An international approach to the implementation of SNOMED CT and ICPC-2 in Family/General Practice

Nick Booth¹,², Graeme Miller¹,²,³, Julie O’Halloran¹,²,³, John Bennett⁴

¹ IHTSDO IFP/GP RefSet and ICPC Mapping Project Group
² Wonca International Classification Committee
³ Family Medicine Research Centre, The University of Sydney
⁴ Chair RACGP National Standing Committee - eHealth
Introduction - Nick Booth

- Primary Care Working Group from 2007
- Collaborative agreement between Wonca and IHTSDO 2009
  - Foundation of a new GP/FP Special interest group (SIG)
  - Project to map SNOMED-CT to ICPC2
  - Primary Care related content of SNOMED-CT
- Graeme – Background
- Julie – details of the project
- John – relationship to work going on in Australia
- Nick – closing remarks
- Then questions

www.ihtsdo.org
Aim: Integration of terminology

- Complementary and integrated use of appropriate terminology with primary care classifications
- Recognizes the importance of public health data for population health promotion
- Adaptation to local language and clinical terminology
- Implementation models in EHRs which work in grass roots primary care
The scope of General/Family Practice

- A large proportion of the world’s medical care is provided by General/Family Practice
- General/Family Practice is expanding rapidly, particularly in developing countries and in eastern Europe
- General Practitioners/Family Physicians (GPs/FPs) manage a very wide spectrum of patient problems: physical, psychological, social and functional
- Good primary medical care = good population health (Starfield)
World Organisation of Family Doctors (Wonca)

- An organization of organizations – National Colleges and Academies of Family Physicians/General Practitioners
- Started in 1972 with 18 foundation Colleges
- Now has 117 member Colleges in 95 countries
- Represents more than 250,000 primary care physicians
Wonca International Classification Committee (WICC)

- Established in 1972 at the formation of Wonca
- An expert committee of clinicians, researchers and epidemiologists
- Responsible for the development of primary care classifications and other clinical measurement systems.
- Custodian of the International Classification of Primary Care (ICPC)
The International Classification of Primary Care

- Compact – 1400 classes
- Comprehensive – covering multiple aspects of primary care
- Based on the epidemiology of primary care – classes are developed based on:
  - Frequency of occurrence in primary care
  - Public Health importance
  - Prognosis/outcome
  - Value of interventions
- ICPC-2 is a member of the WHO Family of International Classifications
<table>
<thead>
<tr>
<th>Chapters</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A B D F H K L N P R S T U V W X Y Z</td>
</tr>
<tr>
<td>1. Symptoms &amp; complaints</td>
<td></td>
</tr>
<tr>
<td>2. Diagnostic, screening,</td>
<td></td>
</tr>
<tr>
<td>prevention</td>
<td></td>
</tr>
<tr>
<td>3. Treatment, procedures,</td>
<td></td>
</tr>
<tr>
<td>medication</td>
<td></td>
</tr>
<tr>
<td>4. Test results</td>
<td></td>
</tr>
<tr>
<td>5. Administrative</td>
<td></td>
</tr>
<tr>
<td>6. Other</td>
<td></td>
</tr>
<tr>
<td>7. Diagnoses, disease</td>
<td></td>
</tr>
</tbody>
</table>

**A** General  
**B** Blood, blood forming  
**D** Digestive  
**F** Eye  
**H** Ear  
**K** Circulatory  
**L** Musculoskeletal  
**N** Neurological  
**P** Psychological  
**R** Respiratory  
**S** Skin  
**T** End/met/nut  
**U** Urinary  
**V**  
**W** Pregnancy  
**X** Female genital  
**Y** Male genital  
**Z** Social
Use of ICPC-2

- Languages (18):
  - Chinese
  - Croatian
  - Czech
  - Danish
  - Dutch
  - English (3)
  - Finnish
  - French
  - Greek
  - Italian
  - German
  - Japanese
  - Portuguese
  - Romanian
  - Russian
  - Spanish (2)
  - Azeri
  - Serbian
  - Finnish
  - Swedish
  - Turkish

Used extensively by clinicians in 21 countries, less frequently in many others.
Wonca/IHTSDO Agreement

- Wonca to provide input into development of SNOMED CT for general/family practice including a RefSet
- Agreement to map SNOMED CT to ICPC-2
- IHTSDO established an International Family Physician/General Practitioner Special Interest Group and Project Group (Chair appointed by Wonca – Dr Nick Booth)
Wonca/IHTSDO Agreement

