nehta

Development approach for reference sets

SNOMED CT-AU Release 20130531

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Approved for Release

National E-Health Transition Authority

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Name	Position	Date
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Quality reviews

Revision	Version	Reviewer(s)	Type of review	Purpose
	001	Terminology analyst	Content review	Updated previous release document with new content.
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	003	Technical writer	Editorial review	Brought the updated document into alignment with NCTIS editorial standards.

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1 Introduction

1.1 Purpose of this document

This document describes the development approach used by NEHTA's National Clinical Terminology and Information Service (NCTIS) in creating reference sets for use by the SNOMED CT—AU community of practice.

1.2 Intended audience

This document has been written for those in the SNOMED CT-AU community of practice who have a solid understanding of SNOMED CT®[1] and its associated concept model, its scope and underlying description logic. It is also helpful in understanding the content if our readers have some knowledge of clinical information models and data modelling principles.

1.3 Scope of this document

The scope of this document is to provide information on reference sets for the SNOMED CT-AU release, which in turn is based on the most recent international release of SNOMED CT.

Progressive development on existing reference sets will be provided in this document when and if updates are made.

Reference set implementation is described in the *SNOMED CT Technical Implementation Guide* [1].

The definitions and statuses applied to reference sets are described in Section 2 of this document.

Throughout this document, by default, all SCTIDs used are concept IDs and all descriptions used are Australian preferred terms unless specified otherwise.

1.4 Related documents

The documents tabulated below provide the context for development of the reference sets described in this document, and should be read in conjunction with this document to enhance understanding of our approach to terminology development.

The complete reference for each document appears in Section 9.

Table 1: Related documents

Name / Reference	Version / Date
SNOMED CT-AU Reference set library [2]	20130531

[1] This material includes SNOMED Clinical Terms® (SNOMED CT®) which is used by permission of the International Health Terminology Standards Development Organisation (IHTSDO®). All rights reserved. SNOMED CT was originally created by The College of American Pathologists. IHTSDO®, SNOMED® and SNOMED CT® are registered trademarks of the IHTSDO.

2 Reference sets

2.1 About reference sets

SNOMED CT-AU reference sets have a range of diverse applications. At their simplest, they can be described by their two distinct purposes.

Firstly, reference sets serve as a mechanism for managing extensions, data structures and release formats for the technical implementation of SNOMED CT and SNOMED CT-AU.

Secondly, reference sets serve as a mechanism for creating subsets of content from SNOMED CT-AU. These reference sets are used by the SNOMED CT-AU community of practice to facilitate the recording, storing, retrieval and processing of information in an electronic health record at the point of care. Each of these reference sets is used to represent a set of SNOMED CT-AU components for a specific purpose within a defined scope. Experience has indicated that while comprehensive terminologies are valuable, they can also pose a challenge for both users and implementers due to their size and breadth of scope. This issue increases in size and complexity due to the multinational, multilingual nature of SNOMED CT[2]. Constraining available concepts to relevant sets provides a means of managing this issue.

2.2 Categorising reference sets

In distinguishing between the different types of reference sets and the different contexts in which they are applied we apply the following categorisations.

2.2.1 Structural reference sets

Structural reference sets are those that serve as a mechanism for managing extensions, data structures and release formats. These are the reference sets that have the most relevance to implementers because they provide the foundation for and support the technical implementation of the SNOMED CT and SNOMED CT-AU release files.

Reference set implementation is described in the *SNOMED CT Technical Implementation Guide* [1]. In particular, reference set specifications (including structural reference sets) are described in detail in 'Chapter 5.5 Release Format 2 - Reference Sets Guide'.

2.2.2 Clinical and administrative content reference sets

Clinical and administrative content reference sets are those that serve as subsets of content from SNOMED CT-AU. These are the reference sets that have the most relevance to clinicians and other users of SNOMED CT-AU.

In distinguishing between clinical content and administrative content reference sets, we further explain these as follows:

Clinical content Healthcare data that directly represents patient care. Examples are patient history; physical examination; psychological, social, environmental, family and self care information; allergies and other therapeutic precautions.[3]

[2] See *SNOMED CT Technical Implementation Guide* [1] for a discussion.

[3] Adapted from *SA 18308:2005, Health Informatics Requirements for an EHR Architecture* [18].

Administrative content	Healthcare data that represents the structures, processes and functions supporting patient care and the delivery of healthcare services. Examples are demographic data that identifies individuals such as name, address, provider roles, provider specialty etc.; demographic data that identifies organisations; utilisation data; patient movement data; financial, billing or other commercial information such as health fund, eligibility, coverage, costs, charges and casemix data.[4]

2.2.3 Bound and non-bound reference sets

Bound reference sets are those that align with a clinical information specification and take into account data element and data group definitions, as well as other surrounding data structures, which may or may not impact on the content of that reference set. NEHTA's clinical information components are referred to as Detailed Clinical Models (DCMs); more information around these can be found on the website at: <http://www.nehta.gov.au/connecting-australia/terminology-and-information/detailed-clinical-models>. The SNOMED CT concept model is also considered in this alignment process.

Non-bound reference sets are those that are agnostic of clinical information specifications and are instead developed against a statement of purpose, scope or general definition. Like bound reference sets, their development takes into account the SNOMED CT concept model. Unlike bound reference sets, however, they do not take into account any other definitions or data items that may co-exist where these reference sets might be implemented.

The reuse of bound or non-bound reference sets outside of the context within which they were developed should be approached with caution and a full analysis undertaken to ensure applicability.

Reference sets with specific bindings described in this document are categorised according to those bound to NEHTA clinical information specifications and those bound to other clinical information specifications.

2.3 Reference sets produced by the NCTIS

2.3.1 Overview

The approach used for development is based upon taking the whole of SNOMED CT-AU and progressively breaking it down into more useful isolated content that can be implemented into systems.

The levels of possible reference sets shown in Figure 1 are:

- Foundation reference sets
- Broad context and Intermediate reference sets
- Specific reference sets
- Exclusion reference sets

Examples of reference sets are shown at the right of Figure 1 below.

[4] Adapted from *SA 18308:2005, Health Informatics Requirements for an EHR Architecture* [18].

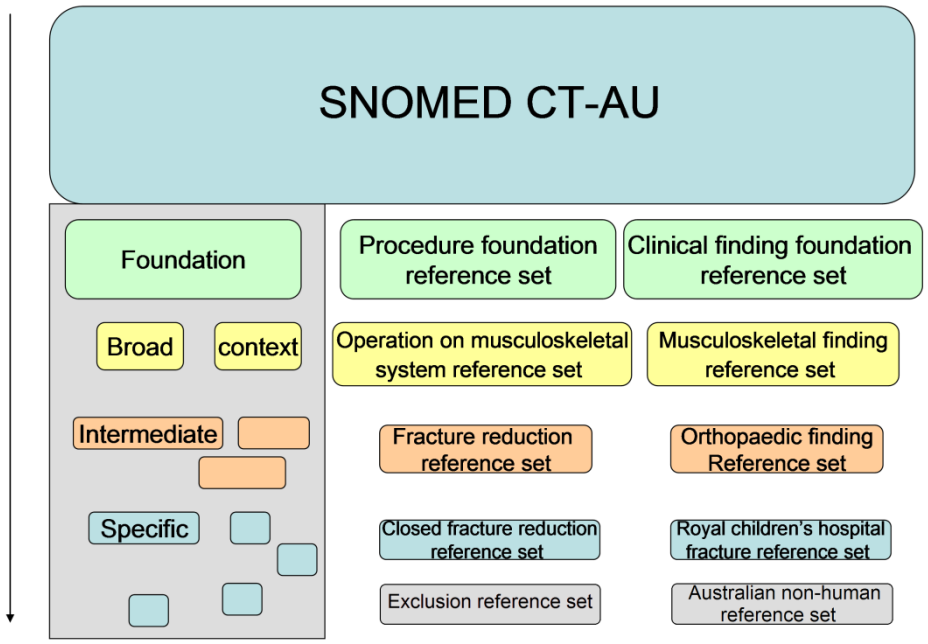

Figure 1: Reference set types

The resulting library or collection of reference sets will then provide the basis for use in implementations whether they are implementations of NEHTA Clinical Information specifications or for a specific system such as an operating room system or patient administration system.

2.3.2 Foundation reference sets

Foundation reference sets are those that form the basis from which all NCTIS clinical and administrative content reference sets will be developed. They will also serve as the basis for local reference set development within the SNOMED CT-AU community of practice.

2.3.3 Broad context and Intermediate reference sets

Broad context reference sets are derived from the Foundation reference sets and are based on the terminology that would be used by those working in clinical groups. For example, terminology commonly used to describe patients admitted to an orthopaedic ward. Intermediate reference sets use the same approach but can be understood to be more specific than a Broad context reference set. They are defined as sets that contain enough content to make them sufficiently responsive that they return any concept within a given use for the intended purpose.

Broad context and Intermediate reference sets may be used by implementers until specific reference sets are developed if required. The Broad context reference sets developed to date have been achieved by using a semi-automated method by isolating whole sections of SNOMED CT hierarchies. Again, these reference sets can be clinical or administrative and are not bound to a clinical information specification, nor will they have the wording 'broad context' or 'intermediate' in their name. This 'typing' exists to provide the community with information about how these reference sets are developed.

2.3.4 Specific reference sets

Foundation, Broad context and Intermediate reference sets can be used to create reference sets for specific implementations/instances. These specific reference sets are bound to Clinical Information archetype structures such as data elements, or they are developed to fulfil very specific definitions. Thus specific reference sets are only ratified for that particular use. For example, NEHTA has developed the *Therapeutic good claim category reference set* to record the claim category types applicable to prescribing. Another example would be for 'Dr John' who would like to create his own Specific reference set for his clinic.

2.3.5 Exclusion reference sets

Exclusion reference sets, as the name suggests, are used to exclude content from various clinical situations. They can be used to exclude content from complete implementations or used in the development of reference sets to ensure certain content is not included. For example, the foundation reference sets are developed so that they exclude content from the Australian non-human reference set.

2.4 Release Format 2.0

SNOMED CT Release Format 2.0 (RF2) categorises SNOMED CT reference sets by their pattern, for example:

- Attribute value
- Simple type
- Simple map
- Complex map
- Language
- Query specification
- Annotation
- Association

For more information on the RF2 reference sets and patterns please refer to the *SNOMED CT Technical Implementation Guide* [1].

2.5 Methods for developing reference sets

The NCTIS is defining and refining various manual and automated methods for developing SNOMED CT-AU reference sets. Our primary aim in making the development approach more automated and transparent is so that our methods in identifying content are always understandable, reproducible and useful to the SNOMED CT-AU community of practice. A secondary aim in a more automated process is to reduce the burden of maintenance.

This section briefly describes the methods developed to date. They are not mutually exclusive; methods can be combined to produce the desired output.

2.5.1 Source data mapping method

This method determines suitable SNOMED CT concepts on the basis of an existing value set, codeset or list of terms. The process involves mapping the source data to SNOMED CT concepts and determining the extent of content coverage, and then creating a reference set. New concepts may or may not be created, depending on the extent of coverage and other factors such as the quality of the underlying terms within the source data files.

