

SNOMED CT search techniques

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Delivering

SNOMED CT

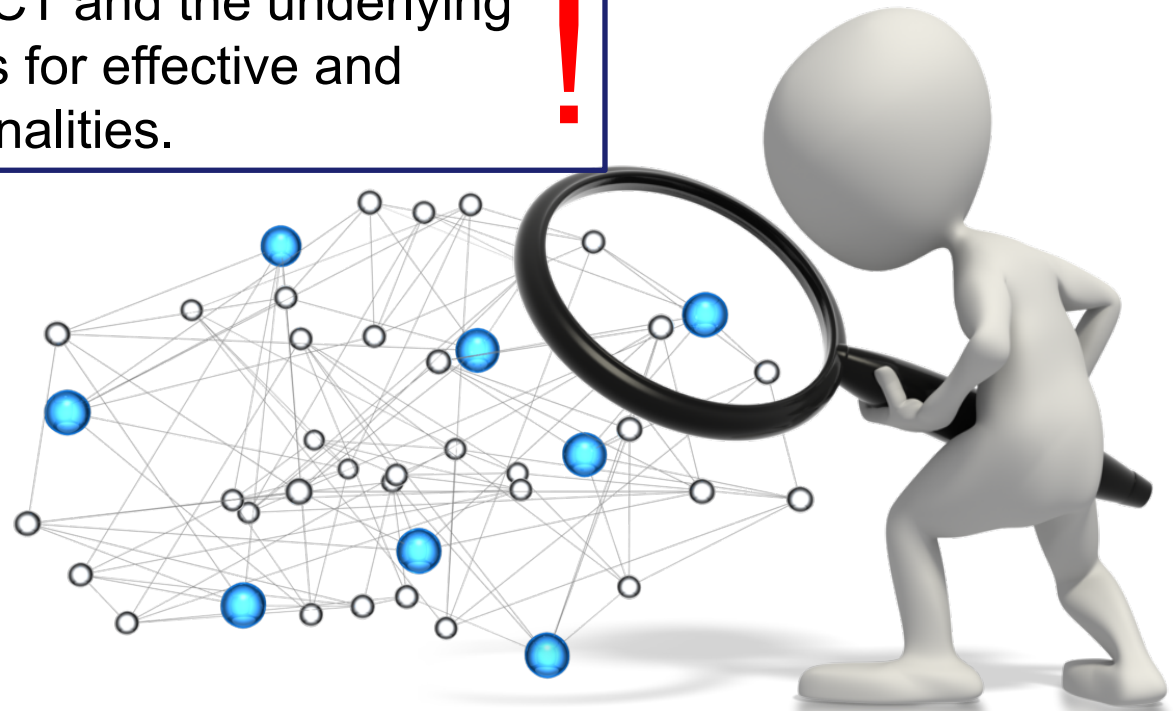
The global
language of
healthcare

Why do we need search capabilities?

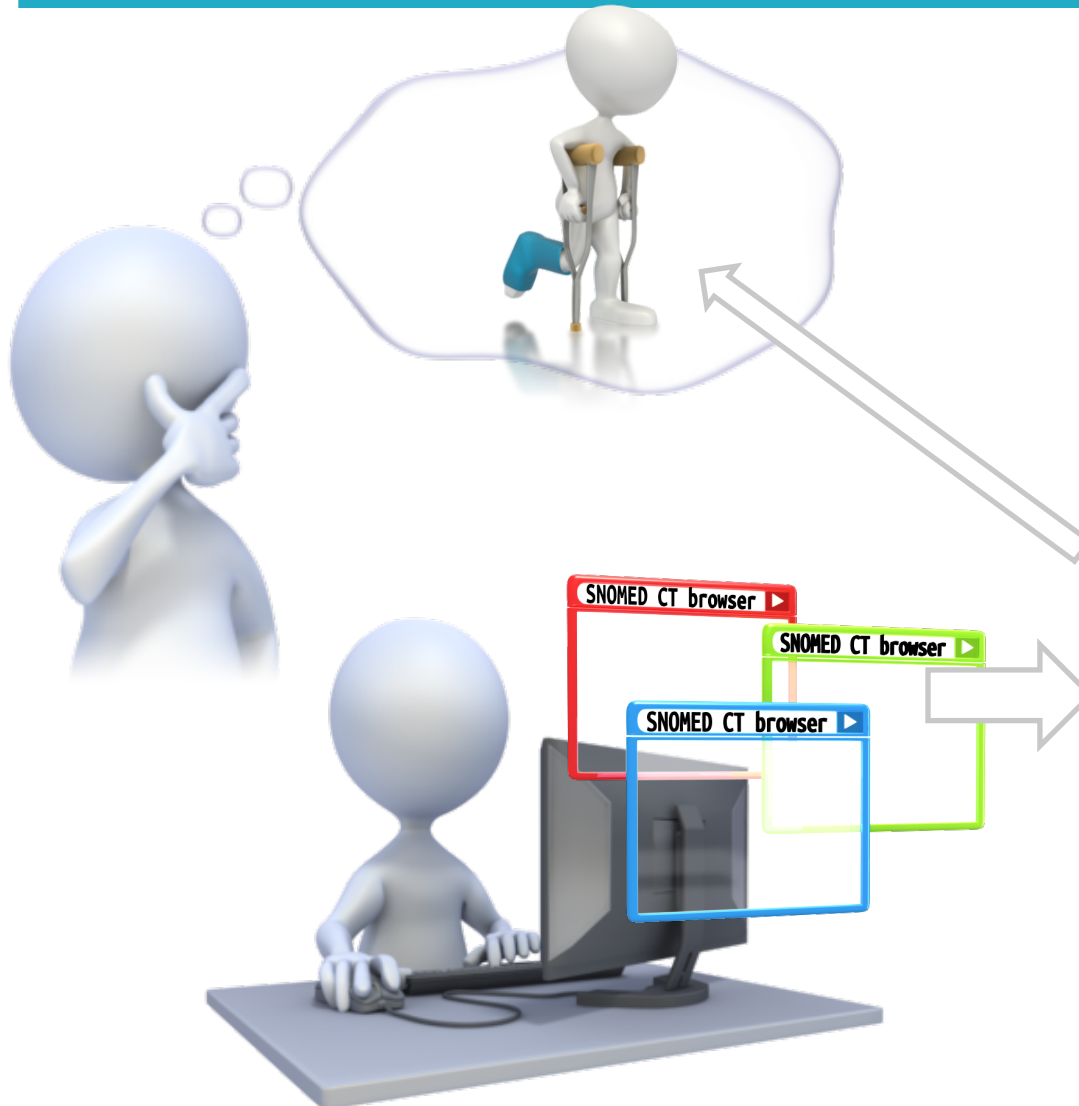
SNOMED CT is the most comprehensive, clinical healthcare terminology in the world.

It includes concepts representing the wide range of types of information that need to be recorded in clinical records.

The size of SNOMED CT and the underlying logical model demands for effective and efficient search functionalities. **!**



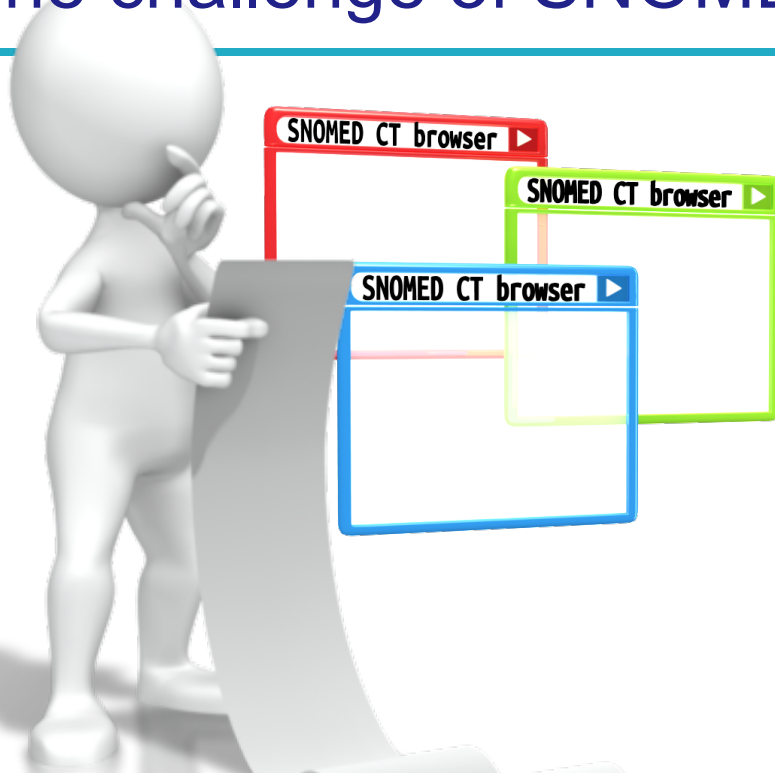
What is SNOMED CT search?



- Fracture of lower limb
- Injury of ankle
- **Fracture of ankle**
- Closed fracture of ankle
- Fracture dislocation of ankle joint
- Fracture of distal end of fibula
- Fracture of distal end of tibia
- Fracture of talus
- Open fracture of ankle

The challenge of SNOMED CT searches

- Diabetes type
- renal diabetes
- Labile diabetes
- Latent diabetes
- Bronze diabetes
- Diabetes clinic
- Brittle diabetes
- Bronzed diabetes
- Diabetes mellitus
- Chemical diabetes
- Diabetes resolved
- Diabetes dietitian
- Diabetes dietitian
- Anemia of diabetes
- Diabetes monitored
- Phosphate diabetes
- Diabetes insipidus
- Diabetes diet
- Anaemia of diabetes
- Adult diabetes



EXAMPLES OF SEARCH TECHNIQUES

Search by terms

- String searches must be user configurable to support searches, such as searching for:
 - words any order
 - phrase match
 - identical term

Search by terms (Words any order)

Type at least 3 characters ✓ Example: *shou fra*

myo inf

359 matches found in 0.214 seconds.







☰ Infective myositis	Infective myositis (disorder)
☰ Myocardial infarct	Myocardial infarction (disorder)
● Infantile myotonia	Infantile myotonia (disorder)
☰ Infectious myositis	Infective myositis (disorder)
● Infestation by Myobia	Infestation by Myobia (disorder)
☰ Myocardial infarction	Myocardial infarction (disorder)
☰ Infective myocarditis	Myocarditis due to infectious agent (disorder)

Search by terms (Phrase match)

Type at least 3 characters ✓ Example: *blistered finger*

"Myocardial infarct" ✕

269 matches found in 0.619 seconds.

 <u>Myocardial infarct</u>	Myocardial infarction (disorder)
 <u>Myocardial infarction</u>	Myocardial infarction (disorder)
 Myocardial ischemia manifest on stress test status post <u>myocardial infarction</u>	Myocardial ischemia manifest on stress test status post myocardial infarction (finding)
 Myocardial ischaemia manifest on stress test status post <u>myocardial infarction</u>	Myocardial ischemia manifest on stress test status post myocardial infarction (finding)
 Myocardial ischemia manifest on stress test status post <u>myocardial infarction</u> (finding)	Myocardial ischemia manifest on stress test status post myocardial infarction (finding)
 Old <u>myocardial infarction</u>	Old myocardial infarction (disorder)

Search by identifiers - Searching for cold

(Concept Id:13645005)

13645005	
☰ Chronic obstructive lung disease	Chronic obstructive lung disease (disorder)
☰ COLD	Chronic obstructive lung disease (disorder)
☰ COPD	Chronic obstructive lung disease (disorder)
☰ Chronic airway obstruction	Chronic obstructive lung disease (disorder)
☰ Chronic irreversible airway obstruction	Chronic obstructive lung disease (disorder)
☰ Chronic airflow obstruction	Chronic obstructive lung disease (disorder)
☰ CAFL - Chronic airflow limitation	Chronic obstructive lung disease (disorder)
☰ COAD - Chronic obstructive airways disease	Chronic obstructive lung disease (disorder)
☰ CAO - Chronic airflow obstruction	Chronic obstructive lung disease (disorder)
☰ Chronic airflow limitation	Chronic obstructive lung disease (disorder)
☰ CAL - Chronic airflow limitation	Chronic obstructive lung disease (disorder)
☰ COPD - Chronic obstructive pulmonary disease	Chronic obstructive lung disease (disorder)
☰ Chronic obstructive airway disease	Chronic obstructive lung disease (disorder)
☰ Chronic airway disease	Chronic obstructive lung disease (disorder)
☰ COLD - Chronic obstructive lung disease	Chronic obstructive lung disease (disorder)
☰ Chronic obstructive pulmonary disease	Chronic obstructive lung disease (disorder)
☰ Chronic obstructive lung disease (disorder)	Chronic obstructive lung disease (disorder)

Search by identifiers - Searching for cold

(Concept ID:13645005)

F	★	Chronic obstructive lung disease (disorder)	Preferred
S	✓	CAFL - Chronic airflow limitation	Acceptable
S	✓	CAL - Chronic airflow limitation	Acceptable
S	✓	CAO - Chronic airflow obstruction	Acceptable
S	✓	COAD - Chronic obstructive airways disease	Acceptable
S	✓	COLD	Acceptable
S	✓	COLD - Chronic obstructive lung disease	Acceptable
S	✓	COPD	Acceptable
S	✓	COPD - Chronic obstructive pulmonary disease	Acceptable
S	✓	Chronic airflow limitation	Acceptable
S	✓	Chronic airflow obstruction	Acceptable
S	✓	Chronic airway disease	Acceptable
S	✓	Chronic airway obstruction	Acceptable
S	✓	Chronic irreversible airway obstruction	Acceptable
S	✓	Chronic obstructive airway disease	Acceptable
S	★	Chronic obstructive lung disease	Preferred
S	✓	Chronic obstructive pulmonary disease	Acceptable

