Terminologies and classifications: SNOMED CT-AU and ICD-10-AM use in Australia
We would like to acknowledge the traditional owners of country throughout Australia, and their continuing connection to land, sea and community. We pay our respects to them and their cultures, and to Elders both past and present.
Learning objectives

- Give examples of different code sets used in health
- Describe the purpose of a health classification
- Be informed about the ICD revision, and maps between SNOMED CT and ICD-10
- Describe the purpose of a clinical terminology
- Compare the features of SNOMED CT-AU and ICD-10-AM
Why record clinical data electronically?
Changes in the delivery of clinical practice

**Clinical experience**
- Individual clinician experience
- No real data requirements

**Predictive medicine**
- Accessing other clinicians knowledge
- Requires access to published papers, supported by simple audit

**Evidence-based medicine**
- Identifying best practice and gold standards for treatment
- Requires detailed audit and definition of treatment guidelines

**Personalised medicine**
- Identifying optimal treatment for the individual patient
- Requires high levels of data collection and analysis to support automated processes and decision support

DATA
Use of standard vocabularies leads to actionable insights

- Standardisation in treatments
- Reduction of variation in treatments

Clinical characteristics
  *How many?*

Patient level prediction
  *What will happen to me?*

Population health estimation
  *Can we find a cause?*
Overview of code sets used in health
Some of the most commonly used code sets in health

**Terminology**
Set of concepts about a domain that shows properties and relationships between them, and organised by meaning.

**Classification**
Organises concepts into categories or groups based on common characteristics, enabling consistent statistical data analysis.

Many other types of code sets, that enable:
- Standardisation and interoperability between systems
- A listing (or schedule) of subsidised healthcare services and medications
Definitions and links to these code sets are provided at the end of this slide deck.
Different levels of granularity and content to support specific use cases

- **RESOURCE GROUPS (HRG/DRG)**
  - Support healthcare system management
  - Stable
  - 100s of groups, covering national requirements

- **CLASSIFICATIONS (ICD-10)**
  - Support secondary analysis of data
  - Grouped terms and stable
  - 10,000s of concepts, covering specific use cases, e.g. morbidity and mortality statistics

- **CLINICAL TERMINOLOGIES (SNOMED CT)**
  - Support direct clinical care
  - Granular and dynamic
  - 100,000s of concepts, covering all healthcare domains
Clinical terminology overview
What are clinical terminologies?

• A structured vocabulary of terms and concepts used in clinical practice, implemented in software applications e.g. electronic health records (EHRs).

• Standardised naming and identification of those concepts relevant to the patient and the healthcare that is delivered to them.

• Concepts are defined by machine-readable relationships to other concepts (i.e. they hold clinical meaning).

Clinical terminologies enable:

- Structured recording of statements about the health and health care of an individual patient.
- Communication of information without loss of detail or change to meaning (semantic interoperability).
- Various levels of data abstraction for clinicians, patients, researchers or organisations.
- A consistent way of indexing, storing, retrieving and aggregating clinical data from structured, computerised clinical records.
Why use a clinical terminology?

To best utilise clinical systems, computing tools and apps used in healthcare we need computable data – this means coded and structured data.

**Terminology is coded, structured data**

- It provides a foundation for successful delivery and realisation of the benefits of many of the national digital health strategic priorities.¹

¹ Australian Digital Health Agency. Australia’s National Digital Health Strategy: Australian Digital Health Agency; 2017
SNOMED CT is the preferred national solution for clinical terminology, endorsed by the Australian Health Ministers’ Advisory Council (AHMAC)

**SNOMED CT**
- A large ‘dictionary’ of clinical terms with a unique code that are machine-readable
- Designed to capture clinical data within electronic records
- Covers content areas of:
  - diseases, procedures, clinical findings and therapeutic products, organisms, substances, events
  - plus additional content that helps define the meaning of these major content areas
- A logical model that supports inferencing because identifiers do not carry meaning

**SNOMED CT-AU**
- Australian extension of SNOMED CT
- Contains SNOMED CT core files plus Australian developed content, including:
  - Australian Medicines Terminology (AMT), a standard terminology for commonly used medicines in Australia.
  - Australian dialect reference set.
  - Over 90 reference sets based around common clinical use cases.
  - Emerging FHIR ValueSets
- Used across all healthcare sectors (GP, Community, Allied Health, Child Health, ED, inpatient)
- Clinician medical record documentation
- Released monthly to licence holders
When should we use a clinical terminology?

