Technical Track
Definitions, Assumptions and Issues

10 a.m-11a.m Core Set of Problems with Maps

James Campbell, MD, University of Nebraska, SNOMED-CT® Editorial Board

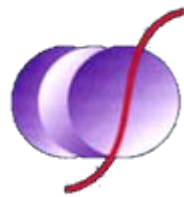
Mark Tuttle, FACMI, Vice-President

Mapping:
Why is it important?
Why is it so hard?

James R. Campbell MD

October 15, 2005

University of Nebraska Medical Center



Overview

- US vocabulary architecture and mapping requirements
- Barriers to implementation of reliable map products
- Features of next generation maps

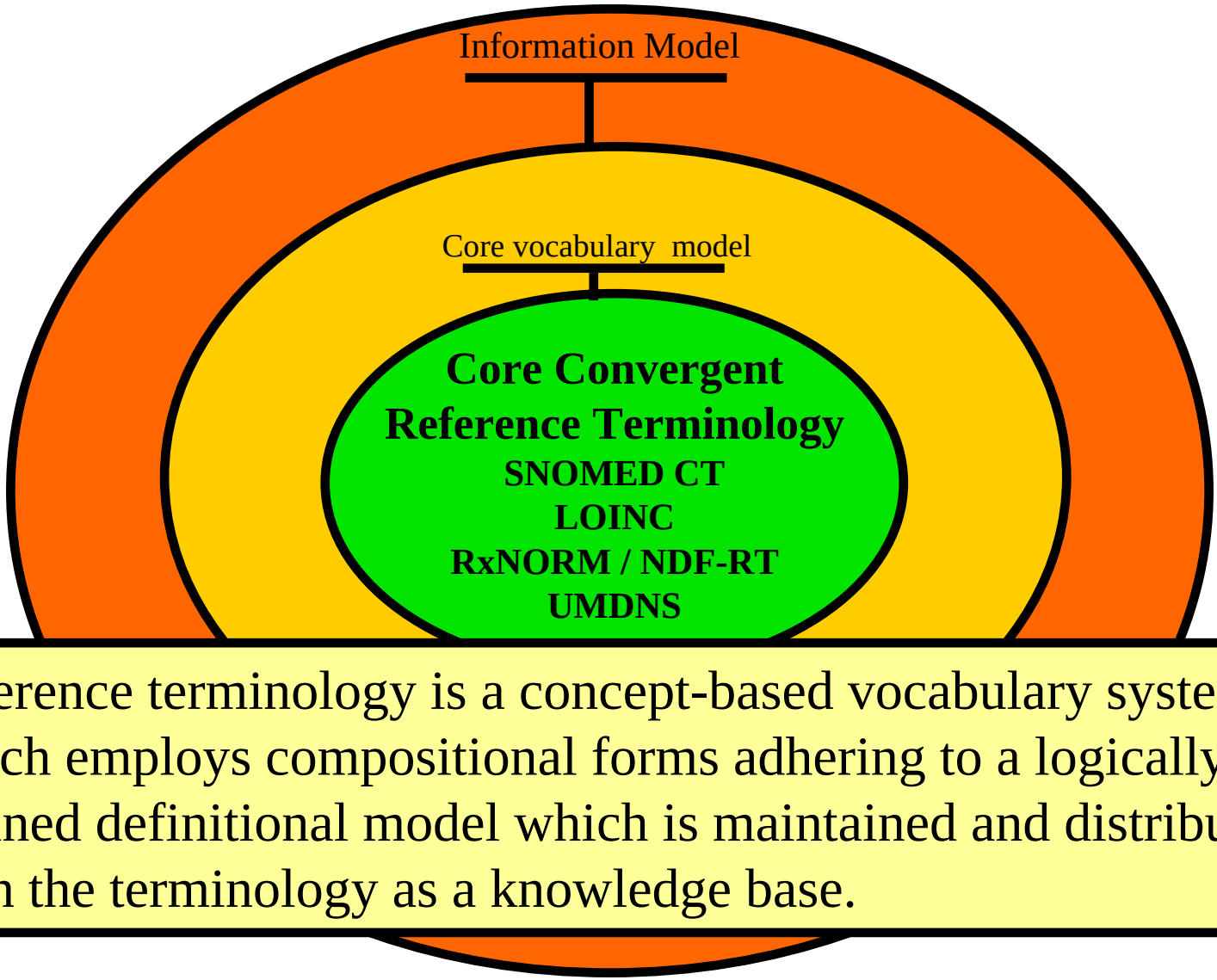
US Terminology architecture for patient care: Milestones

