Development of Medicines Terminology Standards for Use in Australia

National Clinical Terminology & Information Service
NEHTA
23 January 2013
Healthcare system: Australia

- One of the largest & most complex industry.
- Employs over 850,000 people.
- Delivers services to 22.6 million people.
- Multiple geographies and socio-economic settings.
- Complex network of mainly autonomous public & private care providers.
  - Over 1,000 public & private hospitals.
  - 10,000s of general practice, specialist, community health, allied health & aged care settings.
Healthcare system: Australia

• In 2010-2011, Australia spent about $130 billion on health. In 2000-2001, this was $77.5 billion\(^2\).
• 9.3% of GDP vs. 8.2% of GDP for same periods.
• Estimated recurrent expenditure on health is about $5,800 p/p.
• Growth due to ↑ volume of health goods & services purchased, not price – mainly population growth, not ↑ expenditure p/p.
• Two largest increases:
  • Public hospital services (↑ $2.2 billion)
  • Medications (↑ $2.1 billion)

Health to GDP ratio: Aust vs. OECD countries

(a) See definition of ‘OECD financial year’ in Box 5.1.

Source: Table 5.1.

Figure 5.1: Health expenditure as a proportion of GDP, selected OECD countries, 2010(a)
Health to GDP ratio: Aust vs. Asia-Pacific countries

Health expenditure as a proportion of GDP, selected Asia-Pacific countries, 2010
Healthcare system challenges – Australia (1)

- Significant challenges in continuing to deliver high standards of health outcomes:
  - Large ageing population
  - Increasing incidence of chronic diseases
  - Increasing consumer demand for more costly, complex & tech advanced procedures
  - Differences between advantaged & disadvantaged Australians
  - Supply & distribution of skilled health sector workers
Healthcare system challenges – Australia (2)

- Various local/proprietary code-sets, classifications & terminologies in use
- Various EMRs are in use
- Different states & jurisdictions
- Different healthcare settings
- Different reporting requirements
- Different underpinning business/editorial rules
- Little to no sharing of information:
  - Point to point
  - Point to share
Healthcare system challenges – Australia (3)

Clinical records:

• Not only a record for the author
• Essential to inform the next person in the care team
• Clinical safety risks of poor quality, ambiguous communication, e.g. prescribing, dispensing and administration errors
• Difficult to establish a person’s medication history reliably and efficiently across the continuum of care
Australian Healthcare Community
National E-Health Transition Authority (NEHTA)

- Identify and develop the necessary foundations for eHealth
- Develop the Personally Controlled Electronic Health Record (PCEHR)
NEHTA Vision

To enhance healthcare by enabling access to the right information, for the right person, at the right time and place.
NEHTA Purpose

• Lead the uptake of eHealth solutions
• Enable the progression and accelerate the adoption of eHealth through:
  • Infrastructure integration
  • Health information standards
## NEHTA Work Program

<table>
<thead>
<tr>
<th>PERSONALLY CONTROLLED ELECTRONIC HEALTH RECORD</th>
<th>CLINICAL INFORMATION</th>
<th>INDIVIDUAL INFORMATION</th>
<th>SHARED INFORMATION</th>
<th>MEDICARE DATA</th>
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<td>E-HEALTH SERVICES</td>
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<td>NATIONAL INFRASTRUCTURE COMPONENTS</td>
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<td>NATIONAL CLINICAL AND TERMINOLOGY SERVICE</td>
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## Personaly Controlled Electronic Health Record

<table>
<thead>
<tr>
<th>Priority health activities</th>
<th>Benefits of national PCEHR system (2010-2025) (M$)</th>
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<tbody>
<tr>
<td>Reduced avoidable hospital admissions and GP visits due to more effective medication management</td>
<td>$10,237</td>
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<tr>
<td>Improved continuity of care</td>
<td>$1,308</td>
</tr>
<tr>
<td><strong>Total net community benefits</strong></td>
<td>$11,545</td>
</tr>
</tbody>
</table>

