Clinical Terminology and Coding Standards

National Resource Centre for EHR Standards (NRCeS)

C-DAC Pune

Background

- Ministry of Health & Family Welfare (MoH&FW) notified the Electronic Health Record (EHR) Standards for India in Sept 2013 and revised in December 2016

- India Member of SNOMED International in 2014

- C-DAC Pune is appointed as India NRC for SNOMED CT through National Resource Centre for EHR Standards (NRCeS) project
  - Promote and support adoption, access, and integration of EHR standards

- Notified clinical terminology and coding standards by MoHFW in the EHRSI-2016 & National Digital Health Blueprint (NDHB)
  - SNOMED CT as preferred terminology for all clinically relevant information
  - Logical Observation Identifiers Names and Codes (LOINC) - Test, measurement, observations
  - WHO ICD-10 - for statistical classification of diseases and related health problems

WHY DO WE NEED OF DATA STANDARDS

- Data standard is a powerful system
  - Comprehensive scope and support for detailed information
  - A code system providing standard representation of clinical meanings
  - A global reference terminology with multilingual term support
  - A polyhierarchy with ontological features that enable inference

- Data standards are meant for use in electronic health records
  - On its own, these standards does nothing!

- Data standards delivers value when implemented as part of an electronic health record
  - Standards make it easier to create, share, and integrate data
  - Ensures that the data are represented and interpreted correctly.
  - Reduce the time spent cleaning and translating data.

- Making health records electronic
  - A significant step forward
  - Improves communication
  - Increases availability of relevant information

  … but it is only a partial solution; the real challenge is …

- Making health records meaningful
  - Identifying significant facts in oceans of data
  - Enabling effective meaning-based retrieval
  - Linking the EHR to authoritative clinical knowledge

- Data standards represents clinical information meaningfully as part of a well-designed EHR

Classification vs Terminology

	Classification	Terminology
Definition	A classification is a structured way of organising information into standard groupings	A structured vocabulary used in clinical practice to accurately describe the care and treatment of patients
Examples	• ICD • ICF • ICHI • ICD-O	• SNOMED CT • LOINC
Purpose & Usage	• Monitoring of the incidence and prevalence of a disease • Epidemiological research of health trends • Observing reimbursements and resource allocation trends • Keeping track of safety and quality guidelines	• Capture, retrieve, and exchange of clinical information of individual patient • Provide a consistent way of indexing, storing, retrieving and aggregating clinical data from structured, computerised clinical records • Interoperability

SNOMED CT

SNOMED CT

- SNOMED CT stands for SNOMED Clinical Terms, now an acronym
- SNOMED International (also known as IHTSDO stands for International Health Terminology Standards Development Organization)
- Owned, maintained and distributed by SNOMED International
  - International **not-for-profit** association, Owned by National Members
- Comprehensive, multilingual clinical healthcare terminology
- Used to code, retrieve, and analyze clinical data.
- SNOMED CT resulted from the merger of SNOMED Reference Terminology (SNOMED RT) developed by
  - College of American Pathologists (CAP)
  - Clinical Terms Version 3 (CTV3) developed by the National Health Service (NHS) of the United Kingdom.

- Comprehensive vocabulary to describe clinical findings, diseases, procedures etc.

- Contains **355,619 concepts**, more than 1.5 million descriptions and more than three million relationships.

- Aims at transmitting all concepts that have been expressed throughout history in the healthcare domain, unambiguously.

- The terminology is comprised of concepts, terms and relationships with the objective of precisely representing clinical information across the scope of health care.

Benefits

- Record clinical information at greater levels of specificity
- Improved sharing of information across care settings
- Ability to receive electronic data such as discharge summaries in a coded format
- Ability to aggregate data across care settings to support quality outcomes analysis.
- **Data can flow electronically across healthcare** without the need to re-enter data or try to find equivalent codes for essential clinical terms from a different coding scheme.
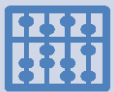
Design Benefits of SNOMED CT

Comprehensive clinical scope

Reduces need to support multiple code systems

Common framework for consistent retrieval and processing

Logical definitions

Allow clinically relevant meaning-based retrieval

Post-coordination

Combining codes to add detail and specificity

Increases scope without 'combinatorial explosion' of codes

Updates and versioning

Regular updates to International Release (six-monthly)

Support for incremental updates

Full historical view of all previous versions of SNOMED CT

National Flexibility with SNOMED CT

- SNOMED CT - Extensible design
  - Enables addition of National or local content
  - Allows for translations per country
  - Configurable to meet National requirements
  - Reference Sets: a standard representation for
    - Subsets and Value-Sets of SNOMED CT
    - Cross Mapping to/from SNOMED CT
    - Other references to SNOMED CT content
- SNOMED International Workbench
  - Opensource tools to support maintenance and release of National Extensions to SNOMED CT
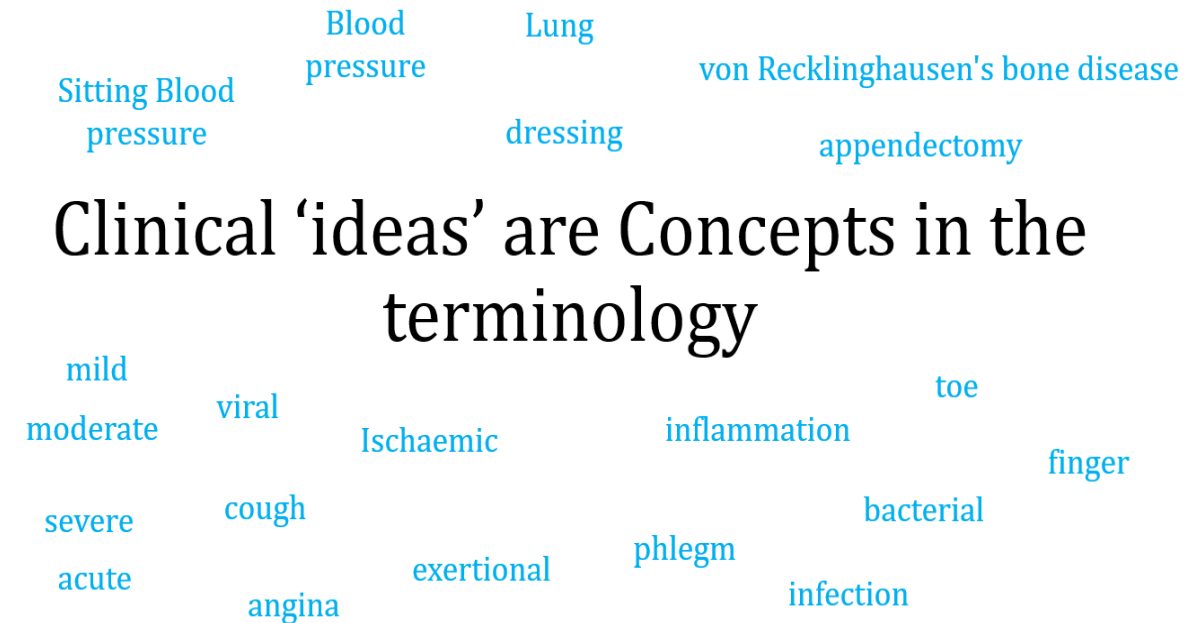
Coverage
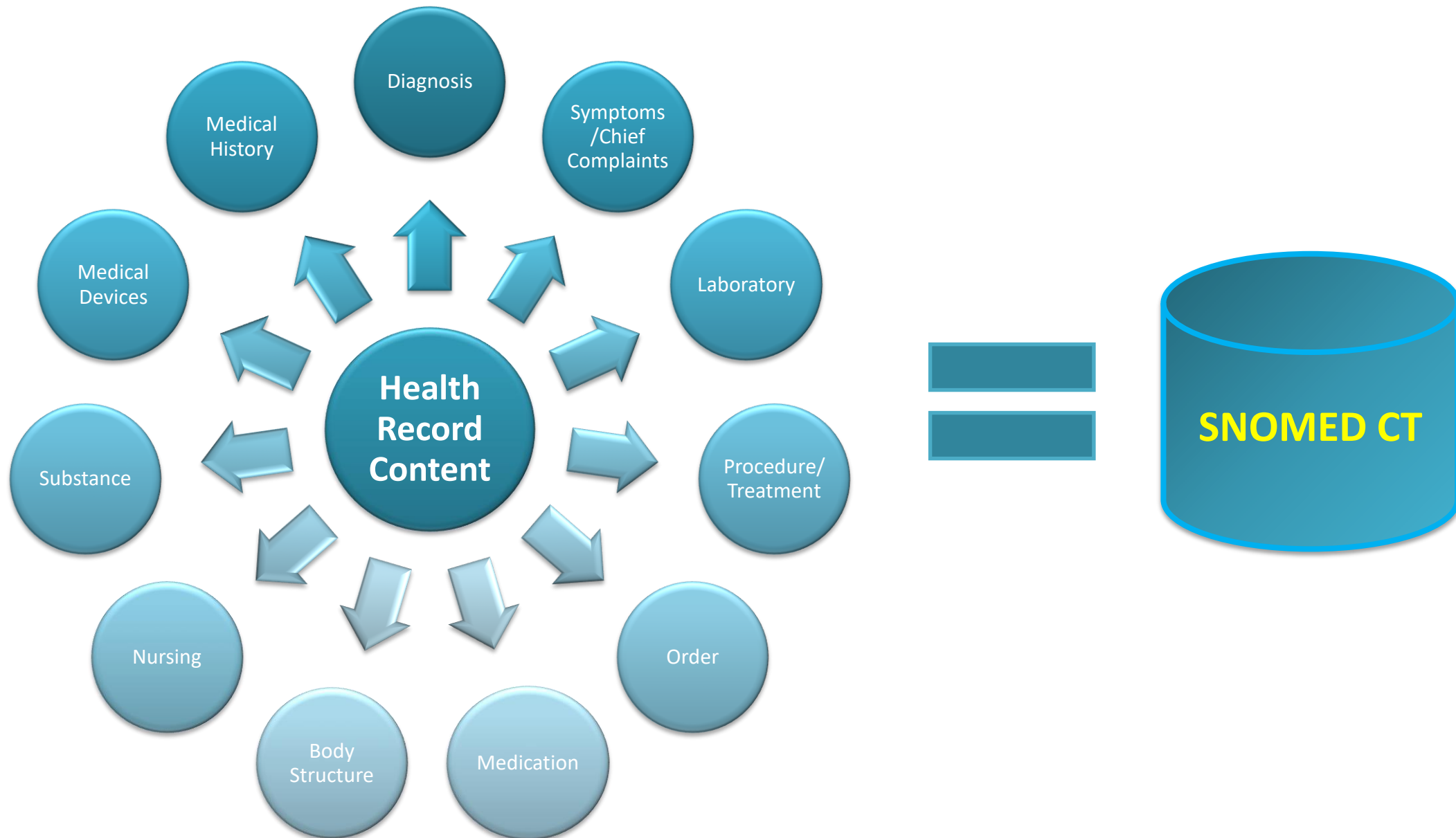
SNOMED CT Hierarchies