A) Structured and coded clinical data capture at the point of care

B) Sharing of clinical information between systems

C) Meaning-based retrieval and analytics
Structured and coded clinical data capture

- Record information about a patient healthcare encounter at the point of care, in a clinical information system.

- Allows clinicians to record what they need:
  - Content coverage
  - Specificity
  - One concept can be found using multiple descriptions (synonyms)

PROGRESS NOTES
81 year old female presents with approx 1 month of decreased R visual acuity
CF PH 6/18
For FFA
Right CALE ? cause - likely to be ??? Inflammatory anterior vitreous cells
Anterior chamber ??
No chorioretinitis
No ???
? vascular
No history of diabetes or hypertension but some AV ?
changes
? old branch retinal vein occlusion
# A simple patient record with SNOMED CT-AU coding

**TEST, Patient - 24962**

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/1/2017</td>
<td>Chronic otitis media</td>
<td>Active</td>
</tr>
<tr>
<td>18/3/1996</td>
<td>Asthma</td>
<td>Active</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Status</th>
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<tbody>
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<td>3/12/1992</td>
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</table>

<table>
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<th>Date</th>
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<th>Status</th>
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</thead>
<tbody>
<tr>
<td>11/1/2017</td>
<td>Lipid panel</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/1/2017</td>
<td>Kenacomb Otic ointment, 5 g</td>
<td>Active</td>
</tr>
<tr>
<td>18/3/1996</td>
<td>Ventolin 200 microgram powder for inhalation, 120 unit doses</td>
<td>Active</td>
</tr>
</tbody>
</table>

In this example:
- SNOMED CT-AU **terms** are displayed to users
- SNOMED CT-AU **concept identifiers** are in the backend

Note: terminologies work together with an information model in a well-designed EHR
Sharing of clinical information

• Standard terminology across the system

• Unambiguous concept identification

• Different systems can share information that has a commonly understood meaning

• Synonyms (as depicted in the speech bubbles) cater for local language preferences and enable flexible term searching
Meaning-based retrieval and analytics

- The structure of SNOMED CT supports flexible retrieval of clinical information for analytics and reporting.
- A subject can be retrieved via many pathways or properties (polyhierarchy)
- In this example, records encoded with “Viral pneumonia” can be retrieved when starting from any of the higher-level concepts, such as
  - Pulmonary disease
  - Infection
  - Inflammatory disorder
Meaning-based retrieval and analytics

- Concepts are represented by precise, unambiguous and machine-readable definitions, enabling a rich clinical dataset for analysis
- Subjects can be found based on common defining attributes
- In this example, querying for infectious processes in the lung will return records containing (amongst others)
  - Viral pneumonia
  - Pulmonary tuberculosis
Meaning-based retrieval and analytics

- Clinical information can be retrieved easily using Expression Constraint Language (ECL)
  - ECL is a computer processable language that allows searching for SNOMED CT concepts using their structure and attributes.
- Static and dynamic on-the-fly queries can be formulated for data retrieval
- An ECL tool is available in the CSIRO Shrimp terminology browser: [https://ontoserver.csiro.au/shrimp/ecl](https://ontoserver.csiro.au/shrimp/ecl)
Health classification overview
What are health classifications?

• A classification is a structured way of organising information into standard groupings for statistical reporting.

• Rules for collecting and coding clinical information are standardised nationally and internationally, to ensure patient data are grouped consistently and accurately.

• For example, after a patient is discharged, diagnoses and interventions are translated from the health care record of a patient into alphanumeric codes within a classification such as ICD-10-AM and ACHI.

Classifications enable

- Health Information Managers (HIMs) and others to use aggregated data to support their decisions and policies
- Epidemiological research, large dataset analysis, patient registry data collections and public health performance/trends
- Casemix and Activity Based Funding
Why use a health classification?

Placing data into meaningful, distinct and stable groups makes it easier to identify patterns and trends, enabling better decision-making and management of the healthcare system.

**Classifications are output tools for statistical reporting**

- Consistent and comparable method of reporting on conditions, treatment and associated cost.
- Improve management, measurement and funding of services.