- November 2003: NCVHS deliberations conclude for content recommendations under HIPAA
- May 2004: HHS announcement of SNOMED CT public funding
- 2004 IOM publication: “Patient safety: Achieving a new standard for care”, National Academy Press, 2004

US Integrated Model for Terminology Deployment

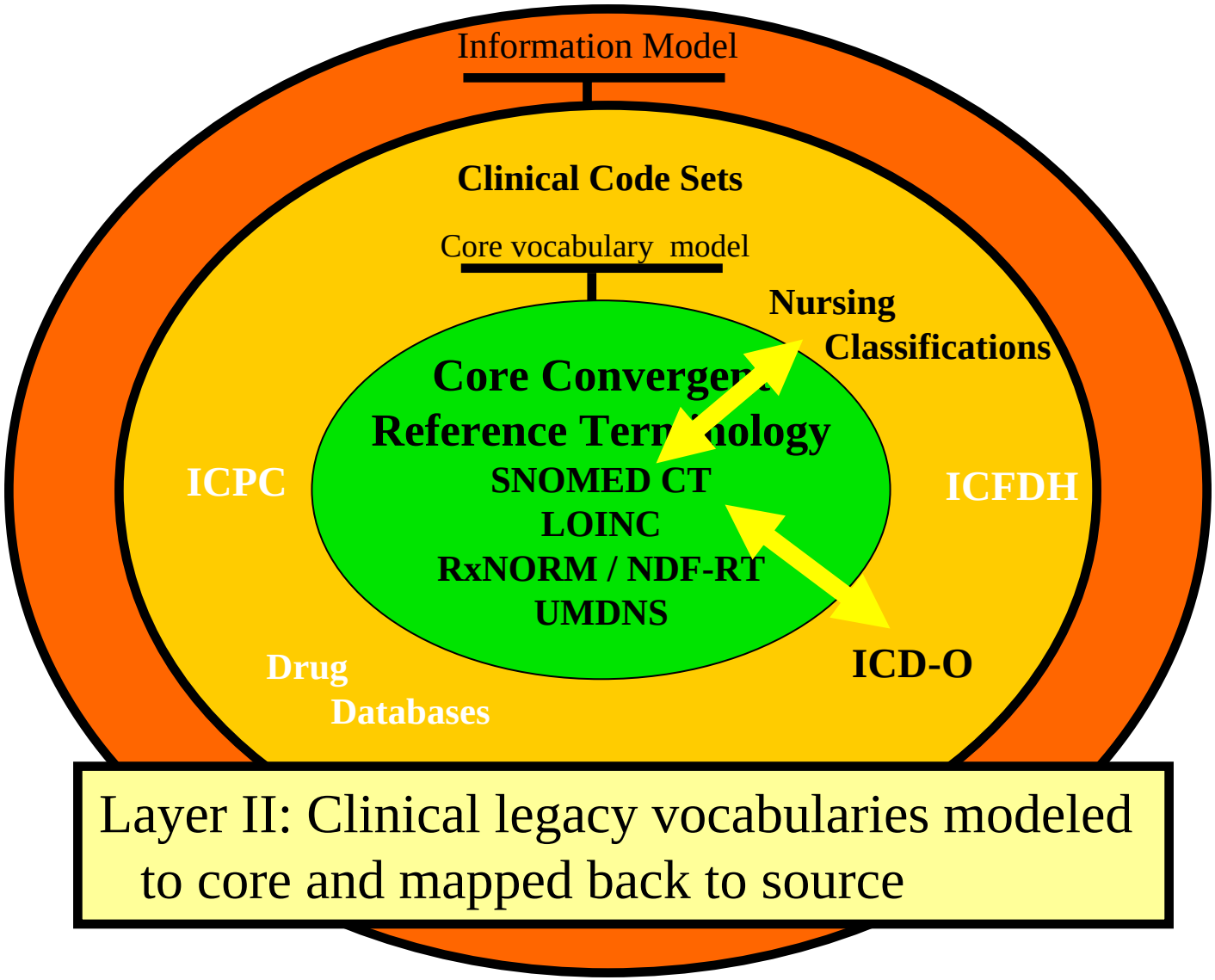
- Core reference terminology serves central patient care needs of health care systems
- Important clinical code sets not well represented in core modeled and integrated into scheme
- Administrative, statistical and epidemiologic classifications mapped from the core