The mapping process may be manual or semi-automated. However the output is not a simple or complex mapping reference set, but a simple type reference set. The aim is not to produce a mapping *per se*, but to produce a reference set of SNOMED CT concepts, which cover clinical or administrative content.

2.5.2 Source data inclusion method

This method uses reference sets as mechanisms for including content in another reference set.

2.5.3 Source data exclusion method

This method uses reference sets as mechanisms for excluding content from another reference set. For example, the *Australian non-human reference set* can be used as a mechanism for identifying non-human concepts and then excluding them or filtering them from appearing in the reference set being created. Note that the *Australian non-human reference set* is not a veterinary reference set; some veterinary concepts are shared with humans such as 'Brain' and 'Eye'.

2.5.4 Attribute method

This method comprises of two identical processes, either of which can be used in isolation or jointly. The distinction between the processes is that one is automated and the other is not.

The first process examines the allowable attributes used to define the top-level hierarchies in the SNOMED CT concept model to identify the potential concepts for the reference set. The scope, statement of purpose or definition of the reference set is taken into account, and this scope may or may not be bound to a clinical information specification. If it is bound to a specification, then the related data elements within the data group are also considered to avoid semantic overlap between the concept model and the specifications.

The second process is an automated version of the first. The modelled attribute relationships are identified and then used to create automated rules for the inclusion or exclusion of content.

2.5.5 Concept enumeration method

This method applies automated inclusion or exclusion rules which are built from the concept enumeration values appropriate to a certain field, or a combination of fields, in the SNOMED CT core files (tables) and/or structural reference sets.

An example of this method would be to use the active field in the concept file and the valueId field in an attribute value reference set, and then applying automated rules to certain concept enumeration values that equate to an inactive concept. This process enables the automated exclusion of inactive concepts within a reference set.

2.5.6 Simple inclusion method

This method is largely a manual method, even though an IHTSDO workbench tool is used to select concepts. The relevant top-level hierarchies are identified and then sub-hierarchies of concepts or individual concepts are selected for inclusion. The scope, statement of purpose or definition of the reference set is taken into account, and this scope may or may not be bound to a clinical information specification. If it is bound to a specification, then the related data elements within the data group are also considered to avoid semantic overlap between the concept model and the specifications.

As selections are made, rules or guidelines are produced which reflect the logic of the decisions made to include or exclude a concept. Of particular importance are the justifications for the level of granularity, and the justification for how the decisions relate back to scope. While the primary aim of the guidelines is to enable reproducibility, they also form the basis of a quality check.

3 Foundation reference sets

3.1 Reference set definition and usage

Foundation reference sets developed for SNOMED CT-AU provide the broadest possible terminology considered necessary to support the clinical information requirements in Australian eHealth implementations.

Foundation reference sets support the following uses:

- They can be used in implementations where reference sets are yet to be developed and the required hierarchy or conceptual idea of information has been identified. For example, concepts from the *Clinical finding foundation reference set* would be applicable for a data element that captures a presenting problem. Equally, concepts from the *Procedure foundation reference set* would be applicable for a data element that captures a surgical intervention.
- They can be used as the basis from which further use-case-specific reference sets can be developed through a process of constraint.
- They can be used as the basis on which use-case-specific reference sets that have been developed by members of the SNOMED CT-AU community of practice will be tested to assure that they are logical constraints of the full set of SNOMED CT components necessary in Australian eHealth implementations.

Sixteen Foundation reference sets have been developed, namely:

- *Body structure foundation reference set*
- *Clinical finding foundation reference set*
- *Environment or geographical location foundation reference set*
- *Event foundation reference set*
- *Observable entity foundation reference set*
- *Organism foundation reference set*
- *Physical force foundation reference set*
- *Physical object foundation reference set*
- *Procedure foundation reference set*
- *Qualifier value foundation reference set*
- *Record artefact foundation reference set*
- *Situation with explicit context foundation reference set*
- *Social context foundation reference set*
- *Specimen foundation reference set*
- *Staging and scales foundation reference set*
- *Substance foundation reference set*

3.2 Binding details

Foundation reference sets have been developed independently of any particular clinical information specification/binding but it is important to note that they can be used as they are, bound to a data element if the required content of that data element is broad (and matches the definition of the Foundation reference set).

3.3 Method for defining reference set content

Foundation reference sets have been developed using a combination of the 'simple inclusion', 'concept enumeration', and 'source data exclusion' methods.

Two requirements for the development of content are:

- The content must contain only concepts with active statuses of either 'active' or 'pending move'.
- The content must not contain any non-human concepts.

Hierarchies were identified at the top-level by simple inclusion. Concepts with an 'active' or 'pending move' active status were identified and included by applying the concept enumeration method.

Non-human concepts were identified and filtered by applying the source data exclusion method; the *Australian non-human reference set* was used as the mechanism to identify and filter out these concepts.

3.4 Permissible values

Some examples of permissible values drawn from each reference set are tabulated below.

Table 2: Examples of permissible values from each Foundation reference set

Reference set	Permissible value example
Body structure foundation	18639004 |*Left kidney structure*|
Clinical finding foundation	301183007 |*Bacterial endocarditis*|
Environment or geographical location foundation	419590001 |*Stepdown unit*|
Event foundation	242292001 |*Accidental exposure to corrosive or caustic chemical*|
Observable entity foundation	390896004 |*Target cholesterol level*|
Organism foundation	58984003 |*Anthropozoophilic fungus*|
Physical force foundation	32646006 |*Electric field*|
Physical object foundation	80278003 |*Paediatric bed*|
Procedure foundation	373678003 |*Arthroscopic synovial biopsy of knee joint*|
Qualifier value foundation	263675000 |*Antenatal*|
Record artefact foundation	416868005 |*Surgical intraoperative record*|
Situation with explicit context foundation	428287001 |*History of endocarditis*|
Social context foundation	236324005 |*Factory worker*|
Specimen foundation	119297000 |*Blood specimen*|
Staging and scales foundation	106241006 |*Gleason grading system for prostatic cancer*|
Substance foundation	59905008 |*Isoantibody*|

3.5 Future development

Future development for these foundation reference sets includes:

- Development of a Foundation reference set for the *Pharmaceutical/biologic product* hierarchy (release date yet to be published).
- Development of further exclusion rules, which may include, but not be limited to, the exclusion of content that is specific to, and relevant for use only in another country.

Historically, SNOMED CT was created by the College of American Pathologists by combining SNOMED RT and a computer-based nomenclature and classification known as Clinical Terms Version 3, formerly known as Read Codes Version 3, which was created on behalf of the United Kingdom (UK) Department of Health and is Crown copyright. Thus content specific and relevant only to these countries exists within the SNOMED CT International Release. Until this content is moved to their respective national extensions, the NCTIS plans to exclude them from use in SNOMED CT-AU.

4 Broad context reference sets

4.1 Reference set definition and usage

Broad context reference sets developed for SNOMED CT-AU provide the broadest possible terminology considered necessary to support the clinical information requirements within clinical groupings in Australian eHealth implementations.

Broad context reference sets support the following uses:

- They can be used in implementations where reference sets represent a useful method of providing terminology for a clinical grouping. For example, concepts from the *Mental health disorder reference set* would be applicable for a data element that captures a mental health diagnosis.
- They can be used as the basis from which more specific reference sets based on terminology requirements for different professional groups or based on clinical setting may be developed through a process of constraint.
- They can be used as the basis on which use-case-specific reference sets that have been developed by members of the SNOMED CT-AU community of practice will be tested to assure that they are logical constraints of the full set of SNOMED CT components necessary in Australian eHealth implementations.

Nine Broad context reference sets have been developed to date; namely:

- *Cardiovascular finding reference set*
- *Fracture finding reference set*
- *Imaging procedure reference set*
- *Mental health disorder reference set*
- *Microorganism reference set*
- *Musculoskeletal finding reference set*
- *Neoplasm and/or hamartoma reference set*
- *Respiratory finding reference set*
- *Skeletal system reference set*

4.2 Binding details

Broad context reference sets have been developed independently of any particular clinical information specification/binding but it is important to note that they can be used as they are, bound to a data element if the required content of that data element is broad (and matches the definition of the Broad context reference set).

4.3 Method for defining reference set content

Broad context reference sets have been developed using a combination of the ‘simple inclusion’ and ‘source data inclusion’ methods. They are developed using the relevant Foundation reference sets as a basis.

Clinical groupings were identified within sub-hierarchies of the Foundation reference sets by simple inclusion.

4.4 Permissible values

Some examples of permissible values drawn from each reference set are tabulated below.

Table 3: Examples of permissible values from each Broad context reference set

Reference set	Permissible value example
Cardiovascular finding	1939005 |*Abnormal vascular flow*|
Fracture finding	25415003 |*Closed fracture of femur*|
Imaging procedure	77477000 |*Computerised axial tomography*|
Mental health disorder	441704009 |*Affective psychosis*|
Microorganism	409808003 |*Drug resistant Streptococcus pneumoniae*|
Musculoskeletal finding	111245009 |*Compartment syndrome*|
Neoplasm and/or hamartoma	403966009 |*Arteriovenous haemangioma*|
Respiratory finding	421581006 |*Pharyngeal swelling*|
Skeletal system	62413002 |*Bone structure of radius*|

4.5 Future development

Future development for these Broad context reference sets will be undertaken as follows:

- Additional reference set development will use the same methodology to satisfy a greater range of clinical grouping areas.
- Other Broad context and Intermediate reference sets will be developed to satisfy additional clinical grouping areas using other reference set development methodologies such as the ‘attribute’ method, the ‘simple inclusion’ method or a combination of these.

5 Reference sets bound to information specifications

5.1 Adverse reaction type reference set

5.1.1 Reference set definition and usage

The *Adverse reaction type reference set* provides terminology to support the recording of the type of adverse reaction that a patient has experienced.

5.1.2 Binding details

This reference set is applicable across the specifications listed in the following table.

Table 4: Reference set bindings

Detailed Clinical Model or Specification	Details	Consideration
Adverse Reaction DCM [3]	*Reaction Type* data element DE: 15554 OID: 1.2.36.1.2001.1001.101.103.15554 Definition: The type of adverse reaction as determined by the clinician.	

5.1.3 Method for defining reference set content

The *Adverse reaction type reference set* was developed using the 'source mapping method'; the term listings were provided by NEHTA's Clinical Information team through the requirements gathering exercise for medication management.

Content for this reference set is sourced from the *Clinical finding* hierarchy.

A number of changes in the *Australian dialect reference set* have been undertaken as part of this reference set work to ensure that usable terms are allocated as the Preferred Term for use in Australia. Examples are listed in the table below.