**Classifications support**

- Easy storage, retrieval and analysis of health information for evidenced-based decision-making
- Sharing and comparing health information between hospitals, regions, settings and countries
- Data comparisons in the same location across different time periods
- Measurement of hospital and health service provider output
Coded data using ICD-10-AM/ACHI/ACS underpins the Australian Refined Diagnosis Related Groups classification (AR-DRGs)

**ICD-10**
- The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision
- Foundation of health statistics
- An alphanumeric classification
  - Contains codes for diseases, signs and symptoms, abnormal findings, social factors and external causes of mortality or morbidity.
  - Mono-hierarchical, enumerated, codes carry meaning
- In Australia, ICD-10 is used to classify causes of death

**ICD-10-AM**
- Australian modification of ICD-10
  - An expanded version of the World Health Organization’s ICD-10
- Consists of a tabular list of diseases and an accompanying index and coding rules (ACS)
- Companion Px classification (ACHI)
- Used in public and private hospitals in Australia to classify episodes of admitted patient care only
- Information is abstracted and assigned by trained clinical coders
- Released every 2 years+
When should we use a health classification?

A) Immediate and longitudinal data management and retrieval across a number of different groups

B) Statistical reporting of clinical activity and other health information (disease and interventions)

C) Casemix and Activity Based Funding (measuring service provision/use)
ICD codes and leading causes of death

• In Australia, ICD codes are used when analysing deaths and their causes, enabling statistics to be compared over time and between countries

• This approach contributes to policy development and planning related to health strategies and interventions

Indicator progress measure: potentially preventable hospitalisations

- Number of potentially preventable hospitalisations, divided into three groups and total, as defined by ICD-10-AM 9th edition:
  - vaccine-preventable conditions (e.g. tetanus, measles, mumps, rubella).
  - acute conditions (e.g. ear, nose and throat infections, perforated/bleeding ulcer, pelvic inflammatory disease).
  - chronic conditions (e.g. diabetes complications, asthma, angina, hypertension, congestive heart failure and chronic obstructive pulmonary disease).

- all potentially preventable hospitalisations

- [https://meteor.aihw.gov.au/content/index.phtml/itemId/698904](https://meteor.aihw.gov.au/content/index.phtml/itemId/698904)

- Examples include:
  
  **Vaccine-preventable**
  - Pneumonia and influenza (vaccine-preventable)
    Codes: J10, J11, J13, J14

  **Chronic**
  - Asthma
    Codes: J45, J46

  **Acute**
  - Pneumonia (not vaccine-preventable)
    Codes: J15.3, J15.4, J15.7, J16.0
Optimal management of healthcare services

- Patient casemix and volume
- Patient complexity and trends
- Measuring success of clinical models of care
- Additions or modifications to health care services
- Supporting managerial decision making to ensure provision of high-quality health care
- Quality and safety of health care services and policy development
- Business analysis for KPI monitoring and health system improvements
- Accurate allocation of Activity Based Funding
# Australian Activity-Based Funding classifications

<table>
<thead>
<tr>
<th>Classification</th>
<th>Admitted acute</th>
<th>Subacute &amp; Non-acute</th>
<th>Mental Health</th>
<th>Emergency</th>
<th>Non-admitted</th>
<th>Teaching, Training &amp; Research</th>
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<tr>
<td></td>
<td>Disease and Intervention Classifications: ICD-10-AM and ACHI</td>
<td>Disease and Intervention Classifications: ICD-10-AM and ACHI</td>
<td>Australian Mental Health Care Classification (AMHCC)</td>
<td>Urgency Related Groups (URGs)</td>
<td>Tier 2 Non-Admitted Care Services Classification</td>
<td>Australian Teaching and Training Classification (ATTC)</td>
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<td>Australian Refined Diagnosis Related Groups (AR-DRG)</td>
<td>Australian National Subacute and Non-acute (AN-SNAP)</td>
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<td>Urgency Disposition Groups (UDGs)</td>
<td>Categories include: procedures, medical consultation services, diagnostic services, and allied health and/or clinical nurse specialist intervention services</td>
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<td></td>
<td></td>
<td>Australian National Subacute and Non-acute (AN-SNAP)</td>
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</tr>
<tr>
<td>Patients are classified according to relevant measures including:</td>
<td>Diagnosis</td>
<td>Setting</td>
<td>Visit type</td>
<td>Service type</td>
<td>This is not a patient classification</td>
<td></td>
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<td>Care type</td>
<td>Discharge disposition</td>
<td>Clinician type</td>
<td>This classification is health professional trainee oriented and key concepts include profession and training stage</td>
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<td></td>
<td>Length of stay</td>
<td>Phase of care</td>
<td>Treatment urgency</td>
<td>Patient condition</td>
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<tr>
<td></td>
<td>Age</td>
<td>Assessment of function</td>
<td>Diagnosis</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Sex</td>
<td>Age</td>
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<td></td>
<td>Mode of separation</td>
<td>Complexity</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Newborn admission weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Mechanical ventilation hours</td>
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</tbody>
</table>
How SNOMED CT-AU and ICD-10-AM support specific use cases
SNOMED CT and ICD-10 were designed for their intended primary use case.