Core Reference Terminologies

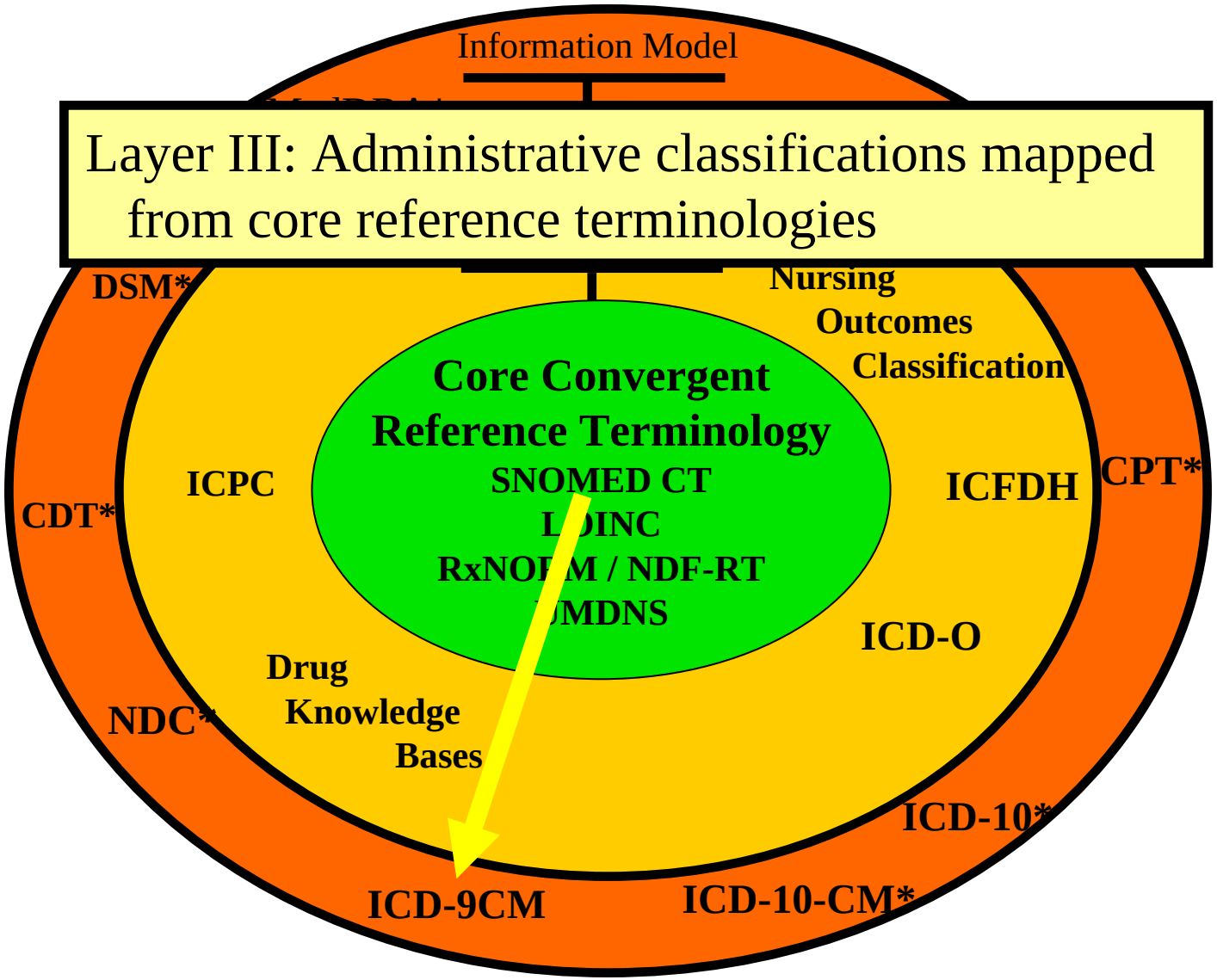


A reference terminology is a concept-based vocabulary system which employs compositional forms adhering to a logically defined definitional model which is maintained and distributed with the terminology as a knowledge base.

US Integration: Clinical code sets



US Integration: Administrative classifications



What is mapping?

- Mapping is the process of creating directed interoperable links from a fully coordinated concept within a reference terminology to one or more codes in a legacy vocabulary or administrative classification
- Mapping may also refer to creating equivalence links between two legacy systems for purposes of merging or update

Purpose of mapping?

- Core terminologies work to achieve the vision of a comprehensive and useful vocabulary system to serve clinical care
- However, there are many parties who need to employ that data in vocabulary schemes designed for other purposes:
  - Government
  - Payers
  - Scientists
- Mapping is employed to translate clinical data into alternative representations without compromising the primary clinical mission.

