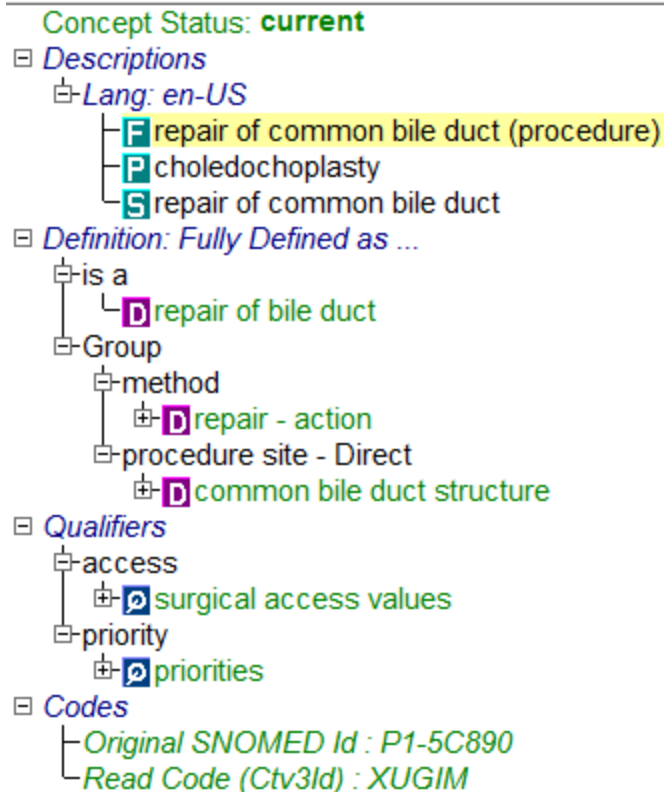
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- C** 116680003 is a **D** 50582007 hemiplegia
- C** 116680003 is a **D** 60342002 movement disorder
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- C** 116680003 is a **D** 95641009 disorder of midbrain
- C** 363698007 finding site **D** 56193007 oculomotor nerve structure
- Group**
 - C** 116676008 associated morphology
 - C** 26026004 obstruction

Fully Specified Name: FSN ()

- ▶ Each *concept* has one *Fully Specified Name* (FSN) intended to provide an unambiguous way to name a *concept*. The purpose of the FSN is to uniquely describe a *concept* and clarify its meaning.
- ▶ The FSN is not a commonly used term or natural phrase and would not be expected to appear in the human-readable representation of a clinical record.

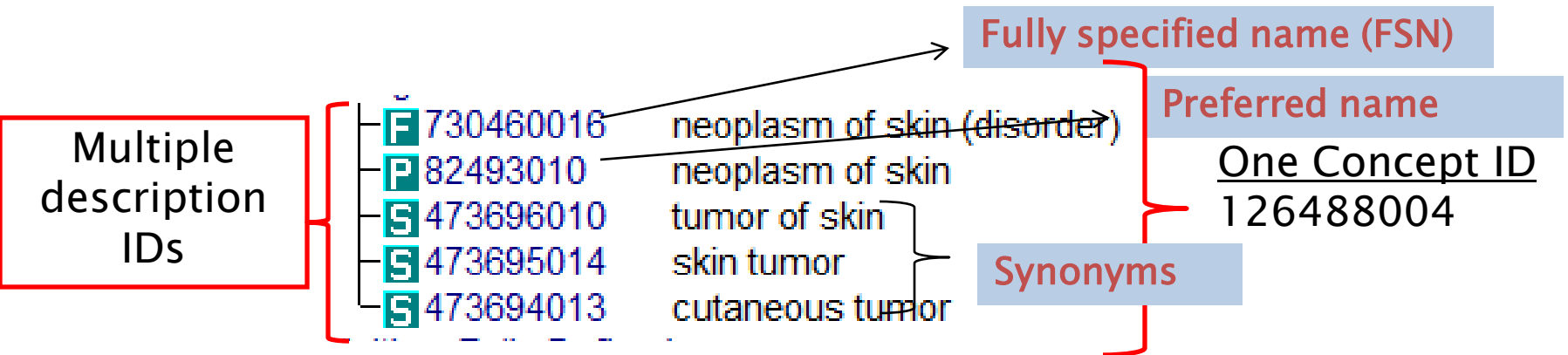
Preferred term

- ▶ Each *concept* has one *Preferred Term* in a given language *dialect*. This is a common word or phrase used by clinicians to name that *concept*.



Remember....