- Concepts are divided into 19 hierarchies, which include:

SNOMED CT BASIC COMPONENTS

Concepts

- A "concept" is a clinical meaning identified by a unique numeric identifier (ConceptID) that never changes

- Concepts are represented by a unique human-readable Fully Specified Name (FSN)

- These "logical definitions" give explicit meaning which a computer can process and query on

- Every concept also has a set of terms that name the concept in a human-readable way

Blood pressure   Lung

Sitting Blood pressure   von Recklinghausen's bone disease

dressing   appendectomy

Clinical 'ideas' are Concepts in the terminology

mild   toe

moderate   viral   inflammation

Ischaemic   finger

severe   cough   bacterial

acute   phlegm

exertional   infection

angina

Example:
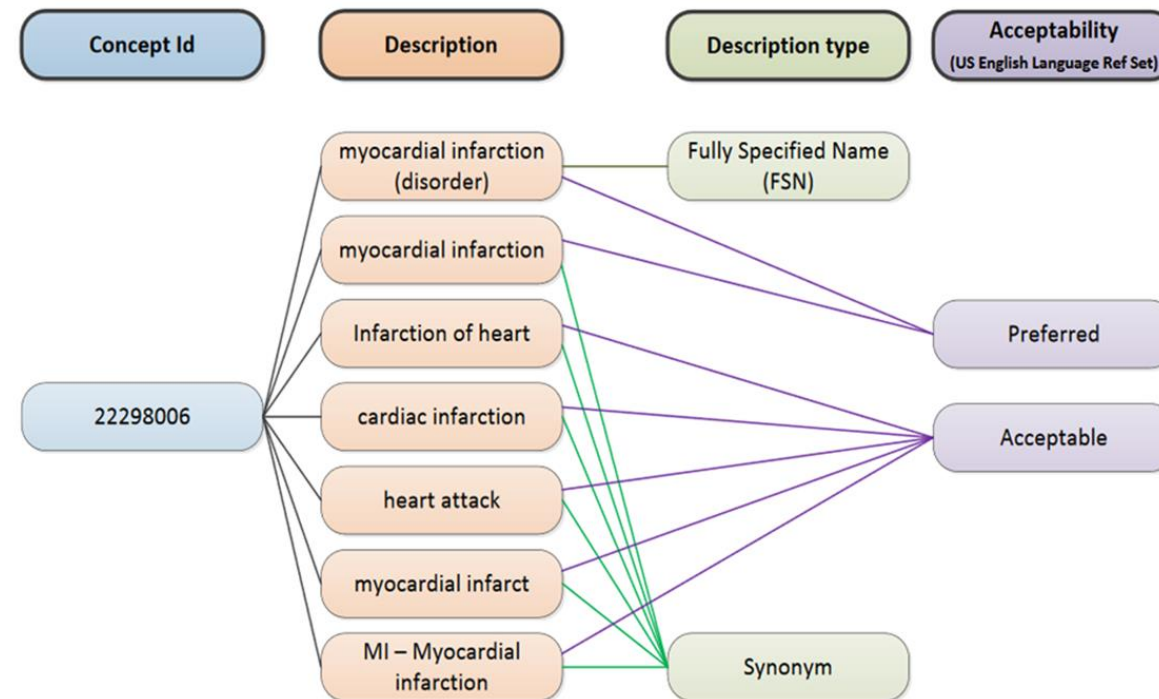22298006 |Myocardial infarction(disorder)|

Descriptions

- Concept descriptions are the terms or names assigned to a SNOMED CT concept
- "Term" in this context means a phrase used to name a concept
- Types of Descriptions
  - Fully Specified Name (FSN)
  - Synonym

Example of descriptions for a single concept (US - English)

Relationships

- Relationships link concepts in SNOMED CT
- Relationships and concept definitions
  - Each concept in SNOMED CT is logically defined through its relationships to other concepts.
  - Every active SNOMED CT concept (except the "SNOMED CT Root concept) has at least one IS_A relationships
- IS_A relationships are also known as "Supertype-Subtype relationships" or "Parent-Child relationships." IS_A relationships are the basis of the SNOMED CT's hierarchies.
- Example:
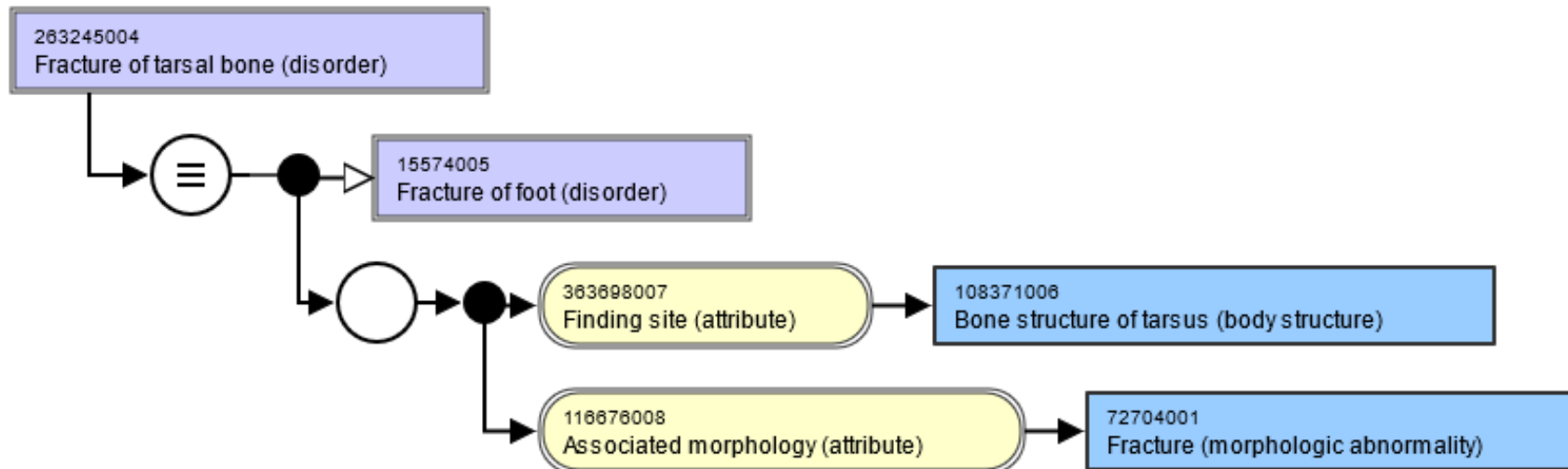
SNOMED CT Logical Model

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SNOMED CT Expressions
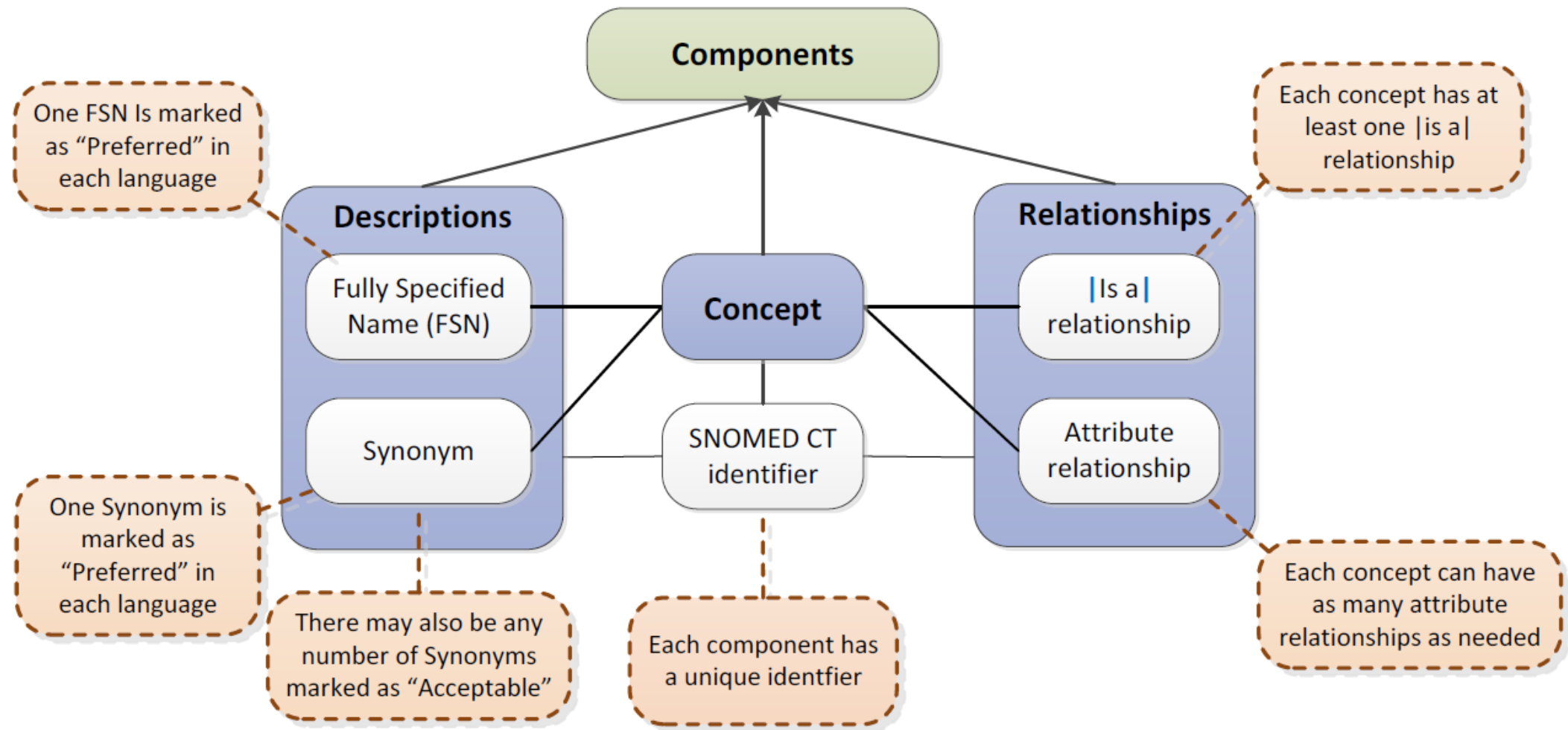
- ## Pre-coordinated Expression

  - Representation of a clinical meaning using a single concept identifier is referred to as a pre-coordinated expression.

  - Examples:

    - 31978002 | Fracture of tibia (disorder) |

    - 174041007 | Laparoscopic emergency appendectomy (procedure) |

- ## Post-coordinated Expression

  - Representation of a clinical meaning using a combination of two or more concept identifiers is referred to as post-coordination.