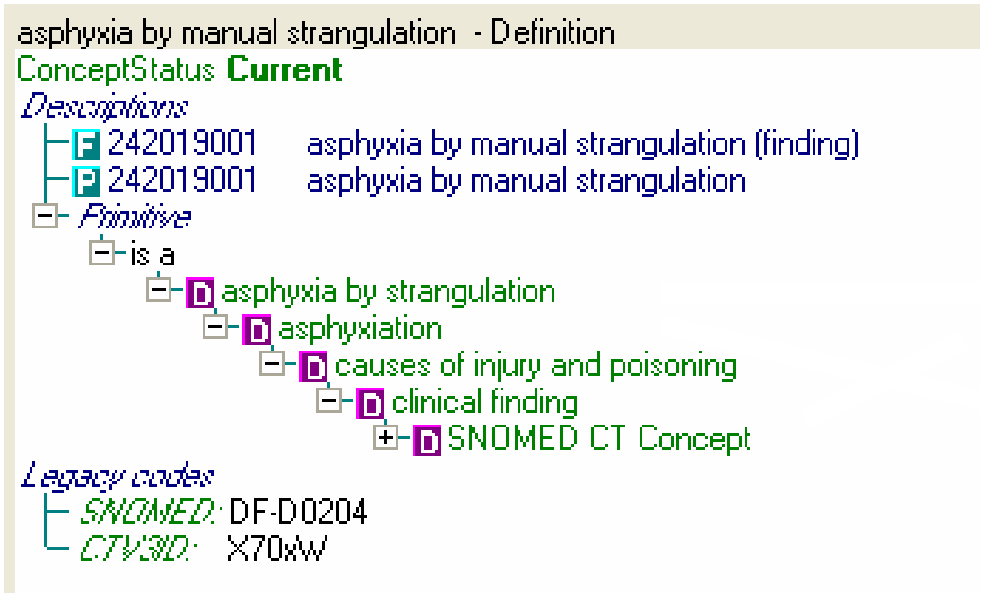
Barriers to successful mapping

- Terminology differences:
  - Scope
  - Editorial policy
  - Differences in granularity
  - Management of context
  - Version control
- Vendor implementation issues:
  - Matching with use case
  - Information model
  - Implementation infrastructure

Technical Barriers to Mapping: Vocabulary Systems

- Terminologies and classifications differ in scope of content
- Discrepancies in total content may be resolved by clear definition of map domains, however…
- RT statements are often clinically general and may not adhere to definitional requirements of the classification, contributing to:
  - Source of variability in the map
  - Contention between RT and classification editorial use cases

What constitutes an injury?



E968.7 Human bite
E968.8 Other specified means
E968.9 Unspecified means
Assassination (attempt) NOS
Homicidal (attempt):
injury NOS
wound NOS
Manslaughter (nonaccidental)
Murder (attempt) NOS
Violence, non-accidental

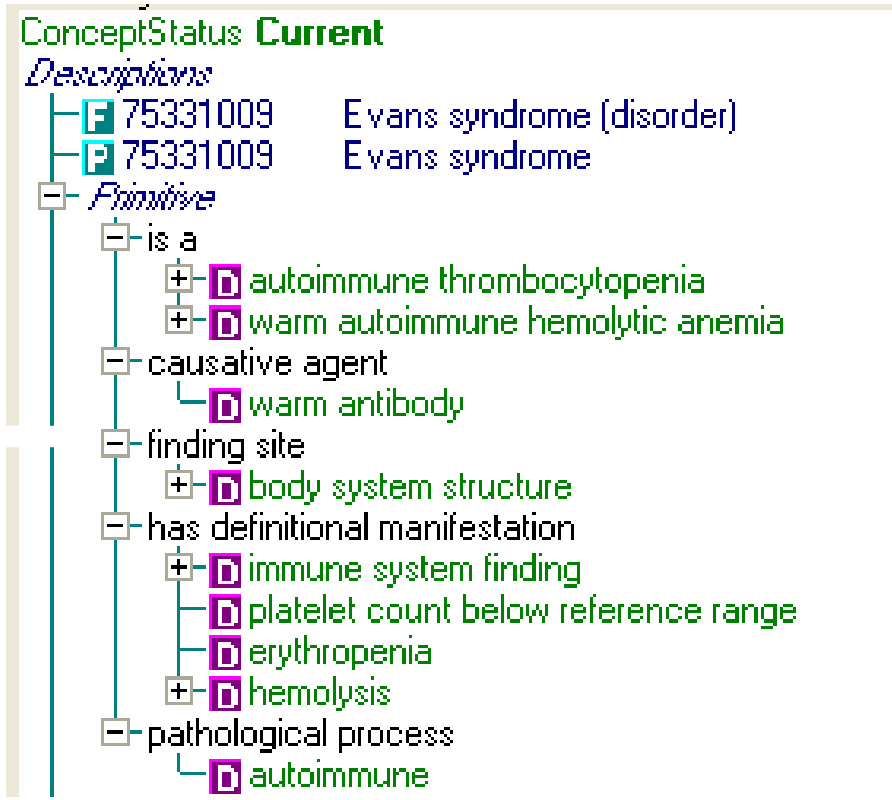
994.7 Asphyxiation and strangulation
Suffocation (by):
bedclothes
cave-in
constriction
mechanical
Suffocation (by):
plastic bag
pressure
strangulation
EXCLUDES *asphyxia from:*
carbon monoxide (986)
inhalation of food or foreign body (932-934.9)
other gases, fumes, and vapors (987.0-987.9)

