

# Coding and terminologies – terminology services

Jean Karl Soler  
Mediterranean Institute of Primary Care  
University of Ulster



# What?

- Concept
  - Unit of meaning or knowledge
- Code
  - Converting information into a representation, also for communicating such information
- Term
  - Words and compound words that are used in specific contexts
- Attributes
  - a characteristic of an object

# What?

- Concept: *Upper respiratory tract infection*
  - Unit of meaning or knowledge
- Code: *R74*
  - Converting information into a representation, also for communicating such information
- Term: *cold, pharyngitis, nasopharyngitis, rhinitis, coryza*
  - Words and compound words that are used in specific contexts
- Attributes: *acute, inflammation, nasal or pharyngeal mucosa, infection, virus, respiratory*
  - a characteristic of an object

# Coding or terming?

- Free text
  - Ambiguity of meaning is an issue
- Nomenclature
  - List of names and/or terms
  - System of principles, procedures and terms related to naming
- Terminology
  - ? ditto
- Classification – unique coding of concepts

# Why bother?

- Organised information in medical record
- Problem list
- ‘Machine-readable’ unique medical concept in the record
- Patient recall
- Decision support systems
- Practice management
- Facilitates audit and research

# Terminology or classification?

- Terminology gives promise of entering a preferred term, and the concept is captured without fuss
- Classifications seem technical, may be too big or too small (granularity), but have the major advantage of coding concepts exclusively
- Terminologies trade ambiguity for ease of use

# Ambiguity of attributes

- Red
- Beautiful
- Expensive
- Desirable

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- Red
- Beautiful
- Expensive
- Desirable



# Ambiguity of attributes

- Red
- Beautiful
- Expensive
- Desirable



# Ambiguity of terms

- “Cold”
  - Upper respiratory tract infection
  - Influenza
  - Cold injury
  - Emotionally cold
  - Cold agglutinins

# Ambiguity of terms

- “Cold”
  - Upper respiratory tract infection R74
  - Influenza R80
  - Cold injury A88
  - Emotionally cold P29
  - Cold agglutinins B82

# Ambiguity of concepts

- “Metabolic syndrome”
- “Asthmatic bronchitis”
- Sadness, or clinical depression?
  
- Do we need unique concepts which are well defined, and which appropriately cover the domain?

# SNOMED-CT

- Possible to code 'acute appendicitis' in many ways, *each correct but each with a different code* built up from child concepts in many different ways
- Each concept described by one or more terms
- No preferred or synonymous terms
- Concepts may overlap
- Further compounded with different languages, more complex or more ambiguous concepts, and when one chooses different level of specificity of the diagnostic label

# ICPC

- Rubrics code mutually exclusive concepts
- Inclusion and exclusion criteria: definitions
- Covers the breadth of the domain
- “Granularity” appropriate for the domain
- Classification based on empirical data
- Non-ambiguity, non-vagueness (codes refer to one object in the domain)
- non-redundancy (only one correct way to code the concept)

# Interoperability

- What?
- Why?
- How?

# Interoperability

- The ability of diverse systems and organizations to work together (inter-operate)
- Why?
- How?

# Semantic Interoperability

- Ability of any communicating entities (not only computers) to share unambiguous meaning
- Why?
- How?