- ▶ A single concept may have multiple descriptions



- ▶ Separate concepts may share the same text description

Antihypertensive agent 1182007 ← product

Antihypertensive agent 372586001 ← substance

Note of caution

- *SNOMED CT contains both Human and non-Human content
- *Problematic especially if mapping
- *Can remove from system using the non-human subset file

Concept Id: 387802007 **thoracic spondylosis**
(Type:= clinical finding)

Description Id: 1481872012

Words - any order

Find: spondylosis

Clinical finding

- P spondylosis
- P **thoracic spondylosis**
 - P thoracic spondylosis with radiculopa
 - S dorsal spondylosis without myelopat
- S spondylosis deformans
- P myelopathy due to spondylosis
- P spondylosis and allied disorders
- ... more matches ...

Hierarchy: Subtype hierarchy

- C thoracic arthritis
- C osteoarthritis
 - **thoracic spondylosis**
 - C thoracic spondylosis with myelopath
 - C thoracic spondylosis with radiculopa
 - C thoracic spondylosis without myelop

Concept Status: current

Descriptions

- Lang: en-US
 - F thoracic spondylosis (disor
 - P thoracic spondylosis
 - S osteoarthritis of thoracic sp
 - S thoracic spondylarthritis
 - S thoracic osteoarthritis

Definition: Fully Defined as ...

- is a
 - D thoracic arthritis
- is a
 - D osteoarthritis
- Group
 - associated morphology
 - D inflammation
 - finding site
 - D thoracic spine joint struc
- Group
 - associated morphology
 - D degeneration
 - finding site

Context

- finding with explicit context
- finding context = known present
- temporal context = current or specified
- subject relationship context = subject of re

Refinement

Attributes: - +

thoracic spondylosis
due to
causative agent
finding site = intervertebral disc, T13-T14
severity

Expression view: Selected

Transform: <no transform>

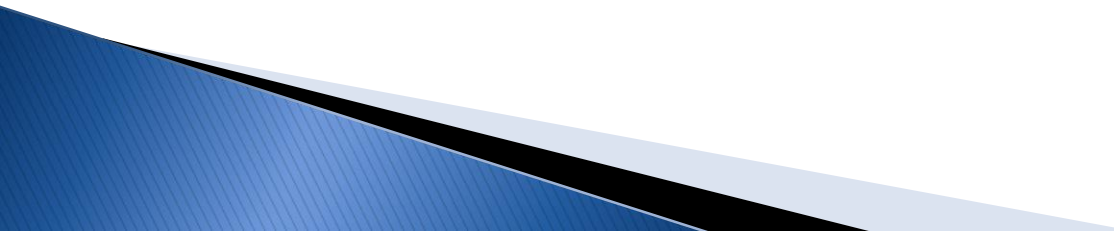
Renderer: HTML formatted

HTML formatted

Browser allows you to select T13-T14
...a non-human code

sis | :
7941000 |
14 |

Relationships

- ▶ A relationship is an association between two concepts
 - ▶ Two types of relationships within SNOMED
 - ▶ **Is_a** relationships: Relationships that link concepts within a hierarchy
 - ▶ **Attribute** relationships (roles): Allow links between concepts across hierarchies (defining, qualifying, historical, additional)
- 

Relationships

The screenshot displays a medical ontology interface with two main panels. The left panel, titled 'Starts with', shows a search for 'gastric ulcer' and a list of related concepts. The right panel, titled 'gastric ulcer - Definition', shows the concept's status and its hierarchical structure.

Left Panel: Starts with

Find: gastric ulcer

clinical finding
gastric ulcer
procedure
gastric ulcer operation
specimen

Hierarchy: Subtype hierarchy

Concept ID	Concept Name
29384001	disorder of stomach
40845000	gastrointestinal ulcer
397825006	gastric ulcer
69326003	abomasal ulcer
95529005	acute gastric ulcer
109814008	acute ulcerative ga
63137003	chronic erosive gas
95530000	chronic gastric ulce
79806007	combined gastric A
70622003	Crohn's disease of
44204006	erosion of aizzard
235651006	gastric erosion
424301005	gastric ulcer induce
266436006	gastric ulcer NOS
15902003	gastric ulcer with h

Right Panel: gastric ulcer - Definition

Concept Status: **Current**

Descriptions

- 1765744015 gastric ulcer (disorder)
- 1777426014 gastric ulcer
- 1785986014 GU - Gastric ulcer
- 1785987017 gastric ulceration
- 1785985013 stomach ulcer

Definition: Fully defined by ...

is a

- disorder of stomach
- gastrointestinal ulcer

Group

- associated morphology
- ulcer
- finding site
- stomach structure

Qualifiers

- severity
- severities
- episodicity
- episodicities
- clinical course
- courses

Codes

- Original SnomedId : D5-32017
- Read Code (Ctv3Id) : XUYPs

Relationships:

- is_a**: A red arrow points from 'gastric ulcer' in the left panel to 'disorder of stomach' in the right panel.
- Attributes**: A red arrow points from 'gastric ulcer' in the left panel to 'gastric ulcer' in the right panel.