  - Examples:

    - Laparoscopic removal of device from abdomen

    - 68526006 | Removal of device from abdomen (procedure) | + 86174004 | Laparoscope, device (physical object) |

SNOMED CT IMPLEMENTATION ASPECT
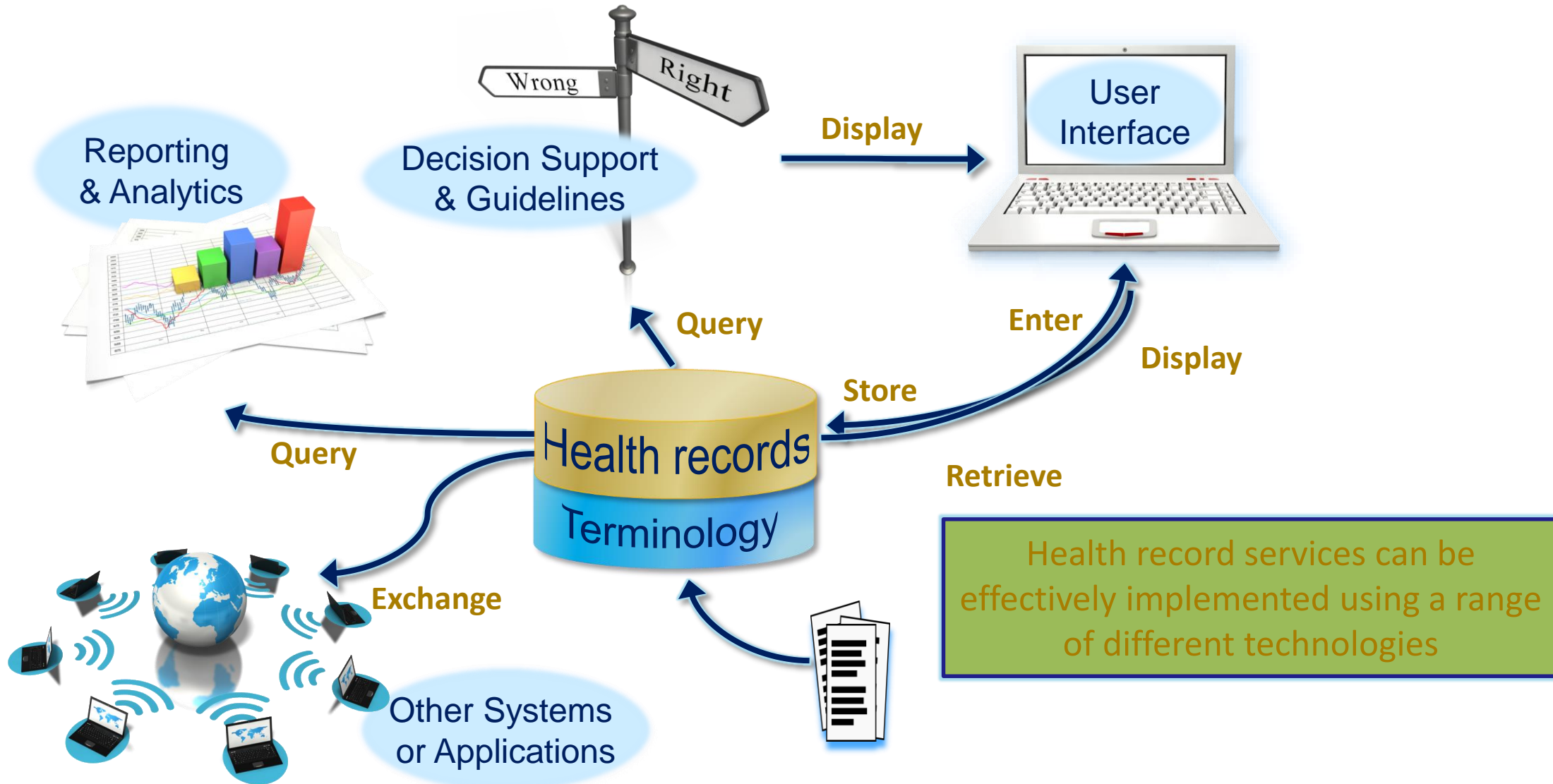
Why Develop Software with SNOMED CT?

- Clinical semantics in a computable form
- Synonyms and dialect-specific descriptions
- Tab-delimited text files can be loaded into any data store
- Regularly updated and fully versioned
- Data analytics uses formal description logic definitions
- Enables applications with
  - Improved user interface design
  - Data stored in a computable form
  - Clinical decision support
  - Common code system for integrated data
  - Data analytics such as population health management and clinical research

The Role of SNOMED CT

Reporting & Analytics

Decision Support & Guidelines

Right

Wrong

Display

User Interface

Query

Enter

Display

Store

Health records

Terminology

Query

Retrieve

Exchange

Other Systems or Applications

Health record services can be effectively implemented using a range of different technologies

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SNOMED CT Implementation Stages

| Adoption | Planning | Specification and Procurement / Design and Development | Deployment | Use |

Strategic   **Technical**   **Practical**

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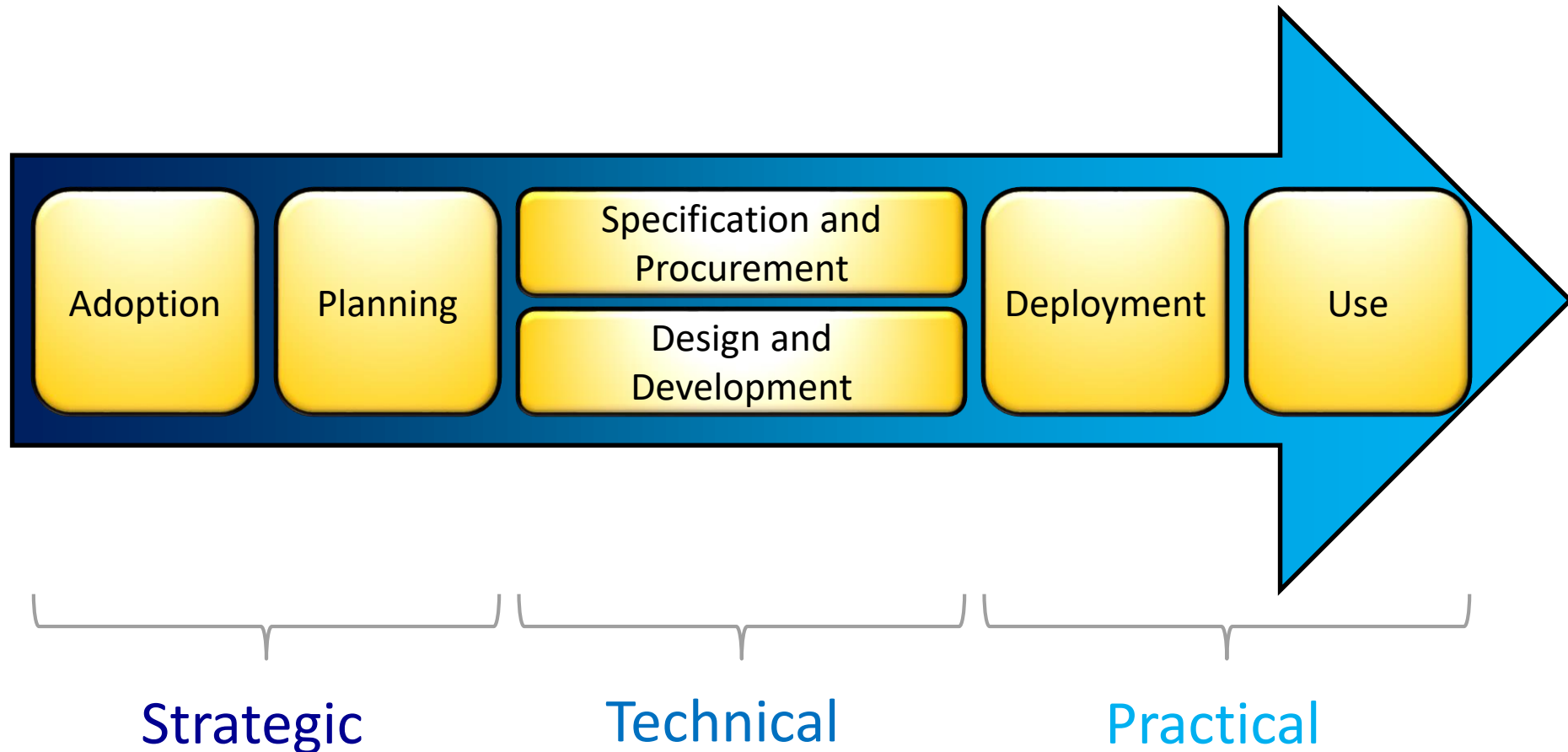
Integration Approaches

- SNOMED CT can be integrated as:

What	Why
A code system	To store clinical information
An interface terminology	To capture and display clinical information
An indexing system	To retrieve clinical information
A common terminology	To communicate in a meaningful way
	To integrate heterogeneous data
A dictionary	To query, analyze and report
	To link health records to knowledge resources
An extensible foundation	To represent new types of clinical data

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Integration of SNOMED CT in Health Records

☰ History		▲	Active Medicines	+	Medical Condition	+

Mr. _____
MRN : ZFO260
| DOB Not Available Add DOB
☏ : _____ 📅 Last Visited : 13 Oct 2017, 03:41 am

[Public] [Payment] [Prescription] [Finish]

Active Medicines
- ALDICORD 16MG TABLET
- AZITHIOPRINE 50MG TABLET
- URIVOID 25MG TABLET
- AZOMARC 250MG TABLET

Medical Condition
- Lucey-Driscoll Syndrome
- Peripheral Neuralgia
- Typhoid Fever
- Common Migraine
- Gingivitis

---

e-Prescription   Load Previous | Clear

Symptom

🔍 Search Symptom

> Vitals

Symptoms

Chest pain

➕ Add Findings / Symptoms

Disorders

Acidaemia

Common migraine

➕ Add Disorders / Disease

Clinical Notes

Patient complaining of uneasiness and acidity

पुरी नींद ले . हल्के प्रानयाम करे

Type Here...