# Semantic Interoperability

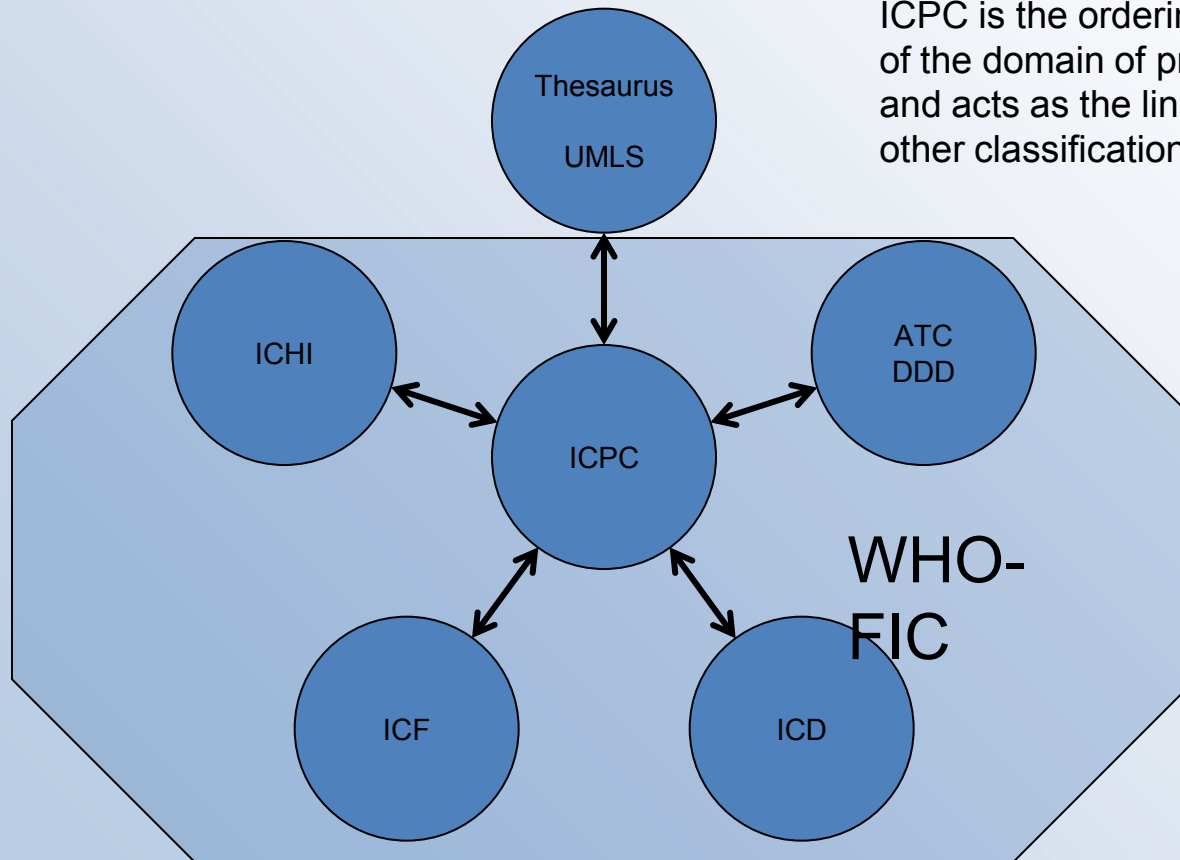
- Ability of any communicating entities (not only computers) to share unambiguous meaning
- If not, meaning is lost through communication
- How?

# Semantic Interoperability

- Ability of any communicating entities (not only computers) to share unambiguous meaning
- If not, meaning is lost through communication
- Classifications offer unambiguous meaning

# ICPC within WHO-FIC

ICPC is the ordering principle of the domain of primary care and acts as the link between other classifications in the FIC



# Semantic interoperability in practice

A thesaurus for ICPC2 and ICD10

Because  
ICPC does order the domain of  
family medicine..

..but has insufficient granularity to  
document all individual patients' diagnoses

.... thus a thesaurus would allow easy, semi-automatic double coding, using:

- ICPC-2 as an ordering principle based on the high prevalence of common diagnoses in family practice
- and ICD-10 as a nomenclature based on the wide range of known diagnoses

## ICPC2-ICD10 THESAURUS

**A diagnostic Terminology for Semi-automatic Double Coding  
in Electronic Patient Records**



**Henk Becker, Sibö Oskam, Inge Okkes, Kees van Boven, Henk Lamberts**  
**Academic Medical Center/University of Amsterdam**  
**Department of Family Medicine**