Deloitte, Expected benefits of the National PCEHR System Based on economic modelling work undertaken in 2010-2011. Published 2012.
National Clinical Information & Information Service

- SNOMED CT-AU
- Australian Medicines Terminology
- Clinical Information
- Reference Group engagement
- Service Desk
- Implementation Support
How does a national standardised medicines terminology enhance healthcare?
Between 22% and 71.9% of consumers have errors at admission to hospital and 2.8% of medication discrepancies have the potential to cause probable ‘patient discomfort or clinical harm’

Re-admission is more than twice as likely if more than one medication is unintentionally omitted from a discharge summary

2–3% of all hospital admissions are medication related and up to 30% of unplanned geriatric admissions are associated with Adverse medication events

*Australian Commission for Safety and Quality in Healthcare, The Case for Medication Reconciliation, Presentation. December 2010*
Medicine files

- ARTG
- PBS
- Proprietary vendor lists
- Formularies
- Pharmacy wholesalers
- Knowledge databases
APO Pantoprazole 40mg Tablets, 30 or Pantoprazole (Apotex) 40 mg tablet: enteric-coated, 30 tablets
Language

• guten morgen
• aloha kakahiaka
• selamat pagi
• buenos días

buongiorno
•

• bonjour
Language

- guten morgen
- buongiorno
- aloha kakahiaka
- selamat pagi
- good morning
- bonjour
- buenos días
Context

That’s what I mean

I feel

The water is COLD

I have a
What are the benefits of terminology?
Datum: 23/11/190

Vince. Did you have a good day?

Herb

Don’t write like this.
“If you’re stumped, why not write an illegible prescription and hope the pharmacist comes up with something?”
Twentieth century picture of interoperability
Benefits

• Improved data quality
• Enables unambiguous communication and interpretation across different healthcare settings
• Better ability to monitor patient care and clinical outcomes through the care continuum
• Supporting interoperability between clinical systems
• More efficient updates of clinical information, facilitating improved workflow;
• Better aggregation and re-use of information for population health/epidemiology, policy & Strategy, research and education purposes.
What have we achieved?

Design
Development
Maintenance
Design

Objectives
Use cases / requirements
Model design
Editorial Rules & technical documentation

Scope
Collaboration/user engagement
Review and evaluate existing standards
Objective

- Standardised medicines terminology universally used throughout the healthcare system.
- Communicate medicinal information without loss of detail or change to meaning.
- Achieve semantic interoperability – “ability of computer systems to communicate and exchange data with unambiguous, shared meaning”.
- Support effective and consistent clinical recording of medicinal data to improve patient care.
AMT overview

• AMT is a systematically organised computer readable collection of medicinal terms.
• Modeled according to international terminology SNOMED CT.
• Delivers standardised identification of brand (trade) products and equivalent generic medicines along with associated components.
• Standard naming conventions defined by editorial rules.
AMT is not...

- A classification system.
- Memorisable – meaningless identifiers.
- Just for human readership.
- Able to be printed out and used like a book.
- Replacing or displacing other instruments.
Provide medicines terminology for implementation in clinical information systems to support:

- Prescribing
- Recording
- Review
- Issue – including dispense
- Administration
- Transfer of information
# Clinical Scenarios

<table>
<thead>
<tr>
<th>AMT concept groups</th>
<th>Prescribe</th>
<th>Record</th>
<th>Review</th>
<th>Issue (including dispense)</th>
<th>Administer</th>
<th>Transfer of information</th>
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</thead>
<tbody>
<tr>
<td>Medicinal Product (MP)</td>
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<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
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<td></td>
<td>✓</td>
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</tbody>
</table>
Model Design

Based on previous work undertaken prior to the establishment of NEHTA including:

- UK Dictionary of Medicines and Devices (dm+d)
- Australian Medicines and Devices Terminology developed by the Department of Health and Ageing in conjunction with HL7 Australia and New Zealand (Sep 2004)
- SNOMED CT
AMT Components

Consists of

• concepts
• descriptions
• relationships
• Identifiers (codes)
Relational Model

Identifies the Medicinal Products

Medicinal Product (MP)
amoxicillin

Medicinal Product Unit of Use (MPUU)
amoxicillin 500 mg capsule

Medicinal Product Pack (MPP)
amoxicillin 500mg capsule, 20

Identifies the Trade Products

Trade Product (TP)
Amoxil

Trade Product Unit of Use (TPUU)
Amoxil 500 mg capsule: hard, 1 capsule

Containered Trade Product Pack (CTPP)
Amoxil 500 mg capsule: hard, 20 capsules, blister pack

Trade Product Pack (TPP)
Amoxil 500 mg capsule, 20
Focus on the naming conventions and rules associated with all description types for concepts in the AMT model.
<table>
<thead>
<tr>
<th>Rule ID</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>AMT-MP-PT-5</td>
<td>The sequence of ingredients in the Medicinal Product Preferred Term will, by default, be based on the alphabetic order of the ingredient names. However, if every MPUU associated with one of the components of the MP (either through the &quot;MPUU is a MP&quot; relationship, or through the two relationships &quot;MPP is a MP&quot; and &quot;MPP has MPUU&quot;) has the same &quot;PreferredTermOrder&quot; for the corresponding ingredients, then this order is used instead.</td>
</tr>
</tbody>
</table>

**EXCEPTION**  
The order sequence for multi-ingredient products will be alphabetical, unless an altered sequence is determined as in Appendix C:. This will be developed on a case-by-case basis. The complete list of exceptions may be found in Appendix C:, Section C.6.  

**Example:**  
MP FSN is codeine + paracetamol  
MP PT is paracetamol + codeine  
MP FSN is clavulanic acid + ticarcillin  
MP PT is ticarcillin + clavulanic acid
### Content - Terminology or Information?

- Product name, e.g. Panadol
- Clinical indication
- Pack size
- Strength
- Dose Form
- Unit of use
- Adverse reaction
- Relationships between concepts
- Availability

<table>
<thead>
<tr>
<th>Synonyms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifier code</td>
</tr>
<tr>
<td>Drug interaction</td>
</tr>
<tr>
<td>Allergy class</td>
</tr>
<tr>
<td>Dose</td>
</tr>
<tr>
<td>Generic name, e.g. Paracetamol</td>
</tr>
<tr>
<td>Contraindication</td>
</tr>
<tr>
<td>Subsidy</td>
</tr>
<tr>
<td>Container</td>
</tr>
<tr>
<td>Price</td>
</tr>
</tbody>
</table>
Terminology vs. Information

- Wide range of knowledge about medicines not included in a medicines terminology.
- Terminology information must always, necessarily be ‘true’ (i.e. definitional) e.g. product name, active ingredients, strength, form, pack size, unit of use, container.
- Some information may change over time e.g. dosage, interactions, indications, contraindications, adverse reactions.
- This knowledge not included in terminology, but can be linked to product descriptions within the terminology.
Scope

- Registered items and listed items from the Australian Register of Therapeutic Goods
- All items included on Pharmaceutical Benefits Scheme and Repatriation Pharmaceutical Benefits Scheme inclusive of medical devices and nutritionals.
AMT December 2012

Total product concept count  61,940
Stakeholder engagement

• Clinicians
• Health informaticians
• Software vendors
• Government
• Medicine information data providers
• Standards & peak industry organisations
• Health boards
• Encompassed Australia and New Zealand
What have we achieved?

Design

Development

Maintenance
Development

Source data
Tools
Resources
Testing
Release strategies
Safety/external review
Documentation including Quality Plan
Governance
How is it created?

