The SNOMED CT Mapping Project

By Karen Szeto
Health Informatician
Hong Kong Hospital Authority
On 15 February 2011
Agenda

• Hospital Authority Clinical Vocabulary Table (HACVT)

• SNOMED CT

• Mapping of HACVT (Diagnosis & Procedure) to SNOMED CT

• Conclusion
HOSPITAL AUTHORITY
CLINICAL VOCABULARY TABLE
(HACVT)
1992
- Integrated Patient Administration System (IPAS):
  - ICD9 Diagnosis (3-digit code)
  - Daily ward return

1993
- Medical Record Abstract System (MRAS):
  - ICD9CM Diagnosis & Procedure (5-digit code)
  - Discharge summary

1995
- HA Master Disease Code Table (HAMDCT) in CMS
  - ICD9CM diagnoses & procedures
  - Extension for locally added terms, alias, associated codes

2001
- HA Clinical Vocabulary Table (HACVT) replacing HAMDCT
  - ICD9CM diagnosis & procedures, ICD 10 diagnosis
  - Unique TermID

2009
- HACVT in Information Architecture Management System (IAMS)—Concept module
  - Other terminologies/classifications, e.g. SNOMED CT, ICPC
  - Beyond diagnoses and procedures, e.g. organism, medication
## HACVT – Statistics on Dx & Px (as at 31 January 2011)

<table>
<thead>
<tr>
<th></th>
<th>Active</th>
<th>Inactive</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td>18,743</td>
<td>7,265</td>
<td>26,008</td>
</tr>
<tr>
<td>Procedure</td>
<td>7,244</td>
<td>1,953</td>
<td>9,197</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25,987</strong></td>
<td><strong>9,218</strong></td>
<td><strong>35,205</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Original ICD terms</th>
<th>Added terms</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td>15,571</td>
<td>10,437</td>
<td>26,008</td>
</tr>
<tr>
<td>Procedure</td>
<td>4,431</td>
<td>4,766</td>
<td>9,197</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20,002</strong></td>
<td><strong>15,203</strong></td>
<td><strong>35,205</strong></td>
</tr>
</tbody>
</table>
SYSTEMATIZED NOMENCLATURE OF MEDICINE - CLINICAL TERMS (SNOMED CT)
• Single largest healthcare terminology:
  - ~300,000 active concepts
  - Cover various healthcare domains, e.g. disease, procedure, drug, laboratory ...

• Owned and maintained by:

• Joint effort of:
  - US : The College of American Pathologists (CAP)
  - UK: National Health Service (NHS)

• Originally created by CAP by combining:
  - SNOMED Reference Terms & Clinical Terms Version 3 (Read Codes Version 3)
## SNOMED CT – 19 Hierarchies

<table>
<thead>
<tr>
<th>Body structure</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical finding</td>
<td>Qualifier value</td>
</tr>
<tr>
<td>Environment and geographical location</td>
<td>Record artifact</td>
</tr>
<tr>
<td>Event</td>
<td>Situation with explicit context</td>
</tr>
<tr>
<td>Linkage concept</td>
<td>Social context</td>
</tr>
<tr>
<td>Observable entity</td>
<td>Special concept</td>
</tr>
<tr>
<td>Organism</td>
<td>Specimen</td>
</tr>
<tr>
<td>Pharmaceutical/biologic product</td>
<td>Staging and scales</td>
</tr>
<tr>
<td>Physical force</td>
<td>Substance</td>
</tr>
<tr>
<td>Physical object</td>
<td></td>
</tr>
</tbody>
</table>

**Total: 291,000 active concepts (Jan 2010 release)**
MAPPING OF DIAGNOSIS & PROCEDURE TO SNOMED CT
Objective

• To map all ICD-9-CM based (diagnosis & procedure terms) in HACVT to SNOMED CT in preparation to transit from a single hierarchical classification to a poly-hierarchical terminology in future

• To facilitate clinical documentation

• To support sharing of clinical data

• To assist data retrieval at granularity level:
  – *For building decision support system*
  – *For other purposes, e.g. research, reporting data ...*
SNOMED CT Example: TB Meningitis