Relationships

The screenshot displays a medical terminology application with two main panes. The left pane shows a search for 'endarterectomy' and a list of related terms under the 'Subtype hierarchy'. The right pane shows the 'Definition' for 'endarterectomy', including its status, descriptions, and various attributes.

Left Pane: Search and Hierarchy

- Search: **Find** endarterectomy
- Filter: **procedure**
- Result: **endarterectomy**
- Hierarchy: **Subtype hierarchy**
- Results:
 - 6832004 atherectomy
 - 392031002 **endarterectomy**
 - 66951008 carotid endarterectomy
 - 275064002 endarterectomy and atherectomy
 - 7642007 endarterectomy of atheroma
 - 49187005 endarterectomy of atherosclerosis
 - 175426005 endarterectomy of axillary artery
 - 175691002 endarterectomy of femoral artery
 - 35888008 endarterectomy of heart
 - 175510006 endarterectomy of internal carotid artery
 - 44620006 endarterectomy of internal carotid artery
 - 40455006 endarterectomy of lower extremity
 - 175420004 endarterectomy of subclavian artery
 - 175511005 endarterectomy of subclavian artery
 - 43418007 endarterectomy of upper extremity
 - 175418002 endarterectomy of vertebral artery
 - 175515001 endarterectomy of visceral artery
 - 38863001 gas endarterectomy
 - 287355006 other endarterectomy

Right Pane: endarterectomy - Definition

- Concept Status: Current**
- Descriptions**
 - endarterectomy (procedure)
 - endarterectomy
 - intimectomy
- Definition: Primitive**
- is a**
 - atherectomy
- Group**
 - method
 - excision - action
 - direct morphology
 - atheroma
 - procedure site - Indirect
 - arterial structure
- Qualifiers**
 - access
 - surgical access values
 - priority
 - priorities
 - using device
 - radiofrequency controlled thermal probe
 - surgical approach
 - transarterial approach
- Codes**
 - Original SnomedId : P1-30014
 - Read Code (Ctv3Id) : XUXSS

Annotations:

- A red arrow labeled **is_a** points from the '392031002 endarterectomy' entry in the hierarchy to the 'is a' relationship in the definition.
- A red arrow labeled **Attributes** points from the '392031002 endarterectomy' entry to the 'Group' section of the definition.

SNOMED CT Core Tables

Concepts

ConceptId

Concept Status
Fully Specified
Name
CTV3ID
SNOMEDID
IsPrimitive

Relationships

RelationshipId

ConceptId1
RelationshipType
ConceptId2

Characteristic Type
Refinability
RelationshipGroup

Descriptions

DescriptionId
Description
Status

ConceptId

Term
Initial Capital
Status
Description Type
Language Code

SNOMED CT is indexed by ConceptIDs

Description logic

- ▶ IS_A + defining attributes
= defining characteristics
- ▶ logical representation of the *meaning* of a concept

Relationships

Starts with

Find

clinical finding

- + ☐ gastric ulcer

procedure

- + ☐ gastric ulcer operation

specimen

Description logic components

gastric ulcer - Definition

Concept Status: Current

Descriptions

- ☐ 1765744015 gastric ulcer (disorder)
- ☐ 1777426014 gastric ulcer
- ☐ 1785986014 GU - Gastric ulcer
- ☐ 1785987017 gastric ulceration
- ☐ 1785985013 stomach ulcer

Definition: Fully defined by ...

is a

- ☐ disorder of stomach
- ☐ gastrointestinal ulcer

Group

- ☐ associated morphology
 - ☐ ulcer
- ☐ finding site
 - ☐ stomach structure

Qualifiers

- ☐ severity
 - ☐ severities
- ☐ episodicity
 - ☐ episodicitv
- ☐ clinical course
 - ☐ courses