**Amsterdam, 2005**

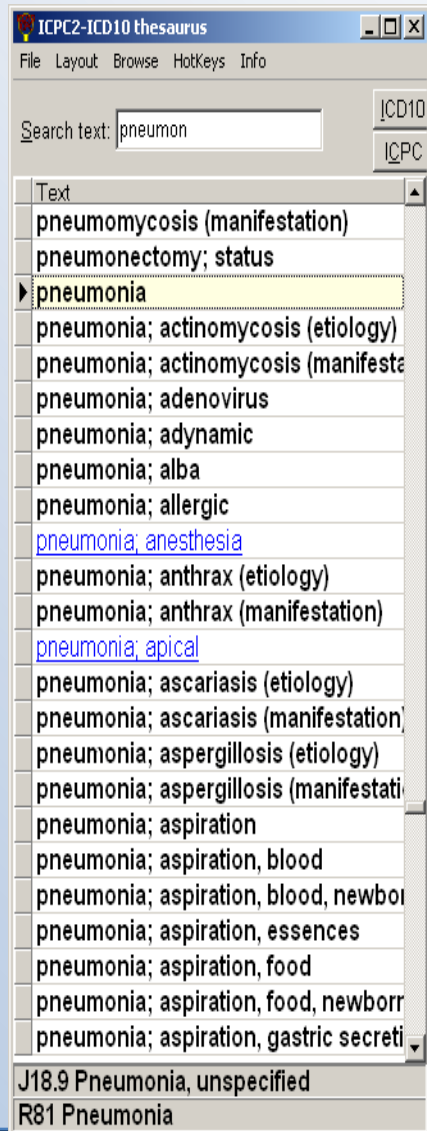


## Example:

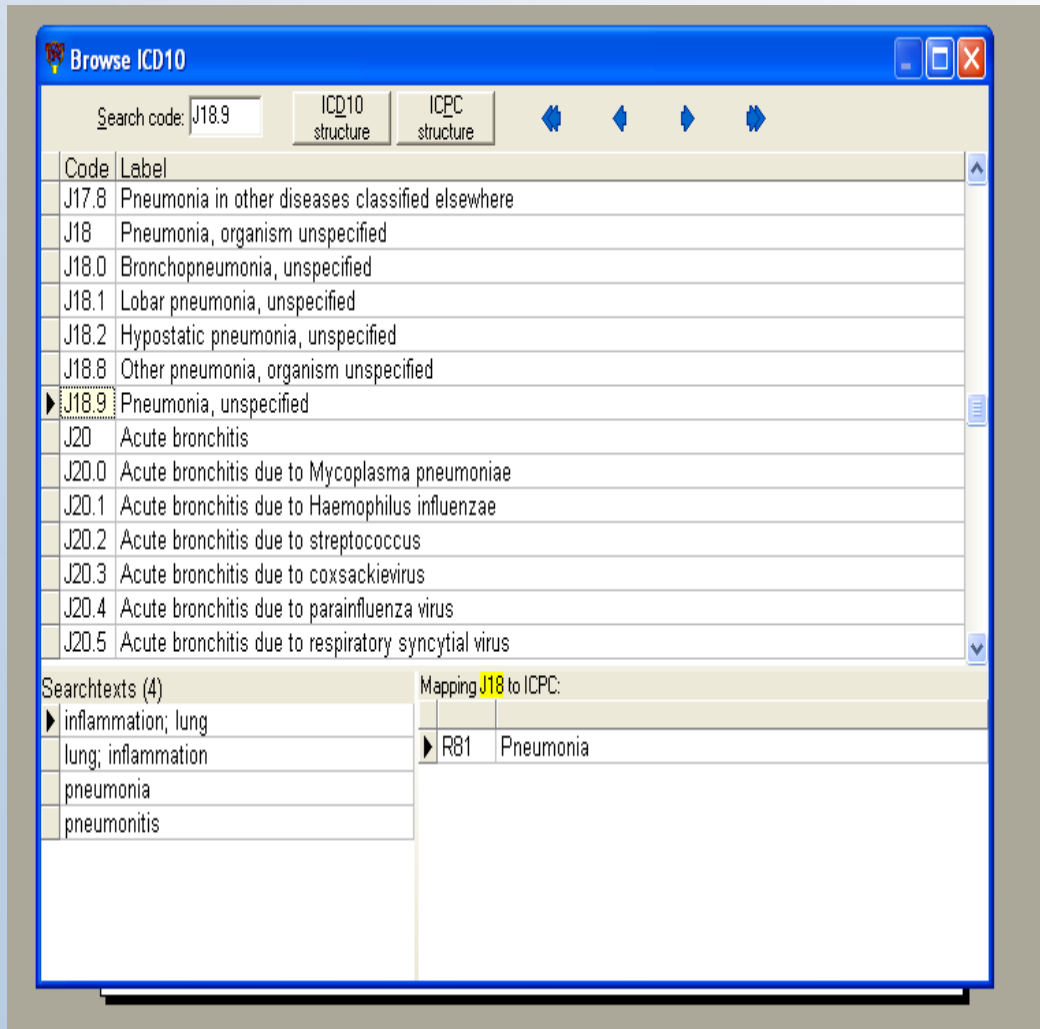
In the Search text box, you type 'pneumonia',

Search text: <input type="text" value="pneumonia"/>	<input type="button" value="ICD10"/>
	<input type="button" value="ICPC"/>
Text	▲
<a href="#">pneumohydrothorax</a>	
pneumohydrothorax	
pneumomediastinum	
pneumomediastinum; congenital or perinatal	
pneumomycosis (etiology)	
pneumomycosis (manifestation)	
pneumonectomy; status	
▶ pneumonia	
pneumonia; actinomycosis (etiology)	
pneumonia; actinomycosis (manifestation)	
pneumonia; adenovirus	
pneumonia; adynamic	
pneumonia; alba	
pneumonia; allergic	
<a href="#">pneumonia; anesthesia</a>	
pneumonia; anthrax (etiology)	
	▼