Table 5: Examples of Preferred Terms in the ADRS

Concept ID and Fully Specified Name	Description noted as the Preferred Term in ADRS with Description IDs
90092004 |*Hypersensitivity reaction mediated by antibody (disorder)*|	149332018 |*Hypersensitivity reaction type II*|
83699005 |*Hypersensitivity reaction mediated by immune complex (disorder)*|	138813014 |*Hypersensitivity reaction type III*|
12263007 |*Type 1 hypersensitivity response (disorder)*|	21116017 |*Hypersensitivity reaction type I*|
28031001 |*Cell-mediated immune reaction (disorder)*|	46923011 |*Hypersensitivity reaction type IV*|
7895008 |*Poisoning by drug AND/OR medicinal substance (disorder)*|	14059012 |*Drug toxicity*|

5.1.4 Permissible values

Some examples of permissible values:

- 12263007 |*Hypersensitivity reaction type I*|
- 106190000 |*Allergy*|
- 421492009 |*Pseudoallergy*|
- 404204005 |*Drug interaction with drug*|
- 33845003 |*Idiosyncratic drug reaction*|

5.2 Anatomical location name reference set

5.2.1 Reference set definition and usage

The *Anatomical location name reference set* provides terminology to support the recording of anatomical locations. It is void of information that represents body structures with laterality and it represents a subset of the *Anatomical site reference set*. The correct usage of this reference set would involve capturing laterality information outside of and separate to this reference set.

Additional information which applies to concepts in this reference set and indeed *Body structure* concepts in general, includes the distinction between 'entire' and 'structure' concepts. The model underlying the *Body structure* hierarchy defines how concepts are related. For this reason, there are concepts which appear similar to each other with the difference being that one will define the 'structure' of the entity and the other the 'entire' entity, e.g., 71854001 |*Colon structure*| and 302508007 |*Entire colon*|. The model defines 'structure' concepts as 'entire' concepts or 'part of entire' concepts. Therefore when selecting a concept for use, this must be kept in mind.

Essentially, this means when selecting a concept which represents the entire entity, the 'entire' concept should be used. For example, if describing the anatomical site for the procedure, total colectomy, the concept 302508007 |*Entire colon*| should be chosen. However, when selecting a concept which is not specific and therefore could mean either the entire entity or part of the entity, then the 'structure' concept should be used. For example, if describing the anatomical site for the procedure, colectomy, the concept 71854001 |*Colon structure*| should be chosen.

5.2.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 6: Anatomical location name reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Problem/Diagnosis DCM [4] *Adverse Reaction DCM* [3] *Imaging Examination Result DCM* [5] *Pathology Test Result DCM* [6] *Procedure DCM* [7]	*Name of location* data element DE: 16153 OID: 1.2.36.1.2001.1001.101.103.16153 Definition: The name of an anatomical location.	This reference set may be applicable for use cases outside of this specification.

5.2.3 Method for defining reference set content

The *Anatomical location name reference set* was developed using a combination of the source data inclusion method and a number of exclusion methods. These exclusions amount to the information which represents the laterality of body structures.

The constraints that were applied to develop this reference set are tabulated below.

Table 7: Anatomical location name reference set constraints

Constraint Type	Details
Inclusions	Reference set content was sourced from the Anatomical site reference set.
Exclusions	Concepts that have relationships where the destination concept is a member of the Laterality reference set. Concepts that have descriptions which contain either 'left' or 'right' in the text string. The concept, 422525002 |*Structure of bilateral paired structures*| and its descendants.
Exceptions	Unilateral body structures that have relationships where the destination concept is a member of the Laterality reference set were included. For example 72481006 |*Structure of right middle lobe of lung*|.

5.2.4 Permissible values

Some examples of permissible values:

- 48467007 |*Aortic tunica media*|
- 245524004 |*Entire lobe of lung*|
- 87342007 |*Bone structure of fibula*|

5.3 Anatomical site reference set

5.3.1 Reference set definition and usage

The Anatomical site reference set provides terminology to describe human anatomical sites. It supports a wide variety of uses including describing anatomical sites from which a specimen may be collected for a pathology investigation.

Additional information which applies to concepts in this reference set and indeed Body structure concepts in general, includes the distinction between 'entire' and 'structure' concepts. The model underlying the *Body structure* hierarchy defines how concepts are related. For this reason, there are concepts which appear similar to each other with the difference being that one will define the 'structure' of the entity and the other the 'entire' entity, e.g. 71854001 |*Colon structure*| and 302508007 |*Entire colon*|. The model defines 'structure' concepts as 'entire' concepts or 'part of entire' concepts. Therefore when selecting a concept for use, this must be kept in mind.

Essentially, this means when selecting a concept which represents the entire entity, the 'entire' concept should be used. For example, if describing the anatomical site for the procedure, total colectomy, the concept 302508007 |*Entire colon*| should be chosen. However, when selecting a concept which is not specific and therefore could mean either the entire entity or part of the entity, then the 'structure' concept should be used. For example, if describing the anatomical site for the procedure, colectomy, the concept 71854001 |*Colon structure*| should be chosen.

5.3.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 8: Anatomical site reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Result Report SDT [8]	*Specimen Anatomical Site* data element (DE-11010) within the *Specimen Detail* data group (DG-11005). Definition: The categorisation of the anatomical site from which a specimen was obtained from an individual for pathology investigation.	This reference set may be applicable for use cases outside of this specification.

5.3.3 Method for defining reference set content

The *Anatomical site reference set* was developed using a combination of the source data inclusion method and the simple inclusion/exclusion methods.

The constraints that were applied to develop this reference set are tabulated below.

Table 9: Anatomical site reference set constraints

Constraint Type	Details
Inclusions	Reference set content was sourced from the *Body structure foundation reference set*. Concepts from the *Acquired body structure* and *Physical anatomical entity* sub-hierarchies from within the *Body structure* hierarchy were included.
Exclusions	Concepts from the *Cell structure*, *Intercellular anatomical structure*, *Morphologically altered structure* and *Non-human body structure* sub-hierarchies from within the *Body structure* hierarchy were excluded.

5.3.4 Permissible values

Some examples of permissible values:

- 91764005 |*Lumen of vein*|
- 362209008 |*Entire left kidney*|
- 8966001 |*Left eye structure*|

5.3.5 Change history

Reference sets released as part of the SNOMED CT-AU release have been maintained to align with the most recent data from the International release of SNOMED CT. Additional development work outside of this regular maintenance is listed in the table below.

Table 10: Anatomical site reference set change history

Release	Change / update comments
20130531	Fully specified name description was changed from *Specimen anatomical site reference set (foundation metadata concept)* to *Anatomical site reference set (foundation metadata concept)* to reflect its wide range of uses.
20130531	Synonym description was changed from *Specimen anatomical site reference set* to *Anatomical site reference set* to reflect its wide range of uses.
20130531	4764 concepts were retired from the reference set as a result of the newly defined constraints.
20130531	127 concepts were added to the reference set as a result of the newly defined constraints.

5.4 Change type reference set

5.4.1 Reference set definition and usage

The *Change type reference set* provides terminology to record the way in which the current medication instruction differs from the previous one.

5.4.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 11: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication Instruction and Action DCM [9]	*Change Type* data element DE: 16593 OID: 1.2.36.1.2001.1001.101.103.16593 Definition: The way in which the current medication instruction differs from the previous one.	This reference set may be applicable for use cases outside this specification.

5.4.3 Method for defining reference set content

The *Change type reference set* was developed using the 'source data mapping method'; the term listings were provided by NEHTA's Clinical Information team through the requirements gathering exercise for medication management.

5.4.4 Permissible values

Some examples of permissible values:

- 385655000 |*Suspended*|
- 385656004 |*Ceased*|
- 89925002 |*Cancelled*|

5.4.5 Change history

As a result of the collaboration between Queensland Health Medication Safety Unit and NEHTA's Clinical Information team on the harmonization of the Medication Change Type value set, there has been an update to the definition and values of this reference set.

The definition of the data element has changed slightly with the insertion of the word 'medication' to more clearly define the context in which it is to be used. The table below shows the results of the review and the changes that were made to the allowable values of the data element that this reference set is bound to.

Table 12: Change type reference set values

Old values (Description ID)	New values (Description ID)
387931011 |*No change*|	494211000036112|*Unchanged*|
391978017 |*Changed*|	494191000036113|*Changed*|
1479858012 |*Ended*|	494151000036116|*Ceased*|
1479854014 |*Started*|	494171000036114|*Prescribed*|
	1479857019 |*Suspended*|
	149063014 |*Cancelled*|

Although the two values for 'Changed' appear to be similar, they are modelled quite differently. With the change in the definition of the data element to be more medication-oriented, the original concept did not accurately reflect the intended meaning of the value. A new concept for 'Changed' was created as a child of 410523001 |*Post-starting action status*| has now been created to support this.

Table 13: Change type reference set change history

Release	Change / update comments
20130531	Addition of two new members and the change of some existing values. Updated to reflect the newly defined value set.

5.5 Collection procedure reference set

5.5.1 Reference set definition and usage

The *Collection procedure reference set* provides terminology to support the recording of the method of collection to be used.

It is to be used to provide values for collection procedures specifically used for the collection of pathology specimens.

5.5.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 14: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM [6]	*Collection Procedure* data element ID: DE-16111 OID: 1.2.36.1.2001.1001.101.103.16111 Definition: The method of collection to be used.	This reference set may be applicable for use cases outside of this specification.

5.5.3 Method for defining reference set content

The *Collection procedure reference set* was developed using a combination of the source data inclusion method, attribute method and the simple inclusion method.

The constraints that were applied to develop this reference set are tabulated below.

Table 15: Collection procedure reference set constraints

Constraint Type	Details
Inclusions	Reference set content was sourced from the *Procedure foundation reference set.* Concepts from the *Puncture procedure, Biopsy, Evacuation procedure, Extraction, Specimen collection, Surgical removal, Incision* and *Endoscopic operation* sub-hierarchies from within the *Procedure* hierarchy were included.
Exclusions	Concepts that have been modelled using the attributes Procedure site and Procedure morphology were excluded.
Exceptions	Concepts deemed to be useful that fall outside of these constraints have been included (e.g. 22778000 |*Venipuncture*|). Some concepts that fall within these constraints have been manually excluded, with particular attention paid to avoid semantic overlap with adjacent data elements, incorrectly modelled concepts and the use case (e.g. 178264009 |*Biopsy of neuromuscular junction*|).

5.5.4 Permissible values

Some examples of permissible values:

- 439336003 |*Brush biopsy*|
- 9911007 |*Core needle biopsy*|
- 2475000 |*Urine specimen collection, 24 hours*|

5.6 Dose unit reference set

5.6.1 Reference set definition and usage

The *Dose unit reference set* is developed to provide terminology for the *Dose Unit* data element within the *Medication Instruction and Action DCM* [9].

5.6.2 Binding details

This reference set is applicable across the specifications listed in Table 9 below.

Table 16: Dose unit reference set bindings

Detailed Clinical Models or Specifications	Details	Considerations
Medication Instruction and Action DCM [9] *Adverse Reaction DCM* [3]	*Dose Unit* data element DE: 16524 OID: 1.2.36.1.2001.1001.101.103.16524 Definition: The dose unit of this amount.	This reference set may be applicable for use cases outside of this specification.

5.6.3 Method for defining reference set content

The *Dose Unit reference set* was developed using the 'source data mapping' method; the source terms were drawn from the Australian Medicines Terminology (AMT) *Unit of Measure* hierarchy where concepts described a dose unit.

In addition the 'simple inclusion' method was utilised to include other concepts from within the SNOMED CT-AU *Qualifier value* hierarchy that met the data element definition.

Note: Further information about the Dose unit mapping rules can be found in Section 8.2 of this document.