Codes

- ☐ Original SnomedId : D5-32017
- ☐ Read Code (Ctv3Id) : XUYPs

IS_A

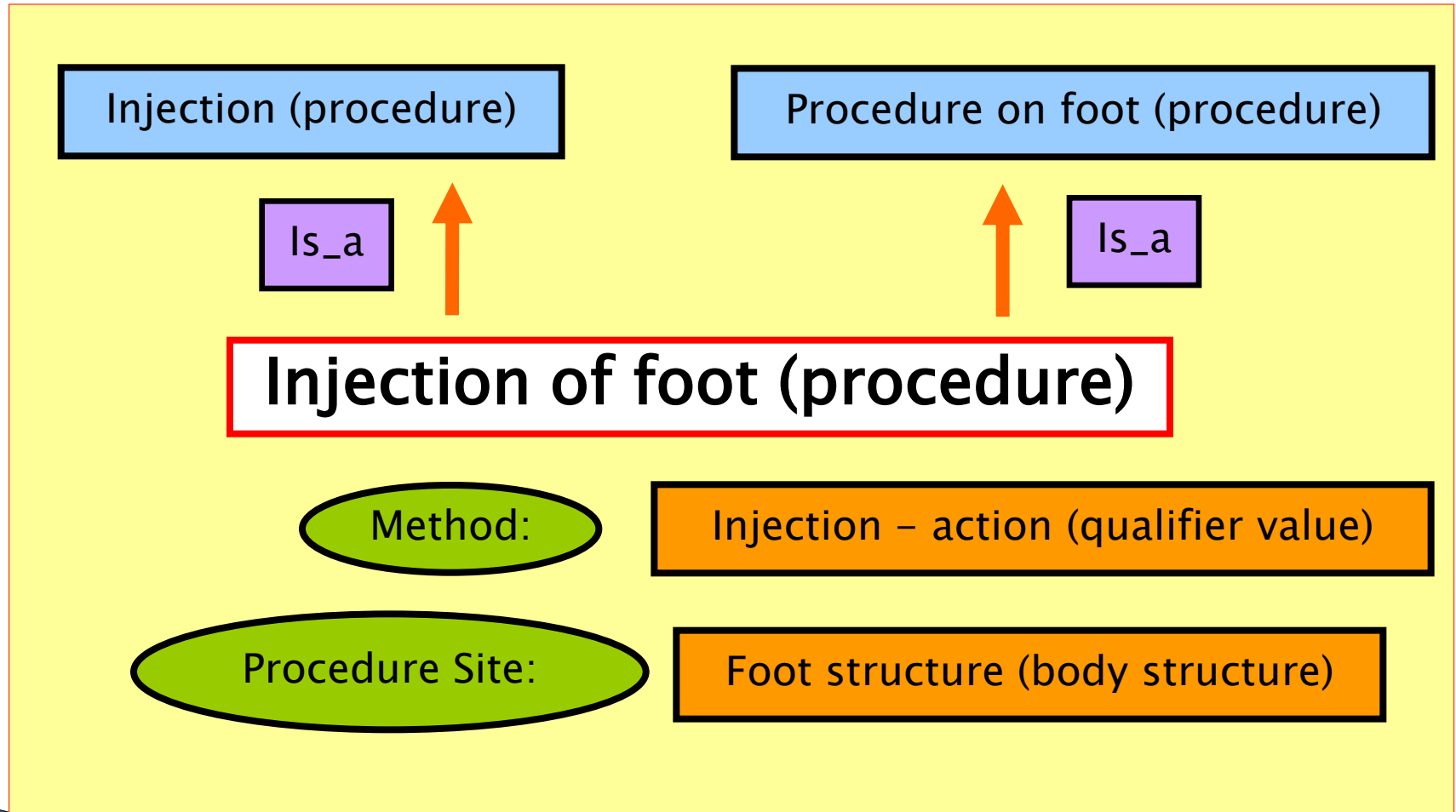
Defining

Qualifying

gastric ulcer

- ☐ 13978251006 gastric ulcer
- ☐ 69326003 abomasal ulcer
- ☐ 95529005 acute gastric ulcer
- ☐ 109814008 acute ulcerative ga
- ☐ 63137003 chronic erosive gas
- ☐ 95530000 chronic gastric ulce
- ☐ 79806007 combined gastric A
- ☐ 70622003 Crohn's disease of
- ☐ 44204006 erosion of aizzard
- ☐ 235651006 gastric erosion
- ☐ 424301005 gastric ulcer induce
- ☐ 266436006 gastric ulcer NOS
- ☐ 15902003 gastric ulcer with h

Logical definition of a concept (using defining relationships)



Thank You

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