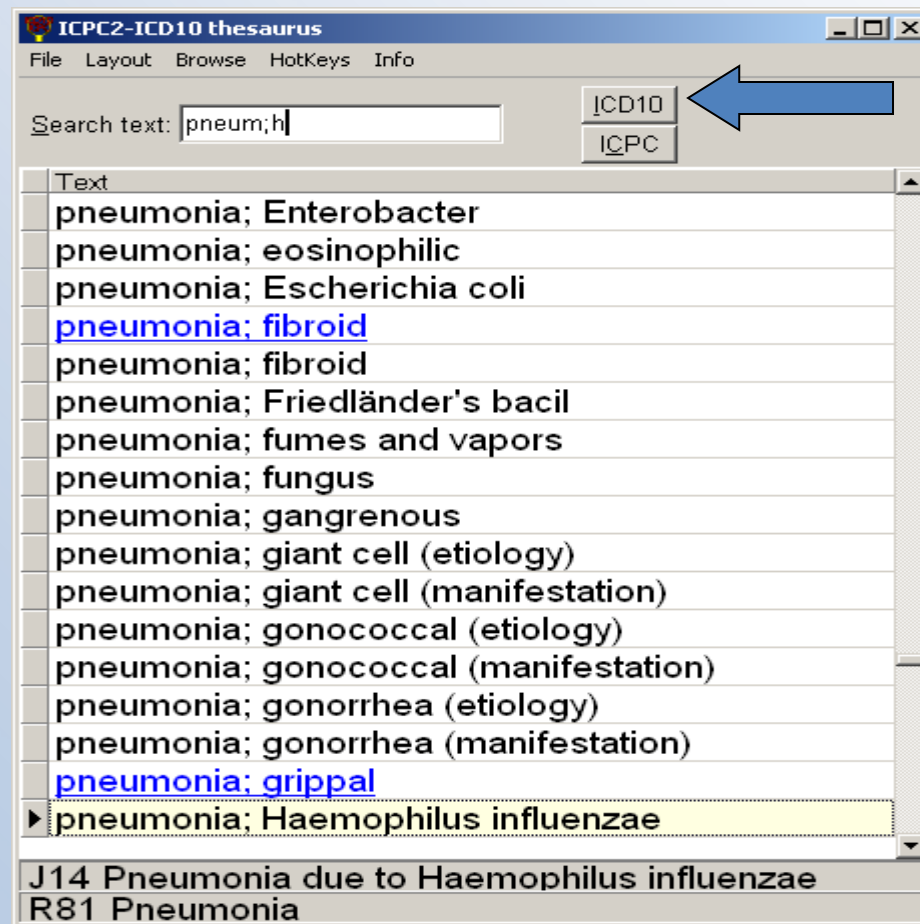
there are many types of pneumonia in ICD-10,



..and the various types by aetiology show.  
(Note: the cursor jumps to J18.9; the list starts with J12.0)

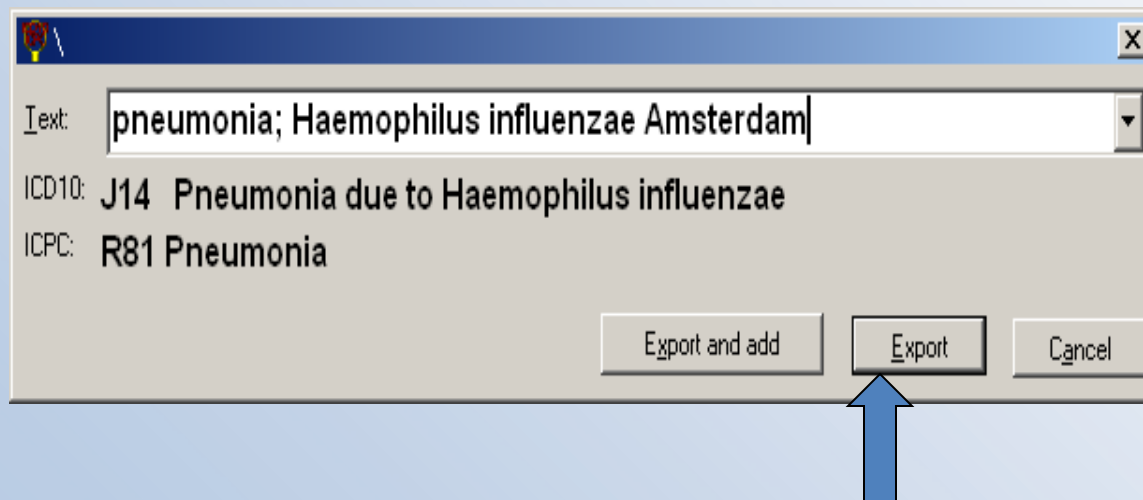


Say we want to select 'pneumonia; Haemophilus influenzae' (typing 'pneum;h' will do)..



..double click, and the export box shows.

Suppose you want to add a new type (e.g., 'Amsterdam'). You can add that term, and also you may add this new type to your Thesaurus.. just click 'Export and add'...