The constraints that were applied to develop this reference set are tabulated below.

Table 17: Dose unit reference set constraints

Constraint Type	Details
Inclusions	Concepts from the *Qualifier value* hierarchy were identified using a mapping process from the source data. Additional concepts from the *Qualifier value* hierarchy were also selected where they met the data element definition.

5.6.4 Permissible values

Some examples of permissible values:

- 258684004 |*mg*|
- 429587008 |*Lozenge - unit of product usage*|

5.6.5 Future development

This reference set is subject to further development based on feedback.

5.7 Emergency department diagnosis reference set

5.7.1 Reference set definition and usage

The *Emergency department diagnosis reference set* provides suitable concepts to support the recording of diagnosis in Emergency department settings within Australia.

5.7.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 18: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Emergency department information systems	*Diagnosis* data element Definition: the diagnosis mainly responsible for occasioning a person's non-admitted patient emergency department service episode: see *Non-admitted patient emergency department service episode—principal diagnosis* [10].	Further information about the Emergency department information model can be found in Section 7.1 of this document.

5.7.3 Method for defining reference set content

The *Emergency department diagnosis reference set* was developed using the 'source data mapping' method; the term listings were provided by the National Centre for Classification in Health (NCCH). Suitable SNOMED CT-AU concepts were identified using a mapping process from the term listings.

In addition the 'simple inclusion method' was utilised to include concepts requested by stakeholders such as NSW Health.

Note: Further information about the Emergency department mapping rules can be found in Section 8.1 of this document.

The constraints that were applied to develop this reference set are tabulated below.

Table 19: Emergency department diagnosis reference set constraints

Constraint Type	Details
Inclusions	Concepts from the *Clinical finding* and *Situation with explicit context* hierarchies were identified by using a mapping process from the source data. Concepts from the above-stated hierarchies were included based upon requests from stakeholders.

5.7.4 Permissible values

Some examples of permissible values drawn from the *Clinical finding* hierarchy are listed below:

- 111286002 |*Acute bacterial endocarditis*|
- 359820003 |*Closed fracture of neck of femur*|

5.7.5 Change history

Reference sets released as part of the SNOMED CT-AU release have been maintained to align with the most recent data from the International release of SNOMED CT. Additional development work outside of this regular maintenance is listed in the Table 13 below.

Table 20: Additional development work

Release	Change / update comments
20110531	Concept additions based upon requests from the National Emergency Department Project Advisory Committee (NEDPAC).

5.8 Emergency department findings in presenting problem reference set

5.8.1 Reference set definition and usage

The *Emergency department findings in presenting problem reference set* provides terminology to support the recording of presenting problems within Emergency department settings within Australia.

This reference set should be used in conjunction with:

- the *Emergency department diagnosis in presenting problem reference set*; and
- the *Emergency department reason for presenting problem reference set*.

These three reference sets have been built separately to increase the flexibility of data use across different systems and to support more robust maintenance and quality assurance of reference sets. At the user interface, the end-user should not be aware that they are selecting from three separate sets.

The implication for vendors implementing this structure should be a simple code change to point to multiple lists for one data element, instead of one list per data element.

5.8.2 Binding details

This reference set is applicable across the specifications listed in Table 14 below.

Table 21: Emergency department findings in presenting problem reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Emergency department information systems	*Presenting Problems* data element. Definition: The clinical interpretation of the problem or concern that is identified by the triage clinician as the main reason for the person's non-admitted patient emergency department service episode: see *Non-admitted patient emergency department service episode—presenting problem* [11].	Further information about the Emergency department information model can be found in Section 7.1 of this document.

5.8.3 Method for defining reference set content

The *Emergency department findings in presenting problem reference set* was developed using the 'source data mapping' method; the term listings were provided by the NCCH. Suitable SNOMED CT-AU concepts were identified for the *Presenting Problem* data element using a mapping process from the term listings.

As a secondary part of the mapping process, the 'source data exclusion method' was used to exclude concepts that were members of the *Disease* sub-hierarchy because these items had been identified as content for the *Emergency department diagnosis in presenting problem reference set*.

In addition the 'simple inclusion method' was utilised to include concepts requested by stakeholders such as NSW Health.

Note: Further information about the Emergency department mapping rules can be found in Section 8.1 of this document.

The constraints that were applied to develop this reference set are tabulated below.

Table 22: Emergency department findings in presenting problem reference set constraints

Constraint Type	Details
Inclusions	Concepts from the *Clinical finding* hierarchy were identified by using a mapping process from the source data. Concepts from the abovementioned hierarchy were included based upon requests from stakeholders.
Exclusions	Mapped concepts from the *Disease* sub-hierarchy were excluded because they were identified as content for a separate reference set.

5.8.4 Permissible values

Some examples of permissible values drawn from the *Clinical finding* hierarchy are listed below:

- 30989003 |*Knee pain*|
- 309774006 |*Weakness of limb*|

5.8.5 Change history

Reference sets released as part of the SNOMED CT-AU release have been maintained to align with the most recent data from the International release of SNOMED CT. Additional development work outside of this regular maintenance is listed in the Table 16 below.

Table 23: Additional maintenance work

Release	Change / update comments
20110531	Concept additions based upon requests from the National Emergency Department Project Advisory Committee (NEDPAC).

5.9 Emergency department diagnosis in presenting problem reference set

5.9.1 Reference set definition and usage

The *Emergency department diagnosis in presenting problem reference set* provides terminology to support the recording of presenting problems within Emergency department settings within Australia.

This reference set should be used in conjunction with:

- the *Emergency department findings in presenting problems reference set*; and
- the *Emergency department reason for presenting reference set*.

These three reference sets have been built separately to increase the flexibility of data use across different systems and to support more robust maintenance and quality assurance of reference sets. At the user interface, the end-user should not be aware that they are selecting from three separate sets.

The implication for vendors implementing this structure should be a simple code change to point to multiple lists for one data element, instead of one list per data element.

5.9.2 Binding details

This reference set is applicable across the specifications listed in Table 17 below.

Table 24: Emergency department diagnosis in presenting problem reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Emergency department information systems	*Presenting Problems* data element Definition: The clinical interpretation of the problem or concern that is identified by the triage clinician as the main reason for the person's non-admitted patient emergency department service episode: see *Non-admitted patient emergency department service episode—presenting problem* [11].	Further information about the Emergency department information model can be found in Section 7.1 of this document.

5.9.3 Method for defining reference set content

The *Emergency department diagnosis in presenting problem reference set* was developed using the 'source data mapping' method; the term listings were provided by the NCCH. Suitable SNOMED CT-AU concepts were identified for the *Presenting Problem* data element using a mapping process from the term listings.

As a secondary part of the mapping process, the 'source data exclusion method' was used to exclude concepts that were not members of the *Disease* hierarchy because these items had been identified as content for the *Emergency department findings in presenting problem reference set*.

In addition the 'simple inclusion method' was utilised to include concepts requested by stakeholders such as NSW Health.

Note: Further information about the Emergency department mapping rules can be found in Section 8.1 of this document.

The constraints that were applied to develop this reference set are tabulated below.

Table 25: Emergency department diagnosis in presenting problem reference set constraints

Constraint Type	Details
Inclusions	Concepts from the *Disease* hierarchy were identified by using a mapping process from the source data. Concepts from the *Disease* hierarchy were included based upon requests from stakeholders. Concepts that contain anatomical sites for injuries were evaluated to ensure the consistent use of a general site.

5.9.4 Permissible values

Some examples of permissible values drawn from the *Disease* hierarchy are listed below:

- 410429000 |*Cardiac arrest*|
- 283359004 |*Laceration of forehead*|

5.9.5 Change history

Reference sets released as part of the SNOMED CT-AU release have been maintained to align with the most recent data from the International release of SNOMED CT. Additional development work outside of this regular maintenance is listed in the Table 19 below.

Table 26: Additional development work

Release	Change / update comments
20110531	25 concept additions based upon requests from the National Emergency Department Project Advisory Committee (NEDPAC).

5.10 Emergency department reason for presenting reference set

5.10.1 Reference set definition and usage

The *Emergency department reason for presenting reference set* provides terminology to support the recording of presenting problems within Emergency department settings within Australia.

This reference set should be used in conjunction with:

- the *Emergency department diagnosis in presenting problems reference set*; and
- the *Emergency department findings in presenting problem reference set*.

These three reference sets have been built separately to increase the flexibility of data use across different systems and to support more robust maintenance and quality assurance of reference sets. At the user interface, the end-user should not be aware that they are selecting from three separate sets.

The implication for vendors implementing this structure should be a simple code change to point to multiple lists for one data element, instead of one list per data element.

5.10.2 Binding details

This reference set is applicable across the specifications listed in Table 20 below.

Table 27: Emergency department reason for presenting reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Emergency department information systems	*Presenting Problems* data element Definition: The clinical interpretation of the problem or concern that is identified by the triage clinician as the main reason for the person's non-admitted patient emergency department service episode: see *Non-admitted patient emergency department service episode—presenting problem* [11].	Further information about the Emergency department information model can be found in Section 7.1 of this document.

5.10.3 Method for defining reference set content

The *Emergency department reason for presenting reference set* was developed using the 'source data mapping' method; the term listings were provided by the NCCH. Suitable SNOMED CT-AU concepts were identified using a mapping process from the term listings.

In addition the 'simple inclusion method' was utilised to include concepts requested by stakeholders such as NSW Health.

Note: Further information about the Emergency department mapping rules can be found in Section 8.1 of this document.

The constraints that were applied to develop this reference set are tabulated below.

Table 28: Emergency department reason for presenting reference set constraints

Constraint Type	Details
Inclusions	Concepts from the *Event and Procedure* hierarchies were identified by using a mapping process from the source data. Concepts from the abovementioned hierarchies were included based upon requests from stakeholders.

5.10.4 Permissible values

Some examples of permissible values drawn from the *Procedure* hierarchy are listed below:

- 18949003 |*Change of dressing*|
- 116859006 |*Transfusion of blood product*|

5.10.5 Change history

Reference sets released as part of the SNOMED CT-AU release have been maintained to align with the most recent data from the International release of SNOMED CT. Additional development work outside of this regular maintenance is listed in the table below.

Table 29: Additional development work

Release	Change / update comments
20110531	25 concept additions based upon requests from the National Emergency Department Project Advisory Committee (NEDPAC).

5.11 Exclusion statement reference set

5.11.1 Reference set definition and usage

The *Exclusion statement reference set* provides terminology to record statements about the absence or exclusion of information from within a patient record.

5.11.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 30: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Adverse Reaction DCM [3] *Medication Instruction and Action DCM* [9] *Problem/Diagnosis DCM* [4] *Procedure DCM* [7]	*Exclusion Statement* data element DE-16302 OID: 1.2.36.1.2001.1001.101.103.16302 Definition: The *Exclusion Statement* data element records global statements about the absence or exclusion of information from within a patient record.	

5.11.3 Method for defining reference set content

The *Exclusion statement reference set* was developed using the 'source mapping method'; the term listings were provided by NEHTA's Clinical Information team through the requirements gathering exercise.

Content for this reference set has been created within the *Administrative value* hierarchy.