ConceptId:
13645005

Search by identifiers - Searching for cold (DescriptionId: 475424014)

475424014 ✕	
☰ CAO - Chronic airflow obstruction	Chronic obstructive lung disease (disorder)

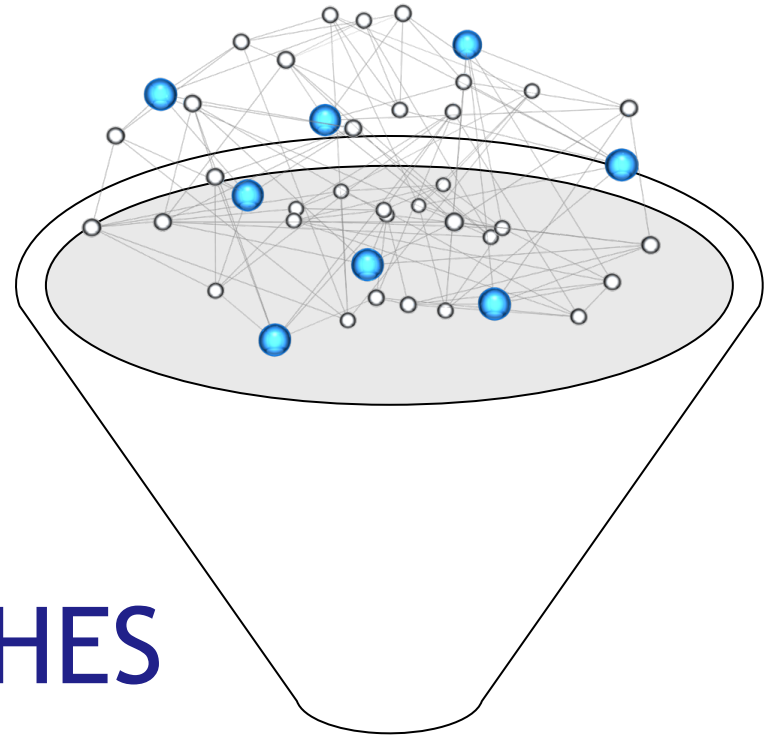
Search by identifiers - Searching for cold

(Concept ID:13645005)

F	★	Chronic obstructive lung disease (disorder)	Preferred	739041012
S	✓	CAFL - Chronic airflow limitation	Acceptable	475422013
S	✓	CAL - Chronic airflow limitation	Acceptable	475426011
S	✓	CAO - Chronic airflow obstruction	Acceptable	475424014
S	✓	COAD - Chronic obstructive airways disease	Acceptable	475423015
S	✓	COLD	Acceptable	23289016
S	✓	COLD - Chronic obstructive lung disease	Acceptable	475430014
S	✓	COPD	Acceptable	23290013
S	✓	COPD - Chronic obstructive pulmonary disease	Acceptable	475427019
S	✓	Chronic airflow limitation	Acceptable	475425010
S	✓	Chronic airflow obstruction	Acceptable	475421018
S	✓	Chronic airway disease	Acceptable	475429016
S	✓	Chronic airway obstruction	Acceptable	475419011
S	✓	Chronic irreversible airway obstruction	Acceptable	475420017
S	✓	Chronic obstructive airway disease	Acceptable	475428012
S	★	Chronic obstructive lung disease	Preferred	23287019
S	✓	Chronic obstructive pulmonary disease	Acceptable	475431013

ihtsdo

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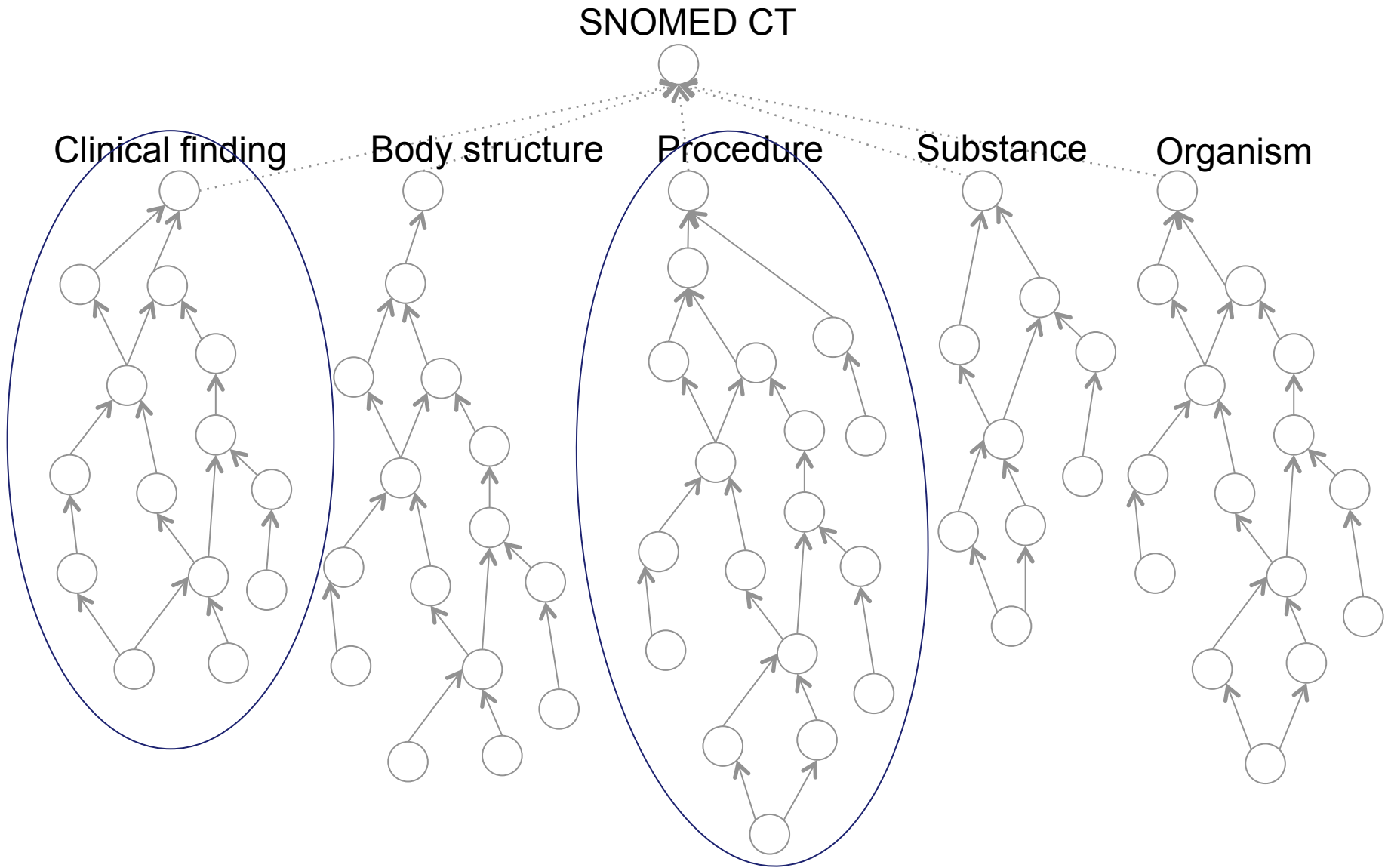


CONSTRAIN SEARCHES



Result

Constrain search by hierarchy



Type at least 3 characters ✓ Example: *shou fra*

blood pressure|

337 matches found in 0.421 seconds.

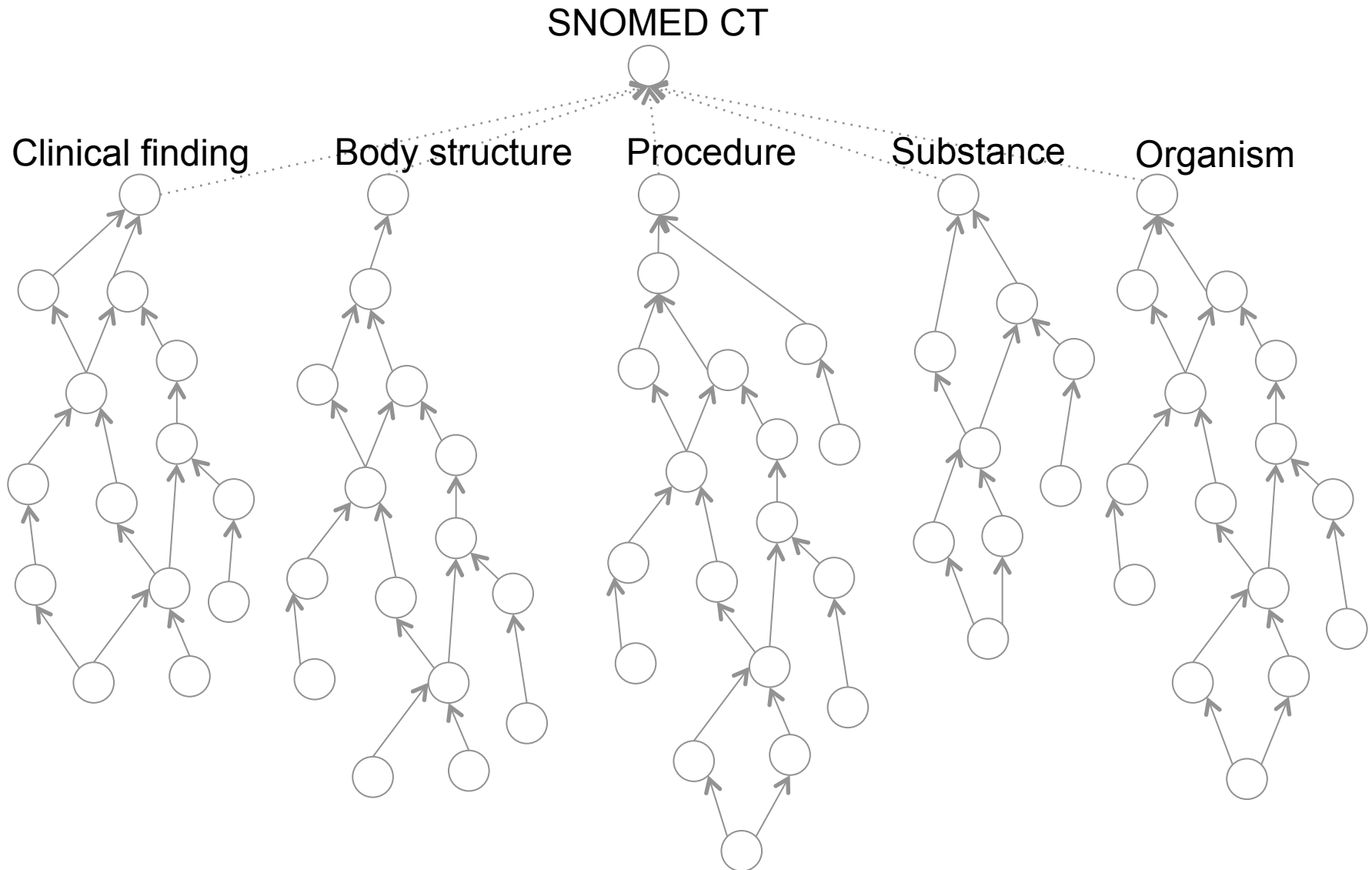
● Blood pressure	Blood pressure (observable entity)
● Low blood pressure	Low blood pressure (observable entity)
● Cuff blood pressure	Non-invasive arterial pressure measurement (observable entity)

Filter results by Semantic Tag

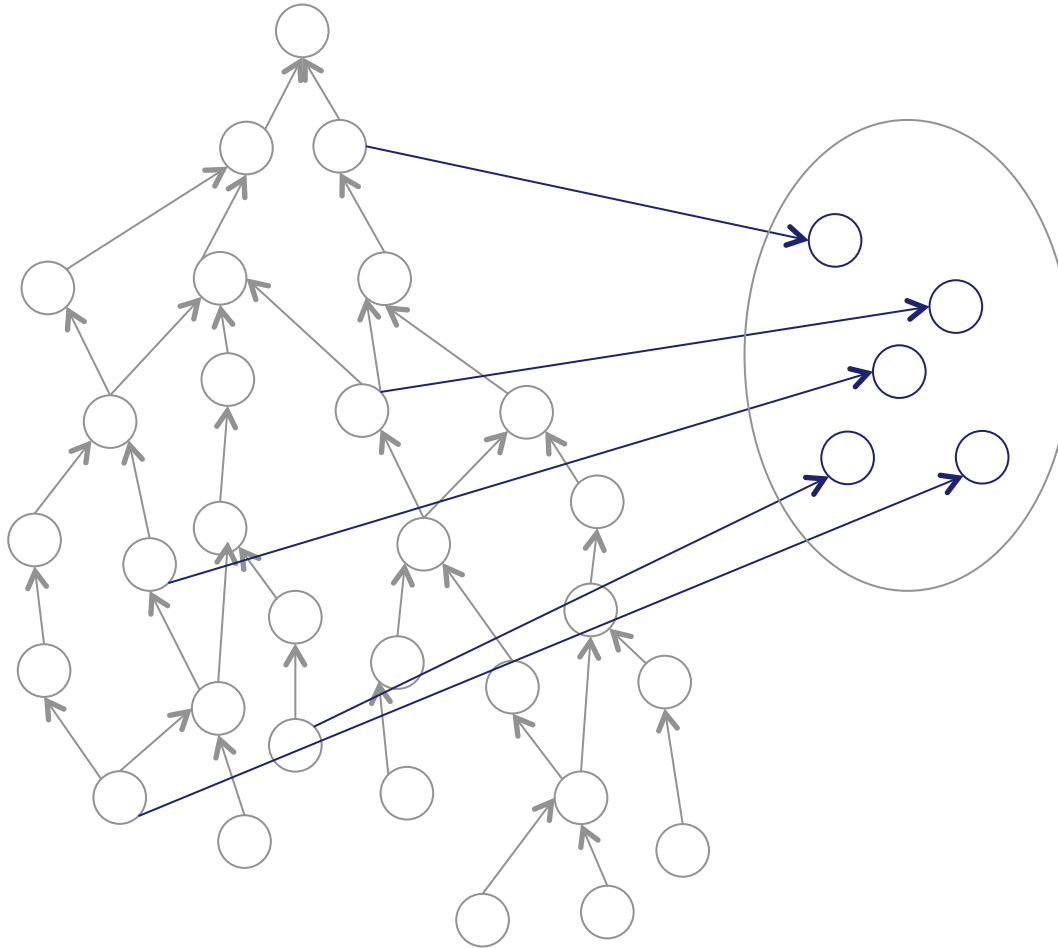
observable entity	127
finding	86
procedure	61
regime/therapy	21
disorder	16
situation	11
physical object	6
assessment scale	5
qualifier value	4