# UMLS

## Metathesaurus



Rich Release Format Browser 2005AA C1331395

File Edit Options Help

Subset Directory C:\UMLS\2005AA\META

CUI Search Tree Browser Word Search

Context Tree Tops

- + CPC2E
- + International Statistical Classification of Diseases and F
- + MeSH
- + SNOMED CT Concept
- + The International Classification of Diseases: 9th revisio

Raw View Report View

**Concept:** International Classification of Primary Care 2nd Edition, Electronic, 2E  
**CUI:** C1331395

**Semantic Type:** Intellectual Product

**Atoms (4):**  
 International Classification of Primary Care 2nd Edition, Electronic, 2E  
 [A4376358/SRC/RPT/V-ICPC2EENG]  
 ICPC2E [A4376014/SRC/RHT/V-ICPC2EENG]  
 ICPC2E [A4376015/SRC/SSN/V-ICPC2EENG]  
 ICPC2EENG [A4376318/SRC/RAB/V-ICPC2EENG]

**Contexts (1):**  
 ICPC2EENG/RHT/V-ICPC2EENG 1  
 <ICPC2E>

**Relationships (4):**  
 [CHD] Symptoms and Complaints Component [ICPC2EENG/CO||ICPC2EENG] [C0497525](#)  
 [CHD] Diseases Component [ICPC2EENG/CO||ICPC2EENG] [C1331399](#)  
 [RN] International Classification of Primary Care 2nd Edition, Electronic, 2E,  
 200203 [SRC/VPT|version\_of|SRC] [C1331396](#)  
 [RO] International Classification of Primary Care 2nd Edition, Electronic, 2E, Dutch  
 Translation [SRC/DPT#translation\_of|SRC] [C1266727](#)

Rich Release Format Browser 2005AA C0702166

File Edit Options Help

Subset Directory C:\JMLS\2005AA\META

CUI Search Tree Browser Word Search

Context Tree Tops

- [-] ICPC2E
  - [-] Diseases Component
    - Abdominal hernia other
    - Abnormal cervix smear
    - Abnormal result investigation nos
    - Abnormal urine test nos
    - Abortion induced
    - Abortion spontaneous
    - Acne**
    - Acoustic trauma
    - Acquired deformity of limb
    - Acquired deformity of spine
    - Acute bronchitis/bronchiolitis
    - Acute internal damage knee
    - Acute myocardial infarction
    - Acute otitis media/myringitis
    - Adverse effect medical agent
    - Adverse effect physical factor
    - Affective psychosis
    - Allergic rhinitis
    - Allergy/allergic reaction nos

Raw View Report View

**Concept:** [X]Acne, unspecified  
**CUI:** C0702166

**Semantic Type:** Disease or Syndrome

**Atoms (14):**

- [X]Acne, unspecified [A3223623/SNOMEDCT/PT/201408008]
- Acne [A2878063/SNOMEDCT/PT/11381005]
- Acne [A4375449/ICPC2EENG/PT/S96]
- Acne [A4375448/ICPC2EENG/AB/S96]
- Acne [A0019095/ICD10/HT/L70]
- Acne, NOS [A2952587/SNOMEDCT/SY/11381005]
- acne [A4386539/ICPC2ICD10ENG/PT/MTHU002966]
- Acne NOS [A1576036/MTHICD9/ET/706.1]
- [X]Acne, unspecified (disorder) [A3793678/SNOMEDCT/FN/201408008]
- Acne (disorder) [A3439373/SNOMEDCT/FN/11381005]
- Acne, unspecified [A0857558/ICD10/PT/L70.9]
- Acne [A5065334/ICPC2EDUT/PT/S96]
- Acne [A6763751/ICD10DUT/HT/L70]
- Acne, niet gespecificeerd [A5147121/ICD10DUT/PT/L70.9]

**Relationships Within Concept (10):**

- Acne [CHD/ICD10] Acne, unspecified
- Acne [CHD/SNOMEDCT] [X]Acne, unspecified

Rich Release Format Browser 2005AA C0702166

File Edit Options Help

Subset Directory C:\UMLS\2005AA\META

CUI Search **Tree Browser** Word Search

Context Tree Tops

- [-] ICPC2E
  - [-] Diseases Component
    - Abdominal hernia other
    - Abnormal cervix smear
    - Abnormal result investigation nos
    - Abnormal urine test nos
    - Abortion induced
    - Abortion spontaneous
    - Acne**
    - Acoustic trauma
    - Acquired deformity of limb
    - Acquired deformity of spine
    - Acute bronchitis/bronchiolitis
    - Acute internal damage knee
    - Acute myocardial infarction
    - Acute otitis media/myringitis
    - Adverse effect medical agent
    - Adverse effect physical factor
    - Affective psychosis
    - Allergic rhinitis
    - Allergy/allergic reaction nos