5.11.4 Permissible values

Some examples of permissible values:

- 61000036101 |*Not asked*|
- 81000036106 |*None known*|
- 91000036108 |*None supplied*|

5.11.5 Future development

In the above mentioned DCMs, the value domains specified have some additional values not currently included in this reference set. A review of these additional values is planned.

5.12 Laterality reference set

5.12.1 Reference set definition and usage

The *Laterality reference set* is developed to provide terminology for the *Side* data element within NEHTA-developed DCMs.

5.12.2 Binding details

This reference set is applicable across the specifications listed in Table 24 below.

Table 31: Laterality reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Problem/Diagnosis DCM [4] *Adverse Reaction DCM* [3] *Imaging Examination Result DCM* [5] *Pathology Test Result DCM* [6] *Procedure DCM* [7]	*Side* data element DE: 16336 OID: 1.2.36.1.2001.1001.101.103.16336 Definition: The laterality of an anatomical location.	This reference set may be applicable for use cases outside of this specification.

5.12.3 Method for defining reference set content

The *Laterality reference set* is developed using the 'simple inclusion method'.

The constraints that were applied to develop this reference set are tabulated below.

Table 32: Laterality reference set constraints

Constraint Type	Details
Inclusions	• Reference set content was derived from the *Qualifier value foundation reference set*. • Concepts from the *Side* sub-hierarchy within the *Qualifier value* hierarchy were included.

5.12.4 Permissible values

Some examples of permissible values:

- 24028007 |*Right*|
- 419161000 |*Unilateral left*|

5.13 Medication form reference set

5.13.1 Reference set definition and usage

The *Medication form reference set* is developed to provide terminology for the *Form* data element in the *Chemical Description of Medication* cluster within the *Medication Instruction and Action DCM* [9].

5.13.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 33: Medication form reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication Instruction and Action DCM [9]	*Form* data element DE: 10186 OID: 1.2.36.1.2001.1001.101.103.10186 Definition: The formulation or presentation of the overall substance.	This reference set may be applicable for use cases outside of this specification.

5.13.3 Method for defining reference set content

The *Medication form reference set* was developed using the 'source data mapping' method; the source terms were drawn from the Australian Medicines Terminology *Form* hierarchy where concepts described a medication form. Only concepts that are currently used in HAS MANUFACTURED DOSE FORM relationships were considered. From this mapping the appropriate SNOMED CT-AU sub-hierarchies were identified.

In addition the 'simple inclusion' method was utilised to include other concepts from within the SNOMED CT-AU *Qualifier value* hierarchy that met the data element definition.

Note: Further information about the Medication form mapping rules can be found in Section 8.2 of this document.

The constraints that were applied to develop this reference set are tabulated below.

Table 34: Medication form reference set constraints

Constraint Type	Details
Inclusions	Reference set content was derived from the *Qualifier value foundation reference set*. All descendant concepts of *Device form*, *Dialysis dosage form*, *Dose form by site prepared for* and *Drug dose form*. The concepts 421251002 |*Dried herb*|, 422077001 |*Extract*|, 385037005 |*Herbal tea*| and all their descendants.

5.13.4 Permissible values

Some examples of permissible values:

- 385267006 |*Impregnated pad*|
- 385049006 |*Capsule*|

5.14 Out of range indicator reference set

5.14.1 Reference set definition and usage

The *Out of range indicator reference set* provides suitable concepts to indicate whether the value for a particular pathology observation is within or outside of its associated reference range. If the result is outside the reference range, this indicator may also describe the direction in which the result falls outside the range (i.e. lower or higher).

More complex reporting will provide an indication of the extent to which the result falls outside the given reference range. A laboratory information system will provide an out of range indicator value based on programmed rules defined by the reporting pathologist. Factors influencing these rules may include:

- the analytical performance of methods used (accuracy and precision);
- the clinical significance of the observation; and
- the relevant standard deviations from the normal population mean.

The *Out Of Range Indicator* data element simply highlights a particular result's relationship to an associated reference range.

5.14.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 35: Out of range indicator reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM [6]	*Result Value Normal Status* data element DE: 16572 OID: 1.2.36.1.2001.1001.101.103.16572 Definition: Optional normal status indicator of value with respect to normal range for this value.	This reference set may be applicable for use cases outside of this specification.
Pathology Result Report SDT [8]	*Out of Range Indicator* data element (DE-11028) within the *Structured Result Entry* data group (DG-11008). Definition: Indicates whether the result is within or outside of its reference ranges. This indicator may also describe the relative amount the result is lower or higher than the reference range. This data element is used within *Structured Result Entry* data group for numerical results only. It relates to the number value and reference range for that particular test.	

5.14.3 Method for defining reference set content

The *Out of Range Indicator* data element is used to indicate that an observed value is outside the specified reference range; it aligns with concepts from the *Result comments* sub-hierarchy which exists in the top-level hierarchy *Qualifier value*.

The 'simple inclusion' method was used to further analyse the sub-hierarchies and identify content which conceptually matched the data element definition. The surrounding data structures were also considered, together with whether the concept was clinically relevant.

The table below describes the constraints that were used in developing this reference set.

Table 36: Out of range indicator reference set constraints

Constraint Type	Details
Inclusions	• Concepts from the *Result comments* sub-hierarchy that can be used to indicate the relevance of a pathology observation to its associated reference range (e.g. 281302008 |*Above reference range*|). • All current inclusions are descendants of the following two concepts: • 281298000 |*Reference range comments*| • 281299008 |*Therapeutic range comments*|
Exclusions	• Grouper concepts that are judged as not having clinical relevance. For example, 281299008 |*Therapeutic range comments*| is a grouper concept that is not meaningful in a pathology result report context. Concepts that are subsumed by the excluded grouper are still included (where suitable). • Concepts that did not conceptually match the definition of the data element (e.g. 373065002 |*Z-score*|).

5.14.4 Permissible values

Some examples of permissible values drawn from the *Results comments* sub-hierarchy are listed below:

- 281301001 |*Within reference range*|
- 281303003 |*Above therapeutic range*|

5.14.5 Future development

The selection of concepts available in SNOMED CT-AU for the *Out of range indicator reference set* is limited, although they have been deemed comprehensive enough for initial implementations. Feedback from stakeholders following review and implementation may indicate that new concepts may need to be added, or existing concepts revised. These issues will be addressed through the IHTSDO request submission process where appropriate.

5.15 Problem / Diagnosis reference set

5.15.1 Reference set definition and usage

The *Problem/Diagnosis reference set* provides terminology to support the recording of a patient problem or diagnosis for medical records within Australia.

5.15.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 37: Problem/Diagnosis reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Problem/Diagnosis DCM [4]	*Problem/Diagnosis* data element DE: 15514 OID: 1.2.36.1.2001.1001.101.103.15514 Definition: Identification of the problem or diagnosis.	This reference set may be applicable for use cases outside of this specification.
Adverse Reaction DCM [3]	*Manifestation* data element DE: 15564 OID: 1.2.36.1.2001.1001.101.103.15564 Definition: Clinical manifestation of the adverse reaction expressed as a single word, phrase or brief description.	This reference set may be applicable for use cases outside of this specification.

5.15.3 Method for defining reference set content

The *Problem/Diagnosis reference set* was developed using the 'simple inclusion method'.

The constraints that were applied to develop this reference set are tabulated below.

Table 38: Problem/Diagnosis reference set constraints

Constraint Type	Details
Inclusions	Reference set content was derived from the following Foundation reference sets: • *Clinical finding foundation reference set* • *Event foundation reference set* • *Situation with explicit context foundation reference set* Suitable content was derived from the following sub-hierarchies within the *Clinical finding* hierarchy: • *Bleeding* • *Calculus finding* • *Clinical history and observation* • *Cyanosis* • *Deformity* • *Disease* • *Drug action* • *Effect of exposure to physical force* • *Enzyme activity finding*

Constraint Type	Details
	• *Erythema* • *Evaluation finding* • *Finding by method* • *Finding by site* • *Finding of grade* • *Finding related to physiologic substance* • *Finding reported by subject or history provider* • *Foetal finding* • *General state clinical finding* • *Jaundice* • *Neurological finding* • *Oedema* • *Papule* • *Swelling* • *Wound finding* Suitable content was also included from the following sub-hierarchies of the *Event* hierarchy: • *Abuse* • *Death* • *Exposure to potentially harmful entity* • *Intentionally harming self* • *Immediately dangerous to life and health condition* Suitable content was also included from the following sub-hierarchy of the *Situation with explicit context hierarchy*: • *Unilateral clinical finding*
Exclusions	Content from the following sub-hierarchies of the *Clinical finding foundation reference set*: *Administrative statuses* sub-hierarchy *Adverse incident outcome categories* sub-hierarchy *Clinical stage finding* sub-hierarchy *Prognosis/Outlook finding* sub-hierarchy

5.15.4 Permissible values

Some examples of permissible values:

- 111286002 |*Acute bacterial endocarditis*|
- 359820003 |*Closed fracture of neck of femur*|

5.16 Related item relationship type reference set

5.16.1 Reference set definition and usage

The *Related item relationship type reference set* provides terminology to support the recording of the type of relationship that a related item (e.g. diagnosis or procedure) has with the problem/diagnosis being recorded.

5.16.2 Binding details

This reference set is applicable across the specifications listed in the following table.

Table 39: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Problem/Diagnosis DCM [4]	*Relationship Type* data element DE: 16560 OID: 1.2.36.1.2001.1001.101.103.16560 Definition: The type of relationship that this problem/diagnosis has to the related item.	This reference set may be applicable for use cases outside of this specification.

5.16.3 Method for defining reference set content

The values and definitions provided in the *Problem/Diagnosis DCM* [4] that have been used as a data source and requirement for this development process are shown in the table below.

Table 40: DCM values and definitions

Example value	Definition
Caused by	This identifies the direct cause or causative agent of a Problem/Diagnosis and will include the idea of 'complications', 'causative agent' and 'due to'. Note: Where no causality or sequence of events is known, this relationship type should be left blank.
Following	This identifies the sequence of events between the related items, but does not assert causality. This can be used for sequelae or late effects. Note: Where no causality or sequence of events is known, this relationship type should be left blank.

The SNOMED CT allowable attributes table as per the January 2013 release of the *SNOMED CT User Guide* [12] is shown below and lists the applicable attributes, their definition and the concept types that are applicable for the related item as per the concept model rules.

Table 41: SNOMED CT concept model attributes

Attribute	Definition	Allowable concept values
ASSOCIATED WITH	This attribute represents a clinically relevant association between concepts without either asserting or excluding a causal or sequential relationship between the two.	*Clinical finding* *Procedure* *Event* *Organism* *Substance* *Physical object* *Physical force* *Pharmaceutical/biologic products (AMT)*
CAUSATIVE AGENT	This attribute identifies the direct causative agent of a disease.	*Organism* *Substance* *Physical object* *Physical force* *Pharmaceutical/biologic products (AMT)*
AFTER	This attribute neither asserts nor excludes a causal relationship between concepts, it instead emphasises a sequence of events.	*Clinical finding* *Event*
DUE TO	This attribute is used to relate a *Clinical finding* directly to its cause. If a clinical finding merely predisposes to or worsens another disorder, rather than causing it directly, then the more general attribute ASSOCIATED WITH is used instead.	*Clinical finding* *Procedure*

A consolidation exercise was undertaken to determine the best way to allow presentation of data entry options to users as well as maintain data integrity for information collected using the DCM-identified values while still being compatible with the requirements of the SNOMED CT concept model. The outcome is listed in the table below and shows which of the DCM values should be used for the each of the above attributes.