SNOMED CT-AU Polyhierarchy

- Respiratory disease
- Inflammatory disorder
- Infection
- Viral infection
- Pneumonia
- Respiratory tract infection
- Viral pneumonia

* Not all pathways shown
** Children of “Viral pneumonia” are not shown

SNOMED CT-AU Concept Definition

- Viral pneumonia
- Infective pneumonia
- Inflammation and consolidation
- Pathological process
- Infectious process
- Associated morphology
- Causative agent
- Finding site
- Lung structure

ICD-10-AM Monohierarchy

- Diseases
  - Ch 10 Diseases of the respiratory system
  - J09-J18 Influenza and pneumonia
  - J12 Viral pneumonia, not elsewhere classified

ICD-10-AM for Statistical Aggregation and Reporting

- Items organised into non-overlapping categories based on their properties (monohierarchical)
- No subject belongs to multiple classes
- Complete and includes a category for everything

** Not all pathways shown

SNOMED CT-AU for Clinical Data Capture and Retrieval

- Items defined according to meaning (polyhierarchical)
- A subject can be retrieved via many pathways or properties
- Precise and unambiguous definitions that are machine-readable

ICD-10-AM for Clinical Data Capture and Retrieval

- Items organised into non-overlapping categories based on their properties (monohierarchical)
- No subject belongs to multiple classes
- Complete and includes a category for everything

** Not all pathways shown

SNOMED CT-AU for Concept Definition

- Viral pneumonia
- Infective pneumonia
- Inflammation and consolidation
- Pathological process
- Infectious process
- Associated morphology
- Causative agent
- Finding site
- Lung structure

ICD-10-AM for Concept Definition

- Viral pneumonia, not elsewhere classified
  - Includes: bronchopneumonia due to viruses other than influenza viruses
  - Excludes: congenital rubella pneumonia (F35.0), pneumonia
  - aspiration (due to):
  - neonatal (P24.9)
  - NOS (J09.0)
  - solids and liquids (J69.9)
  - in influenza (J09, J10.0, J11.0)
  - immunosup. NOS (J84.9)
  - lipid (J09.1)
  - viral, congenital (P23.0)

J12.0 Adenoviral pneumonia
J12.1 Respiratory syncytial virus pneumonia
J12.2 Parainfluenza virus pneumonia
J12.3 Human metapneumovirus pneumonia
J12.8 Other viral pneumonia
J12.9 Viral pneumonia, unspecified
Supporting data capture and clinical communication

Specificity and content coverage are important considerations when selecting a standard code system for data capture that can also communicate with other electronic systems.

SNOMED CT-AU is designed for primary data capture in a clinical information system
- Contains sufficient detail to allow clinicians to record the information they need
- Meaning is retained when transferred between systems

ICD-10-AM has limited values to capture specific clinical detail in individual health records
- Broad groupings represent one dimension of meaning
- A single code groups multiple clinical meanings
Supporting clinical data analytics

• Once data has been captured in a structured way, it can then be meaningfully analysed
• The types of questions that can be asked of the data and how easily relevant results are returned will depend on the codes you are working with
• Terminologies and classifications support clinical analytics at different levels of specificity

Primary collection of data
Clinicians input SNOMED CT-AU into individual health records which enables analysis of patient data

Secondary use of data
SNOMED CT-AU coded health records are a rich source of clinical data for clinical cohort analyses, prognoses, outcomes, decision support and patient care exchange

Secondary use of data
Health information managers use the health care records to code episodes into ICD-10-AM and ACHI codes which enables analysis of aggregated data in predefined categories
Supporting clinical data analytics