Raw View **Report View**

**Relationships (56):**

- [CHD] Acne vulgaris [ICD10/PT||ICD10] [C0001144](#)
- [CHD] Other acne [ICD10/PT||ICD10] [C0029485](#)
- [CHD] Acne varioliformis [ICD10/PT||ICD10] [C0152249](#)
- [CHD] Infantile acne [ICD10/PT||ICD10] [C0263437](#)
- [CHD] Acne conglobata [ICD10/PT||ICD10] [C0263442](#)
- [CHD] Acne excoriee des jeunes filles [ICD10/PT||ICD10] [C0343078](#)
- [CHD] Acne tropica [ICD10/PT||ICD10] [C0494863](#)
- [PAR] Disorders of skin appendages [ICD10/HT||ICD10] [C0037272](#)
- [RQ] Other acne [ICD9CM/PT|mapped\_to|HLREL] [C0029485](#)
- [CHD] Acne vulgaris [SNOMEDCT/PT|isa|SNOMEDCT] [C0001144](#)
- [CHD] Acne keloid [SNOMEDCT/PT|isa|SNOMEDCT] [C0001145](#)
- [CHD] Other acne [SNOMEDCT/PT|isa|SNOMEDCT] [C0029485](#)
- [CHD] Acne varioliformis [SNOMEDCT/PT|isa|SNOMEDCT] [C0152249](#)
- [CHD] Neonatal acne [SNOMEDCT/PT|isa|SNOMEDCT] [C0263437](#)
- [CHD] Adult premenstrual acne [SNOMEDCT/PT|isa|SNOMEDCT] [C0263438](#)
- [CHD] Acne atrophica [SNOMEDCT/PT|isa|SNOMEDCT] [C0263439](#)
- [CHD] Tropical acne [SNOMEDCT/PT|isa|SNOMEDCT] [C0263440](#)
- [CHD] Acne indurata [SNOMEDCT/PT|isa|SNOMEDCT] [C0263444](#)
- [CHD] Acne of external chemical origin [SNOMEDCT/PT|isa|SNOMEDCT] [C0263451](#)
- [CHD] Acne venenata [SNOMEDCT/PT|isa|SNOMEDCT] [C0263456](#)
- [CHD] Acne estivalis [SNOMEDCT/PT|isa|SNOMEDCT] [C0263459](#)
- [CHD] Acne mechanica [SNOMEDCT/PT|isa|SNOMEDCT] [C0263460](#)
- [CHD] Canine acne [SNOMEDCT/PT|isa|SNOMEDCT] [C0263461](#)

Rich Release Format Browser 2005AA C0263442

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CUI Search Tree Browser Word Search

Context Tree Tops

- ICPC2E
  - Diseases Component
    - Abdominal hernia other
    - Abnormal cervix smear
    - Abnormal result investigation nos
    - Abnormal urine test nos
    - Abortion induced
    - Abortion spontaneous
    - Acne**
    - Acoustic trauma
    - Acquired deformity of limb
    - Acquired deformity of spine
    - Acute bronchitis/bronchiolitis
    - Acute internal damage knee
    - Acute myocardial infarction
    - Acute otitis media/myringitis
    - Adverse effect medical agent
    - Adverse effect physical factor
    - Affective psychosis
    - Allergic rhinitis
    - Allergy/allergic reaction nos

Raw View Report View

**Concept:** Acne conglobata  
**CUI:** C0263442

**Semantic Type:** Disease or Syndrome

**Atoms (9):**

- Acne conglobata [A2952564/SNOMEDCT/PT/42228007]
- Acne conglobata [A0531985/ICD10/PT/L70.1]
- acne; conglobata [A4433206/ICPC2ICD10ENG/PT/MTHU002971]
- conglobata; acne [A4399652/ICPC2ICD10ENG/PT/MTHU018764]
- Acne, conglobata [A0532025/MTHICD9/ET/706.1]
- Acne conglobata (disorder) [A3439446/SNOMEDCT/FN/42228007]
- Acne conglobata [A5147117/ICD10DUT/PT/L70.1]
- conglobata; acne [A5085641/ICPC2ICD10DUT/PT/MTHU018764]
- acne; conglobata [A5071105/ICPC2ICD10DUT/PT/MTHU002971]

**Relationships Within Concept (4):**

- Acne conglobata [RN/ICPC2ICD10ENG] conglobata; acne
- Acne conglobata [RN/ICPC2ICD10ENG] acne; conglobata

**Contexts (14):**

ICD10/PT/L70.1 1  
 International Statistical Classification of Diseases and Related Health Problems, Tenth Revision