- 10706006 Tuberculosis of central nervous system
- 15758002 Disorder of meninges
- 58437007 Tuberculosis of meninges (disorder)
- 1231004 Meninges structure
- 113858008 Mycobacterium tuberculosis complex
- 441862004 Infectious process

Finding site
Pathological process
Has causative agent
Is a
## Scope of HACVT (as at August 2009)

<table>
<thead>
<tr>
<th></th>
<th>Total Terms</th>
<th>Exclude Never Used / Invalid</th>
<th>Revised Total Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td>25,707</td>
<td>(5,631)</td>
<td>20,076</td>
</tr>
<tr>
<td>Procedure</td>
<td>8,302</td>
<td>(1,143)</td>
<td>7,159</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34,009</strong></td>
<td><strong>(6,774)</strong></td>
<td><strong>27,235</strong></td>
</tr>
</tbody>
</table>
Mapping Process (1)

- Based on SNOMED CT, version Jan 2010

- Mapping process - 2 levels:
  - Staff A: Initial mapping
  - Staff B: Verification

- Mapping outcomes:
  - Exact matched: ~53%
  - Not exact matched: ~47%
Mapping Process (2)

Terminology Tool
- Information Architecture Management System
- Apelon

Editorial Policy
- SNOMED CT
- HKCTT

SNOMED Mapping Core Group
Mapping Process (3)

SNOMED Mapping

- Not Exact Match (~47%)
  - Post-coordination
- Exact Match (~53%)
  - Submit Request to IHTSDO (~4,000 terms)
Mapping Process (4)

2009
- Jul → Get prepared
- Aug → Start mapping project (Total 34,009 terms)
- Sept → Set up SNOMED Mapping Core Group

2010
- Jul → Exclude invalid & never used (6,774 terms)
- Oct → Withhold submission to IHTSDO (>4,000 terms submitted)
- Dec → Exact matched terms completed

2011
- Jan → Start post-coordination for unmatched terms (12,691 terms)
- Feb → Develop editorial policy
Mapping Status
(as at 10 February 2011)

Total Terms: 25707
Completed: 16586 (63%)
Remaining: 9121 (37%)
Mapping Project Plan

**Jul 2009**
- Get prepared
- Mapping

**2010**
- Mapping & Verification

**2011**
- Mapping & Verification

**2012**
- Mapping & Verification
- Refinement of Mapping
Governance

- eHR IS Coordinating Group
- eHR Project Management Office
- HKCTT Editorial Policy Group
- SNOMED Mapping Core Group
Conclusion

• Over 3 years mapping project
• Closely monitor the performance
• Promptly deal with mapping issues/difficulties
• Ongoing tasks:
  – New version of SNOMED CT (every 6 months)
  – Ongoing mapping for new terms
  – Auditing
Thank You
Examples: Exact Match Terms

<table>
<thead>
<tr>
<th>HACVT Term</th>
<th>SNOMED CT Concept ID</th>
<th>SNOMED CT (FSN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute tonsillitis</td>
<td>17741008</td>
<td>Acute tonsillitis (disorder)</td>
</tr>
<tr>
<td>Pneumonia due to adenovirus</td>
<td>41207000</td>
<td>Adenoviral pneumonia (disorder)</td>
</tr>
<tr>
<td>Renal stone</td>
<td>95570007</td>
<td>Kidney stone (disorder)</td>
</tr>
<tr>
<td>Prolapse of vaginal wall</td>
<td>398022005</td>
<td>Vaginal wall prolapse (disorder)</td>
</tr>
<tr>
<td>HACVT Term</td>
<td>Relationship</td>
<td>SNOMED Concept ID</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Acute pulmonary embolism</td>
<td>is a</td>
<td>59282003</td>
</tr>
<tr>
<td>Group - associated morphology - finding site</td>
<td></td>
<td>55584005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>81040000</td>
</tr>
<tr>
<td>clinical course</td>
<td></td>
<td>424124008</td>
</tr>
</tbody>
</table>

| Left pneumonectomy    | is a         | 49795001          | Total pneumonectomy (procedure)                   |
|                       |              | 12930400          | Excision – action (qualifier value)                |
|                       |              | 361982005         | Entire left lung (body structure)                 |