G   [EN]

Symptom list:
- Foot joint temperature finding (finding)   [Expand]
- Peripheral neuropathic pain   [Expand]
- O/E - cold and clammy   [Expand]
- Malarial fever   [Expand]
- Red eye   [Expand]
- Portal-systemic shunt   [Expand]
- Ankle pain (finding)   [Expand]
- Chill (finding)   [Expand]
- Fever   [Expand]
- Swollen gums (finding)   [Expand]
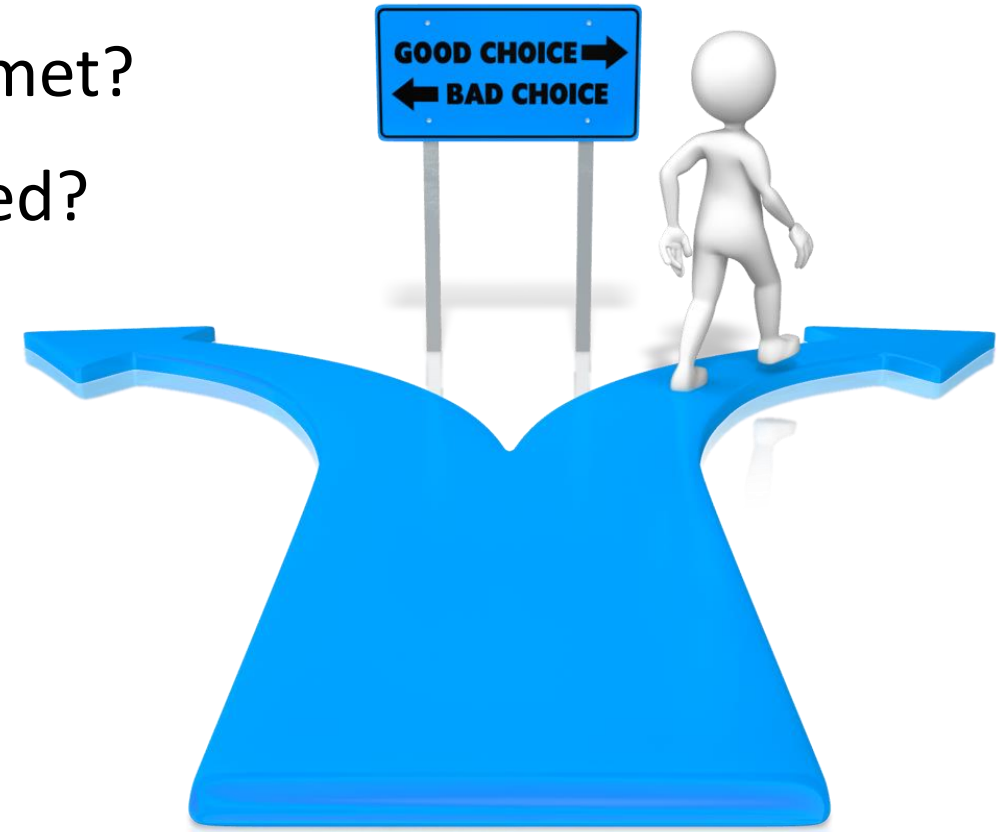- Excessively deep breathing   [Expand]
- Temporomandibular joint tenderness on palpation [Expand]
- Malignant tertian fever (finding)   [Expand]

- What use cases will SNOMED CT support?

- How will SNOMED CT be used?

- How should performance requirements be met?
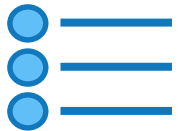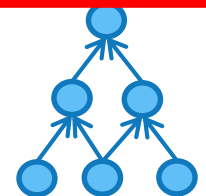
- How will updates to SNOMED CT be managed?

What Use Cases will SNOMED CT Support?

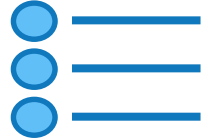|	Simple terminology use	Advanced terminology use
Single patient	• Simple data entry and retrieval of patient data • Sharing of homogeneous patient data	• Aggregated clinical summaries • Clinical decision support • Query clinical history • Link to clinical knowledge
Population	• Integration of homogeneous patient data • Population queries based on simple codes and subset membership	• Population health management • Epidemic surveillance • Clinical research

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- Consider infrastructure and software architecture
    - Non-distributed or distributed architectures
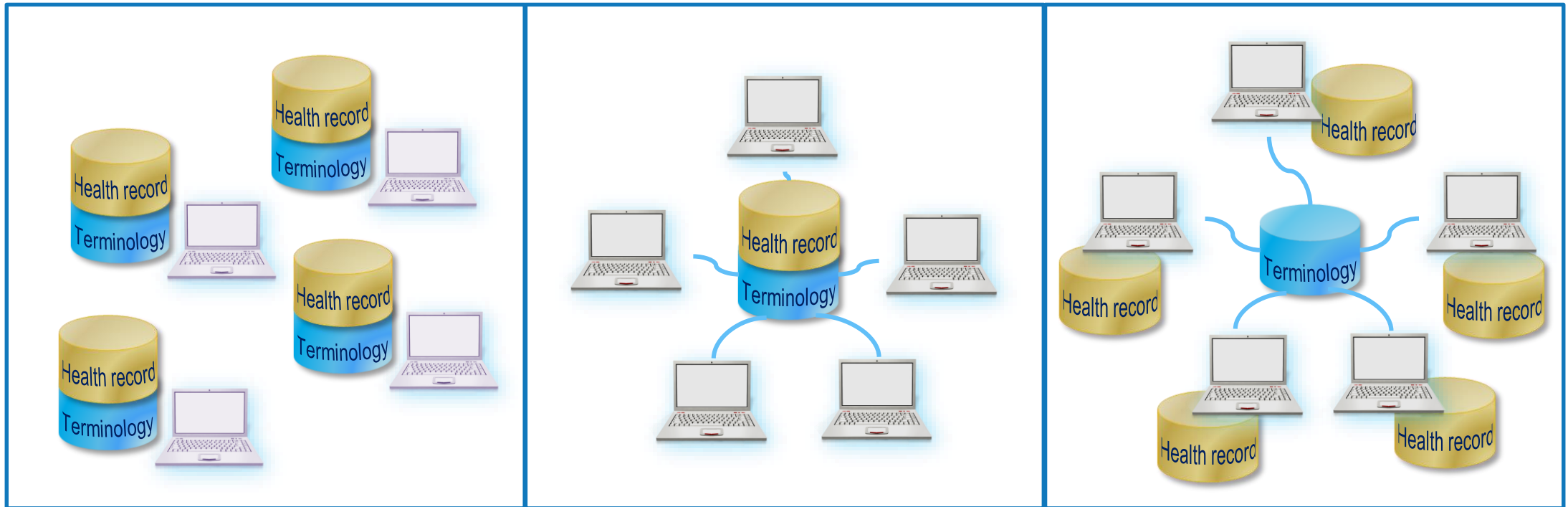
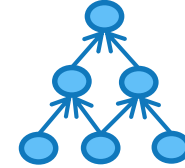# How should performance requirements be met?

Simple Terminology Use

- Effective lexical searching
  - Indexing
  - Lexical optimization techniques

Advanced Terminology Use

- Effective navigation of subtype and attribute relationships
  - Transitive closure
  - Dedicated in-memory technologies
  - Caching
  - Parallel processing

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How will Updates to SNOMED CT be Managed?

- New release of SNOMED CT International Edition
  - Every month
  - All changes captured in version history
  - History of changes necessary to support health records captured using a previous version of the terminology
  - Different release types (Full, Snapshot)
- Managing terminology changes
  - New concepts, descriptions or relationships
  - New subsets, maps or language preferences
  - Updates and inactivations
- National and local editions
  - Contain additional content to support localized data
  - Have their own release cycles

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ADVANCE USAGE OF SNOMED CT

The patient is a frail 88-year-old caucasian male was admitted to our hospital for complaints of nausea and vomiting and suspected urinary tract infection.

He has a past medical history of hypertension, atrial fibrillation and chronic right hip pain after total hip replacement in 2012.

The patient was started on antibiotics. Urine culture confirmed an E. coli urinary tract infection sensitive to trimethoprim.

During admission an episode of possible coffee ground vomiting coupled with his non-steroidal inflammatory drug use prompted an upper GI endoscopy at which no abnormality was detected. Fecal occult blood was negative.

The patient was also provided with physiotherapy and fully remobilised.

Clinical Findings

Concept ID	Preferred term	Finding context	Temporal context	Subject relationship context
16932000	Nausea and vomiting	Known present	Current or specified time	Subject of record
68566005	Urinary tract infectious disease	Suspected	Current or specified time	Subject of record
38341003	Hypertensive disorder	Known present	Current or past	Subject of record
49436004	Atrial fibrillation	Known present	Current or past	Subject of record
49218002	Hip pain	Known present	Current or past	Subject of record
301011002	Escherichia coli urinary tract infection	Known present	Current or past	Subject of record
40835002	Coffee ground vomiting	Possible	Current or specified time	Subject of record
167667006	Fecal occult blood: negative	Known present	Current or specified time	Subject of record

Procedures

Concept ID	Preferred term	Procedure context	Temporal context	Subject relationship context
52734007	Total replacement of hip	Done	Past	Subject of record
117010004	Urine culture	Done	Current or specified time	Subject of record
76009000	Esophagogastroduodenoscopy	Done	Current or specified time	Subject of record
91251008	Physical therapy procedure	Done	Current or specified time	Subject of record

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Analytics using SNOMED CT relationships
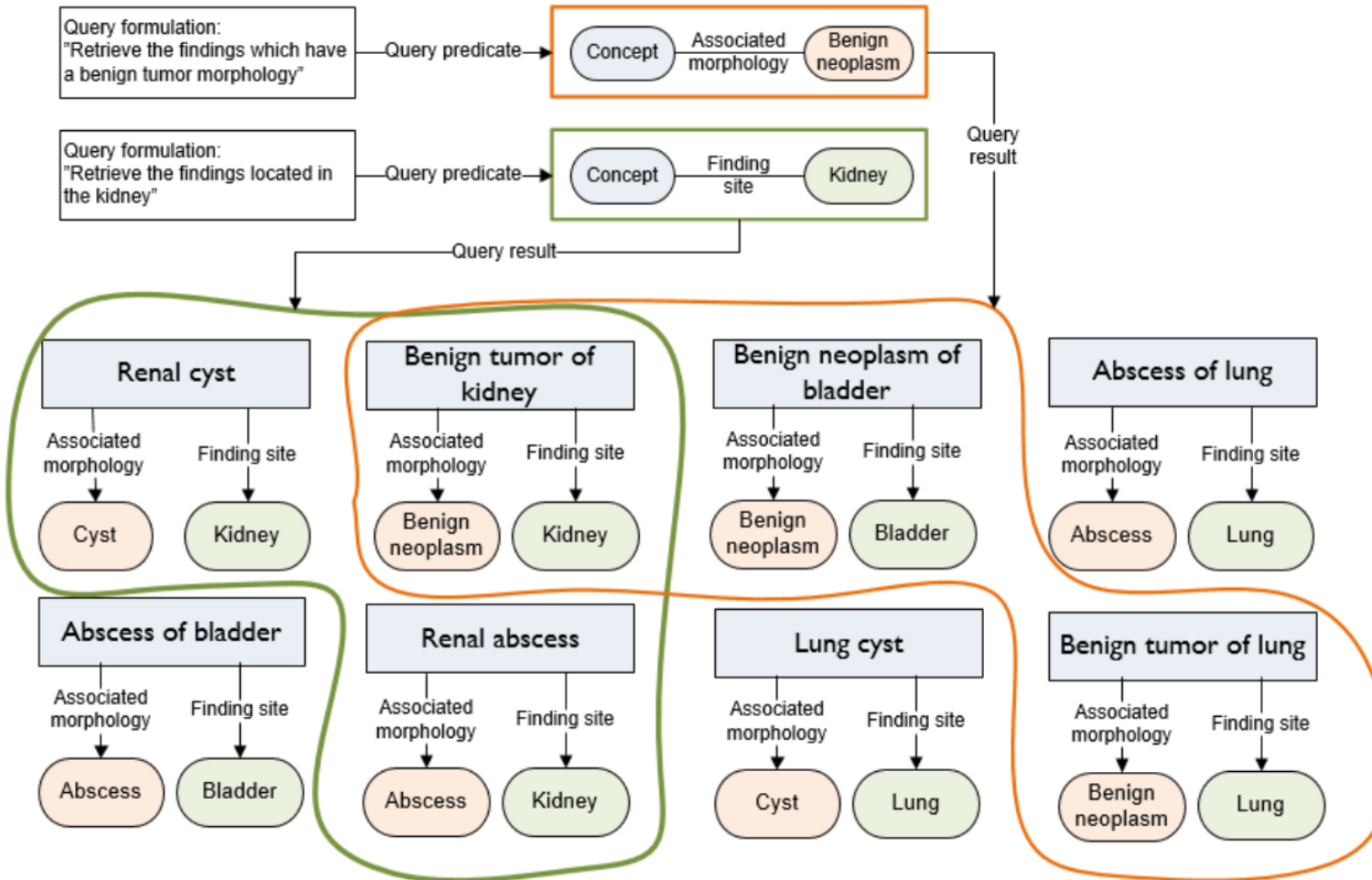
< 404684003 |clinical finding|:
  116676008 |associated morphology| = << 3898006 |benign neoplasm| AND
  363698007 |finding site| = << 64033007 |kidney structure|