Technical Barriers to Mapping: Vocabulary Systems

- Terminologies and classifications differ in editorial policies for uniqueness, permanence and definition
- RT seek to uniquely define each concept in the pre-coordinated space with a necessary and sufficient coordination of attributes
- Classifications attempt to sort every concept to a unique category of a mutually exclusive set of categories
- Equivalence mapping may not be strictly possible; proper classification of an RT concept is dependent upon the version of the classification
- NEC defeats any permanent logical definition in a changing environment for standards

ICD-9-CM v10/1/2004

287 Purpura and hemorrhagic conditions
- 287.0 Allergic purpura
- 287.1 Qualitative platelet defects
- 287.2 Other nonthrombocytopenic purpura
- 287.3 Primary thrombocytopenia
- 287.4 Secondary thrombocytopenia
- 287.5 Thrombocytopenia unspecified
- 288.8 Other specified hemorrhagic condition
- 288.9 Unspecified hemorrhagic cond



ICD-9-CM v10/1/2005

287 Purpura and hemorrhagic conditions
- 287.0 Allergic purpura
- 287.1 Qualitative platelet defects
- 287.2 Other nonthrombocytopenic purpura
- 287.3 Primary thrombocytopenia
  - 287.31 ITP
  - 287.32 Evans syndrome
  - 287.33 Congenital and hereditary TP
  - 287.39 Other primary TP
- 287.4 Secondary thrombocytopenia
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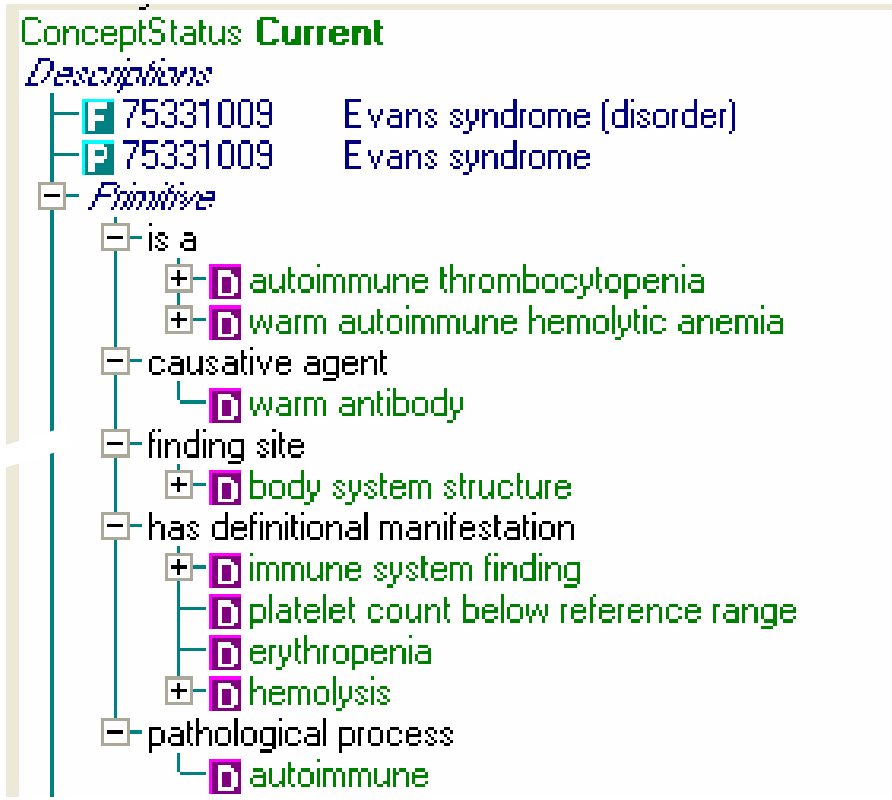
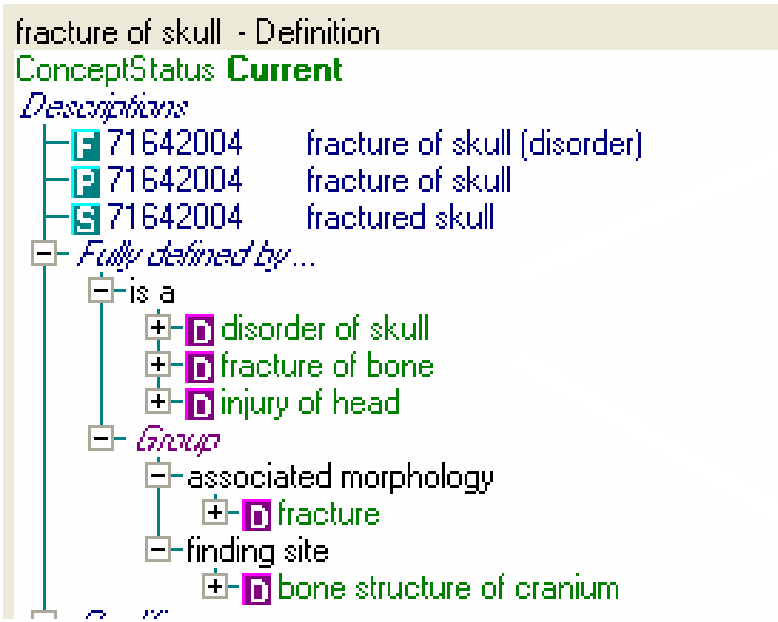
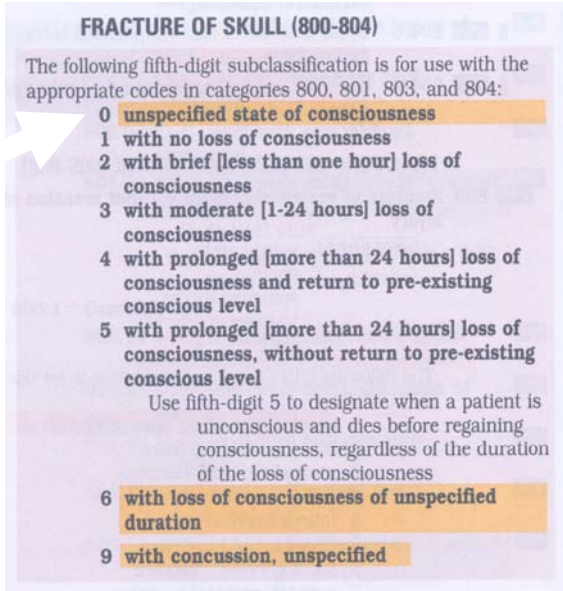