Table 42: Consolidation of SNOMED CT attributes to the DCM values

SNOMED CT Attribute	DCM value
ASSOCIATED WITH	To be left blank
CAUSATIVE AGENT	Caused by
AFTER	Following
DUE TO	Caused by

In summary, and to ensure usability of data for secondary purposes, it is important to note that during retrieval and subsumption queries the following should be inferred:

- Where problems/diagnoses that have a relationship type of caused by and are related to organisms, substances, physical forces, physical objects and AMT products, these should be inferred to correspond to the CAUSATIVE AGENT attribute.
- Where problems/diagnoses that have a relationship type of caused by and are related to clinical findings and procedures, these should be inferred to correspond to the DUE TO attribute.

This decision was made to simplify the point of care data entry and reduce the confusion around the synonymy of the 'Complication of', 'Causative agent' and 'Due to' descriptors.

The reference set was developed using the 'simple inclusion method'; inclusions are listed below.

Table 43: Related item relationship type reference set constraints

Constraint Type	Fully Specified Name (Concept ID)	ADRS Preferred Term (Description ID)
Inclusions	255234002 |*After (attribute)*| 42752001 |*Due to (attribute)*|.	21000036114 |*Following*| 71336013 |*Caused by*|

5.16.4 Permissible values

Some examples of permissible values:

- 255234002 |*Following*|
- 42752001 |*Caused by*|

5.17 Relationship to subject of care reference set

5.17.1 Reference set definition and usage

The *Relationship to subject of care reference set* provides terminology to support the recording of how a person is associated with or related to the subject of care for clinical and administrative records within Australia.

5.17.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 44: Relationship to subject of care reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Participation Specification [13]	*Relationship to Subject of Care* data element DE: 20116 OID:1.2.36.1.2001.1001.101.103.20116 Definition: The relationship of a participant to a subject of care (patient).	

5.17.3 Method for defining reference set content

The *Relationship to subject of care reference set* provides terminology to support the recording of how a person is associated with or related to the subject of care for clinical and administrative records within Australia. Applicable concepts within the *Person* sub-hierarchy of the *Social context* hierarchy were identified.

The reference set was developed using the 'simple inclusion method' where this sub-hierarchy was analysed for content which conceptually matches the reference set definition.

The constraints that were applied to develop this reference set are tabulated below.

Table 45: Relationship to subject of care reference set constraints

Constraint Type	Details
Inclusions	• Reference set content was derived from the *Social context foundation reference set*. • Concepts from the *Person* sub-hierarchy that can be used to describe how a person is associated with or related to the subject of care.
Exclusions	• The concept and descendants of *Member of public* are to be excluded, except for *Member of public involved incidentally*. • Concepts that contain clinical information as well as a person's relationship to the subject of care. (Loading this relationship with clinical data may have medicolegal/privacy implications, e.g. *Sperm donor, Donor for heart transplant*.) • The *Person in family of subject* sub-hierarchy due to duplication of concepts from the *Person in the family* sub-hierarchy and also due to duplication of the phrasing 'relationship to subject of care' that exists with the data element names. • Descendants of *Sick relative* because specific disease contexts such as *Demented relative* are not needed for this data element. • *Elderly parents* and *Homosexual parents* because these are plural, and the data element indicates an individual as well as providing more information than just the relationship.

5.17.4 Permissible values

Some examples of permissible values:

- 394859001 |*Maternal grand-mother*|
- 45929001 |*Half-brother*|

5.17.5 Future development

There will be consideration for the development of a reference set that is applicable to the family history of genetic relatives only. Such a reference set would contain a subset of the concepts from the *Relationship to subject of care reference set*.

5.18 Result test name reference set

5.18.1 Reference set definition and usage

The *Result test name reference set* provides suitable concepts to describe the testing procedure(s) completed by the pathologist, and forms part of the result generated for clinical communication.

5.18.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 46: Result test name reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Result Report SDT [8]	*Result Test Name* data element (DE-11031) within the *Result Detail* data group (DG-11007). Definition: the term representing the pathology investigations completed by the pathologist. The term may represent a single analyte or a panel of grouped tests that have been performed.	

5.18.3 Method for defining reference set content

The *Result Test Name* data element holds the description of the pathology investigation that was undertaken and aligns with concepts from the *Procedure* hierarchy from SNOMED CT.

The *Result test name reference set* was developed using the 'source data mapping' method; the term listings were provided by Australian State health departments. Suitable SNOMED CT concepts were identified using a mapping process from the term listings.

Where the source terms included information that is captured elsewhere in the data group or structured document template, such as the specimen, a baseline concept that represented the core intent of a specific test was selected. This is illustrated in the table below.

Table 47: Identification of baseline concept for test procedures

SNOMED CT Concept Id and Preferred Term	Baseline Test Concept Id and Preferred Term
104935006 |*Sodium measurement, urine*|	25197003 |*Sodium measurement*|

The table below summarises the constraints that were applied to develop this reference set.

Table 48: Result test name reference set constraints

Constraint Type	Details
Inclusions	• Concepts from the *Procedure* hierarchy were identified by using a mapping process from the source data. Where these terms included information such as the specimen, a baseline concept that represented the core intent of a specific test was selected (e.g. 25197003 |*Sodium measurement*|).
Exclusions	• Concepts that did not map to the test lists provided, as only content useful for the Australian healthcare environment was required. • Concepts that provided pre-coordinated content such as the pathology test together with the specimen and/or the specimen qualifier as the additional information is captured by other pathology reference sets (e.g. 104935006 |*Sodium measurement, urine*|).

5.18.4 Permissible values

Some examples of permissible values drawn from the *Procedure* hierarchy are listed below:

- 392375006 |*Maple leaf sycamore RAST*|
- 104329000 |*Epstein-Barr EA antibody measurement*|
- 25514001 |*Digoxin measurement*|
- 77020008 |*Direct Coombs test*|

5.19 Request test name reference set

5.19.1 Reference set definition and usage

The *Request test name reference set* provides suitable concepts to describe a pathology investigation that may be requested by a clinician.

The reference set is currently identical to the *Result test name reference set*.

5.19.2 Binding details

This reference set is applicable across the specifications listed in Table 42 below.

Table 49: Request test name reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Result Report SDT [8]	*Request Test Name* data element (DE-11017) within the *Request Detail* data group (DG-11002) Definition: The *Request Test Name* data element is defined as the term representing the requested pathology investigation. The term may represent a single analyte or a panel of grouped tests to be performed.	

5.19.3 Method for defining reference set content

The *Request Test Name* data element holds a description of the pathology investigation that was requested and aligns with concepts from the *Procedure* hierarchy from SNOMED CT.

The *Request test name reference set* was developed using the 'source data mapping' method; the term listings were provided by Australian State health departments. Suitable SNOMED CT concepts were identified using a mapping process from the term listings.

Where the source terms included information that is captured elsewhere in the data group or structured document template, such as the specimen, a baseline concept that represented the core intent of a specific test was selected. This is illustrated in the table below.

Table 50: Identification of baseline concept for test procedures

SNOMED CT Concept Id and Preferred Term	Baseline Test Concept Id and Preferred Term
104935006 |*Sodium measurement, urine*|	25197003 |*Sodium measurement*|

The constraints that were applied to develop this reference set are tabulated below.

Table 51: Request test name reference set constraints

Constraint Type	Details
Inclusions	• Concepts from the *Procedure* hierarchy were identified by using a mapping process from the source data. Where these terms included information such as the specimen, a baseline concept that represented the core intent of a specific test was selected (e.g. 25197003 |*Sodium measurement*|).
Exclusions	• Concepts that did not map to the term listings provided, as only content useful for the Australian healthcare environment was required. • Concepts that provided pre-coordinated content such as the pathology test together with the specimen and/or the specimen qualifier (e.g. 104935006 |*Sodium measurement, urine*|). This additional information is captured by other pathology reference sets.

5.19.4 Permissible values

Some examples of permissible values drawn from the *Procedure* hierarchy are listed below:

- 392358000 |*Eucalyptus RAST*|
- 71466003 |*Valproic acid measurement*|
- 61594008 |*Microbial culture*|

5.20 Route of administration reference set

5.20.1 Reference set definition and usage

The *Route of administration reference set* provides terminology to support the recording of the route by which medicines are to be administered for medicines records within Australia.

5.20.2 Binding details

This reference set is bound to the *Route* data element in the *Medication Administration* cluster within the *Medication Instruction and Action DCM* [9].

This reference set is applicable across the specifications listed in Table 45 below.

Table 52: Route of administration reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication Instruction and Action DCM [9] *Adverse Reaction DCM* [3]	*Route* data element DE: 10147 OID: 1.2.36.1.2001.1001.101.103.10147 Definition: The route by which the medication is administered.	This reference set may be applicable for use cases outside of this specification.

5.20.3 Method for defining reference set content

The *Route of administration reference* set was developed using the 'simple inclusion method'.

The constraints that were applied to develop this reference set are tabulated below.

Table 53: Route of administration reference set constraints

Constraint Type	Details
Inclusions	• Content that was suitable to record the route of administration of a medication. • Reference set content was derived from the *Qualifier value foundation reference set*.

5.20.4 Permissible values

Some examples of permissible values:

- 404820008 |*Epidural route*|
- 26643006 |*Oral route*|

5.21 Specimen type reference set

5.21.1 Reference set definition and usage

The *Specimen type reference set* provides suitable concepts to describe the sample to be collected or tested in a pathology investigation.

5.21.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 54: Specimen type reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM [6]	*Specimen Tissue Type* data element. DE: 11008 OID: 1.2.36.1.2001.1001.101.103.11008 Definition: The type of specimen to be collected.	This reference set may be applicable for use cases outside of this specification.
Pathology Result Report SDT [8]	*Specimen Type* data element (DE-11008) within the *Specimen Detail* data group (DG-11005). Definition: The categorisation of the sample collected and/or tested in a pathology investigation in relation to the subject of care.	

5.21.3 Method for defining reference set content

The type of specimen associated with a pathology request must be unambiguously represented in order for the laboratory to conduct the investigation and for the pathologist to report/interpret the results. The data element aligns with concepts from the *Specimen* hierarchy in SNOMED CT.

The 'attribute' method was used to further analyse this hierarchy and identify content which conceptually matched the data element definition. Concepts with attributes that could be captured by other data elements within the same data group were excluded. For concepts that were not yet fully modelled, the implied attributes were considered. Mapping forward from source data term listings was used for rudimentary gap analysis.

The 'source data exclusion' method was also applied to filter non-human content from this reference set.

The table below summarises the constraints that applied to develop this reference set.