Concept ID	Preferred Term
254925008	Benign tumor of renal calyx
254919009	Cortical adenoma of kidney
269489006	Benign tumor of renal parenchyma
254920003	Cystadenoma of kidney
254922006	Oncocytoma of kidney
276866009	Benign tumor of pelviureteric junction
254927000	Benign papilloma of renal pelvis
92319008	Benign neoplasm of renal pelvis
307618001	Juxtaglomerular tumor
254923001	Hemangiopericytoma of kidney
254921004	Angiomyolipoma of kidney
92165001	Benign neoplasm of kidney

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Clinical Decision Support (CDS) with SNOMED CT
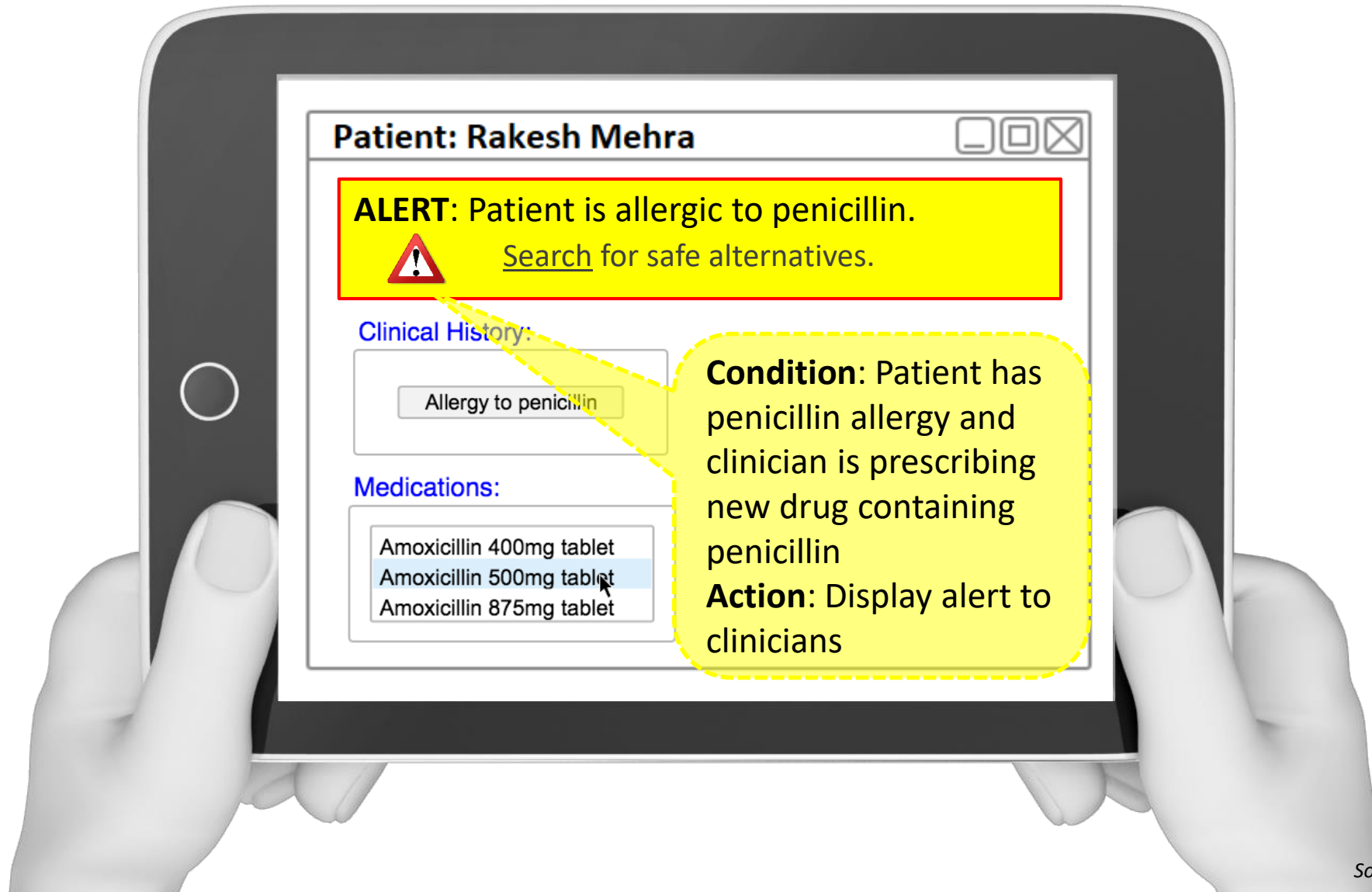
Clinical Decision Support (CDS) with SNOMED CT
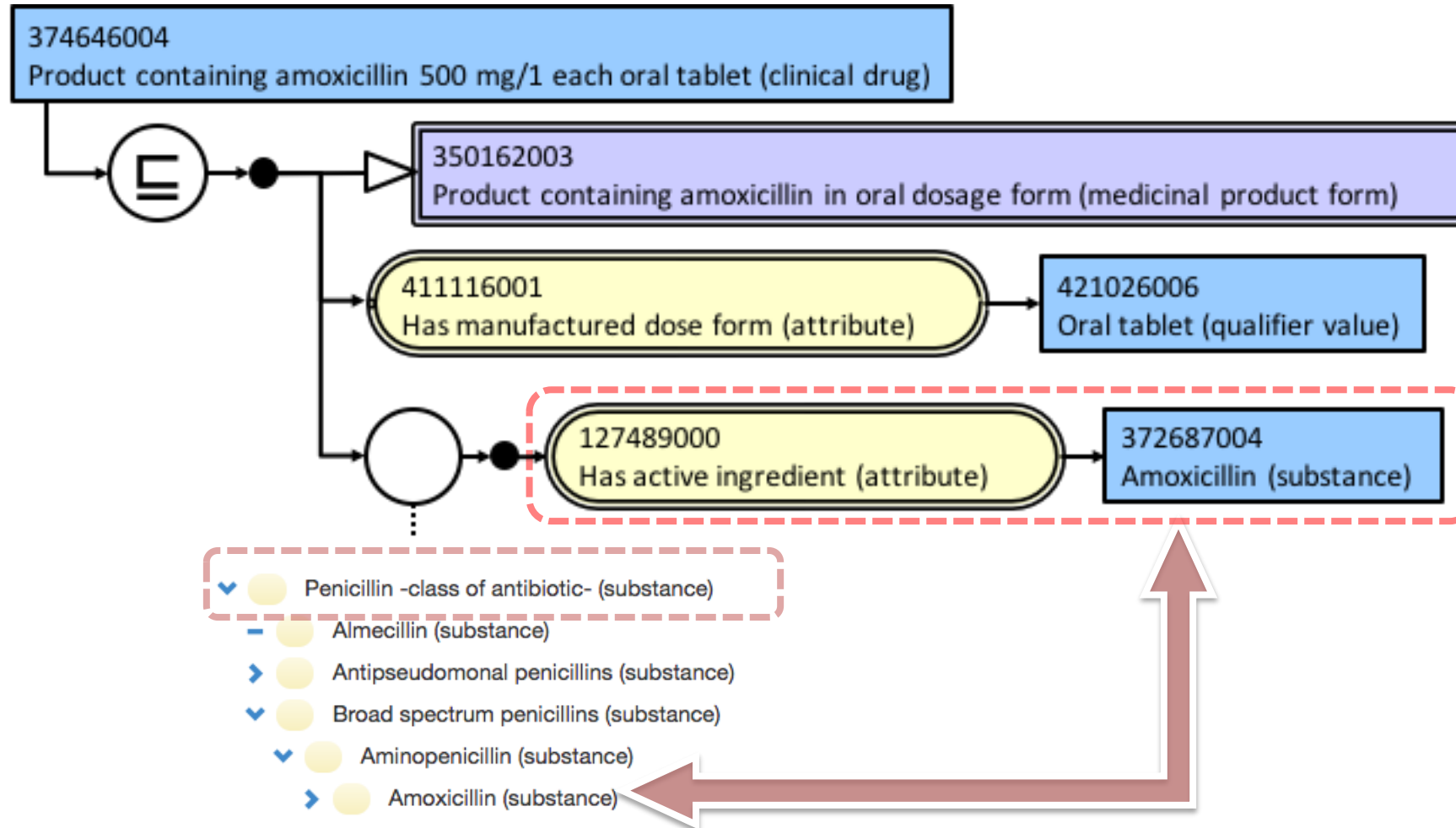
< 373873005 |Pharmaceutical / biologic product|:
127489000 |Has active ingredient| = << 373270004 |Penicillin|

Source – SCT Educational Material

INTEGRATING SNOMED CT

- SNOMED CT is distributed as a set of tab-delimited text files
- Release Package Contains
  - Full Release (containing the complete history of every component ever released)
  - Snapshot Release (containing the current state of every component)
- Available to the registered Affiliates
- MoHFW allows free distribution and usages of SNOMED CT in India
- NRCeS is designated as National Release Center (NRC) for SNOMED CT
- Register for accessing SNOMED CT file at - Member Licensing & Distribution Service (MLDS)

Global Patient Set

- The GPS is a managed list of existing SNOMED CT concepts
- Licensed under the terms of the Creative Commons Attribution 4.0 International Public License
- No cost associated with either the download or use of the GPS
- Supports health information interoperability across care settings, systems, organizations and national borders.
- Download at: GPS Information Page.