- Define categories using ECL, identify records with SNOMED CT codes matching the criteria, and use these codes to filter the clinical dataset, for example determining opioid usage by sex.

```python
opioids= [('\'<34841011000036108','dihydrocodeine')],
('\'<21821011000036104','codeine')],
('\'</1705011000036108','pholcodine')],
('\'</21723011000036101','buprenorphine')],
('\'</2132011000036109','methadone')],
('\'</135971000036102','tapentadol')],
('\'</21258011000036102','fentanyl')],
('\'</21259011000036105','oxycodone')],
...
('\'</21252011000036100','morphine')],
('\'</21486011000036105','tramadol')],
('\'</21901011000036101','dextropropoxyphene')],
('\'</34839011000036106','pethidine')],
('\'</1247191000168104','sufentanil')]

for opioid in opioids:
    OpioidSet = PopulateSetWithECL([opioid])
    filter = codeSet["Medication"].isin(OpioidSet)
    codeSet.loc[filter,"Opioid"] = opioid[1]
```

![Opioid usage by Sex chart](chart.png)
Supporting statistical reporting and aggregation

ICD-10-AM categories are broad and distinct, allowing single counting of an instance and meaningful population health analysis.

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Code categories</th>
<th>Counts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Certain infectious and parasitic diseases</td>
<td>A15 Respiratory tuberculosis, bacteriologically and histologically confirmed</td>
<td>3</td>
</tr>
<tr>
<td>10 Diseases of the respiratory system</td>
<td>J12 Viral pneumonia, not elsewhere classified</td>
<td>2</td>
</tr>
<tr>
<td>8 Diseases of the ear and mastoid process</td>
<td>H66 Suppurative and unspecified otitis media</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total patients</td>
<td>10</td>
</tr>
<tr>
<td>Identify people with influenza and pneumonia (J09-J18)</td>
<td>4</td>
</tr>
<tr>
<td>Identify people with respiratory tuberculosis (A15-)</td>
<td>3</td>
</tr>
<tr>
<td>Double counting</td>
<td>0</td>
</tr>
</tbody>
</table>
Supporting statistical reporting and aggregation

SNOMED CT is not as straightforward as ICD-10-AM for statistical uses in which we need strategies in place to avoid the same disease being counted in more than one category.

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total patients</td>
<td>10</td>
</tr>
<tr>
<td>Identify people with respiratory diseases</td>
<td>7</td>
</tr>
<tr>
<td>Identify people with bacterial infections</td>
<td>8</td>
</tr>
<tr>
<td>Double counting</td>
<td>5</td>
</tr>
</tbody>
</table>
International Classification of Diseases revision
ICD-11 overview

The 11th Revision of the International Classification of Diseases (ICD-11) was released by World Health Organization in 2018.

In May 2019, it was adopted by the World Health Assembly for implementation by member states from 1 January 2022.

No decision has been made in Australia (as of February 2020) as to whether, when or how ICD-11 may be implemented to replace ICD-10 and ICD-10-AM for statistical or Activity Based Funding purposes.

Comparatively, ICD-11 offers a wider scope of services, a new digital format, improved clinical relevance and an opportunity for expanded international comparison.

SNOMED International are collaborating with the World Health Organization to align SNOMED CT with ICD-11-MMS
# Features of ICD-11

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>ICD-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>55,000 coded entities, supported by more entities in the Foundation</td>
</tr>
<tr>
<td>Scope</td>
<td>Diseases, related health problems, external causes, functioning</td>
</tr>
<tr>
<td>Used in</td>
<td>All health settings</td>
</tr>
<tr>
<td>Use cases</td>
<td>Patient episodes of care, death records</td>
</tr>
<tr>
<td>Primary purpose</td>
<td>Statistical reporting on mortality and morbidity, Activity Based Funding</td>
</tr>
<tr>
<td>Deployed in</td>
<td>Not yet deployed in Australia</td>
</tr>
<tr>
<td>Applied by</td>
<td>-</td>
</tr>
<tr>
<td>Enables</td>
<td>-</td>
</tr>
<tr>
<td>Structure</td>
<td>Multi-parented, mutually exclusive</td>
</tr>
<tr>
<td>Logic</td>
<td>Statistical, categorical (counting)</td>
</tr>
<tr>
<td>Granularity</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Every year (index entries) to five years (code structure changes)</td>
</tr>
</tbody>
</table>
ICD-11 review: towards implementation planning in Australia

• The Australian Institute of Health and Welfare (AIHW) undertook a review of the ICD-11 and its potential implementation in Australian health information systems (the Review project).

• The Review project aimed to provide evidence to support decision-making and implementation planning.