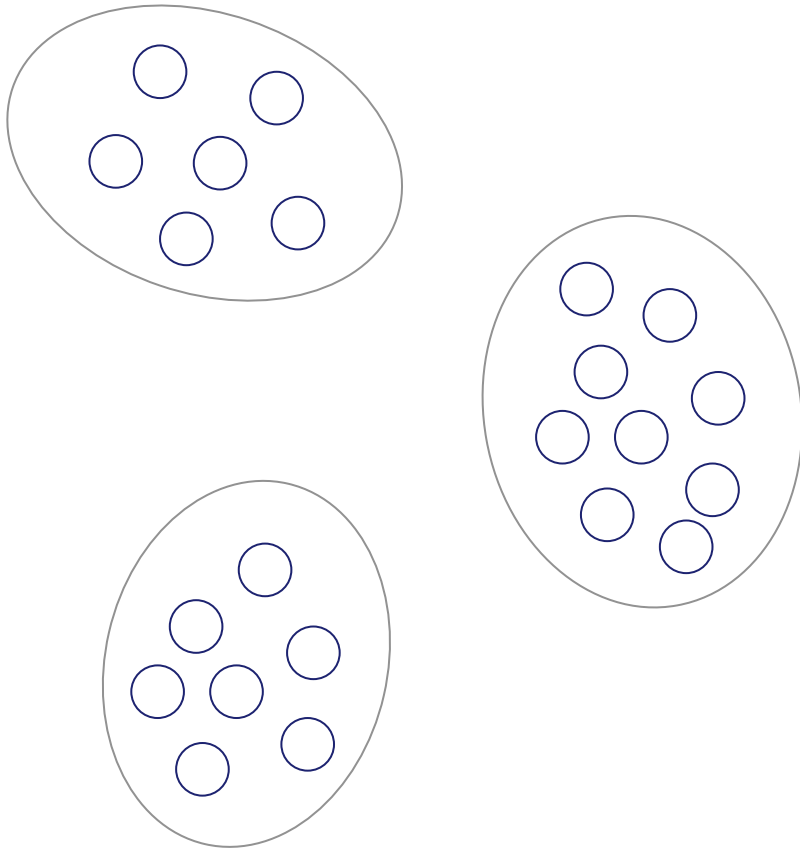
Constrain search by hierarchy



Constrain search and data entry by reference sets



Constrain search by reference sets

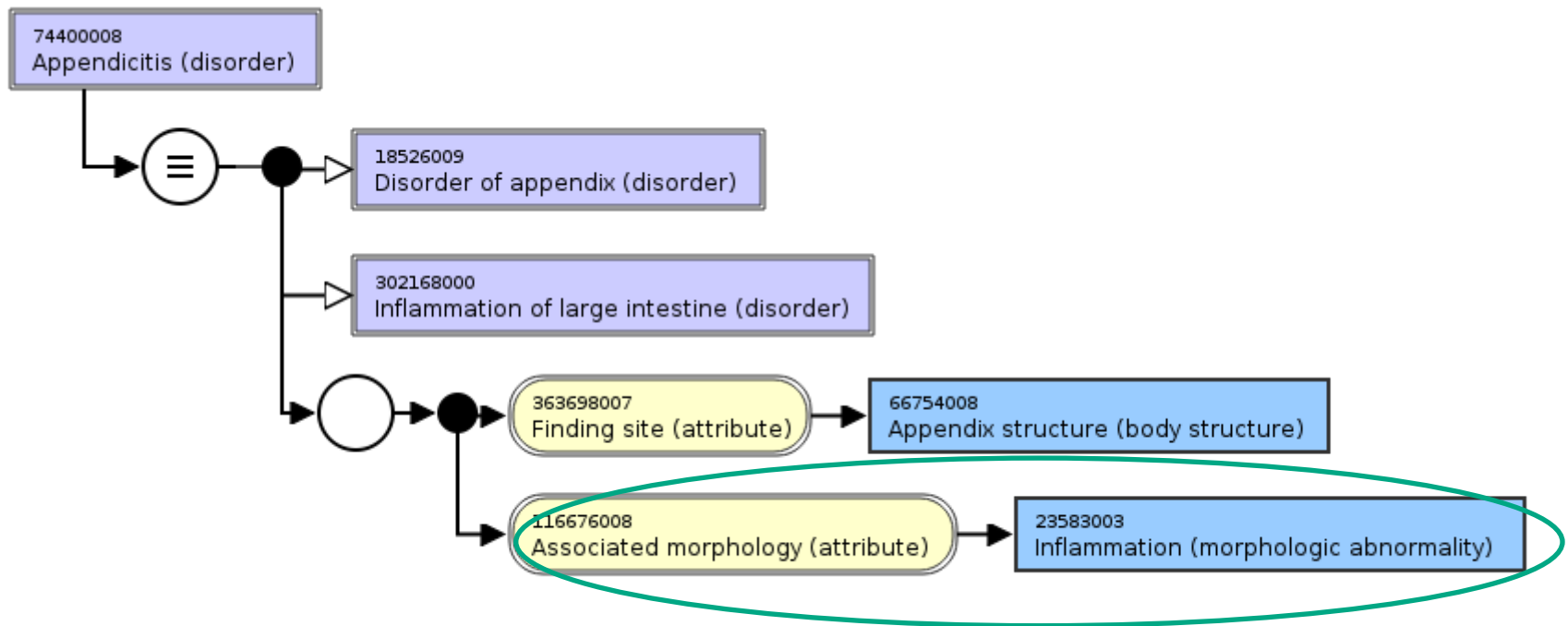


Examples:

- Language ref sets to avoid uncommon or foreign terms
- Simple ref sets to simplify or encourage selection of concepts or used in a particular country, organization, or specialty
- Context ref sets to specify or order the valid Concepts for entry in a particular field

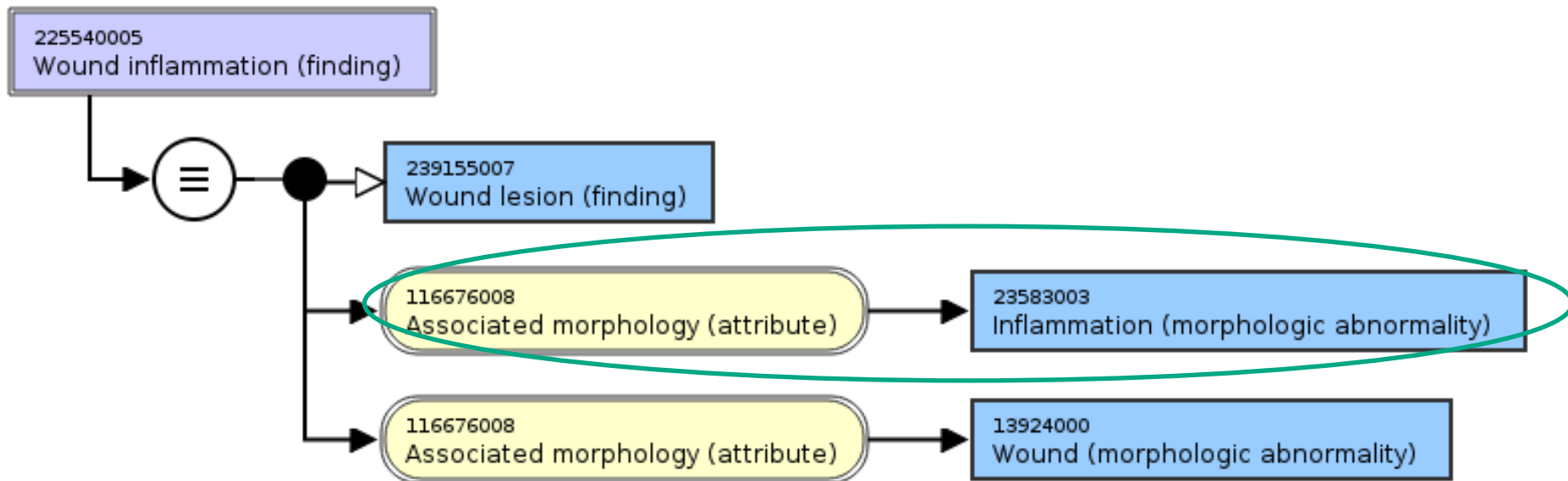
Constrain by attribute

- Constraints based on particular attributes of the concept
 - For example, only concepts with the attribute |associated morphology| having the value |inflammation|.



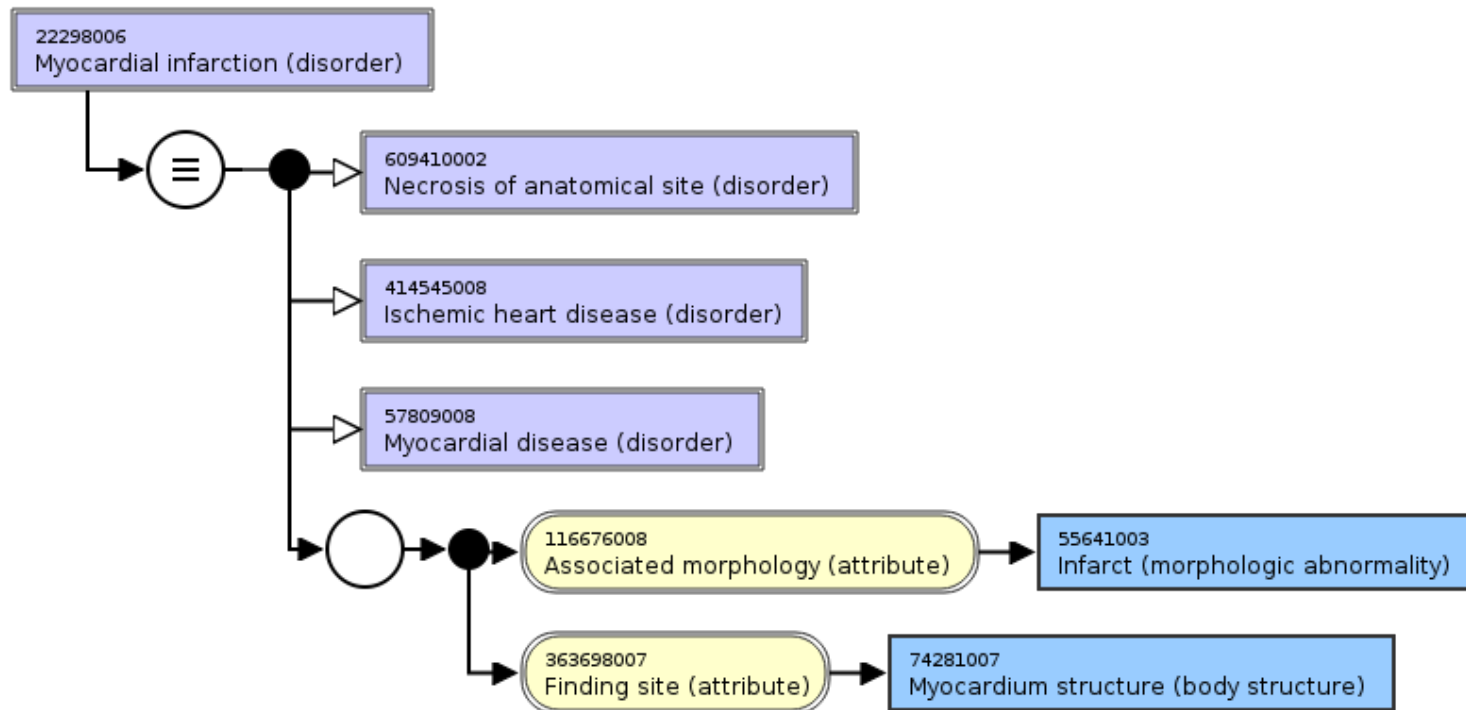
Constrain by attribute

- Constraints based on particular attributes of the concept
 - For example, only concepts with the attribute |associated morphology| having the value |inflammation|.



Constrain by attribute

- Constraints based on particular attributes of the concept
 - For example, only concepts with the attribute [associated morphology] having the value [inflammation].



The logo for ihtsdo, consisting of the lowercase letters 'ihtsdo' in a white, sans-serif font, positioned on a solid blue square background.

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EXTEND SEARCHES

Extend searches – Use Word Equivalents (1)

- In healthcare, there are many words with equivalent meanings
- *Synonyms* provide alternative phrases referring to the *concept*
- *Synonyms* are not created automatically for every possible combination of words with an equivalent meaning

- One way of addressing this problem is to maintain a table of *Word Equivalents*

Extend searches – Use Word Equivalents (2)

1

Search box

Search results *No results*

Unable to find concepts.
Expand search with word equivalents?