SNOMED CT eLearning Courses

SNOMED CT Foundation Course
This course provides an introduction to a broad range of SNOMED CT related topics, including the why, what and how of SNOMED CT.

SNOMED CT Implementation Course
This course provides an in depth understanding of the stages in implementing a SNOMED CT enabled system - from the decision to adopt SNOMED CT, through to design, procurement, development and use.

SNOMED CT Authoring Level 1 Course
This course teaches you the knowledge and skills needed to perform basic SNOMED CT authoring tasks. It also prepares you for the SNOMED CT Authoring Level 1 certification exam.

SNOMED CT for Developers
- The goal of this learning pathway is to teach you enough about SNOMED CT in as short as possible a time to enable you to develop software applications that leverage its capabilities.

SNOMED CT for Data Analysts
- The goal of this learning pathway is to provide a solid understanding of how SNOMED CT can be used to support your clinical data analytics requirements.

Open Source Browsers/Tools

- Links to websites and applications that allow you to view the content of SNOMED Clinical Terms
    - SNOMED CT Browsers - Online
    - SNOMED CT Browsers - Downloadable
    - SNOMED CT Browsers - Mobile Apps

- SNOMED CT – SNOMED in Action - https://www.snomed.org/snomed-ct/snomed-in-action

- SNOMED CT Vendor Portal - https://www.snomed.org/our-customers/vendors/marketplace
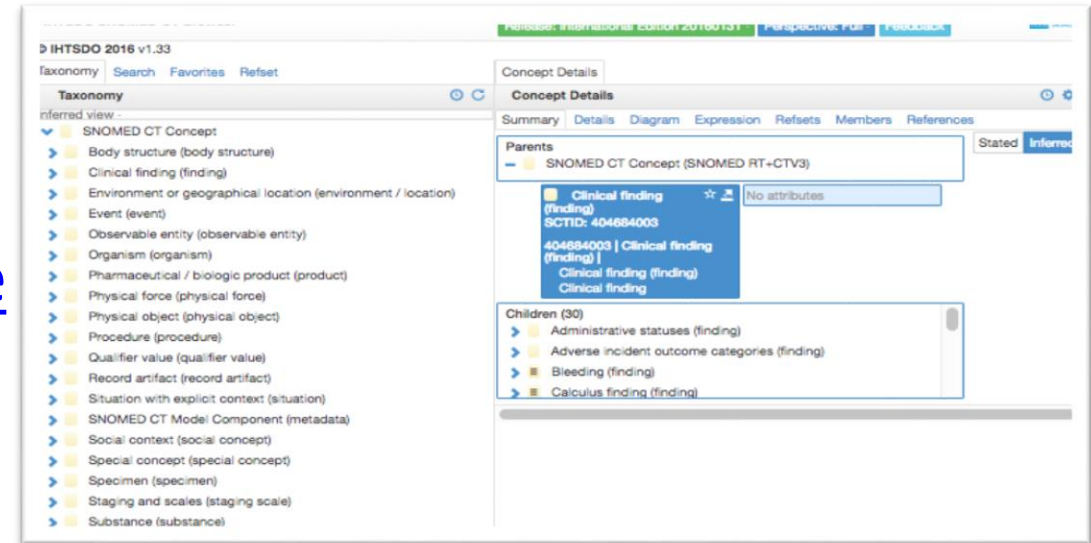
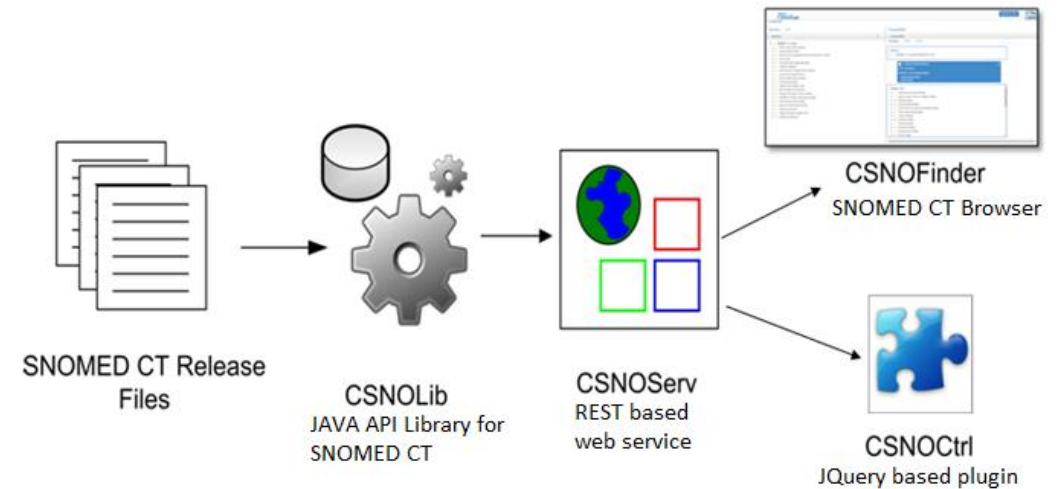# C-DAC's SNOMED CT® Toolkit (CSNOtk)

- C-DAC's Toolkit for SNOMED CT (CSNOtk)
  - Easy to use Object-Oriented API for search, suggest, lookup, and explore
  - Adopted version of SNOMED International Browser
  - Support for national extension(s)
- The CSNOtk is available from C-DAC at www.cdac.in (email: sdk-enq@cdac.in) under Apache License v2.0 as free and open source software.

CSNOFinder
SNOMED CT Browser

SNOMED CT Release Files

CSNOLib
JAVA API Library for SNOMED CT

CSNOServ
REST based web service

CSNOCtrl
JQuery based plugin

CSNOtk Download Page

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CSNOtk - Downloads

C-DAC's Toolkit For SNOMED CT
Version: 7.0 | 16/07/2021

CSNOtk Suite	Download	(File Format: .zip, File Size: 17.5 MB, Updated on: 16/07/2021)
CSNOLib	Download	(File Format: .zip, File Size: 6.47 MB, Updated on: 16/07/2021)
CSNOServ	Download	(File Format: .zip, File Size: 8.22 MB, Updated on: 16/07/2021)
CSNOCtrl	Download	(File Format: .zip, File Size: 942 KB, Updated on: 16/07/2021)
CSNOFinder	Download	(File Format: .zip, File Size: 556 KB, Updated on: 16/07/2021)

CSNOFinder Installer Platform	File Size (in MB)	Download
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Linux_x86_64	12.5	Download
MacOS-X	24.9	Download
MacOS-X-PPC	24.4	Download

LOGICAL OBSERVATION IDENTIFIERS NAMES AND CODES (LOINC)

What LOINC is?

- LOINC stands for Logical Observation Identifiers Names and Codes
- A database & universal standard for identifying medical laboratory observations developed & maintained by the Regenstrief Institute, a US non-profit medical research organization
- Endorsed by the American Clinical Laboratory Association & the College of American Pathologists
- Created in response to the demand for an electronic database for clinical care and management
- Purpose: To assist in the electronic exchange and gathering of clinical results (such as laboratory tests, clinical observations, outcomes management and research)
- Publicly available at no cost

LOINC: Basic Structure

- Codes are unique and have no meaning

- Unique identifier; Not inferable

- Each LOINC record corresponds to a single test or panel

- Includes long names, short names, and synonyms

- LOINC codes have a fixed-length field of 3-7 characters

- Format – nnnnnn-n (where the last n is a mod 10 check digit)

- Number after (-) is the check digit, is automatically created by the coding system

Examples: LOINC codes and formal LOINC names

LOINC CODES	LOINC Names
8886-4	Heart rate method
8889-8	Heart rate by Pulse oximetry
2955-3	Sodium [Moles/volume] in Urine
24356-8	Urinalysis complete panel - Urine
58077-9	Urinalysis complete W Reflex Culture panel - Urine
69742-5	CBC W Differential panel, method unspecified - Blood
34565-2	Vital signs, weight and height panel
44249-1	PHQ-9 quick depression assessment panel [Reported.PHQ]

THE LOINC CONCEPT MODEL

LOINC: Divisions

Laboratory: focuses on the observations and measurements that can be made on specimen

- Chemistry, Hematology, Serology, Microbiology (including parasitology and virology)
- Toxicology , Allergy testing, Molecular pathology
- Drugs and cell counts for blood smears and cerebrospinal fluids
- Antibiotic susceptibilities

Clinical: focuses on the observations and measurements that can be made on patients.

- Vitals signs, Hemodynamics, Intake/output, ECG, Obstetric ultrasound, Cardio echo
- Urologic imaging, Pulmonary ventilator management, Survey instruments, Phenx and other

LOINC: Axes/Part -The Solution

- A formal, distinct, and unique 6-axes/part name

- The database currently has contains 98,268 terms

- LOINC's goal is to create different codes for each test, measurement, or observation that has a clinically different meaning.

- To do that LOINC codes distinguish a given observation (test ordered/reported, survey question, clinical document) across 6 dimensions that we call Parts.

LOINC Parts

Component (Analyte)

- The substance or entity being measured or observed
- For eg: Sodium, Body Weight

Property

- The characteristic or attribute of the analyte
- For eg: Mass Concentration, Catalytic activity

Time

- The interval of time over which an observation was made
- For eg: 24H for a Urine Sodium Concentration

System (Specimen)

- The specimen or thing upon which the observation was made
- For eg: Cerebral Spinal Fluid, Urine, Radial Artery

-

Scale

- How the observation value is quantified or expressed: quantitative, ordinal, nominal

Method

- [OPTIONAL] A high-level classification of how the observation was made. Only needed when the technique affects the clinical interpretation of the results.