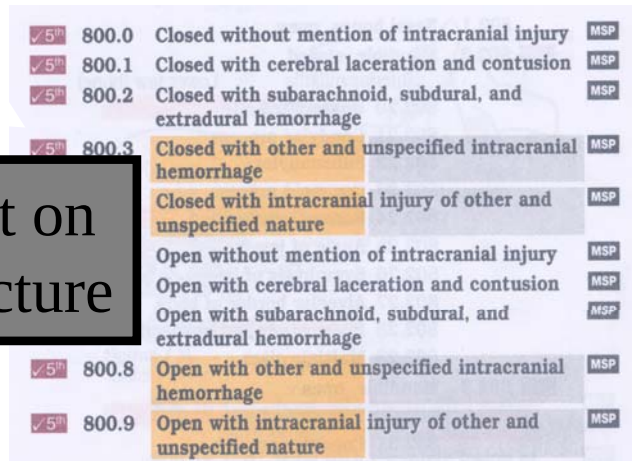
Technical Barriers to Mapping: Vocabulary Systems

- Differences in granularity of classification systems require assumptions / heuristics to deal with this problem
  - Editorial focus organizes classifications for epidemiologic or reimbursement aggregation; reference terminologies define concepts for clinical relevance
  - Procedural decisions in developing equivalence maps are often un-documented and arbitrary
  - Classifications may have inconsistent definitions and conflict with specificity of RT