# Challenges for EU TRANSFoRm

- Cross Mapping of Vocabularies
  - *For example:* the difficulty with using national vocabularies such as the National Cancer Institute Enterprise Vocabulary Service in European Primary Care, is that primary care systems like Read codes and ICPC2 are not included
  - NCI EVS can be augmented by referencing Read codes to UMLS codes via SNOMED CT (where a cross-mapping exists), and by adding the ICPC-2 mapping through ICD-10, the ICPC2-ICD-10 Thesaurus and UMLS
  - The NCI EVS is English language – a multi-language layer may be added through UMLS

# WT7.2 Achievements

- A working terminology service is made available as a **software-based milestone**
  - A simple **web-based interface of the TRANSFoRm Integrated VS**, allowing terminology searches through the Unified Medical Language System (UMLS) to a subset of hosted vocabularies, relevant to Primary Care Research and Clinical Practice.
  - A publically\* available **web service**
  - **Integration** of TRANSFoRm VS to users, such as electronic Primary Care Research Network workbench

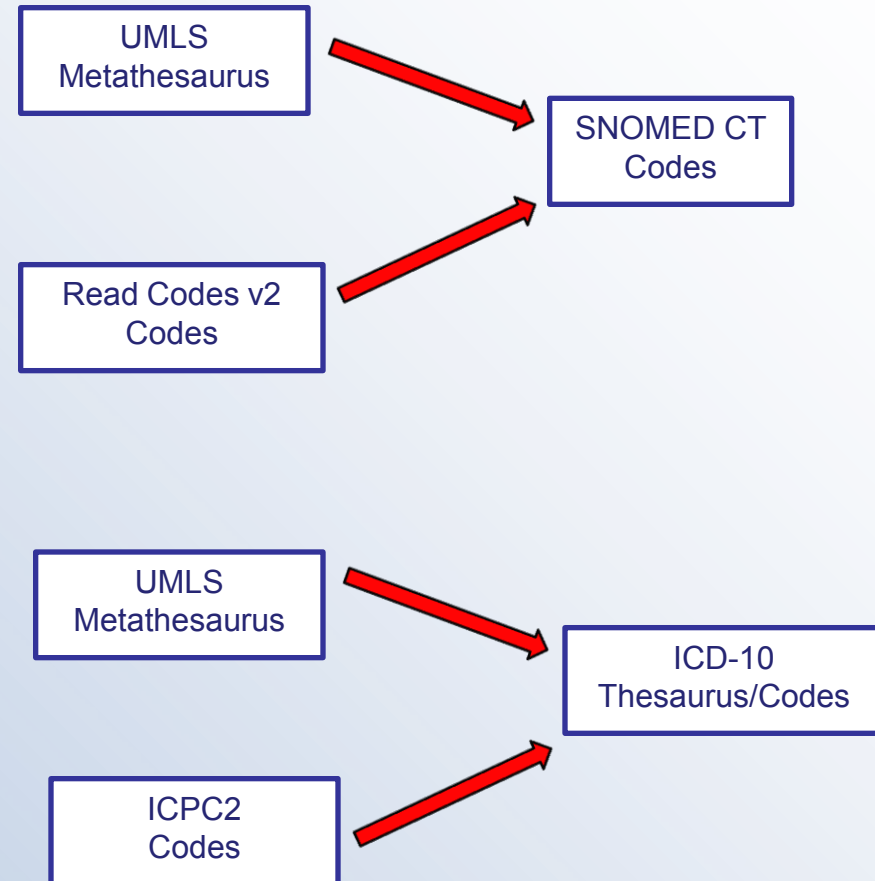
# Hosted Vocabularies

- **UMLS Metathesaurus**
- National Cancer Institute Thesaurus
- ICD-9-Clinical Modification
- ICD-10
- ICPC-2
- ICPC-2-ICD-10 Thesaurus
- Read Codes version 2

**Various Languages** (e.g. English, Basque, Danish, Dutch, Finnish, French, German, Hebrew, Hungarian, Italian, Norwegian, Portuguese, Spanish, Swedish)

# RCD v2/ICPC2

- Read Codes (RCDv2) and International Classification of Primary Care (ICPC2) corpus of terms and their associated mappings
  - created to cater for the initial need of the existence of specific **primary care** oriented terminologies.
- The UK NHS Connecting for Health Terminology Centre - mappings from Read Codes version 2 to SNOMED CT.
- The Read Codes v2 database in Transform VS is set up based on this mapping so that Read Codes 2 concepts can be linked to a UMLS search. Similar approach for ICPC2.
- ICPC2-ICD10 Thesaurus and mappings - Transition Project @ University of Amsterdam
- WP7 (MIPC) is updating the ICPC-ICD 10 mapping and Thesaurus
  - to eventually incorporate the new Thesaurus into UMLS (09/2011).