Example: LOINC - Axes/Parts

- 18262-6:Cholesterol.in LDL:MCnc:Pt:Ser/Plas:Qn:Direct assay

Axes	CODES	AXES / PART	Description
	18262-6	LOINC code	Unique identifier; Not inferable
I	Cholesterol. in LDL	Component	substance or entity that is measure eg. HIV1 P24 antigen, Cytomegalovirus antibody, Body weight
II	MCnc	Property	Different kinds of quantities eg. MCnc, SCnc etc
III	Pt	Timing	Interval of time for observation eg. 24H, 8H^max heart rate
IV	Ser/ Plas	System	The system (context) or specimen type
V	Qn	Scale	Observations types between quantitative from categorical result
VI	Direct assay	Method	Measure of analysis, Optional

LOINC Names

Fully-Specified Name (FSN)

- The six-part formal Name
- *<component/analyte>:<kind of property of observation or measurement>:<time aspect>:<system type>:<scale>:<method>*
- *For eg- Leukocytes: NCnc: Pt: CSF: Qn: Manual count*

Long Common Name (LCN)

- Clinician-friendly display
- *For eg- Leukocytes [#/volume] in Cerebral spinal fluid by Manual count*

Short Name

- Need a column header in a report
- *For eg- WBC # CSF Manual*

C-DAC's Toolkit for LOINC (CLNtk)

- Specially designed FOSS application for easy access and integration of LOINC standard in health care applications

- Provides simple to use REST APIs for LOINC integration

- Enables clinical informatician and researchers to find out relevant LOINC codes from its components including, long common name, short name, display name, and other related information

- Mapping local code to LOINC performed based on columns such as:
  - Orderable_name
  - Class Name
  - Sample Name

- More details & download available at:

https://www.cdac.in/index.aspx?id=hi_hs_medinfo_loinc_home
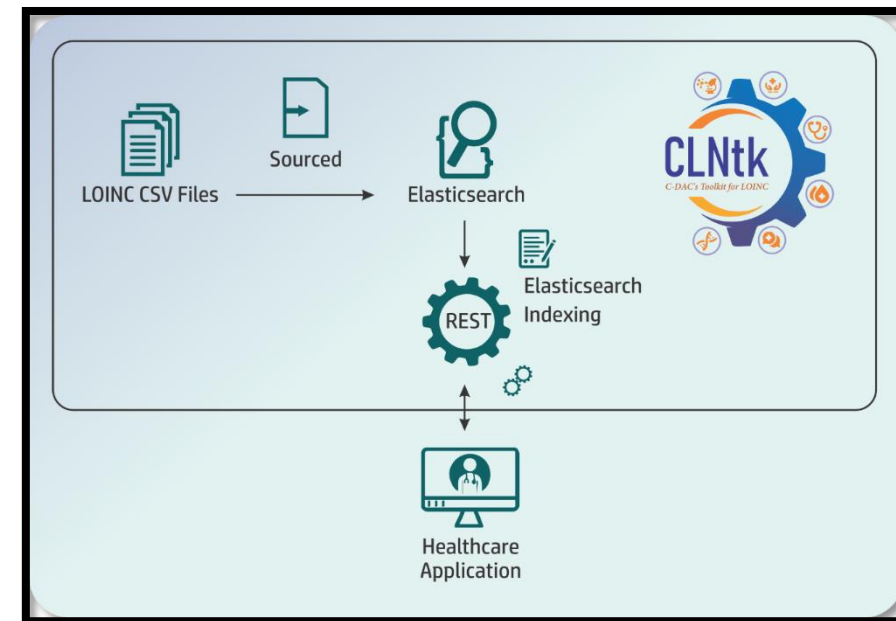
WHO Family of International Classifications (WHO-FIC)

ICD-10

- ICD is designed as a health care classification system, providing a system of diagnostic codes for classifying diseases, including nuanced classifications of a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease-
  - To be used for aggregated information & statistical/epidemiological analysis
  - As mandated by the health regulatory, intelligence, & various research bodies
  - ICD is maintained by the World Health Organization (WHO)
  - Current Version for implementation : ICD-10 – 2016 (as MoHFW Notification 2016)
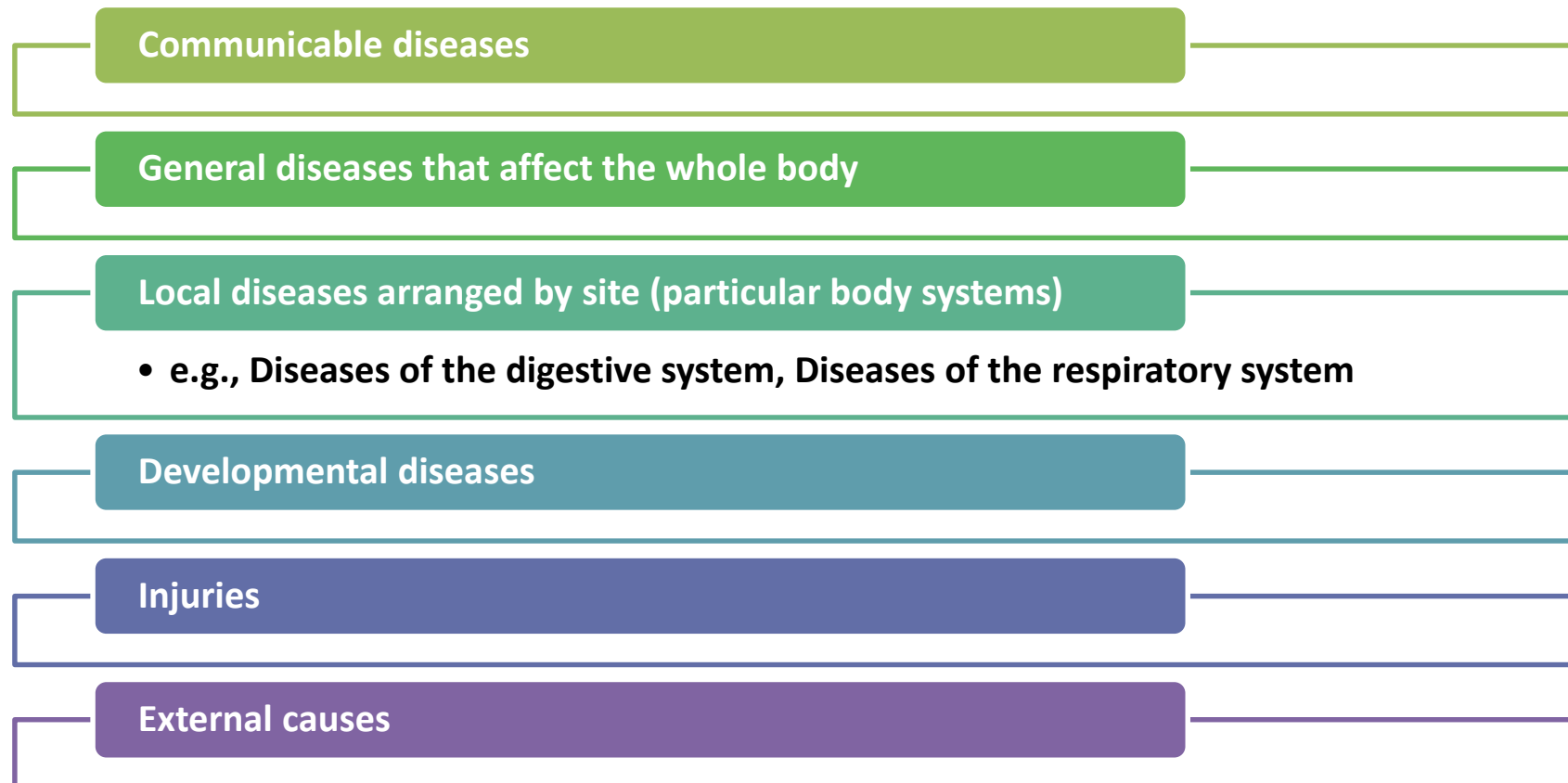
Purpose of Health Classifications

- To support clinical care:
    - Monitoring of the incidence and prevalence of a disease
    - Observing reimbursements and resource allocation trends
    - Keeping track of safety and quality guidelines
- To allow for immediate and longitudinal data management and retrieval across a number of different groups
- Allows HIMs and others to retrieve aggregated data to support their decisions and policies
- Provides mechanism for activity based funding
- Allows government bodies to conduct epidemiological research of health trends
- Allows health data comparisons in the same location across different time periods.

ICD-10 Coverage

- In ICD-10 the information about diseases and conditions and their causes is grouped as follows:

Communicable diseases

General diseases that affect the whole body

Local diseases arranged by site (particular body systems)

- e.g., Diseases of the digestive system, Diseases of the respiratory system

Developmental diseases

Injuries

External causes

ICD 10 Package Structure

Volume 1
The Tabular List

An alphanumeric listing of diseases, disease groups and health related problems

Contains inclusion and exclusion notes and some coding rules (e.g., C03)

22 chapters and over 11400 four-character codes

Volume 2
The Instruction Manual

Instructions on mortality i.e. causes of death **&** **morbidity** e.g. hospital statistics **coding data**

Golden Coding Rule Number 1
Volumes 1 and 3 must be used together to correctly find

Volume 3
The Alphabetical Index

An alphabetical list of the diseases and conditions which have code in tabular list

More entries than Tabular List because some diseases have more than one name and code