Granularity issue



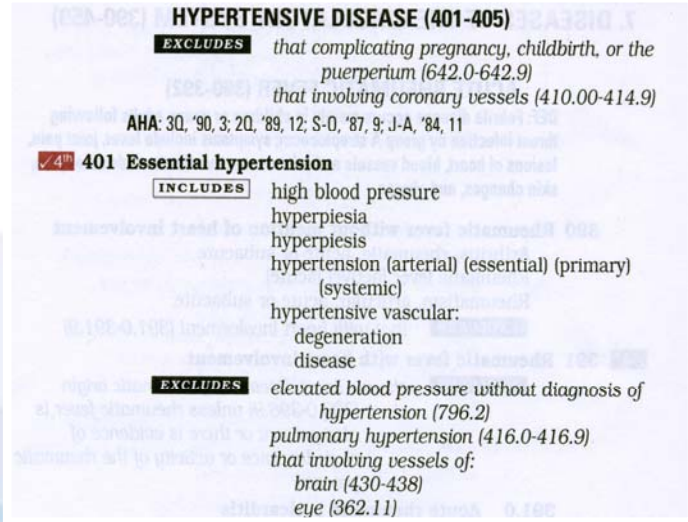




Reproducible map requires agreement on clinical assumption of nature of fracture

Technical Barriers to Mapping: Vocabulary Systems

- Classifications have implementation guidelines dependent on context:
  - Patient co-morbidities (ICD-9 exclusions)
  - Encounter information not within patient record (payer constraints)
  - Episode of care data (ICD 5th digit extension for episodicity)



HYPERTENSIVE DISEASE (401-405)

EXCLUDES *that complicating pregnancy, childbirth, or the puerperium (642.0-642.9)*
that involving coronary vessels (410.00-414.9)

AHA: 3Q, '90, 3; 2Q, '89, 12; S-O, '87, 9; J-A, '84, 11

✓4th **401 Essential hypertension**

INCLUDES high blood pressure
hyperpiesia
hyperpiesis
hypertension (arterial) (essential) (primary) (systemic)
hypertensive vascular:
degeneration
disease

EXCLUDES *elevated blood pressure without diagnosis of hypertension (796.2)*
pulmonary hypertension (416.0-416.9)
that involving vessels of:
brain (430-438)
eye (362.11)

Technical Barriers to Mapping: Vocabulary Systems

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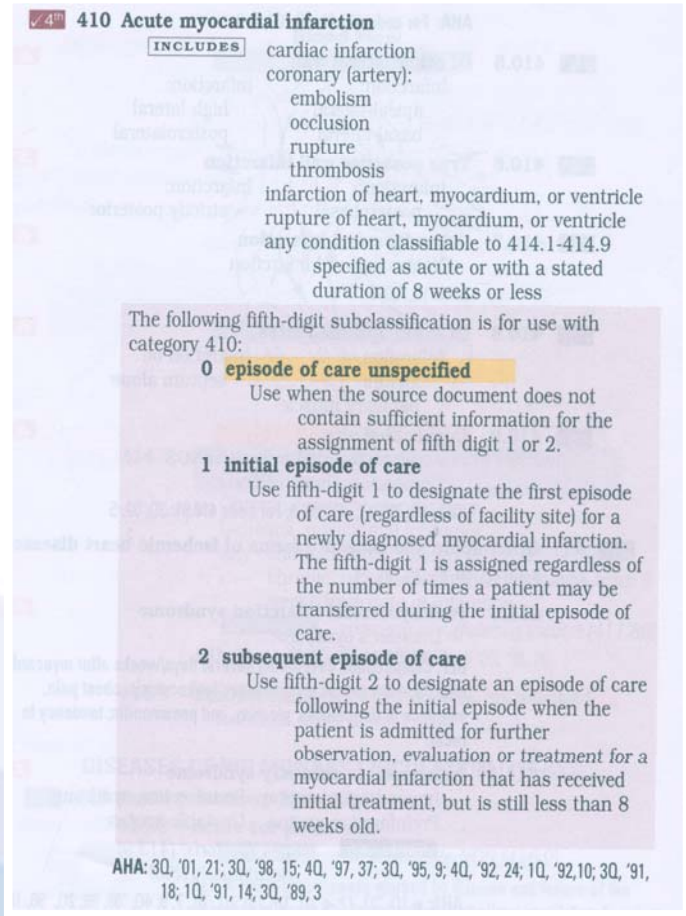


✓4th **410 Acute myocardial infarction**

INCLUDES cardiac infarction
coronary (artery):
embolism
occlusion
rupture
thrombosis
infarction of heart, myocardium, or ventricle
rupture of heart, myocardium, or ventricle
any condition classifiable to 414.1-414.9
specified as acute or with a stated duration of 8 weeks or less

The following fifth-digit subclassification is for use with category 410:

0 episode of care unspecified
Use when the source document does not contain sufficient information for the assignment of fifth digit 1 or 2.

1 initial episode of care
Use fifth-digit 1 to designate the first episode of care (regardless of facility site) for a newly diagnosed myocardial infarction. The fifth-digit 1 is assigned regardless of the number of times a patient may be transferred during the initial episode of care.