Australian Medicines Terminology
<table>
<thead>
<tr>
<th>Number</th>
<th>ARTG_ID</th>
<th>ARTG_LABEL_NAME</th>
<th>PRODUCT_ID</th>
<th>PRODUCT_NAME</th>
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<td>135726</td>
<td>NEXIUM esomeprazole 10 mg (as magnesium trihydrate) enteric coated granules for oral suspension sachet</td>
<td>301693</td>
<td>NEXIUM esomeprazole 10 mg (as magnesium trihydrate) enteric coated granules for oral suspension sachet</td>
<td>247769</td>
<td>enteric coagent</td>
<td>Granules, enteric-coated</td>
<td>30 sachets</td>
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<tr>
<td>1</td>
<td>155842</td>
<td>ONDANSETRON ALPHAPHARM ondansetron (as hydrochloride) 4 mg/2 mL solution for injection ampoule</td>
<td>294293</td>
<td>ONDANSETRON ALPHAPHARM ondansetron (as hydrochloride) 4 mg/2 mL solution for injection ampoule</td>
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<td>ONDANSEINJSOL</td>
<td>Injection, solution</td>
<td>9999 ampoules 2 mL</td>
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<td>113622</td>
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<td>Isoleucine 1000 Amino Acid Supplement (ISOLEUCINE with CARBOHYDRATE), Sachets 4 g containing 1 g isoleucine, 30</td>
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<td>ORLPWD Oral Liquid, powder</td>
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<td>Arginine 2000 Amino Acid Supplement Arginine with Carbohydrate, Sachets 4 g</td>
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<td>PKU Lophlex LQ (AMINO ACID FORMULA with VITAMINS and MINERALS without PHENYLALANINE), Oral liquid 125 mL, 30</td>
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<td>PKU Lophlex LQ (AMINO ACID FORMULA with VITAMINS and MINERALS without PHENYLALANINE), Oral liquid 125 mL, 30</td>
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<td>ORLSOL Oral liquid</td>
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<td>PKU Lophlex LQ 10 (AMINO ACID FORMULA with VITAMINS and MINERALS without PHENYLALANINE), Oral liquid, 62.5 mL, 60</td>
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<td>97971</td>
<td>A/California/7/2009 (H1N1) - like strain (A/California/7/2009 (H1N1))</td>
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<td>10001834</td>
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<td>Bandage retention cotton crepe</td>
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<td>Isoleucine with carbohydrate</td>
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Resources

• Spreadsheets
• ACE workbench (customised version)
• Business rules
• Terminology analysts
• Data administrator / analysts
• Programmers
• Build/release team
• Test team
End-to-End Process

Data entry
- Single or dual
- Dual independent review
- Quality plan
- Sign off – including clinical safety

Build files – transformation of data
- Dual independent review of terms
- QA Reports

Release
Release

- Distributed via dedicated website with secure login
- Provided under the Licence agreements
- Released monthly since 2007
- Viewer/Terminology browser
- RSS feeds / Emails
- Release / supporting documentation including
What does AMT look like?

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What have we achieved?

Design
Development
Maintenance
Maintenance

Governance
Safety/CCA/service desk
User engagement/survey/workshops
Resources
Implementation support / documentation
Roadmap
National eHealth strategic initiatives
Model review
AMT Governance

NEHTA Clinical Terminology Governance

AMT Product Management Group

- Provide operational oversight from a product, medicines & terminology perspective
- Endorse recommendations for clinical issues arising from AMTSG or AMTPMG

AMT Support Group

- Provide clinical, technical & jurisdictional health services advice

AMT Content Board

- Clinical Terminology & Information Reference Group
  - Terms of Reference not supplied as groups outside of scope of AMT clinical governance framework

CTI Terminology Quality Group

NEHTA Clinical Safety Unit

IHTSDO
Maintenance

Governance

Safety/CCA/service desk
User engagement/survey/workshops
Resources
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