Table 55: Specimen type reference set constraints

Constraint Type	Details
Inclusions	Relevant concepts from the *Specimen* hierarchy that describe: • A specimen that has been collected from a subject of care (e.g. 119297000 |*Blood specimen*|). • A specimen that has been refined or modified from material collected from the subject of care (e.g. 119364003 |*Serum specimen*|). • Fluid specimens where the inclusion of anatomical information specifies the type of fluid (e.g. 418564007 |*Pleural fluid specimen*|). • Device specimens that relate to the subject of care (e.g. 119312009 |*Catheter tip specimen*|). • Donor material for which the subject of care is the recipient.
Exclusions	• Non-human content, excluded through use of the *Australian non-human reference set*. • Specimen concepts that include specimen collection procedure information (e.g. 397077004 |*Specimen obtained by incisional biopsy*|) because the focus should be the specimen itself, not the collection procedure. • Environmental specimens (e.g. 419695002 |*Environmental swab*|) as they do not match the data element definition. • Concepts pre-coordinated with details relating to a specific anatomical site for the specimen collection (e.g. 309165001 |*Ear sample*|) as the anatomical site information is captured by the *Specimen anatomical site reference set*. Many of these types of concepts function as groupers within the terminology and do not represent a usefully specific concept. • Specimen concepts with any other qualifying information that should be captured by one of the other data elements in the information model.

5.21.4 Permissible values

Some examples of permissible values drawn from the *Specimen* hierarchy are listed below:

- 119373006 |*Amniotic fluid specimen*|
- 119350003 |*Calculus specimen*|

5.22 Specimen qualifier reference set

5.22.1 Reference set definition and usage

In order to fully describe a specimen, the *Specimen qualifier reference set* provides modifying concepts that are relevant to a pathology investigation and are required for the purpose of specimen collection, analysis or results reporting.

5.22.2 Binding details

This reference set is applicable across the specifications listed in Table 49 below.

Table 56: Specimen qualifier reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Result Report SDT [8]	*Specimen Qualifier* data element (DE-11009) within the *Specimen Detail* data group (DG-11005). Definition: Information that defines characteristics of the specimen that need to be taken into consideration when analysing the specimen or interpreting the results.	

5.22.3 Method for defining reference set content

A specimen must be unambiguously represented in the pathology investigation request. Additional information about the specimen is often required in order for the laboratory to conduct the investigation and for the pathologist to report/interpret the results.

The *Specimen Qualifier* data element is used to add qualifying detail that is not provided by other data elements within the *Specimen Detail* data group (DG-11005); it aligns with concepts from the *Qualifier value* hierarchy.

The 'simple inclusion' method was used to further analyse the sub-hierarchies and identify content which conceptually matched the data element definition. The surrounding data structures were also considered, together with whether the concept was clinically relevant. Mapping forward from source data term listings was used for rudimentary gap analysis.

The table below summarises the constraints that were applied to develop this reference set.

Table 57: Specimen qualifier reference set constraints

Constraint Type	Details
Inclusions	• Concepts from the *Qualifier value* hierarchy that can be used to further qualify a specimen that may be collected from a patient. • Concepts that describe a particular body state of the subject of care. The body state is fully known at the time of specimen collection and relevant to the pathology investigation. The state may describe: o normal stages of human development or physiological processes (e.g. 307429007 |*After menopause*|, 255407002 |*Neonatal*|); or o a temporal relationship to some clinical event or procedure that that is relevant to the pathology investigation (e.g. 115500004 |*Post-dialysis*|, 255242001 |*1 hour post-dose*|). • Concepts that describe temporal aspects that allow the specimen to be fully defined (e.g. 123027009 |*24 hours*|). • Concepts used to differentiate multiple specimens (of the same specimen type) within a single pathology episode (e.g. cardinal and ordinal values).
Exclusions	• Grouper concepts that are judged as not having clinical relevance. For example, 7389001 |*Time frame*| is a grouper concept that is not meaningful in a pathology result report context. • Concepts that did not conceptually match the definition of the data element.

5.22.4 Permissible values

Some examples of permissible values drawn from the *Qualifier value* hierarchy are listed below:

- 123027009 \|*24 hours*\|
- 263675000 \|*Antenatal*\|

5.22.5 Future development

Considering the diversity of this reference set it is expected that feedback from stakeholders following review and implementation could indicate that new concepts may need to be added, or existing concepts revised. NEHTA is already aware that pathology specimen qualifier coverage in SNOMED CT is currently incomplete (e.g. fasting, a commonly used qualifier, is absent). These issues will be addressed through the IHTSDO request submission process where appropriate.

5.23 Specimen characteristic reference set

5.23.1 Reference set definition and usage

The *Specimen characteristic reference set* provides suitable concepts to describe the clinical finding(s) on initial morphological analysis of a specimen identifying attributes or characteristics that may impact the result.

5.23.2 Binding details

This reference set is applicable across the specifications listed in below:

Table 58: Specimen characteristic reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM [6]	Specimen Received Issues data element DE: 16178 OID: 1.2.36.1.2001.1001.101.103.16178 Definition: Specific issue with a received specimen.	This reference set may be applicable for use cases outside of this specification.
Pathology Result Report SDT [8]	*Specimen Characteristic* data element (DE-11015) within the *Specimen Detail* data group (DG-11005). Definition: The clinical findings on initial morphological analysis of a specimen (by a reporting Pathologist or Laboratory Worker) identifying artefacts or characteristics that may impact the result. The characteristics may be judged to be suitable or unsuitable for pathology testing using another data element, the *Specimen Quality* data element.	

5.23.3 Method for defining reference set content

The *Specimen Characteristic* data element is designed to hold details of the morphological appearance of a specimen that may affect the pathology investigation; it aligns with concepts from the *Evaluation finding* sub-hierarchy, which exists in the top-level hierarchy *Clinical finding*.

The 'simple inclusion' method was used to further analyse the sub-hierarchies and identify content which conceptually matched the data element definition. The surrounding data structures were also considered, together with whether the concept was clinically relevant.

The table below describes the constraints that were used in developing this reference set.

Table 59: Specimen characteristic reference set constraints

Constraint Type	Details
Inclusions	Concepts from the *Evaluation finding* sub-hierarchy that: • relate to a specimen; • are a clinical finding that can be observed at initial morphological analysis; and • are either an attribute or characteristic that may impact the interpretation of the result (e.g. 118128002 |*Sample haemolysed*|).
Exclusions	• Concepts that include information that makes an assessment of the suitability of a specimen for testing, as this information is captured by the *Specimen Quality* data element. • Concepts that do not provide a description of the potential characteristics of a specimen that may be evident upon the initial morphological analysis.

5.23.4 Permissible values

Some examples of permissible values drawn from the *Evaluation finding* sub-hierarchy are listed below:

- 281276009 |*Sample cloudy*|
- 84567002 |*Specimen obscured by blood*|

5.24 Specimen quality reference set

5.24.1 Reference set definition and usage

The *Specimen quality reference set* provides suitable concepts for giving an indication of whether the specimen is suitable for the required laboratory tests.

An assessment of the 'suitability for testing' for the specimen collected is important for proper analysis to be done by the pathology laboratory. For example, if a tissue sample is crushed or a blood specimen is haemolysed, assessment will not be optimal; therefore an indication of the quality of the sample must be given.

5.24.2 Binding details

This reference set is applicable across the specifications listed in Table 53 below.

Table 60: Specimen quality reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM [6]	*Adequacy for Testing* data element DE: 16183 OID: 1.2.36.1.2001.1001.101.103.16183 Definition: Is the specimen adequate for testing?	This reference set may be applicable for use cases outside of this specification.
Pathology Result Report SDT [8]	*Specimen Quality* data element (DE-11016) within the *Specimen Detail* data group (DG-11005). Definition: an assessment of the 'suitability for testing' of the specimen collected for analysis. Characteristics may be judged suitable or unsuitable using this data element. Another data element, the *Specimen Characteristic* data element, describes the attributes of the sample that may bias the result, for example sample size or damage.	

5.24.3 Method for defining reference set content

The *Specimen Quality* data element is designed to hold details of the suitability of a specimen for pathology testing; it aligns with concepts from the *Evaluation finding* sub-hierarchy, which exists in the top-level hierarchy *Clinical finding*.

The 'simple inclusion' method was used to further analyse the sub-hierarchies and identify content which conceptually matched the data element definition. The surrounding data structures were also considered, together with whether the concept was clinically relevant.

The table below describes the constraints that were used in developing this reference set.

Table 61: Specimen quality reference set constraints

Constraint Type	Details
Inclusions	• Relevant concepts from the *Evaluation finding* sub-hierarchy that describe the quality of a sample submitted for use in a pathology investigation and conceptually match the data element definition (e.g. 125152006 |*Specimen satisfactory for evaluation*|).
Exclusions	• Concepts that include information on the characteristics of a specimen, as this information is collected in *Specimen Characteristic* data element. • Concepts that do not provide a clinical interpretation of the specimen's suitability for pathology testing (e.g. 397314005 |*Integrity of specimen unknown*|).

5.24.4 Permissible values

Examples of permissible values drawn from the *Evaluation finding* sub-hierarchy are listed below:

- 125152006 |*Specimen satisfactory for evaluation*|
- 125154007 |*Specimen unsatisfactory for evaluation*|

5.25 Sex reference set

5.25.1 Reference set definition and usage

The *Sex reference set* is developed to provide terminology to support the recording of a person's sex within healthcare settings within Australia.

5.25.2 Binding details

This reference set is applicable across the specifications listed in Table 55 below.

Table 62: Sex reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Participation Specification [13]	*Sex* data element ID DE20107 OID: 1.2.36.1.2001.1001.101.103.20107 Definition: The biological distinction between male and female. Where there is inconsistency between anatomical and chromosomal characteristics, sex is based on anatomical characteristics.	This reference set may be suitable for use outside of that specification as required.

5.25.3 Method for defining reference set content

The *Sex reference set* was developed using the 'simple inclusion method'. Suitable SNOMED CT concepts were identified for the *Sex* data element and two new concepts were created for inclusion in this reference set.

The constraints that were applied to develop this reference set are tabulated below.

Table 63: Sex reference set constraints

Constraint Type	Details
Inclusions	• Reference set content was derived from the *Qualifier value foundation reference set*. • Finding related to biological sex sub-hierarchy. Includes descendants *Male* and *Female* only. • New concepts for Intersex and Indeterminate sex were added.
Exclusions	• Other content within the *Finding related to biological sex* sub-hierarchy was excluded as it did not comply with the definition, e.g. one male and one female baby.

5.25.4 Permissible values

Some examples of permissible values:

- 248153007 |*Male*|
- 248152002 |*Female*|

5.26 Testing method reference set

5.26.1 Reference set definition and usage

The *Testing method reference set* provides suitable concepts for the analytical methods that may be used to complete a pathology investigation. The actual method used can influence the interpretation of the final result due to several factors including:

- analytical precision and accuracy;
- methodology sensitivity and specificity;
- influences from interfering factors within the specimen; and
- the reference interval used.

The method used to perform the pathology investigation should be provided where the communication of such information will assist the clinician with the interpretation of the pathology results.

5.26.2 Binding details

This reference set is applicable across the specifications listed in Table 57 below.