• The first phase of the Review project was a stakeholder consultation overseen by the AIHW’s Australian Health Classifications Advisory Committee (AHCAC). The complete ICD-11 Review Stakeholder Consultation Report will be published by the AIHW on 12th March 2020.

• The Review showed that Australian stakeholders had limited knowledge of ICD-11, and that concerns related to threats and weaknesses of ICD-11 would need to be addressed ahead of implementation. The AIHW developed a proposed work program based on the findings of the Review with input and advice from AHCAC, NHDISC and SCNHI in mid 2019.

• This program of work was endorsed for further prioritisation and work planning by the Australian Health Ministers’ Advisory Council (AHMAC) in October 2019.
Proposed work program for prioritisation

The AIHW proposed four broad areas of work:

1. A comprehensive review of how ICD-10(-AM) is, and ICD-11 could be, used in health information systems, including digital settings, including issues associated with ICD-10(-AM) and the way ICD-11 can address these.

2. Development of a national roadmap for classifications and terminologies and how they will be used together within health information arrangements. This would ensure that classifications and terminologies are used appropriately with consideration of their varied use cases.

3. Strategic communications activities to ensure that decision-makers and their advisors can contribute to further work and decision-making over the next year about whether, when and how to implement ICD-11.

4. Continued planning for implementation in mortality data systems to maintain and advance Australia’s current involvement in this international process.
What is ICHI?

- ICHI is the International Classification of Health Interventions developed by the World Health Organization (WHO) and the WHO Family of International Classifications (WHO-FIC).
- The aim is to meet a number of use cases such as:
  - International comparison,
  - National uses,
  - Patient safety and quality, and
  - Health system performance measurement (incl. financing).
ICHI Beta-2 – Australian Field Testing

• 50 Australian coders recently participated in global field testing of the Beta-2 version of ICHI.

• The assessment was undertaken in terms of content coverage and coding feasibility and utility, focusing on comparing country-specific interventions (ACHI) with an ICHI tabular list to identify possible gaps and structural issues.

• Assessing the coding feasibility and utility was done through:
  – line coding of intervention terms representing four different settings i.e. medical-surgical interventions, primary care interventions, functioning interventions and public health interventions
  – case coding of intervention scenarios in medical-surgical and functioning settings.

• WHO will compile the results from all countries and provide the following analysis:
  – Percentage distribution of coders agreement with the gold standard of the ICHI code assignment for each intervention term and case.
  – Basic descriptive statistics including frequency distribution, measures of central tendency (mean and median) of encountered coding time, accuracy and usability disaggregated by appropriate covariates (e.g. age, background etc.).
Maps between SNOMED CT and ICD-10
SNOMED CT and ICD-10 have complementary strengths

Situations may benefit from use of both code systems

- SNOMED CT for the capture of clinical information, decision support, communication, analysis and clinical research
- ICD-10 for statistical analysis, administrative data and billing

Maps may be used when a link is required between SNOMED CT and ICD-10.

- Different maps for different purposes
- Any general map needs to be carefully applied per use case

Mapping is NOT a simple task, a one-off exercise, or a low risk and low cost approach

Consult ISO standards for
- Principles of mapping between terminological systems
- Terminology resource map quality measures
What maps are available?

Mapping tables between

- Different editions of ICD-10-AM
- Different editions of ACHI
- ICD-10-AM to ICD-10

- A complex map from SNOMED CT to ICD-10 is available with the International Edition of SNOMED CT
- Technical guide available from http://snomed.org/icd10map

Mapping tools may be used

- snoMAP for ABF: Enables diagnoses recorded using SNOMED CT-AU in Emergency Department to be converted to ICD-10-AM codes for non-admitted patient reporting
- snoMAP Starter: For research & analytics only. Maps from SNOMED CT-AU to ICD-10-AM 11th Edition
snoMAP Starter

https://aehrc.com/
snoMAP is an AEHRC web-based mapping tool that utilises Ontoserver to provide mappings between defined terminologies.