2 subsequent episode of care
Use fifth-digit 2 to designate an episode of care following the initial episode when the patient is admitted for further observation, evaluation or treatment for a myocardial infarction that has received initial treatment, but is still less than 8 weeks old.

AHA: 3Q, '01, 21; 3Q, '98, 15; 4Q, '97, 37; 3Q, '95, 9; 4Q, '92, 24; 1Q, '92,10; 3Q, '91, 18; 1Q, '91, 14; 3Q, '89, 3

Technical Barriers to Mapping: Vocabulary Systems

- Release schedules, update frequencies and map versioning require a responsive release management strategy
- Maps change content with new release of either source or target vocabulary
- Responsive and useful map products require agreement for synchronization of publication cycles, or revision of map with change in either scheme

Technical Barriers to Mapping: Vendor implementation

- Application of maps is dependent upon the vendor/software use case; this is often not clear or inconsistent with map development
- Vendor use cases may span different context-laden scenarios which employ different assumptions regarding approach to mapping

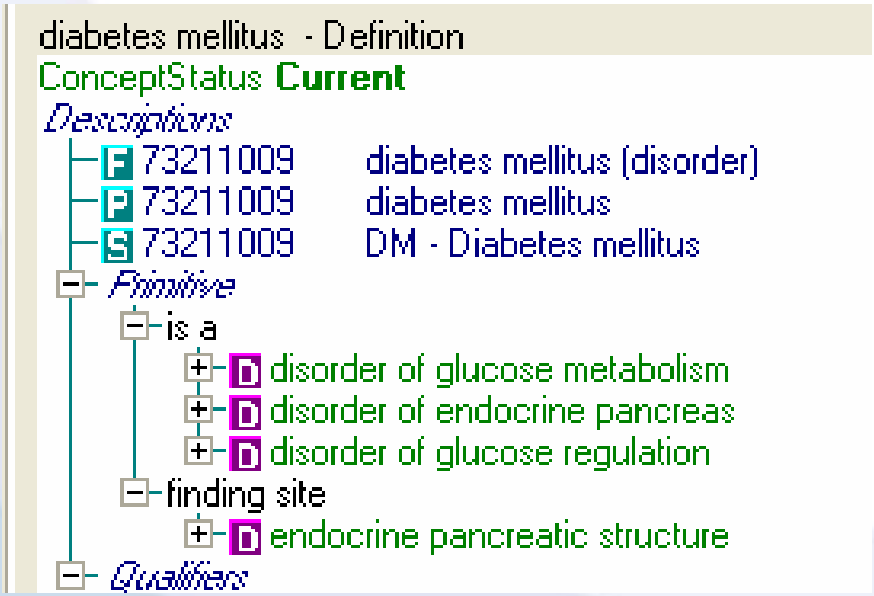
Vendor use case

- Best mapping for epidemiological reporting may be limited for use in reimbursement map
- Context assumptions may be embedded in deployment use case, altering goals of map
- Maps may not be inverted although legacy data conversions require such tools

Technical Barriers to Mapping: Vendor implementation

- Interactions between the reference terminology and the vendor information model create differences in meaning of record instances which are inconsistent with map assumptions
- Conceptual meaning is only complete with binding of information and vocabulary models
- No universal static model for clinical information systems is available
- Such a virtual medical record model is required for unambiguous and reproducible maps

Information model binding



- V18.0 - “Family history of diabetes”
- V12.2 - “History of diabetes”
- 790.29 - “Risk for diabetes”
- 250.9 - “Complication of diabetes”

Technical Barriers to Mapping: Vendor implementation

- Software infrastructure for implementation of knowledge-based maps is rare:
  - No accepted standard for knowledge representation
  - Vendors employ different utilities for inference and reasoning

Principles moving forward

- Understandable
  - All mappings have stated purpose and audience
  - Map documentation is complete, clear and unambiguous
  - Defines source and target domain scope for the map

Principles moving forward

- Reproducible
  - Employs authoritative reference sources uniformly
  - Documentation defines all assumptions, heuristics and procedures required to manage context and create the map
  - All terminology developers move to compliance with sound principles of permanence and version management
  - A standard for the EHR static information model is developed and employed in mapping procedures

Principles moving forward

- Useful
  - All mappings have a business case, a purpose and an audience
  - Use cases are defined for the map which are relevant to the implementation of electronic health records
  - Publication cycle is timely and linked to version change for source and target vocabularies
  - Agreement is reached for standards of knowledge representation in mapping
  - Stable business plan supports map creation and maintenance for all NCVHS approved terminologies

QUESTIONS

Clinical Vocabulary Mapping Methods Institute
Saturday, October 15, 2005