2

Search box

Search results

Extend searches: by post-coordinated searching (1)

- When typing text for a search, the user is unlikely to know if their intended entry can be represented by a single Concept or requires a post-coordinated expression involving additional Concepts or qualifiers.
- Where searches fail to find a pre-coordinated match, expansion of the search to support appropriate or commonly used qualifiers is likely to enhance usability.

Extend searches: by post-coordinated searching (2)

1

Search box emergency closed reduction of fracture of femur Go

Search results *No results*

Unable to find precoordinated concepts.

Postcoordinated search?

Yes

No

2

Search box emergency closed reduction of fracture of femur Go

Search results emergency closed reduction of fracture of femur, left
emergency closed reduction of fracture of femur, right

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IMPROVING SEARCH SPEEDS

Improve search speeds

- Enable real time searching
- Allow slow searches to be paused or cancelled
- Optimize indexing



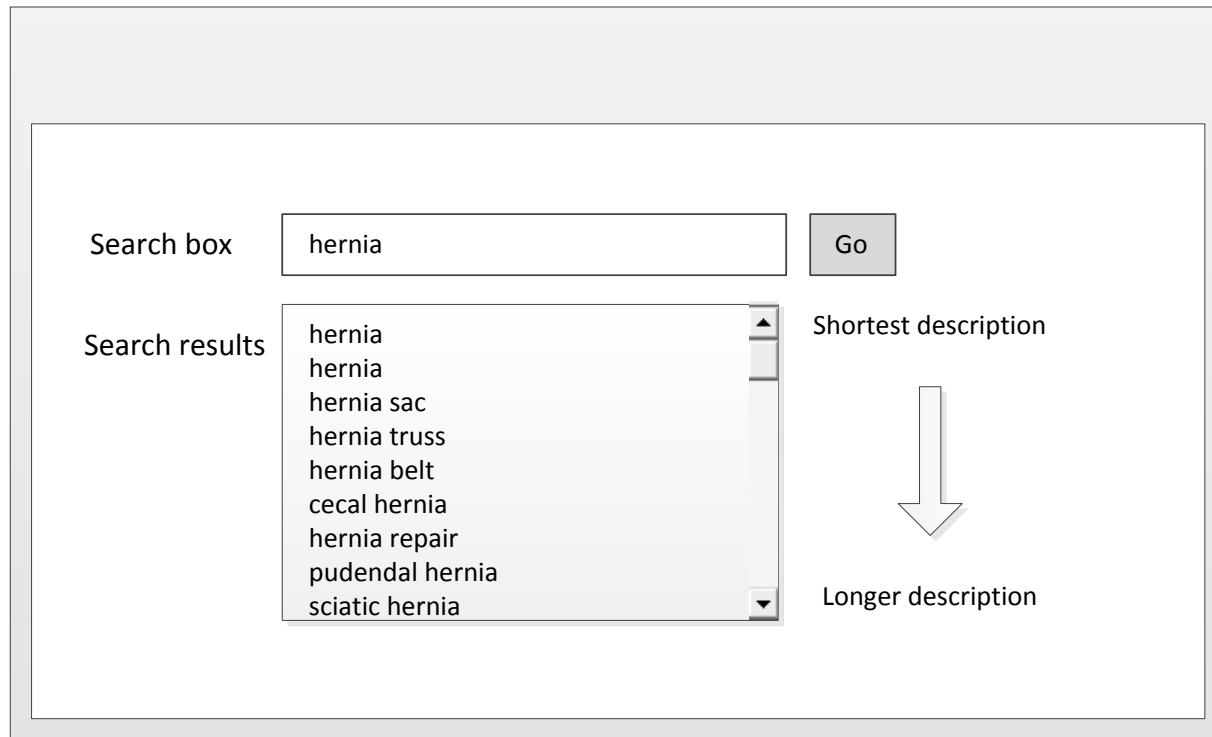
The logo for ihtsdo, featuring the lowercase letters 'ihtsdo' in white on a blue square background.

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DISPLAY OF SEARCH RESULTS

Order Search Results Rationally (1)

- Order shortest matching results first



Order Search Results Rationally (2)

- Order preferred term matches before synonyms

The screenshot shows a search interface with a search box containing the text 'hernia' and a 'Go' button. Below the search box is a list of search results. The results are ordered as follows: Preferred term (P) hernia, Synonym (S) hernia, Preferred term (P) hernia sac, Preferred term (P) hernia belt, Synonym (S) hernia truss, Preferred term (P) hernia repair, Synonym (S) hernia cerebri, Preferred term (P) hernia adiposa, and Preferred term (P) hernia of ovary. Two callout boxes on the left, labeled 'Preferred term' and 'Synonym', point to the corresponding letters in the first few results.

Type	Term
Preferred term	hernia
Synonym	hernia
Preferred term	hernia sac
Preferred term	hernia belt
Synonym	hernia truss
Preferred term	hernia repair
Synonym	hernia cerebri
Preferred term	hernia adiposa
Preferred term	hernia of ovary



Order Search Results Rationally (5)

- Display search results with most frequently used descriptions listed first

1

Search box

Search results

- P hernia
- S hernia
- P hernia sac
- P hernia belt
- S hernia truss
- P hernia repair
- S hernia cerebri
- P hernia adiposa
- P hernia of ovary

2

Search box

Search results

Frequently searched

- S hernia cerebri
-
- S hernia
- P hernia
- S hernia sac
- P hernia belt
- P hernia truss

Distinguish identical descriptions of different concepts

1

Search box

Search results

- P hernia
- S hernia
- P hernia
- P hernia FSN: herniated structure (morphologic abnormality)
- S hernia truss
- P hernia repair
- S hernia cerebri
- P hernia adiposa
- P hernia of ovary

2

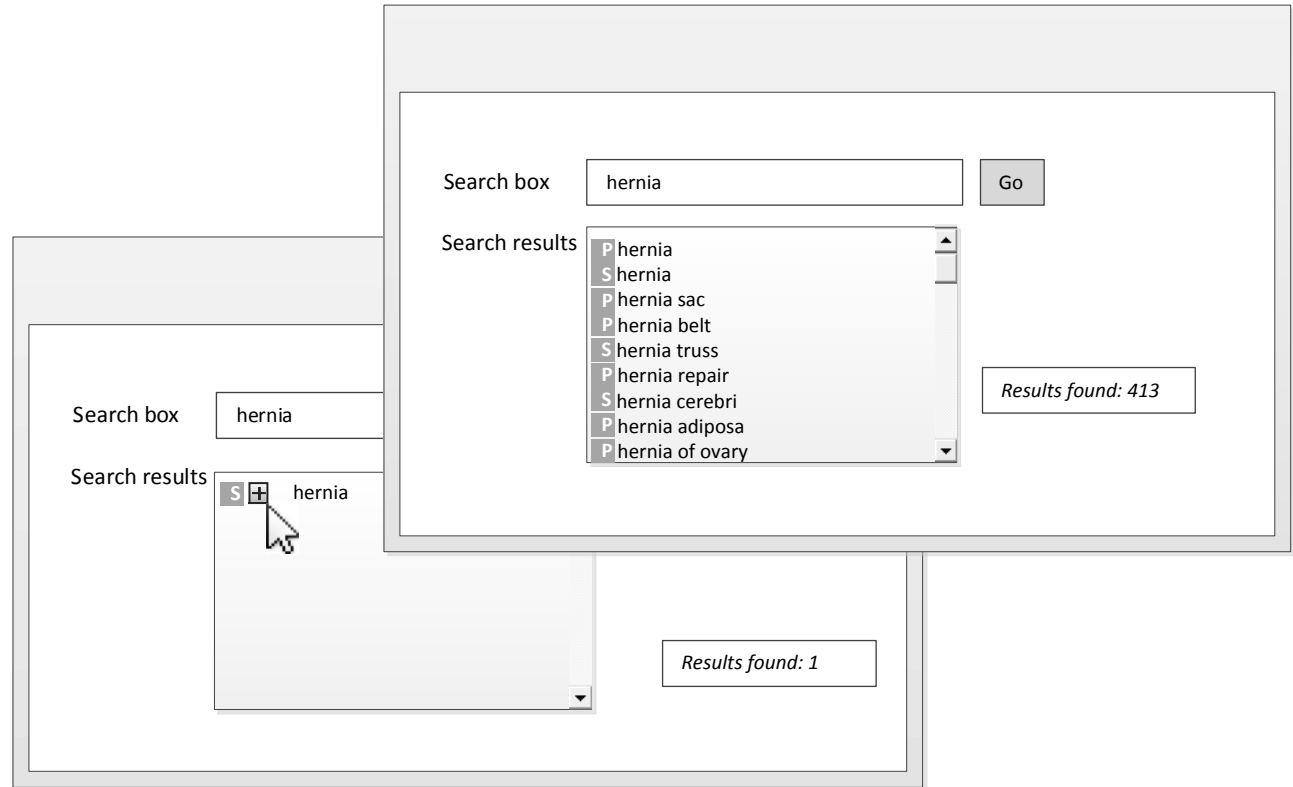
Search box

Search results

- P hernia
- S hernia
- P hernia
- P hernia
- S hernia FSN: hernia of abdominal cavity (disorder)
- P hernia repair
- S hernia cerebri
- P hernia adiposa
- P hernia of ovary

Rationalize search results by subsumption checking

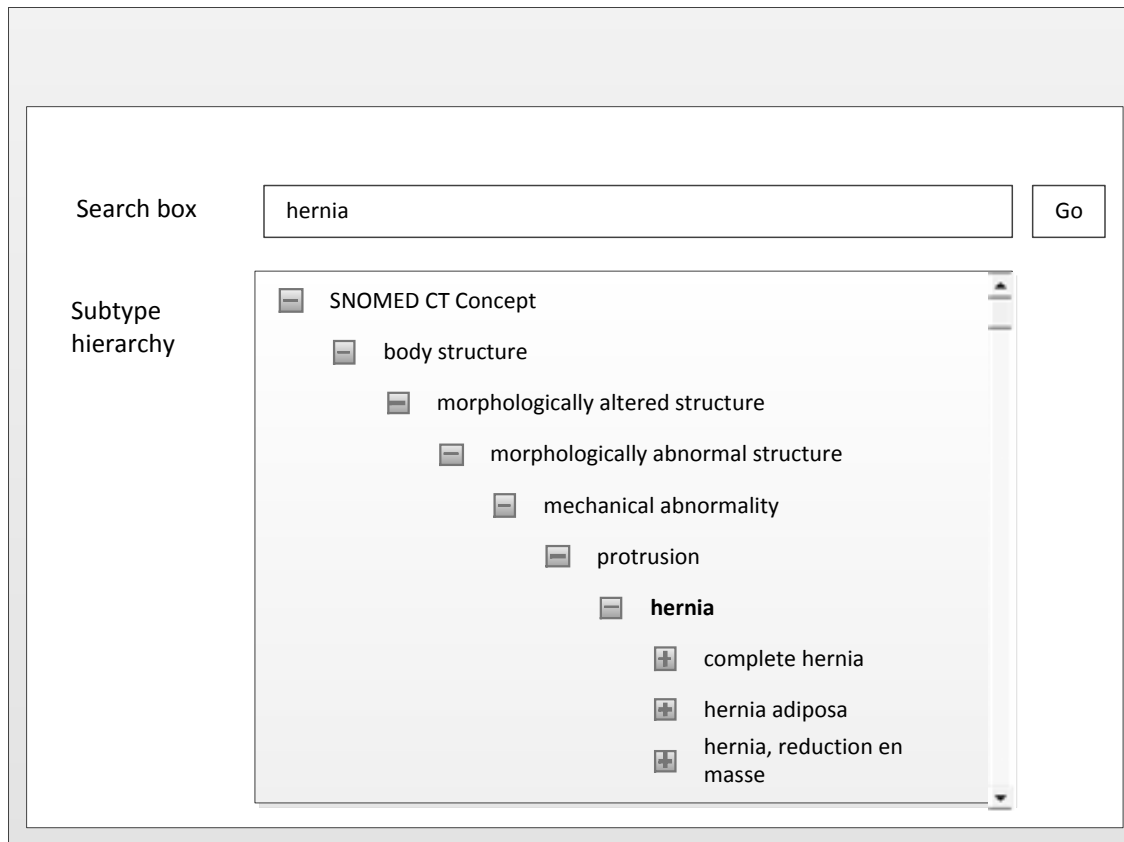
Before



After

Display navigation results effectively (1)

- Using the subtype hierarchy



- Not designed for data entry

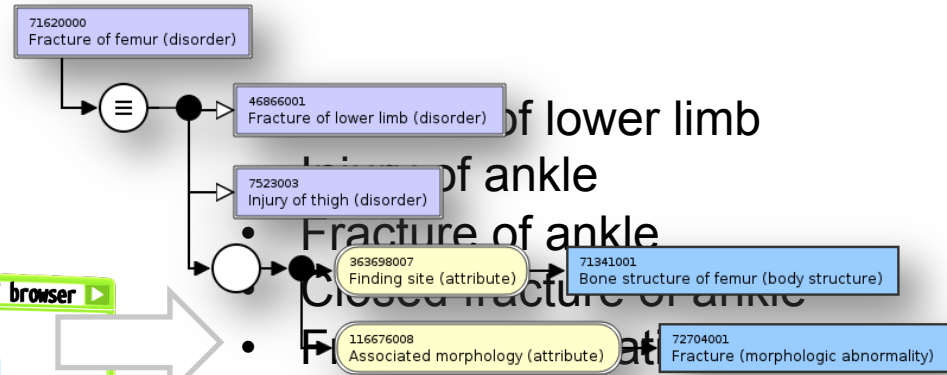
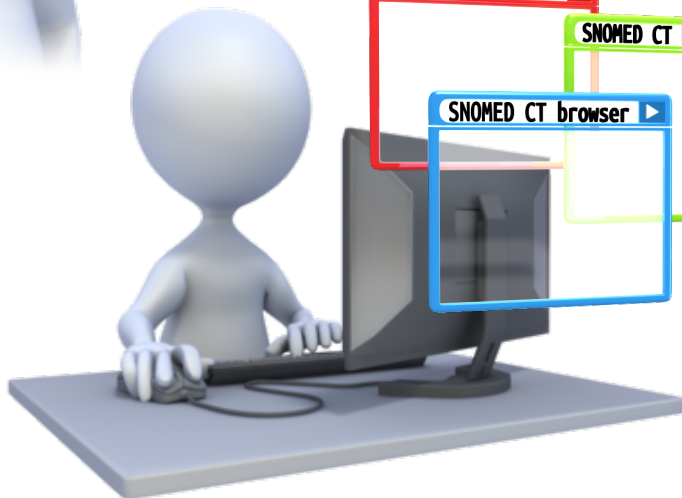
Display navigation results effectively (2)

- Using the navigation hierarchy (hand-crafted)

- common viral disease
 - common cold
 - herpes simplex
 - Human immunodeficiency virus infection
 - Infectious mononucleosis
 - influenza
 - measles
 - mumps
 - rubella
 - varicella-zoster virus infection
 - verruca vulgaris
 - viral gastroenteritis
 - viral hepatitis
 - viral meningitis
 - viral pharyngitis
 - viral respiratory infection
 - viral disease (all)

- Navigation hierarchies can be used to drive some types of structured data entry
- Navigation hierarchies can order data in sensible ways by priority, or by some readily understood convention (e.g. cranial nerve order).