Provides a **starter** map from SNOMED CT AU to ICD-10-AM 11th edition

- Starter map will require application to data (ie. Different application rules for different data sets)
- For research and analytic purposes only
- Requires understanding of SNOMED CT-AU structure and ICD-10-AM rules, as well as application to data
- FHIR conceptmap

**Does not support** mandatory reporting for

- NMDS data
- Casemix funding (DRG or ABF)
snoMAP Starter

**Not for use** in any user facing, point-of-care deployments

Different scope and design than the current snoMAP for ABF deployments; these are optimised only for ABF purposes

Available under subscription - August 2020

For more information, please contact
Donna.Truran@csiro.au,
Robyn.Richards@csiro.au or
Kate.Ebrill@csiro.au
Summary
# SNOMED CT-AU and ICD-10-AM/ACHI at a glance

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>SNOMED CT-AU</th>
<th>ICD-10-AM / ACHI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size</strong></td>
<td>480 000</td>
<td>20 000 / 7 000</td>
</tr>
<tr>
<td><strong>Scope</strong></td>
<td>Anatomy, substances, organisms, diagnoses, procedures, medications</td>
<td>Diseases, related health problems, external causes, interventions</td>
</tr>
<tr>
<td><strong>Used in</strong></td>
<td>All health settings</td>
<td>Admitted inpatient</td>
</tr>
<tr>
<td><strong>Use cases</strong></td>
<td>Individual longitudinal health records</td>
<td>Patient episodes and populations</td>
</tr>
<tr>
<td><strong>Primary purpose</strong></td>
<td>Clinical data entry in a patient record</td>
<td>Statistical reporting on hospital morbidity, casemix, Activity Based Funding</td>
</tr>
<tr>
<td><strong>Deployed in</strong></td>
<td>Clinical information systems (CIS), Electronic health records (eHR)</td>
<td>Patient administration systems (PAS), National Minimum Data Set (NMDS), clinical registries</td>
</tr>
<tr>
<td><strong>Applied by</strong></td>
<td>Clinicians</td>
<td>Health information workforce</td>
</tr>
<tr>
<td><strong>Enables</strong></td>
<td>Communication, messaging, decision support</td>
<td>Health trends, national statistical reporting</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>Poly-hierarchical, multi-parented</td>
<td>Mono-hierarchical, mutually exclusive</td>
</tr>
<tr>
<td><strong>Logic</strong></td>
<td>Definitional, description logic (knowledge)</td>
<td>Statistical, categorical (counting)</td>
</tr>
<tr>
<td><strong>Granularity</strong></td>
<td>Specific</td>
<td>Sensitive</td>
</tr>
<tr>
<td><strong>Update cycle</strong></td>
<td>Monthly</td>
<td>Every two years</td>
</tr>
</tbody>
</table>
Highlights

Terminologies e.g. SNOMED CT-AU
• Support the primary collection (input) of clinical information
• Enable patient care management through decision support and patient care exchange
• Enable effective retrieval and reuse of clinical information for clinical cohort analyses, prognoses, outcomes, and more

Classifications e.g. ICD-10-AM
• Support the statistical reporting of clinical activity and other health information
• Enable use in applications such as Activity Based Funding

Specific use cases
• The broad classification groupings limits communication between clinicians for patient care purposes
• Clinical terminology reporting outputs as a secondary use is currently not well known or utilised in Australia
• Increased integration and interoperability between digital health and health information environments

Using clinical terminologies and statistical classifications together for their intended primary purposes (clinical inputs and communication, and statistical outputs and reporting, respectively), enhances and strengthens clinical and patient information use, decision-making and outcomes.
Useful links and supplementary information
For further information