- GP/FP PG developed work program for mapping, RefSet development and implementation; standards and education (approved Oct 2009)
- The GP/FP SIG is also responsible for the GP/FP content of SNOMED CT at an international level
Project overview

- **Aim:**
  - To develop a reference set (RefSet) of SNOMED CT for use in general/family practice internationally
  - To create a map from the international GP/FP RefSet to ICPC-2
EHR data building blocks
Implementation of RefSets

- Natural language
- Interface terminology
- Keyword selection system
- Reference set
- SNOMED CT concept
- ICPC-2
- ICD 10
- SNOMED CT sub-hierarchy search
Use cases for the GP/FP RefSet and map to ICPC-2

- Data entry
- Electronic transfer of care – referrals
- Patient recall
- Management of legacy data
- Translations
- Research
The GP/FP RefSet and ICPC mapping project was divided into three distinct phases:

1. Requirements gathering and method (9 months)
2. Build phase (6 months)
3. Testing and validation phase (6 months)
What has happened to date

- Phase 1 – Development of project framework
  - Scoping document
  - Requirements document (written in line with the IHTSDO quality assurance framework)
  - Methods document
  - Project plan for Phases 2 and 3
Scoping document

- Outlines the scope of the GP/FP RefSet and ICPC mapping project
- A preliminary scope statement was prepared by the Project Group
- International and national standards for applicable information models were researched
- National Colleges/Academies of General/Family Practice in IHTSDO member countries and SNOMED CT National Release Centres were consulted for feedback on the proposed project scope.
Project scope

- The Project Group decided early in the project that it was unreasonable to develop RefSets for all possible data fields in general/family practice electronic health records internationally
  - Diversity of information models used in general/family practice EHRs
  - Time and resources
  - Overlap between this project and other IHTSDO projects (e.g. pathology and laboratory medicine)
  - Areas of SNOMED CT that are inappropriate for general/family practice (e.g. medication prescribing)
Scope of the GP/FP RefSet and map to ICPC-2

- Reason for encounter
  - Uses the definition from the Wonca Dictionary of General/Family Practice.
    - “An agreed statement of the reason(s) why a person enters the health care system, representing the demand for care by that person”.
Scope of the GP/FP RefSet and map to ICPC-2

- Health issue
  - Uses the definition from the European standard CEN 13940-1: Health informatics – system of concepts to support continuity of care – Part 1: basic concepts
    - “issue related to the health of a subject of care, as identified or stated by a specific health care party”.
    - This is further defined in the notes: “according to this definition, a health issue can correspond to a health problem, a disease, an illness”
Scope of the map – GP/FP RefSet to ICPC-2

- The content of the GP/FP RefSet will form the basis of the scope for the map from the RefSet to ICPC-2
- Target areas in ICPC-2
  - Component 1 (symptoms and signs) – high priority
  - Component 7 (diagnoses and diseases) – high priority
  - The process components in ICPC-2 (Components 2 to 6) will be mapped to with varying levels of detail depending on RefSet content
- The project group will also investigate the extent to which SNOMED CT hierarchies can be used to expand the map
Consultation

- During the scoping phase consultation was undertaken with:
  - National Colleges/Academies of General/Family Practice in IHTSDO member countries
  - National Release Centers
- Seen as a high priority for the project
- Helps to ensure that the products resulting from the project are acceptable to major stakeholders
  - Aim to aid future implementation
Responses received to consultation

- Colleges/Academies of General/Family Practice
  - College of Family Physicians (Singapore)
  - Royal Australian College of General Practitioners (Australia)
  - The College of Family Physicians of Canada (Canada)
  - Spanish Society of Family and Community Medicine (Spain)
  - Dutch College of General Practitioners (the Netherlands)

- National Release Centers
  - National Board of Health (Denmark)
  - National e-Health Transition Authority (Australia)
  - UK Terminology Centre (UK)
Responses to consultation continued

- Overall there was broad support for the project
- Unanimous agreement that reason for encounter and health issue should be the highest initial priorities for the project
- Need for maps to and from other terminologies/classifications (e.g. Read Version 2 and ICD-10)
- Suggestions for future priority areas
  - Hospitalisations
  - Episode of care
  - Procedures
  - Care plans
Requirements document