Conclusive remarks



- Fracture of lower limb
- Injury of ankle
- Fracture of ankle
- Crossed fracture of ankle
- Fracture of ankle at joint
- Fracture of distal end of fibula
- Fracture of distal end of tibia
- Fracture of talus
- Open fracture of ankle

Thank you for your attention

Questions?

- Contact IHTSDO: info@ihtsdo.org
- Web site: www.ihtsdo.org

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SNOMED CT

Search candidate generation

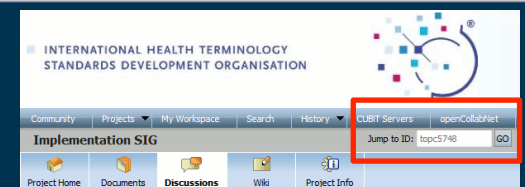
Dr Jeremy Rogers *jeremy.rogers@nhs.net*

IHTSDO Consultant Terminologist

Principal Terminology Specialists NHS HSCIC

IHTSDO Showcase, Amsterdam, October 30th 2014

See ImpSIG thread on Collabnet :
Jump to ID **topc5748** (page 2)



Take home point..

Lucene is good...

Lucene is a vector space search algorithm designed for full text indexing and searching of 'documents' containing paragraphs of text.

..but SNOMED CT isn't a newspaper.

'All descriptions on a concept' approximate poorly to the notion of 'a document'
'All descriptions in SNOMED' approximate very poorly to 'a collection of documents'
from which Lucene may reasonably compute an inverse document frequency metric

Outline

Symptoms

Pathology

Treatment

Evidence

An Experiment:

16 clinical search phrases into 3 SNOMED CT browser implementations

pain lower back

low back pain

traveller diarrhoea

acute asthma

breast lump

breast mass

medication review

vaccine given

enlarged node

morning headache

staging scan

urge incontinence

excision biopsy

post operative analgesia

transoesophageal ultrasound

emergency caesarean

'low back pain'

SNOMED_2013a - SNOMED Browser

File Options Tools Help

Home F2 Centre F3 Back F4 Forward F5 Spawn F6 Subsets F7 ICD OPCS Mappings

low back pain More >>>

- PROCEDURE (2)
 - [UK] Low back pain clinical pathway
 - [UK] Lower back pain assessment
- CLINICAL FINDING (2)
 - Headache following lumbar puncture
 - Low back pain

20130925

CliniClue Xplore: Sctuk_20130401 [Registered user: DemoUser060718@CliniClue.com]

File Edit Language Layout Tools Help

Concept Id 138875005 SNOMED CT Concept (Type: = SNOMED CT Concept)

Description Id 220309016

Words - any order 12

Find low back pain

- Clinical finding
 - low back pain
- Procedure
 - lower back pain assessment
 - low back pain clinical pathway

Hierarchy Subtype hierarchy

- SNOMED CT Concept
 - body structure

Apelon Mycroft - SNOMED CT [UK Edition] (SNOMED CT [UK Edition])

File Favorites Help

Tree Walker Search

Max Results: 100 Sort: Ascending Search

Search For: low back pain

Beneath: <ALL>

Search By: Synonym

Search On:

Search Results: 1 matches found

Low back pain (finding)

'pain lower back'

The image displays three overlapping windows from SNOMED CT browsers. The leftmost window, titled 'SNOMED_2013a - SNOMED Browser', shows a search for 'pain lower back' with a tree view of results. The middle window, 'CliniClue Xplore: Sctuk_20130401', shows details for Concept Id 138875005 and Description Id 220309016, with a search for 'pain lower back' returning one result: 'lower back pain assessment'. The rightmost window, 'Apelon Mycroft - SNOMED CT [UK Edition]', shows a search for 'pain lower back' with 0 matches found.

SNOMED_2013a - SNOMED Browser

Search: pain lower back

- PROCEDURE (2)
 - [UK] Low back pain clinical pathway
 - [UK] Lower back pain assessment
- CLINICAL FINDING (6)
 - Genitofemoral nerve neuralgia
 - Iliohipogastric nerve neuralgia
 - Ilioinguinal nerve neuralgia
 - Intermittent cauda equina claudication
 - Low back pain
 - Lumbago-sciatica due to displacement of lumbar

CliniClue Xplore: Sctuk_20130401

Concept Id: 138875005
Description Id: 220309016

SNOMED CT Concept (Type: = SNOMED CT Concept)

Words - any order: 1

Find: pain lower back

- Procedure
 - lower back pain assessment

Hierarchy: Subtype hierarchy

- SNOMED CT Concept
 - body structure

Apelon Mycroft - SNOMED CT [UK Edition]

Search: pain lower back

Max Results: 100 Sort: Ascending

Search For: pain lower back

Beneath: <ALL>

Search By: Synonym

Search On:

Search Results: 0 matches found

'traveller diarrhoea'

The image displays three overlapping windows from SNOMED CT software:

- SNOMED_2013a - SNOMED Browser:** Shows a tree view for 'traveller diarrhoea' under 'CLINICAL FINDING (1)'. The tree includes 'Traveler's diarrhoea'. The status bar at the bottom left shows '20130925'.
- CliniClue Xplore:** Shows a search for Concept Id '138875005' and Description Id '220309016'. The search term 'traveller diarrhoea' is entered in the 'Find' field. The 'Hierarchy' dropdown is set to 'Subtype hierarchy'. The bottom status bar shows 'SNOMED CT Concept' and 'body_structure'.
- Apelon Mycroft - SNOMED CT [UK Edition]:** Shows a search interface with 'traveller diarrhoea' in the 'Search For' field. The 'Search Results' section indicates '0 matches found'.

'traveler diarrhoea

The image displays three overlapping windows from SNOMED CT browsers, illustrating a search for 'traveler diarrhoea'.

- Left Window (SNOMED_2013a - SNOMED Browser):** Shows a search for 'traveler diarrhoea'. The results list 'CLINICAL FINDING (1)' and 'Traveler's diarrhoea'.
- Middle Window (CliniClue Xplore):** Shows details for Concept Id 138875005 and Description Id 220309016. The description is 'Traveler's diarrhoea' under the category 'Clinical finding'.
- Right Window (Apelon Mycroft - SNOMED CT [UK Edition]):** Shows a search for 'traveler diarrhoea' with 0 matches found.

20130925

'acute asthma'

SNOMED_2013a - SNOMED Browser

File Options Tools Help

Home F2 Centre F3 Back F4 Forward F5 Spawn F6 Subsets F7 ICD OPCS Maps

acute asthma

- CLINICAL FINDING (6)
 - Acute asthma
 - Acute exacerbation of chronic asthmatic bronchi
 - Cardiac asthma
 - Exacerbation of asthma
 - Silo-fillers' disease
 - Simple pulmonary eosinophilia
- PROCEDURE (1)
 - [UK] Acute asthma control management

20130925

CliniClue Xplore: Sctuk_20130401 [Registered user: DemoUser060718@Clini

File Edit Language Layout Tools Help

Concept Id 138875005

Description Id 220309016

SNOMED CT Concept (Type:= SNOMED CT Cond

Words - any order 5

Find acute asthma

- Clinical finding
 - acute asthma
 - acute exacerbation of asthma
 - acute exacerbation of chronic asthmatic bronchitis
- Procedure
 - acute asthma control management

Hierarchy Subtype hierarchy

- SNOMED CT Concept
 - body_structure

Apelon Mycroft - SNOMED CT [UK Edition] (SNOMED CT [UK Edition])

File Favorites Help

Tree Walker Search

Max Results: 100 Sort: Ascending Search

Search For: acute asthma

Beneath: <ALL>

Search By: Synonym

Search On:

Search Results: 1 matches found

Acute asthma (disorder)

'breast lump'

SNOMED_2013a - SNOMED Browser

File Options Tools Help

Home F2 Centre F3 Back F4 Forward F5 Spawn F6 Subsets F7 ICD OPCS Maps

breast lump More >>>

- PROCEDURE (2)
 - Excisional biopsy of breast mass
 - Lumpectomy of breast
- SITUATION WITH EXPLICIT CONTEXT (3)
 - Breast lump present
 - No breast lump
 - O/E - breast lump not tethered
- CLINICAL FINDING (19)
 - Bovine ulcerative mammillitis
 - Breast haematoma
 - Breast lump
 - Cyst of breast
 - Infiltrating ductal carcinoma of breast, stage
 - Infiltrating ductal carcinoma of breast, stage
 - Infiltrating ductal carcinoma of breast, stage
 - Infiltrating ductal carcinoma of breast, stage
 - Malignant tumour of vertebral column
 - Melanocytic naevus of skin of breast
 - Neoplasm of breast
 - O/E - breast lump consistency
 - O/E - breast lump position
 - O/E - breast lump regularity
 - O/E - breast lump smooth
 - O/E - breast lump soft
 - O/E - breast lump tethering
 - Persistent breast nodularity
 - Sarcoma of bone and connective tissue
- BODY STRUCTURE (5)
 - Carcinoma resembling breast carcinoma
 - Juvenile carcinoma of the breast
 - Paget's disease and infiltrating duct carcinoma
 - Paget's disease and intraductal carcinoma of breast
 - Paget's disease, mammary
- SPECIMEN (1)
 - Lumpectomy breast sample

20130925

CliniClue Xplore: Sctuk_20130401 [Registered user: DemoUser060718@CliniClue.com]

File Edit Language Layout Tools Help

Concept Id 138875005
Description Id 220309016

SNOMED CT Concept
(Type:= SNOMED CT Concept)

Words - any order 98

Find breast lump

- Clinical finding
 - breast lump
 - O/E - breast lump cystic
 - O/E - breast lump consistency
 - O/E - breast lump smooth
 - O/E - breast lump soft
 - O/E - breast lump position
 - O/E - breast lump regularity
 - O/E - breast lump tethering
- Procedure
 - lumpectomy of breast
- Situation with explicit context
 - no breast lump
 - breast lump present
 - O/E - breast lump not tethered
- Specimen
 - lumpectomy breast sample

Hierarchy Subtype hierarchy

- SNOMED CT Concept
 - body structure

Apelon Mycroft - SNOMED CT [UK Edition] (SNOMED CT [UK Edition])

File Favorites Help

Tree Walker Search

Max Results: 100 Sort: Ascending Search

Search For: breast lump

Beneath: <ALL>

Search By: Synonym

Search On:

Search Results: 1 matches found

Breast lump (finding)

'breast mass'

SNOMED_2013a - SNOMED Browser

File Options Tools Help

Home F2 Centre F3 Back F4 Forward F5 Spawn F6 Subsets F7 ICD OPCS Maps

breast mass More >>>

- PROCEDURE (5)
 - Excision of adenoma of thyroid
 - Excision of cyst of thyroid
 - Excisional biopsy of breast mass
 - Incisional biopsy of breast mass
 - Parathyroid adenoma excision
- CLINICAL FINDING (14)
 - Breast haematoma
 - Breast lump
 - Cyst of breast
 - Infiltrating ductal carcinoma of breast, stage
 - Infiltrating ductal carcinoma of breast, stage
 - Infiltrating ductal carcinoma of breast, stage
 - Infiltrating ductal carcinoma of breast, stage
 - Malignant tumour of vertebral column
 - Mammographic breast mass
 - Massive pubertal hypertrophy of breast
 - Melanocytic naevus of skin of breast
 - Neoplasm of breast
 - Persistent breast nodularity
 - Sarcoma of bone and connective tissue
- SPECIMEN (2)
 - Breast cyst fluid sample
 - Specimen from breast obtained by incisional biopsy
- SITUATION WITH EXPLICIT CONTEXT (1)
 - No breast lump
- BODY STRUCTURE (5)
 - Carcinoma resembling breast carcinoma
 - Juvenile carcinoma of the breast
 - Paget's disease and infiltrating duct carcinoma
 - Paget's disease and intraductal carcinoma of breast
 - Paget's disease, mammary