<table>
<thead>
<tr>
<th>Topic</th>
<th>Contact</th>
<th>Details</th>
</tr>
</thead>
</table>
| SNOMED CT-AU and the AMT                    | National Clinical Terminology Service (NCTS) at the Australian Digital Health Agency | Help Centre: 1300 901 001  
Email: help@digitalhealth.gov.au  
Website: https://www.healthterminologies.gov.au |
| Health classifications                      | Independent Hospital Pricing Authority (IHPA)                           | Email: enquiries.ihpa@health.gov.au  
Website: https://www.ihpa.gov.au |
| ICD-11                                     | Australian Collaborating Centre for the World Health Organization Family of International Classifications, at the Australian Institute of Health and Welfare | Email: who-fic-acc@aihw.gov.au |
| Statistical and epidemiological uses of health classifications: | Australian Institute of Health and Welfare |
| • data requests, general inquiries          |                                                                         | Email: info@aihw.gov.au  
who-fic-acc@aihw.gov.au |
# Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full name and hyperlink</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACHI</td>
<td>Australian Classification of Health Interventions</td>
</tr>
<tr>
<td>AIR</td>
<td>Australian Immunisation Register</td>
</tr>
<tr>
<td>ANZSCO</td>
<td>Australian and New Zealand Standard Classification of Occupations</td>
</tr>
<tr>
<td>AR-DRG</td>
<td>Australian Refined Diagnosis-Related Groups</td>
</tr>
<tr>
<td>ATC</td>
<td>The Anatomical, Therapeutic, Chemical (ATC) classification system</td>
</tr>
<tr>
<td>BCP 47</td>
<td>Tags for Identifying Languages</td>
</tr>
<tr>
<td>ChEBI</td>
<td>Chemical Entities of Biological Interest</td>
</tr>
<tr>
<td>CPT</td>
<td>Current Procedural Terminology</td>
</tr>
<tr>
<td>DSM</td>
<td>Diagnostic and Statistical Manual of Mental Disorders</td>
</tr>
<tr>
<td>GMDN</td>
<td>Global Medical Device Nomenclature</td>
</tr>
<tr>
<td>HPO</td>
<td>Human Phenotype Ontology</td>
</tr>
<tr>
<td>ICD-10-AM</td>
<td>International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification</td>
</tr>
<tr>
<td>ICD-O</td>
<td>International Classification of Diseases for Oncology</td>
</tr>
<tr>
<td>ICF</td>
<td>International Classification of Functioning, Disability and Health</td>
</tr>
<tr>
<td>ICHA-HP</td>
<td>Classification of Health Care Providers</td>
</tr>
<tr>
<td>ICNP</td>
<td>International Classification for Nursing Practice</td>
</tr>
<tr>
<td>ICPC2+</td>
<td>International Classification of Primary Care, Version 2 PLUS</td>
</tr>
<tr>
<td>LOINC</td>
<td>Logical Observation Identifiers Names and Codes</td>
</tr>
<tr>
<td>MBS</td>
<td>Medicare Benefits Schedule</td>
</tr>
<tr>
<td>MedDRA</td>
<td>Medical Dictionary for Regulatory Activities</td>
</tr>
<tr>
<td>NCPT</td>
<td>Nutrition Care Process Terminology</td>
</tr>
<tr>
<td>OMIM</td>
<td>Online Mendelian Inheritance in Man</td>
</tr>
<tr>
<td>Orphanet</td>
<td>Orphanet</td>
</tr>
<tr>
<td>PBS</td>
<td>Pharmaceutical Benefits Schedule</td>
</tr>
<tr>
<td>SNOMED CT-AU</td>
<td>Systematized Nomenclature of Medicine - Clinical Terms, Australian extension</td>
</tr>
<tr>
<td>TA</td>
<td>Terminologia Anatomica</td>
</tr>
<tr>
<td>UCUM</td>
<td>Unified Code for Units of Measure</td>
</tr>
<tr>
<td>UDI</td>
<td>Unique Device Identification</td>
</tr>
<tr>
<td>WHODrug</td>
<td>WHODrug Global</td>
</tr>
</tbody>
</table>
Acknowledgements

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The Independent Hospital Pricing Authority (IHPA)

- Independently sets the National Efficient Price (NEP) for ABF public hospital services and any 'loadings' to account for variations in prices
- Determine the criteria for defining block funded services and the National Efficient Cost (NEC) of block funded hospitals
- Specify all of the classification, costing, data and modelling standards that are required for ABF
The Australian Digital Health Agency

The Australian Digital Health Agency is funded by all Australian Governments. It designs and operates national digital health services and sets data standards that:

• Give consumers more control of their health and care when they wish it
• Connect and empower healthcare professionals
• Promote Australia’s global leadership in digital health and innovation

“When patients move between care settings, the absence of complete and up-to-date medication data can contribute to instances of care becoming high risk, resulting in medication misadventures and unnecessary hospital readmissions.”

Pharmacy Guild of Australia, submission to National Digital Health Strategy 2017

“The value of utilising pharmacists in digital health initiatives comes not only from the provision of dispensing histories but mainly from pharmacists using their unique skills and medicines expertise to meaningfully engage with the information contained in digital health records... to ensure the safe, effective and judicious use of medicines.”

Pharmaceutical Society of Australia, submission to National Digital Health Strategy 2017
Contact us

Help Centre  1300 901 001
Email  help@digitalhealth.gov.au
Website  healthterminologies.gov.au
digitalhealth.gov.au
Twitter  twitter.com/AuDigitalHealth

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