- Gathering and reporting requirements in a formalized manner allows the Project Group to prepare the GP/FP RefSet and map to ICPC-2 against a defined set of objectives and expectations.
- The requirements were written in the style of the IHTSDO Quality Assurance Framework
  - This allows each requirement to be measured and assessed against a quality metric.
Clinical requirements

- The RefSet must be comprehensive, including terms commonly used by GPs/FPs internationally.
- Concepts in the GP/FP RefSet must be able to be mapped to, and correctly mapped to ICPC-2.
- Suggestions for new content in SNOMED CT identified during the development of the RefSet must be forwarded to the IHTSDO for their consideration.
- The implementation of the GP/FP RefSet and map to ICPC-2 should have a positive impact on users’ electronic medical records systems.
- GP/FP software vendors must be provided with education about the implementation of the GP/FP RefSet and map to ICPC-2 in the form of an implementation guide.
Technical requirements

- Values in the GP/FP RefSet must be linked to the following core clinical headings: reason for encounter and health issue.
- End users must be able to enter SNOMED CT clinical concepts that are not in the GP/FP RefSet into their electronic medical record if they are not able to find a suitable concept in the RefSet.
- The GP/FP RefSet must be generated using existing termsets used in general/family practice from at least five IHTSDO member countries.
- Both the GP/FP RefSet and map to ICPC-2 should be field tested prior to their inclusion in the SNOMED CT international release.
- Content in the GP/FP RefSet must be kept up-to-date with updates to the SNOMED CT international core.
Licensing requirements

- The GP/FP RefSet must only be released to those with a SNOMED CT affiliate licence
- The map from the GP/FP RefSet to ICPC-2 must only be provided to users with both a SNOMED CT affiliate licence and an ICPC-2 licence
Overview of Methods document

1. Create the GP/FP RefSet
2. Create the map from the GP/FP RefSet to ICPC-2
Creating the GP/FP RefSet

- Terminologies/codesets used in general/family practice will be used as the basis for the GP/FP RefSet
  1. Termsets will be obtained
  2. Termsets will be mapped to SNOMED CT using a specialised mapping tool
  3. Each source termset will be rationalised, amalgamating all instances of multiple source terms mapped to a single SNOMED CT concept
  4. Any listed (and relevant) SNOMED CT concept present in three or more source termsets will be included in the RefSet (demonstrating breadth of use internationally)
  5. Frequency of use will be used to determine an appropriate cut-off for the remainder of the RefSet, based on the relative frequency with which concepts have been used and the breadth of concepts overall
Details of source termsets

- Source termsets have been received from the following countries:
  - Argentina
  - Australia
  - Canada
  - the Netherlands
  - New Zealand (2)
  - Sweden
  - United Kingdom (2)
  - United States
Creating links from source terminologies to SNOMED CT

- Australian term set
- UK Read term set
- NZ Read term set
- Canadian SNOMED CT term set
- Argentine SNOMED CT term set
- NAMCS term sets
Tooling

- Use of the CSIRO Snapper mapping tool
Source info
Source terms:

- Hyper tension
- Upper respiratory tract infection
- Depression
- Asthma
- Oesophageal reflux
- Pap smear
- Hypercholesterolaemia
- Immunisation
- Diabetes mellitus

Graphical expression:

- Pain finding at anatomical site
- Pain of truncal structure
- Finding of urinary tract proper
- Abdominal pain
- Dysuria
- Scalding pain on urination
- Urogenital finding
- Urinary system finding
- General finding of abdomen
- Genitourinary pain
- Lower urinary tract finding
- Pain in pelvis
<table>
<thead>
<tr>
<th>Source Term</th>
<th>Related Terms</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>Hypertensive disorder, Hypertensive disorder</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Upper respiratory tract infection</td>
<td>Upper respiratory infection, Upper respiratory infection</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>Depressive disorder</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>Asthma</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Oesophageal reflux</td>
<td>Oesophageal reflux finding</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Pap smear</td>
<td></td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Hypercholesterolaemia</td>
<td>Hypercholesterolaemia</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Immunisation</td>
<td></td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>Diabetes mellitus</td>
<td>Automap</td>
<td></td>
</tr>
</tbody>
</table>