20130925

CliniClue Xplore: Sctuk_20130401 [Registered user: DemoUser060718@CliniClue]

File Edit Language Layout Tools Help

Concept Id 138875005 SNOMED CT Concept (Type:= SNOMED CT Concept)

Description Id 220309016

Words - any order 10

Find breast mass

- Clinical finding
 - breast mass
 - mammographic breast mass
 - massive pubertal hypertrophy of breast
- Procedure
 - excisional biopsy of breast mass
 - incisional biopsy of breast mass
- Specimen
 - specimen from breast obtained by incisional biopsy

Hierarchy Subtype hierarchy

- SNOMED CT Concept
 - body structure

Apelon Mycroft - SNOMED CT [UK Edition] (SNOMED CT [UK Edition])

File Favorites Help

Tree Walker Search

Max Results: 100 Sort: Ascending Search

Search For: breast mass

Beneath: <ALL>

Search By: Synonym

Search On:

Search Results: 1 matches found

Breast lump (finding)

'medication review'

SNOMED_2013a - SNOMED Browser

File Options Tools Help

Home F2 Centre F3 Back F4 Forward F5 Spawn F6 Subsets F7 Maps

medication review

- SITUATION WITH EXPLICIT CONTEXT (3)
 - Medication review declined
 - Medication review done
 - Medication review due
- OBSERVABLE ENTITY (1)
 - [UK] Medication review due date
- PROCEDURE (19)
 - Adverse drug reaction notification
 - Clinical drug trials
 - [UK] Community DMARD (disease modifying antirheumatic drug) administration
 - [UK] Community DMARD (disease modifying antirheumatic drug) administration
 - Controlled substance checking
 - [UK] Disease modifying antirheumatic drug monitoring
 - Drug addiction notification
 - [UK] Drug misuse clinic administration
 - [UK] Drug misuse enhanced services administration
 - Evaluation of response to instruction about medication
 - Evaluation of response to medications
 - [UK] High cost drugs
 - [UK] Medication monitoring administration
 - Procurement of drugs for chemotherapy for cancer
 - Procurement of drugs for chemotherapy for cancer
 - [UK] Provision of written information about medication
 - [UK] Provision of written information about medication
 - Repeat medication check
 - Review of medication

20130925

CliniClue Xplore: Sctuk_20130401 [Registered user: DemoUser060718@CliniClue.com]

File Edit Language Layout Tools Help

Concept Id 138875005
Description Id 220309016

SNOMED CT Concept (Type: = SNOMED CT Concept)

Words - any order 45

Find medication review

- Procedure
 - review of medication
- Observable entity
 - medication review due date
- Situation with explicit context
 - medication review due
 - medication review done
 - medication review declined

Hierarchy Subtype hierarchy

- SNOMED CT Concept
 - body structure

Apelon Mycroft - SNOMED CT [UK Edition] (SNOMED CT [UK Edition])

File Favorites Help

Tree Walker Search

Max Results: 100 Sort: Ascending Search

Search For: medication review

Beneath: <ALL>

Search By: Synonym

Search On:

Search Results: 1 matches found

Review of medication (procedure)

'vaccine given'

SNOMED_2013a - SNOMED Browser

File Options Tools Help

Home F2 Centre F3 Back F4 Forward F5 Spawn F6 Subsets F7 ICD OPC Maps

vaccine given More >>>

- PROCEDURE (5)
 - [UK] CELVAPAN - first influenza A (H1N1v) 2009
 - [UK] CELVAPAN - second influenza A (H1N1v) 2009
 - [UK] PANDEMRIX - first influenza A (H1N1v) 2009
 - [UK] PANDEMRIX - second influenza A (H1N1v) 2009
 - Travel vaccination given
- SITUATION WITH EXPLICIT CONTEXT (3)
 - 1st HiB and DTP vaccine given
 - 2nd HiB and DTP vaccine given
 - 3rd HiB and DTP vaccine given
- CLINICAL FINDING (8)
 - [UK] Consent given for human papillomavirus vaccine
 - Consent given for measles mumps and rubella vaccine
 - Consent given for pneumococcal vaccine
 - No consent - Tetanus/low dose diphtheria vaccine
 - No consent - pertussis immunisation
 - No consent for 3rd HiB booster
 - No consent for MMR
 - No consent for MR - Measles/rubella vaccine

Current (0) primitive
F-03176 68NO.
20000000
20130925

CliniClue Xplore: Sctuk_20130401 [Registered user: DemoUser060718@CliniClue.com]

File Edit Language Layout Tools Help

Concept Id 138875005 SNOMED CT Concept (Type:= SNOMED CT Concept)

Description Id 220309016

Words - any order 8

Find vaccine given

- Clinical finding
 - consent given for pneumococcal vaccine
 - consent given for measles mumps and rubella vaccine
- Situation with explicit context
 - 2nd HiB and DTP vaccine given
 - 1st HiB and DTP vaccine given
 - 3rd HiB and DTP vaccine given

Hierarchy Subtype hierarchy

- SNOMED CT Concept
 - body structure

Apelon Mycroft - SNOMED CT [UK Edition] (SNOMED CT [UK Edition])

File Favorites Help

Tree Walker Search

Max Results: 100 Sort: Ascending Search

Search For: vaccine given

Beneath: <ALL>

Search By: Synonym

Search On:

Search Results: 0 matches found

An Experiment:

16 clinical search phrases into 3 SNOMED CT browser implementations

pain lower back	enlarged node	4+	5+	0
low back pain	morning headache	1	1	1
traveller diarrhoea	staging scan	7	0	0
acute asthma	urge incontinence	3	3	1
breast lump	excision biopsy	45+	22+	1
breast mass	post operative analgesia	1	0	0
medication review	transoesophageal ultrasound	2	1	0
vaccine given	emergency caesarean	3	3	0


SNOMED CT Miscodes

39 months in a busy UK A&E Department

- Setting: 408,831 coded ED episodes
 - One ‘reason’ code per completed visit
 - 39 months (Oct 2008 – Dec 2011)
 - 12,022 distinct SCT codes selected at least once
- Users: No training, time pressured
- Browser: term match on all of SNOMED CT hierarchy not shown
- Result: 11% of data is seriously miscoded

SNOMED CT: New ways to get it wrong

'Obvious' miscode examples

1097	Temperature	246508008 Temperature (attribute)
145	High temperature	285717004 High temperature (physical force)
118	FB (Foreign Body)	367409002 Followed by (attribute)
24	TB (Tuberculosis)	60117003 Transmitted by (attribute)
	33 Spot	23840004 Leiomostomus xanthurus (organism)
15	MI (Myocardial Infarct)	45169001 Without (attribute)
17	Drug used	246488008 Drug used (attribute)
8	Drugs	228011000000101 Drugs (navigational concept)
373	ETOH - Alcohol intake	160573003 Alcohol intake (observable entity)
207	Alcohol	53041004 Alcohol (substance)
117	EtOH – Ethanol	419442005 Ethyl alcohol (substance)
50	Ethanol	419442005 Ethyl alcohol (substance)
33	Lymph node	59441001 Structure of lymph node (body structure)
136	Nasogastric tube	17102003 Nasogastric tube, device (physical object)
82	Catheter	19923001 Catheter, device (physical object)
535	RTA	1776003 Renal tubular acidosis (disorder)
396	Psychiatric	27296002 Psychiatric (qualifier value)
230	Stabbing	410706007 Stabbing sensation quality (qualifier value)



Outline

Symptoms

Pathology

Treatment

Evidence

The Problem:

CodeForString(str) operation

Many different strategies can be employed

All produce different false +ve and –ve results

At least one existing implementation for most elements

Very few implementations with all elements

Naïve approaches predominate

But clever strategies can be slow

and need extra lexical resources

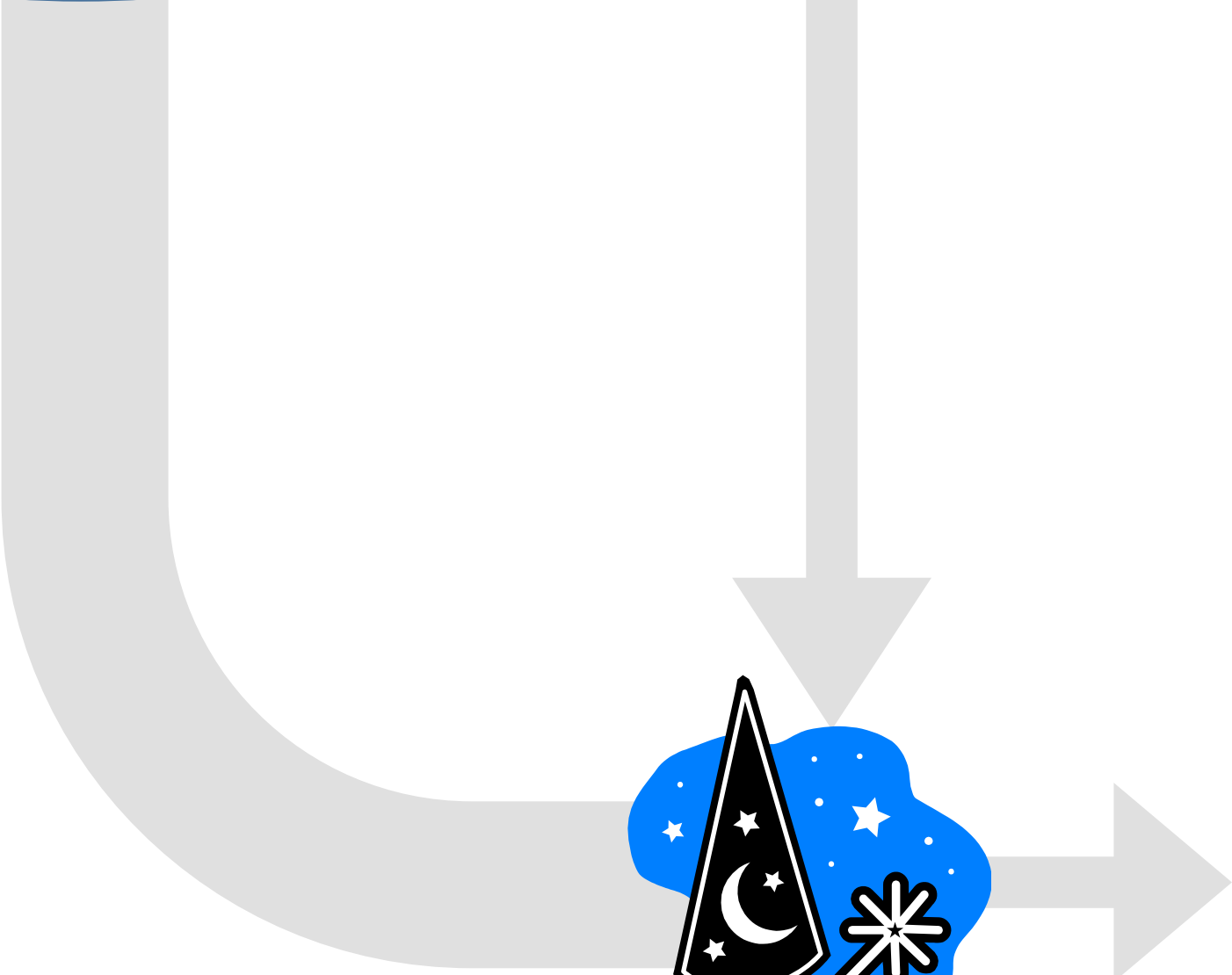
Different strategies \Rightarrow different results

Different results \Rightarrow interrater variability

Interrater variability \Rightarrow reduced interoperability

SNOMED CT

User search:
Lorem ipsum ...



DISPLAY

Outline

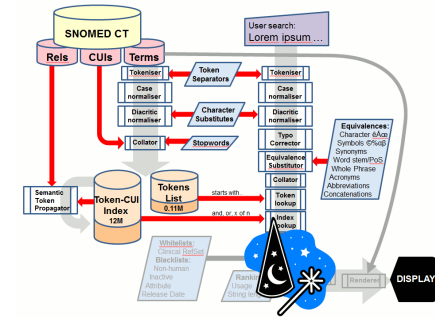
Symptoms

Pathology

Treatment

Evidence

From term to concept...



TOKENISATION

Non WS token separators

Character stripping

TOKEN SET EXPANSION

Word equivalence^{TIG 6.5.4}

Diacritic/Char substn

Metaphone / SoundEx

Levenshtein Distance

Token concatenation

TOKEN CONTRACTION

Stopword lists

Word stemming

TOKEN LOOKUP

Wildcard characters in corpus

Exact matching

Case sensitivity

Force include/exclude tokens

Query token proximity

Query token (re-)ordering^{TIG}

Default wildcarding

Multitoken semantics^{TIG}

Token inheritance

Match scoring and ranking

Match grouping & ordering

IHTSDO Lexical Resources

Stopwords

- [zres_ExcludedWords_en-US_INT_20070731.txt](#)
- (n=53) Virtually unchanged since 2002

IHTSDO Stopwords 2013

(2002 version)

ABOUT	CANNOT	MORE	SPECIFIC
ALONGSIDE	CHRONICALLY	MUST	THAN
AN	CONSISTS	NO	THAT
AND	COVERED	NOT	THE
ANYTHING	DOES	OF	THINGS
AROUND	DURING	ON	THIS
AS	EVERY	ONLY	THROUGHOUT
AT	FINDS	OR	TO
BECAUSE	FOR	PROPERLY	UP
BEFORE	FROM	SIDE	USING
BEING	IN	SIDED	USUALLY
BOTH	INSTEAD	SOME	WHEN
BY	INTO	SOMETHING	WHILE
			WITHOUT

DOWN?