ICD 10 : COMPOSITION OF CHAPTERS

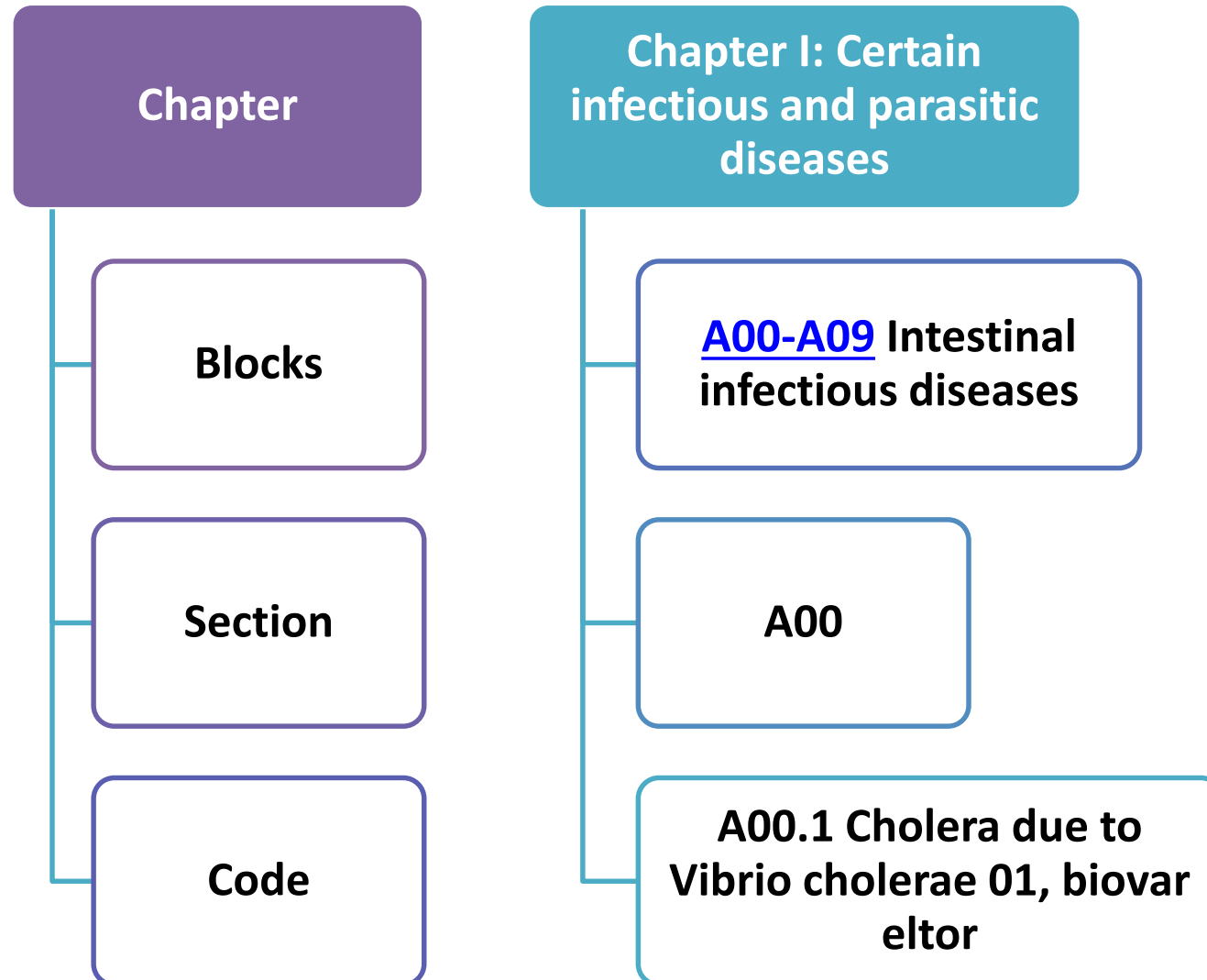| Chapter number and designation	Range of codes
I Certain infectious and parasitic diseases	A00-B99
II Neoplasms	C00-D48
III Disease of the blood and blood forming organs and certain disorders involving the immune mechanism	D50-D89
IV Endocrine, nutritional and metabolic diseases	E00-E90
V Mental and behavioural disorders	F00-F99
VI Diseases of the nervous system	G00-G99
VII Diseases of the eye and adnexa	H00-H59
VIII Diseases of the ear and mastoid process	H60-H95
IX Diseases of the circulatory system	I00-I99
X Diseases of the respiratory system	J00-J99
XI Diseases of the digestive system	K00-K93
XII Disease of the skin and subcutaneous tissue	L00-L99
XIII Diseases of the musculo-skeletal system and connective tissue	M00-M99
XIV Disease of the genito-urinary system	N00-N99
XV Pregnancy, childbirth and the puerperium	O00-O99
XVI Certain conditions originating in the perinatal period	P00-P95
XVII Congenital malformations, deformations, and chromosomal abnormalities	Q00-Q99
XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	R00-R99
XIX Injury, poisoning and certain other consequences of external causes	S00-T98
XX External causes of morbidity and mortality	V01-Y98
XXI Factors influencing health status and contact with health services	Z00-Z98
XXII Codes for special purposes	U00-U85

Structure Of An ICD 10 Code

- F20.10 Hebephrenic schizophrenia continuous course

- F- Mental and Behavioral disorder

- 20 Schizophrenia

- .1 Hebephrenic type

-   0 Continuous course

- 5, 6th character – for specific purpose/research

- "U" codes – unused codes

ANATOMY OF AN ICD-10 CODE

Category   Location   Extension

F20 . **1** **0**

Etiology   Laterality
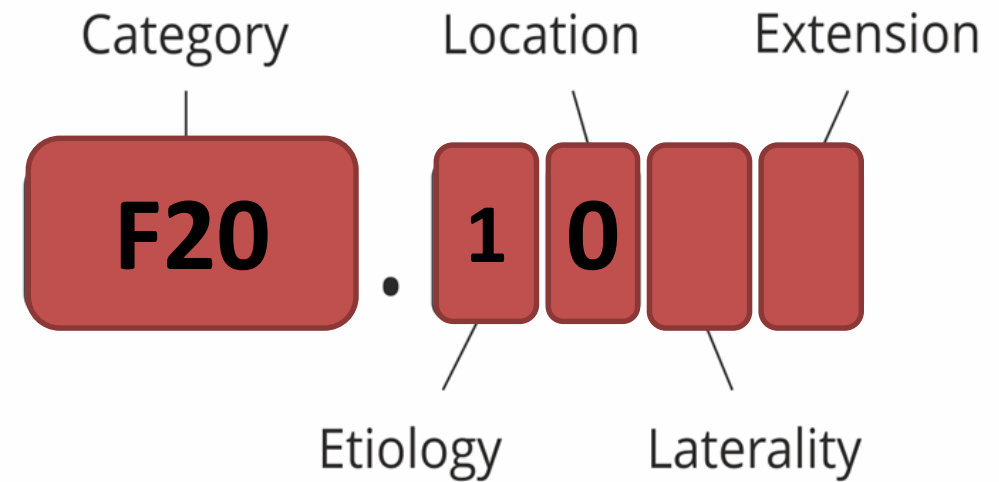
ICD-10 code for torus fracture of lower right end of right radius, initial encounter for closed fracture

ICD-10 code Arrangement

Chapter

Blocks

Section

Code

Chapter I: Certain infectious and parasitic diseases

A00-A09 Intestinal infectious diseases

A00

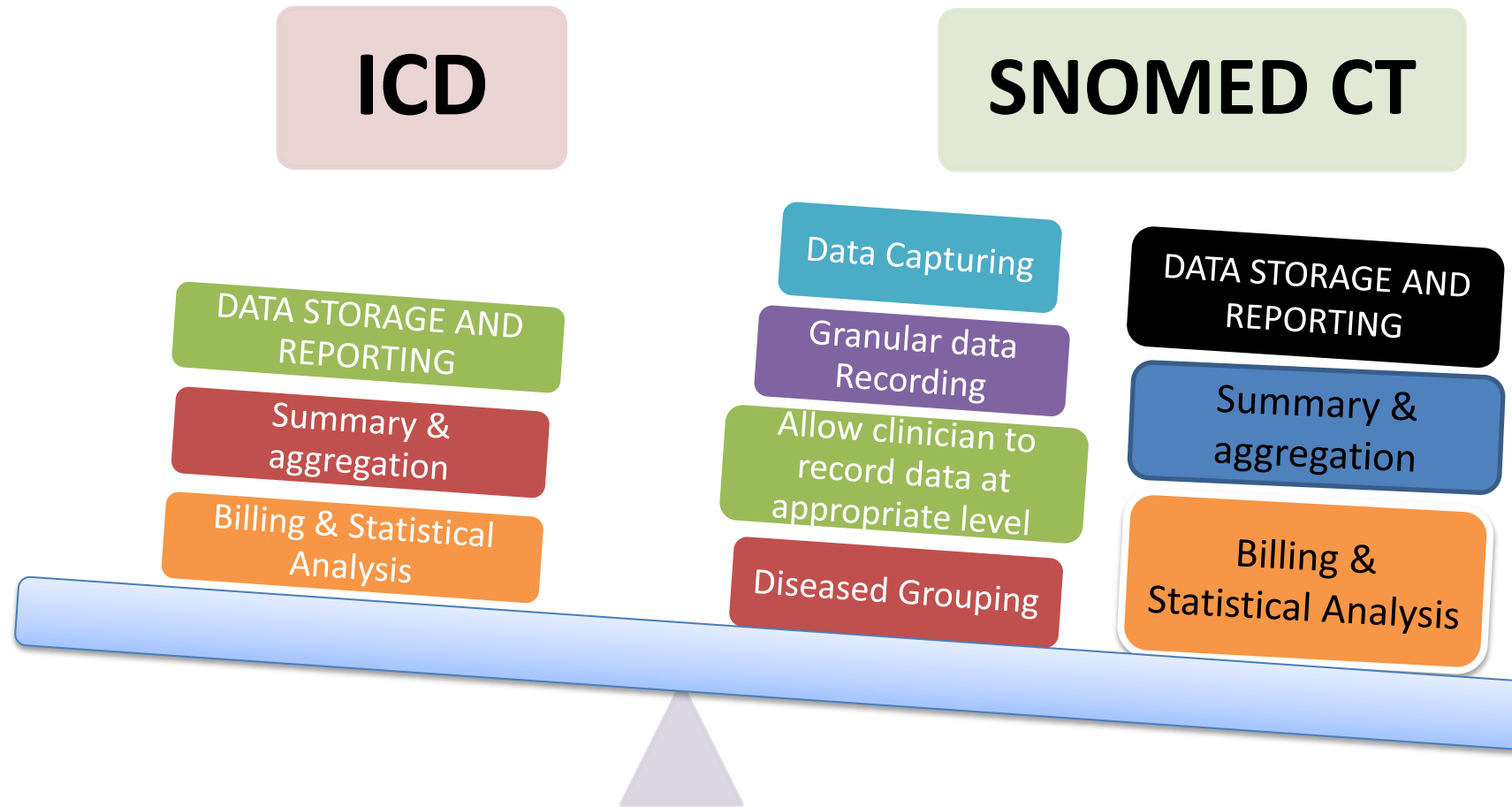A00.1 Cholera due to Vibrio cholerae 01, biovar eltor

Get ICD-10

- ICD-10 classification codes are provided in ClaML (XML based file format) with other related materials

- Available from WHO Website download area

- You will need to register and accept the license before downloading

- [get here](get-here)

- More information could be found at NRCeS website

Mapping SNOMED CT to ICD-10

- SNOMED CT is to be used as primary terminology in healthcare application

- SNOMED CT to ICD-10 maps developed by SNOMED International and WHO

- Maps can be used for classification and reporting as required for regulatory purposes

- C-DAC's Toolkit for SNOMED CT (CSNOtk) provides an API for SNOMED CT to ICD-10 mapping which can be consumed directly to get classification

- Few input parameters provides more appropriate mapping (age, gender, etc.)

SNOMED CT , LOINC and ICD

	SNOMED CT	LOINC	ICD 10
Purpose	Clinical vocabulary standard	Diagnostic test and observation terminology	Classification coding system
Numbers of codes	**4,48,261 unique concepts** relevant in healthcare, with more than 1.3 million descriptions	Around 90,000 diagnostic measurement and observations	17,000 diagnostic categories, with over 100,000 medical diagnostic index terms
Multilingual	Yes. Several language releases are available	Possible	Possible
Licensing	Freely available for usage in Member Countries by registration	Free for use by registration	Available under Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Intergovernmental Organization (CC BY-NC-SA 3.0 IGO) license. Registration and permission is required
What can be answered by their use	What was the disease, specifically? What procedure was performed, body part involved? What were the generics prescribed? What lab-tests where ordered? Was there any clinical risk involved? What was the disability, What was the cancer tumour characteristics?	What method was used for performing the test? Which system was tested? Any temporal parameters involved? What was the measuring units used/reported?	What was the disease, broadly? Was the disease a repeat? How many people had a particular disease?

Thank You

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