**Automap results**

![Automap screenshot](image-url)
<table>
<thead>
<tr>
<th>Source Term</th>
<th>Relation</th>
<th>SNOMED Expression</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>Equivalent to</td>
<td>38341003 [Hypertensive disorder]</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Upper respiratory tract infection</td>
<td>Equivalent to</td>
<td>64160093 [Upper respiratory Infection]</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>Equivalent to</td>
<td>35498007 [Depressive disorder]</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>Equivalent to</td>
<td>196837001 [Asthma]</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Oesophageal reflux</td>
<td>Equivalent to</td>
<td>249456004 [Oesophageal reflux finding]</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>FBC smear</td>
<td>Equivalent to</td>
<td>73211009 [Diabetes mellitus]</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>Equivalent to</td>
<td>13644003 [Hypercholesterolemia]</td>
<td>Automap</td>
<td></td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>Equivalent to</td>
<td>73211009 [Diabetes mellitus]</td>
<td>Automap</td>
<td></td>
</tr>
</tbody>
</table>

**Identified target match**

- Hypertension with albuminuria
- Hypertensive disorder with albuminuria and without oedema in the obstetric context
- Hypertensive encephalopathy
- Hypertensive episode
- Hypertensive renal disease
- Hypertensive urgent
- Labile hypertension
Target match details
View of hierarchical structure
Creating the map from the GP/FP RefSet to ICPC-2

- The map will be from the SNOMED CT GP/FP RefSet to ICPC-2
- The most recent versions of SNOMED CT and ICPC-2 available at the start of the mapping process will be used in the mapping
- Tooling
  - Use of the ICD-10 prototype tool
Current status of project

- Between Phases 1 and 2 at present
- Phase 1 deliverables going through project governance processes
- Phase 2 to commence shortly
What happens next

- It is anticipated that Phase 2 (the production phase) will commence shortly
  → First drafts of the GP/FP RefSet and map to ICPC-2 will be available around July/August
- Testing will then begin
  - Recruitment of testing sites
  - Testing of GP/FP RefSet +/- map to ICPC-2
  - Incorporation of comments resulting from testing
Australian Health Care

- Mix of public and private funding

- Health spending 8.7% of GDP in Australia 2008-09, average of 9.5% in OECD countries in 2009.

- Pharmaceutical Benefits Scheme (PBS) Estimate $10.6 Billion 2011-2

- Over 110 million GP services per year

- Problems with clinical communications
GP e-Health Summary

- High rates of computerisation by GPs
- Health Identifiers Bill’s passage through Parliament
- GPs logical source for a Health Summary for most Australians
- Health Summary work is a logical progression from the development of the 4th Edition of RACGP Standards for General Practices.
- The RACGP supports the development of the GP Ref Set
- There are benefits for GP EHRs
RACGP / NEHTA Collaboration

- The GP Health Summary where appropriate will include:
  - Allergies & Adverse Reactions to Medicines
  - Current Medicines List
  - Current Health Problems & Relevant past health history
  - Immunisations
  - Health risk factors (eg SNAP)
  - Relevant family history
  - Relevant social history
PCEHR: Access to information

- Shared Health Summary
- Event Summaries
- Discharge Summaries
- Pathology Result Reports
- Referrals
- Prescribing and Dispensing Records
- Medicare Information (Organ Donor, MBS, PBS and ACIR)
- Consumer Entered Information (allergies, medicines, emergency contact, advance care directive location)
Terminology is not enough

- Clinical record standards
- EHR configuration library
- Professional governance
A Clinician’s Guide to Record Standards – Part 1:
Why standardise the structure and content of medical records?

A Clinician’s Guide to Record Standards – Part 2:
Standards for the structure and content of medical records and communications when patients are admitted to hospital
Clinical Content Library

Patient care elements

Forms/scales/assessments

Anatomical drawings

Active Problems
- Congestive Heart Failure
- Chronic Obstructive Airways disease
- Diverticular Disease
- Plantar fasciitis

Resolved Problems
- Lobar Pneumonia
- Restless Legs syndrome
- Gaviscon

Current Medication
- Tiotropium
- Bumetanide and amiloride

Past medication
- Investigations requested
- Chest X-ray

Allergies
- Penicillin

Structure records with headings

Document Metadata

RULES and EMBEDDED KNOWLEDGE
For Decision Support and Care Pathway Management

SNOMED-CT
Terminology maps and Refsets

CUI
Computer User Interface

APIs/Apps (ITK)
Discussion

- nb@nhs.net