WITH?

mySQL 5.5 Stopword List

mySQL Full Text Search Stopword List (2011)

a's	able	about	above	according	her	here	here's	hereafter	hereby	serious	seriously	seven	several	shall
accordingly	across	actually	after	afterwards	herein	hereupon	hers	herself	hi	she	should	shouldn't	since	six
again	against	ain't	all	allow	him	himself	his	hither	hopefully	so	some	somebody	somehow	someone
allows	almost	alone	along	already	how	howbeit	however	i'd	i'll	something	sometime	sometimes	somewhat	somewhere
also	although	always	am	among	i'm	i've	ie	if	ignored	soon	sorry	specified	specify	specifying
amongst	an	and	another	any	immediate	in	inasmuch	inc	indeed	still	sub	such	sup	sure
anybody	anyhow	anyone	anything	anyway	indicate	indicated	indicates	inner	insofar	t's	take	taken	tell	tends
anyways	anywhere	apart	appear	appreciate	instead	into	inward	is	isn't	th	than	thank	thanks	thanx
appropriate	are	aren't	around	as	it	it'd	it'll	it's	its	that	that's	thats	the	their
aside	ask	asking	associated	at	itself	just	keep	keeps	kept	theirs	them	themselves	then	thence
available	away	awfully	be	became	know	known	knows	last	lately	there	there's	thereafter	thereby	therefore
because	become	becomes	becoming	been	later	latter	latterly	least	less	therein	theres	thereupon	these	they
before	beforehand	behind	being	believe	lest	let	let's	like	liked	they'd	they'll	they're	they've	think
below	beside	besides	best	better	likely	little	look	looking	looks	third	this	thorough	thoroughly	those
between	beyond	both	brief	but	ltd	mainly	many	may	maybe	though	three	through	throughout	thru
by	c'mon	c's	came	can	me	mean	meanwhile	merely	might	thus	to	together	too	took
can't	cannot	cant	cause	causes	more	moreover	most	mostly	much	toward	towards	tried	tries	truly
certain	certainly	changes	clearly	co	must	my	myself	name	namely	try	trying	twice	two	un
com	come	comes	concerning	consequently	and	near	nearly	necessarily	need	under	unfortunately	unless	unlikely	until
consider	considering	contain	containing						new	unto	up	upon	us	use
corresponding	could	couldn't	course						non	used	useful	uses	using	usually
definitely	described	despite	did						not	value	various	very	via	viz
different	do	does	doesn't						obviously	vs	want	wants	was	wasn't
don't	done	down	downwards						ok	way	we	we'd	we'll	we're
each	edu	eg	eight	either	okay	old	on	once	one	we've	welcome	well	went	were
else	elsewhere	enough	entirely	especially	ones	only	onto	or	other	weren't	what	what's	whatever	when
et	etc	even	ever	every	others	otherwise	ought	our	ours	whence	whenever	where	where's	whereafter
everybody	everyone	everything	everywhere	ex	ourselves	out	outside	over	overall	whereas	whereby	wherein	whereupon	wherever
exactly	example	except	far	few	own	particular	particularly	per	perhaps	whether	which	while	whither	who
fifth	first	five	followed	following	placed	please	plus	possible	presumably	who's	whoever	whole	whom	whose
follows	for	former	formerly	forth	probably	provides	que	quite	qv	why	will	willing	wish	with
four	from	further	furthermore	get	rather	rd	re	really	reasonably	within	without	won't	wonder	would
gets	getting	given	gives	go	regarding	regardless	regards	relatively	respectively	wouldn't	yes	yet	you	you'd
goes	going	gone	got	gotten	right	said	same	saw	say	you'll	you're	you've	your	yours
greetings	had	hadn't	happens	hardly	saying	says	second	secondly	see	yourself	yourselves	zero		
has	hasn't	have	haven't	having	seeing	seem	seemed	seeming	seems					
he	he's	hello	help	hence	seen	self	selves	sensible	sent					

1st, 2nd, 3rd Trimester ?

1st, 2nd 3rd degree burn ?

ALONGSIDE	0	PROPERLY	0
CHRONICALLY	9	SIDE	238
CONSISTS	0	SIDED	73
COVERED	0	SPECIFIC	1356
FINDS	0	THINGS	26

10 tokens in IHTSDO list, but not in mySQL list...

Word Equivalence: 64 'tranquilisers'

206129006

- FSN:** Fetus or neonate affected by maternal tranquilizers during labor and delivery (disorder)
PREF: Fetus or neonate affected by maternal tranquilizers during labor and delivery *enUS*
PREF: Foetus or neonate affected by maternal tranquillisers during labour and delivery *enGB*
SYN: Fetus or neonate affected by maternal tranquilizers during labor and delivery
SYN: Fetus or neonate affected by maternal tranquillisers during labour and delivery

111766000

- FSN:** Poisoning by tranquilizer (disorder)
PREF: Poisoning by tranquilizer *enUS*
PREF: Poisoning by tranquilliser *enGB*
??? Tranquillizer ???

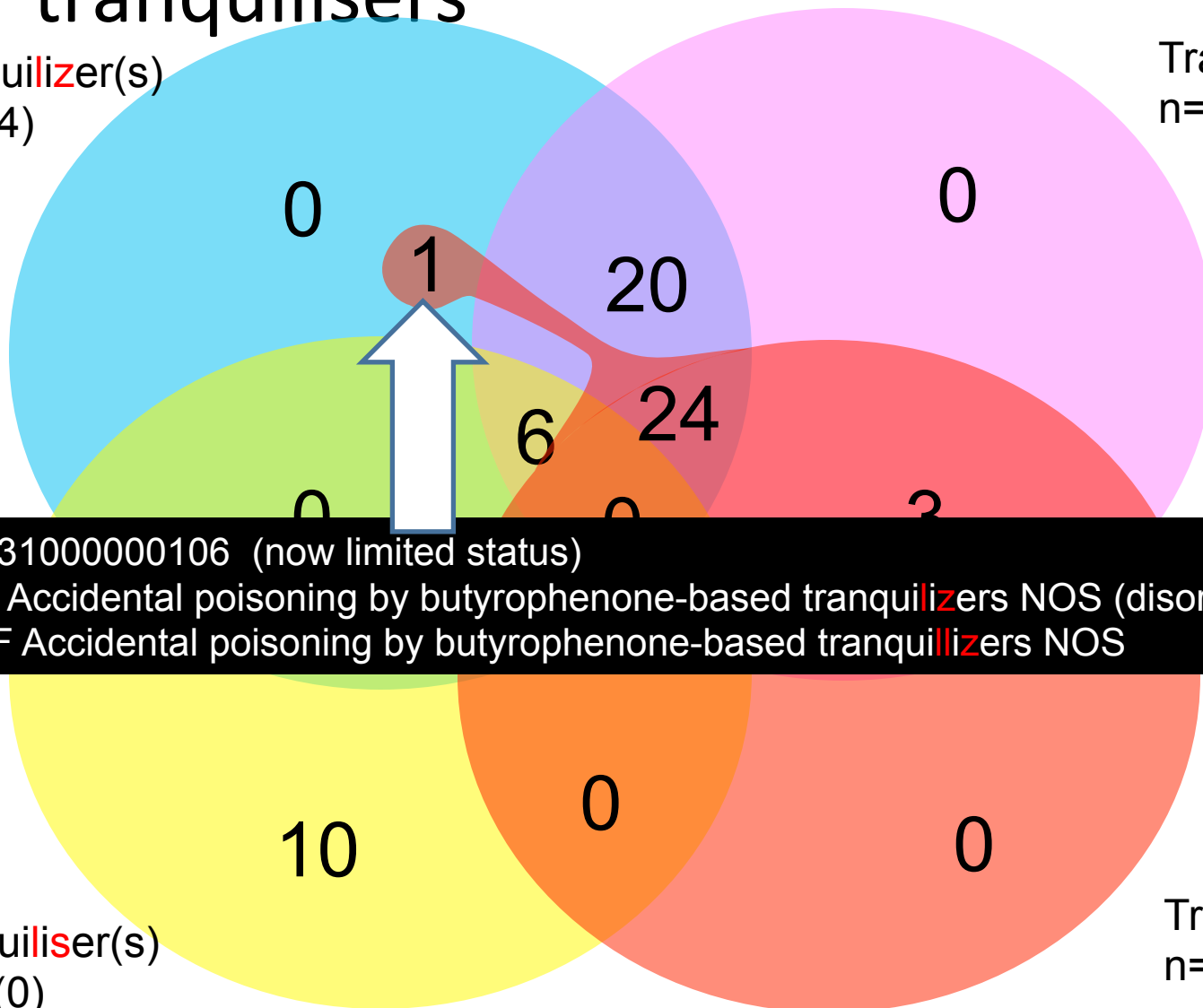
292343009

- FSN:** Benzodiazepine sedative adverse reaction (disorder)
PREF: Benzodiazepine sedative adverse reaction
SYN: Adverse reaction to benzodiazepine-based tranquilliser
SYN: Adverse reaction to benzodiazepine-based tranquilizer
??? Tranquillizer ???

Word Equivalence: 64 'tranquilisers'

Tranquilizer(s)
N=9 (4)

Tranquilliser(s)
n=34 (26)



69973100000106 (now limited status)
FSN: Accidental poisoning by butyrophenone-based tranquilizers NOS (disorder)
PREF Accidental poisoning by butyrophenone-based tranquillizers NOS

Tranquiliser(s)
n=11 (0)

Tranquillizer(s)
n=16 (17)

IHTSDO Lexical Resources

Word and Phrase Equivalence

zres_WordEquivalents_en-US_INT_20020731.txt (n=4666)

res_WordEquivalents_en-GB_GB1000000_20060401.txt (n=71)

cicatrix	rupture	perineal	laryngeal	gastric	scrotal
scar	tear	perineum	larynx	stomach	scrotum
erythrocyte	bleeding	scapula	bronchial	pancreas	penile
red blood cell	haemorrhage	shoulder blade	bronchus	pancreatic	penis
gangrene	bruise	leucocyte	mediastinal	ileal	prostate
gangrenous	contusion	white blood cell	mediastinum	ileum	prostatic
avulsed	telangiectasia	platelet	mouth	duodenal	ovarian
avulsion	telangiectasis	thrombocyte	oral cavity	duodenum	ovaries
neurapraxia	cancer	thymic	palatal	rectal	ovary
neuropraxia	malignant neoplasm	thymus	palate	rectum	uterine
injury	malignant tumour	cardiac	roof of mouth	caecal	uterus
trauma	spinal	heart	teeth	caecum	adenohypophysis
agenesis	spine	spleen	tooth	anal	anterior pituitary
aplasia	vertebra	splenic	lingual	anus	neurohypophysis
neoplasm	arm	aorta	tongue	kidney	posterior pituitary
tumour	upper limb	aortic	pharyngeal	renal	adrenal
verruca	carpal	arterial	pharynx	hepatic	suprarenal
wart	carpus	artery	peritoneal	liver	ear drum
boil	wrist	vein	peritoneum	gall bladder	eardrum
furuncle	leg	venous	oesophageal	gallbladder	tympanic membrane
inflammation	lower limb	cranial	oesophagus	testes	bone
inflammatory	thoracic	cranium	bowel	testicle	bony
lump	thorax	skull	intestinal	testicular	osseous
mass	abdomen	nasal	intestine	testis	cartilage
calculus	abdominal	nose	lung		cartilaginous
stone	pelvic		pulmonary		
	pelvis				

IHTSDO Lexical Resources

Character Substitutions (1)

DeveloperToolkit\Indexes\tls1_Index_Generator_INT_20100131.zip

\conf\greek_character_conversion_table.txt (2004)

\conf\char_conversion_table.txt (2004)

ALPHA	char=A	0391	char=α	03B1	NU	char=N	039D	char=ν	03BD
BETA	char=B	0392	char=β	03B2	XI	char=Ξ	039E	char=ξ	03BE
GAMMA	char=Γ	0393	char=γ	03B3	OMICRON	char=Ο	039F	char=ο	03BF
DELTA	char=Δ	0394	char=δ	03B4	PI	char=Π	03A0	char=π	03C0
EPSILON	char=Ε	0395	char=ε	03B5	RHO	char=Ρ	03A1	char=ρ	03C1
ZETA	char=Ζ	0396	char=ζ	03B6	SIGMA	char=Σ	03A3	char=σ	03C3
ETA	char=Η	0397	char=η	03B7	TAU	char=Τ	03A4	char=τ	03C4
THETA	char=Θ	0398	char=θ	03B8	UPSILON	char=Υ	03A5	char=υ	03C5
IOTA	char=Ι	0399	char=ι	03B9	PHI	char=Φ	03A6	char=φ	03C6
KAPPA	char=Κ	039A	char=κ	03BA	CHI	char=Χ	03A7	char=χ	03C7
LAMBDA	char=Λ	039B	char=λ	03BB	PSI	char=Ψ	03A8	char=ψ	03C8
MU	char=Μ	039C	char=μ	03BC	OMEGA	char=Ω	03A9	char=ω	03C9

Other issues

Case sensitivity

‘AIDS procedure’ ⇒

Minimum token length

3 char: HIV, WCC etc

2 char: MI, Hb, Fe etc

1 char: Haemoglobin A
vs Haemoglobin S

AIDS - Acquired immunodeficiency syndrome antibody test

AIDS (HTLV-III) screening

Aids for severely handicapped

Aids for severely handicapped (procedure)