# Web Service: Example of partial output for the search of the abbreviated clinical term “GORD”

```
Console X
<terminated> VocabularyServiceClient [Java Application] C:\zhaolz\Java\jdk1.6.0_23\bin\javaw.exe (31 Mar 2011 15:54:06)

Concept:      Gastroesophageal reflux disease
UMLS CUI:     C0017168
Semantic type: Disease or Syndrome
Source concepts:
  K21          ICD10          ENG      Gastro-oesophageal reflux disease
  530.81      ICD9CM          ENG      Esophageal reflux
  MTHU030535  ICPC2ICD10ENG  ENG      gastroesophageal; reflux
  MTHU063996  ICPC2ICD10ENG  ENG      reflux; gastroesophageal
  D84004      ICPC2P          ENG      oesophageal reflux
  X3003      RCDv3          ENG      Gastro-oesophageal reflux disease
  J1011      RCDv2          ENG      Acid reflux
  J10y4      RCDv2          ENG      Gastro-oesophageal reflux
  102620007  SNOMEDCT       ENG      Gastroesophageal reflux
  155673008  SNOMEDCT       ENG      Esophageal reflux
  196600005  SNOMEDCT       ENG      Acid reflux
  196624002  SNOMEDCT       ENG      Esophageal reflux
  235595009  SNOMEDCT       ENG      Gastro-esophageal reflux
  266498005  SNOMEDCT       ENG      Esophageal reflux
  54856001   SNOMEDCT       ENG      Gastresophageal reflux disease
  K21        DMDICD10       GER      Gastroesophageale Refluxkrankheit
  K21        ICD10DUT       DUT      Aandoeningen door gastro-oesofagale reflux
  MTHU030535  ICPC2ICD10DUT  DUT      gastro-oesofagaal; reflux
  MTHU063996  ICPC2ICD10DUT  DUT      reflux; gastro-oesofagaal
  102620007  SCTSPA         SPA      reflujo gastroesofagico (hallazgo)
  196600005  SCTSPA         SPA      Acid reflux
  196624002  SCTSPA         SPA      Oesophageal reflux
  235595009  SCTSPA         SPA      reflujo acido
  54856001   SCTSPA         SPA      enfermedad por reflujo gastroesofagico

Concept:      Phylum Nematomorpha
UMLS CUI:     C0027584
Semantic type: Eukaryote|
Source concepts:
  106683009  SNOMEDCT       ENG      Phylum Nematomorpha
  112448006  SNOMEDCT       ENG      Hairworms
  54282001   SNOMEDCT       ENG      Nematomorpha
  106683009  SCTSPA         SPA      tipo Nematomorpha
  112448006  SCTSPA         SPA      nematomorfos
  54282001   SCTSPA         SPA      Nematomorpha
```

# A screenshot of a user interface

The screenshot displays a web application window titled 'TRANSFoRm EVS'. The browser's address bar shows the URL '147.188.87.1'. The main content area features a table with the following columns: Source, Language, Code, and Text. A 'Language:' dropdown menu is open, showing a list of languages with 'English' selected. The table contains 15 rows of data, including source codes like ICD10, ICPC2EENG, and ICPC2ICD10ENG, along with their corresponding codes and text descriptions of medical conditions.

Source	Language	Code	Text
ICD10	ENG	E11	Non-insulin-dependent diabetes mellitus
ICPC2EENG	ENG	T90	Diabetes non-insulin dependent
ICPC2ICD10ENG	ENG	MTHU003788	adult-onset; diabetes
ICPC2ICD10ENG	ENG	MTHU022755	diabetes
ICPC2ICD10ENG	ENG	MTHU022756	diabetes; adult-onset
ICPC2ICD10ENG	ENG	MTHU022795	diabetes; maturity-onset
ICPC2ICD10ENG	ENG	MTHU022815	diabetes; NIDDM
ICPC2ICD10ENG	ENG	MTHU022816	diabetes; non-insulin-dependent
ICPC2ICD10ENG	ENG	MTHU022817	diabetes; nonketotic
ICPC2ICD10ENG	ENG	MTHU022833	diabetes; type II
ICPC2ICD10ENG	ENG	MTHU047774	maturity-onset; diabetes
ICPC2ICD10ENG	ENG	MTHU052916	NIDDM; diabetes
ICPC2ICD10ENG	ENG	MTHU053298	non-insulin-dependent; diabetes
ICPC2ICD10ENG	ENG	MTHU053299	nonketotic; diabetes

# MIPC in TRANSFoRm WP7

- Updating ICPC-2 (with Wonca Classification Committee)
- Updating ICPC-2 map to ICD-10 (with Wonca Classification Committee and University of Nijmegen)
- Updating ICPC-2/ICD-10 Thesaurus (with Transition Project group)
- Thesaurus terms and ICPC-ICD mapping into UMLS

# Thank you

- Questions at the end of the session please