External memory aids training

External memory aids training (procedure)

External memory aids training (regime/therapy)

Handicapped aids

Handicapped aids (procedure)

Instruction in the use of aids

Notification of AIDS

Notification of AIDS (procedure)

Provision of aids to daily living

Provision of aids to daily living (procedure)

Use of aids for daily life

Use of aids for daily life (procedure)

Use of aids for daily life (regime/therapy)

Use of bathroom aids

Use of bathroom aids (procedure)

Use of bathroom aids (regime/therapy)

Use of indoor mobility aids

Use of indoor mobility aids (procedure)

Use of indoor mobility aids (regime/therapy)

Use of kitchen aids

Use of kitchen aids (procedure)

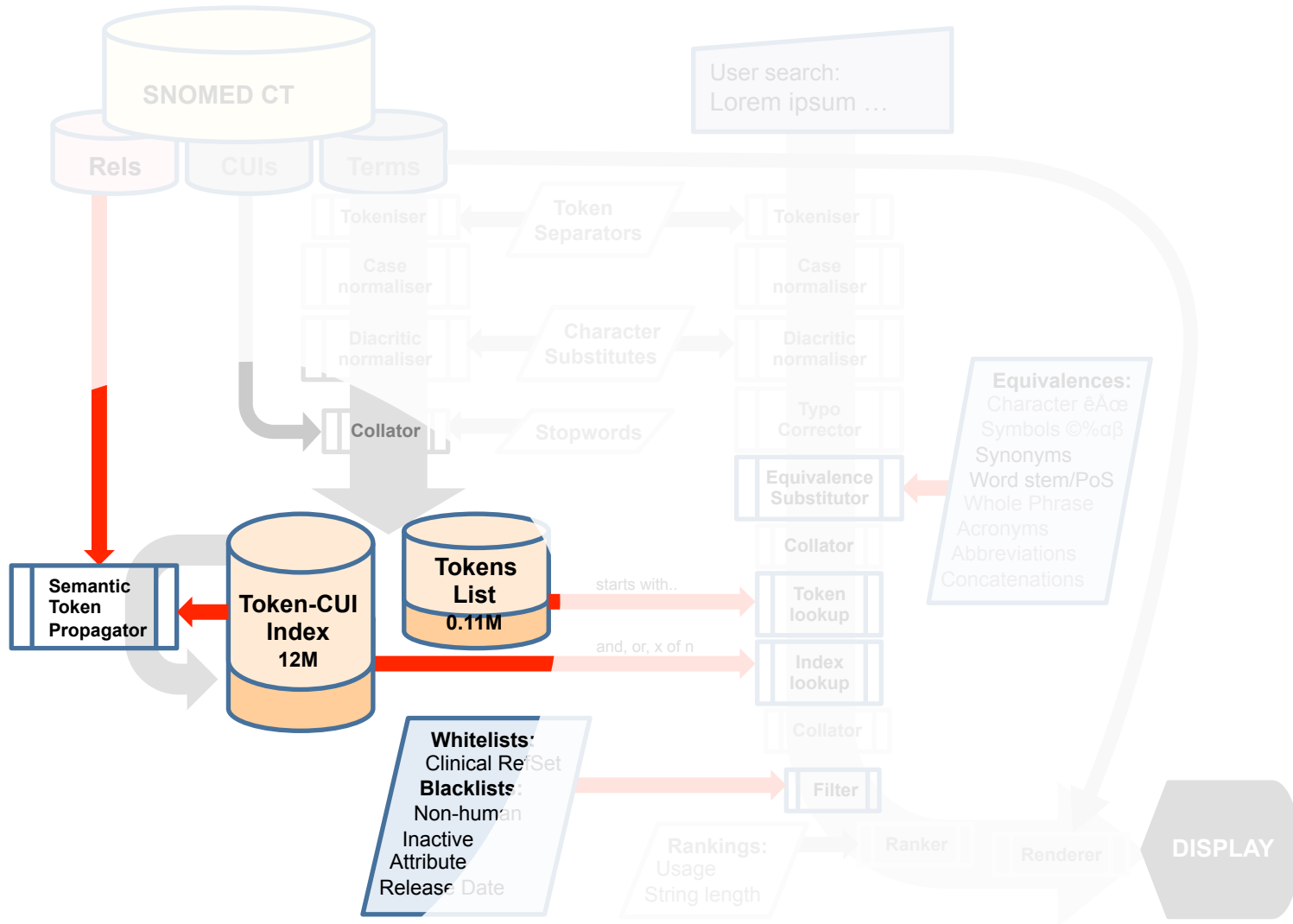
Use of kitchen aids (regime/therapy)

Use of work aids

Use of work aids (procedure)

Use of work aids (regime/therapy)

Semantic Token Propagation



Outline

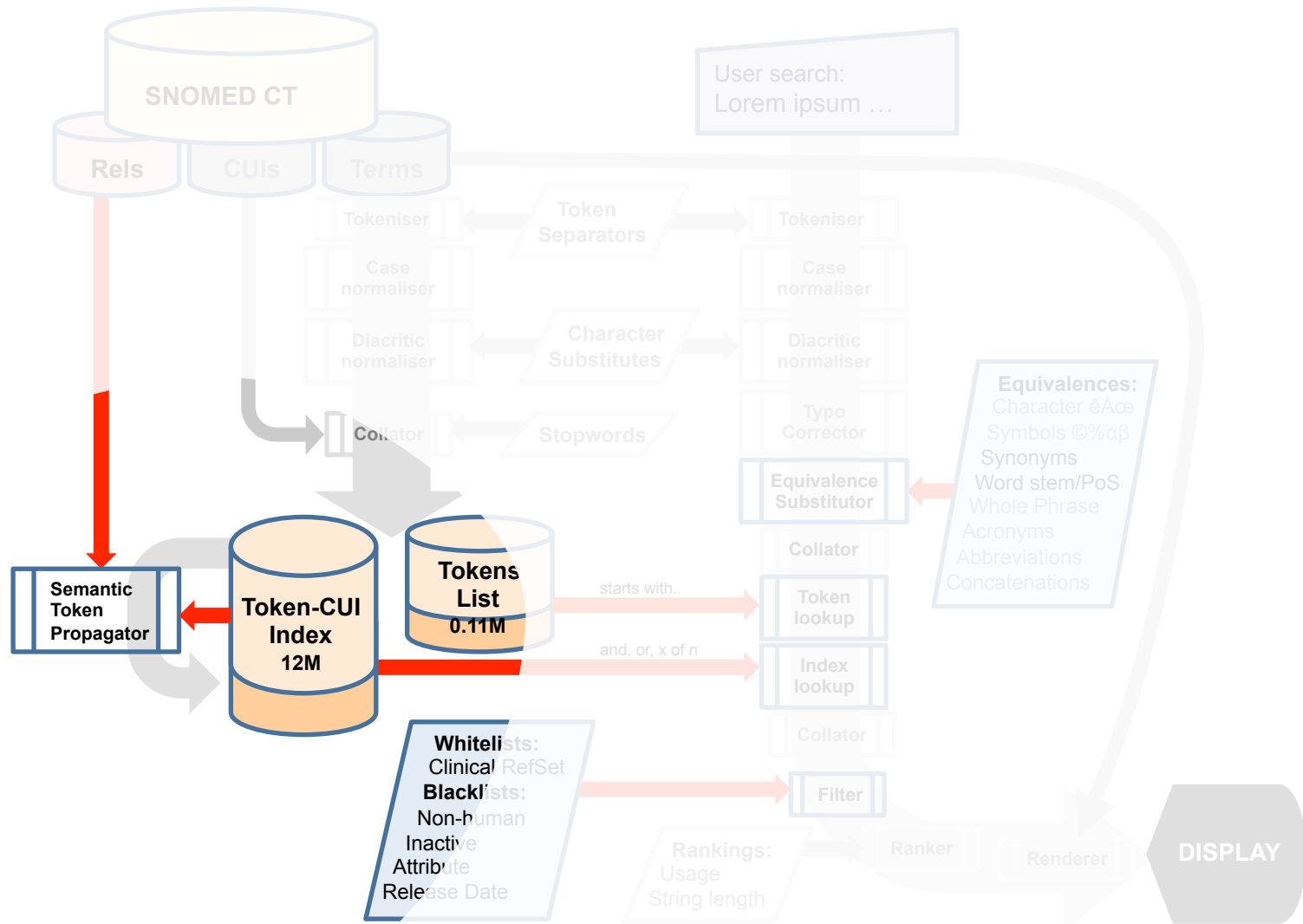
Symptoms

Pathology

Treatment

Evidence

Demonstration : Data Migration Workbench



Demonstration : Data Migration Workbench

Search expression

Search options

The screenshot displays the 'Cluster Definition Editor' window. The search expression 'tranquillizer' is entered in the search field. The search options are set to 'Word Equiv', 'Strategy', and 'Filters'. The results pane shows a list of 69 SNOMED CT concepts, with 50 inactive in SNOMED but remaining in the result set. The results are displayed in a table with columns for SNOMED ID, description, and status.

SNOMED ID	Description	Status
231460003	Tranquilliser abuse	x
45604009	Tranquilizer (substance)	.
64386003	Sedative abuse (disorder)	.
111766000	Poisoning by tranquilizer (disorder)	.
45335007	Poisoning by tranquilizer, NEC -RETIRED-	x
37750001	Administration of tranquilizer (procedure)	=
216518007	Accidental poisoning by tranquilizers (event)	.
218789000	Adverse reaction to tranquilizers NOS (finding)	x
216518007	Accidental poisoning by tranquilizers (disorder)	.
277001000000103	History of major tranquilizer misuse (situation)	.
218784005	Adverse reaction to other tranquilizers (finding)	x
277001000000103	History of major tranquilliser misuse (situation)	.
216543001	Accidental poisoning by tranquilizers NOS (event)	x
212653007	Poisoning: [tranquilliser] or [psychotropic agent]	.
292343009	Benzodiazepine sedative adverse reaction (disorder)	x
216538008	Accidental poisoning by other tranquilizers (event)	x
218767004	Adverse reaction to other major tranquilizer (finding)	x
277701000000101	History of daily major tranquiliser misuse (situation)	.
216542006	Accidental poisoning by other tranquilizers NOS (event)	x
277701000000101	History of daily major tranquilliser misuse (situation)	.
277731000000107	History of weekly major tranquiliser misuse (situation)	.
16248006	Poisoning by butyrophenone-based tranquilizer (disorder)	.
277731000000107	History of weekly major tranquilliser misuse (situation)	.
48534006	Poisoning by phenothiazine-based tranquilizer (disorder)	.
277791000000108	Previous history of major tranquilizer misuse (situation)	.
81914009	Poisoning by benzodiazepine-based tranquilizer (disorder)	.
277791000000108	Previous history of major tranquilliser misuse (situation)	.
277761000000102	History of infrequent major tranquiliser misuse (situation)	.
277761000000102	History of infrequent major tranquilliser misuse (situation)	.
216519004	Accidental poisoning by phenothiazine-based tranquilizers (event)	.
216525000	Accidental poisoning by butyrophenone-based tranquilizers (event)	.
216530001	Accidental poisoning by benzodiazepine-based tranquilizers (event)	.
218761003	Adverse reaction to phenothiazine-based tranquilizers NOS (finding)	x
218766008	Adverse reaction to butyrophenone-based tranquilizers NOS (finding)	x
218783004	Adverse reaction to benzodiazepine-based tranquilizers NOS (finding)	x
216525000	Accidental poisoning by butyrophenone-based tranquilizers (disorder)	.
216519004	Accidental poisoning by phenothiazine-based tranquilizers (disorder)	.
216524001	Accidental poisoning by phenothiazine-based tranquilizers NOS (event)	x
216530001	Accidental poisoning by benzodiazepine-based tranquilizers (disorder)	.
216529006	Accidental poisoning by butyrophenone-based tranquilizers NOS (event)	x
216537003	Accidental poisoning by benzodiazepine-based tranquilizers NOS (event)	x
82719008	Fetus OR newborn affected by maternal anesthesia AND/OR analgesia (disorder)	.
206129006	Fetus or neonate affected by maternal tranquilizers during labor and delivery	.
219118000	Suicide and self-inflicted poisoning by tranquilizers and other psychotropics	x
191903008	Psychoactive substance abuse: [hypnotic (including non-dependent)] or [anxiolytic]	.x

Concept hierarchy

Results

Demonstration : Data Migration Workbench

Word Equivalence

traveller diarrhoea

tranquiliser abuse

flu jab

breast mass

Semantic propagation

acute angina

ossicle removal

defect iris

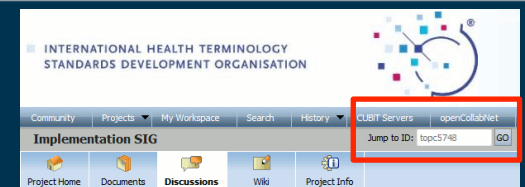
remove ovary fallopian

fat stool

ThankYou!

jeremy.rogers@hscic.gov.uk

See ImpSIG thread on Collabnet :
Jump to ID **topc5748** (page 2)

A screenshot of the Implementation SIG page on Collabnet. The page header includes the text 'INTERNATIONAL HEALTH TERMINOLOGY STANDARDS DEVELOPMENT ORGANISATION' and a logo. The main navigation bar contains links for 'Community', 'Projects', 'My Workspace', 'Search', and 'History'. Below this, the page title is 'Implementation SIG'. A search bar is visible with the text 'Jump to ID: topc5748' and a 'GO' button. The bottom navigation bar includes links for 'Project Home', 'Documents', 'Discussions', 'Wiki', and 'Project Info'. A red box highlights the search bar area.