Table 64: Testing method reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM [6]	*Testing Method* data element DE: 11025 OID: 1.2.36.1.2001.1001.101.103.11025 Definition: The test method used to arrive at the result.	This reference set may be applicable for use cases outside of this specification.
Pathology Result Report SDT [8]	*Testing Method* data element (DE-11025) within the *Structured Result Entry* data group (DG-11008). Definition: A description of the specific analytical principle or method used by the laboratory to perform the analyses and produce the result for the reported observation.	

5.26.3 Method for defining reference set content

The *Testing Method* data element is designed to record the specific analytical procedure that was used to complete a pathology investigation; it aligns with concepts from the top-level hierarchy *Procedure*.

The 'simple inclusion' method was used to further analyse the sub-hierarchies and identify content which conceptually matched the data element definition. The surrounding data structures were also considered, together with whether the concept was clinically relevant. Mapping forward from source data term listings was used for rudimentary gap analysis.

The table below summarises the constraints that applied to develop this reference set.

Table 65: Testing method reference set constraints

Constraint Type	Details
Inclusions	• Concepts from the *Procedure* hierarchy that describe a specific analytical procedure that may be used when performing a measurement procedure (pathology test). Where the concept included information such as the specimen or components being tested, a baseline concept that represented the core intent of the testing method was selected (e.g. 67122001 |*Acid fast stain method*|).
Exclusions	• Concepts from the *Procedure* hierarchy that related to specimen collection/handling methods or administrative procedures, as these procedures did not meet the data element definition. • Grouper concepts that are judged as not having clinical relevance are excluded. For example, 430925007 |*Measurement of substance*| is a grouper concept that is not meaningful in the pathology context.

5.26.4 Permissible values

Some examples of permissible values drawn from the *Procedure* hierarchy are listed below:

- 67047002 |*Microbial wet smear*|
- 117036006 |*Alcian blue stain method*|
- 75890000 |*High performance liquid chromatography measurement*|

5.27 Therapeutic good benefit eligibility reference set

5.27.1 Reference set definition and usage

The *Therapeutic good benefit eligibility reference set* is developed to provide terminology for the *Medical Benefit Category Type* data element which is within the *ePrescription SDT* [14] and *Prescription Request SDT* [15].

5.27.2 Binding details

This reference set is applicable across the specifications listed in Table 59 below.

Table 66: Therapeutic good benefit eligibility reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication Instruction and Action DCM [9]	Concessions Benefit data element DE: 16095 OID: 1.2.36.1.2001.1001.101.103.16095 Definition: Indicates the category of subsidy appropriate to the item being prescribed.	This reference set may be applicable for use cases outside of this specification.
ePrescription SDT [14] *Prescription Request SDT* [15]	Medical Benefit Category Type data element DE: 16095 OID: 1.2.36.1.2001.1001.101.103.16095 Definition: Indicates the category of subsidy appropriate to the item being prescribed.	This reference set may be applicable for use cases outside of this specification.

5.27.3 Method for defining reference set content

The *Therapeutic good benefit eligibility reference set* is developed using the 'simple inclusion method'.

The constraints that were applied to develop this reference set are tabulated below.

Table 67: Therapeutic good benefit eligibility reference set constraints

Constraint Type	Details
Inclusions	• All content for this reference set was specifically created in SNOMED CT-AU in response to the specification requirements. • Concepts from the *Medical benefit eligibility status* sub-hierarchy within the *Administrative value* hierarchy were included.

5.27.4 Permissible values

Some examples of permissible values:

- 32570831000036108 |*Eligible for PBS subsidy*|
- 32570861000036102 |*Not eligible for a pharmaceutical subsidy*|

5.28 Therapeutic good claim category reference set

5.28.1 Reference set definition and usage

The *Therapeutic good claim category reference set* is developed to provide terminology for the *Claim Category Type* data element within the *Dispense Record SDT* [16].

5.28.2 Binding details

This reference set is applicable across the specifications listed in Table 61 below:

Table 68: Therapeutic good claim category reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication Instruction and Action DCM [9] *Dispense Record SDT* [16]	*Claim Category Type* data element DE: 16060 OID: 1.2.36.1.2001.1001.101.103.16060 Definition: Indicates the category of pharmaceutical benefits applicable to the item being dispensed.	This reference set may be applicable for use cases outside of this specification.

5.28.3 Method for defining reference set content

The *Therapeutic good claim category reference set* is developed using the 'simple inclusion' method.

The constraints that were applied to develop this reference set are tabulated below.

Table 69: Therapeutic good claim category reference set constraints

Constraint Type	Details
Inclusions	• All content for this reference set was specifically created in SNOMED CT-AU in response to the specification requirements. • Concepts from the *Medical benefit claim category* sub-hierarchy within the *Administrative value* hierarchy were included.

5.28.4 Permissible values

Some examples of permissible values:

- 32570741000036106 |*General PBS benefit*|
- 32570781000036102 |*RPBS benefit*|

5.29 Unexpected result indicator reference set

5.29.1 Reference set definition and usage

The *Unexpected result indicator reference set* provides suitable concepts to indicate the degree of diagnostic significance associated with a pathology test result based on all the available clinical information. The decision is dependent on clinical information drawn from the patient's health record, including, but not limited to, the following information from *Pathology Result Report SDT* [8]:

- Results from other pathology tests, from both the current and previous pathology requests.
- *Clinical Reason for Request* data element (DE-11004).
- *Related Problem or Diagnosis* data element (DE-11005).
- *Reference Range* data element (DE-11024).
- *Out of Range Indicator* data element (DE-11028).

5.29.2 Binding details

This reference set is applicable across the specifications listed in the table below.

Table 70: Unexpected result indicator reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Result Report SDT [8]	*Unexpected Result Indicator* data element (DE-11027) within the *Structured Result Entry* data group (DG-11008). Definition: An indicator of the degree of diagnostic significance associated with a pathology test result based on all the available clinical information (including but not limited to the reference range).	

5.29.3 Method for defining reference set content

The *Unexpected Result Indicator* data element is used to highlight unexpected results and alert the clinician to their significance. It also provides some clinical interpretation of the result specific to the current subject of care; it aligns with concepts from the *Findings values* sub-hierarchy, which exists in the top-level hierarchy *Qualifier value*.

The 'simple inclusion' method was used to further analyse the sub-hierarchies and identify content which conceptually matched the data element definition. The surrounding data structures were also considered, together with whether the concept was clinically relevant.

The table below describes the constraints that were used in developing this reference set.

Table 71: Unexpected result indicator reference set constraints

Constraint Type	Details

Inclusions	• Concepts from the *Findings value* sub-hierarchy that can be used to describe the clinical significance of a pathology observation and conceptually match the data element definition (e.g. 371927002 |*Moderately significant*|).
	• The following sub-hierarchies have been specifically targeted:
	  o 272520006 |*Degree findings*|
	  o 276800000 |*Normality findings*|
	• Concepts from the *Finding status values* sub-hierarchy, predominately concepts from within the *Change values* sub-hierarchy that can be used to describe the clinical significance of a pathology observation and conceptually match the data element definition.

Exclusions	• Grouper concepts that are judged as not having clinical relevance. For example, 272520006 |*Degree findings*| is a grouper concept that is not meaningful in a pathology result report context. Concepts that are subsumed by the excluded grouper are still included (where suitable). • Concepts that describe the significance of a specific abnormality that are not sufficiently generic to be reusable for other results (e.g. 264916000 |*Receptor defective*|). • Concepts that do not provide a clinical interpretation of the significance of the observation value (e.g. 255511005 |*Long*|).

5.29.4 Permissible values

Some examples of permissible values drawn from the *Findings value* sub-hierarchy are listed below:

- 394845008 |*Potentially abnormal*|
- 260369004 |*Increasing*|

6 Exclusion reference sets

6.1 Australian non-human reference set

6.1.1 Reference set scope and usage

The *Australian non-human reference set* contains concepts that are generally not appropriate for use in human healthcare use cases. The majority of concepts are exclusively relevant to veterinary healthcare and are not expected to be required in eHealth implementations in clinical settings. Up until now, the *Australian non-human reference set* has only existed as an internal reference set and has not been released.

The *Australian non-human reference set* has not been developed to function as a veterinary reference set. Instead, its objective is to enable implementers to exclude content that is irrelevant or potentially clinically unsafe for use in human eHealth implementations.

This reference set has been applied to the NCTIS clinical reference sets to remove the non-human content.

6.1.2 Method for defining reference set content

Inclusion and exclusion rules for this reference set were developed following a review of the two existing non-human reference sets – the January 2012 *International non-human reference set* and the May 2012 *Australian non-human reference set*.

Where it was possible to automate these rules based on subsumption, an initial member list was produced. This was compared to the January 2012 *International non-human reference set* and any additional concepts not included were reviewed for inclusion.

This approach utilised both the 'Source data inclusion' method and the 'Simple inclusion' method for developing reference sets.

Table 72: Australian non-human reference set constraints

Constraint Type	Details
Inclusions	All concepts from the following sub-hierarchies: • *Animal disease vaccine* • *Non-human body structure* • *Non-human disorder* • *Veterinary physicians procedure AND/OR service* • *Veterinary projection* e.g. 442690000 |*Rostrocaudal projection*| • *Veterinary diagnostic product AND/OR test kit* Other concepts that were not subsumed by the above sub-hierarchies which were selected by the review process e.g. 37769006 |*Endemic abortion of ewes*| and 4156004 |*Fleece-pulling*|.

Constraint Type	Details
Exclusions	While the intent of this reference set is to support removal of non-human content which is not relevant to human health care there are some hierarchies and concepts where the distinction is less clear. Given this the concepts from the following hierarchies have been excluded: • *Organism* • *Poisoning e.g.* 123886001 |*Family primulaceae poisoning*| • *Substance* – unless the concept is a kind of Veterinary diagnostic product AND/OR test kit The following concepts were also excluded: • All concepts with descriptions using the terms, with the prefixes 'fore' or 'hind', with the body structure 'limb', 'foot' or 'digit' e.g. 116012003 |*Forelimb*| and 214046003 |*Hindfoot amputation*|, where the FSN did not explicitly state that the concept is non-human e.g. hoof/claw/fetlock/quadruped etc. • Any concepts that represent animal vocalisation such as 79470009 |*Barking*| as these vocalisations may be made by humans.

6.1.3 Permissible values

Some examples of permissible values:

- 417127006 |*Dorsal fin*|
- 107721008 |*Veterinary tumour*|

6.1.4 Future development

This reference set is subject to further development based on feedback from stakeholders and implementations, and the current work being undertaken at the International level.

7 Information model details

7.1 Emergency department information model

7.1.1 Overview

The information model as addressed by these reference sets is for the recording of presenting problems and diagnoses for patients attending emergency departments in Australia.

The reference sets and associated bindings have been defined as part of the EDRS (Emergency Department Reference sets) project undertaken in collaboration with the Department of Health and Ageing (DoHA) and endorsed by the National Emergency Department Project Advisory Committee (NEDPAC).

7.1.2 Scope

The scope of these reference sets pertain to the recording, storage and communication and exchange of information recorded during an emergency department visit.

7.1.3 Definitions

Table 73: Emergency department information model definitions

Data element	Definition
Presenting Problem	The clinical interpretation of the problem or concern that is identified by the triage clinician as the main reason for the person's non-admitted patient emergency department service episode: see *Non-admitted patient emergency department service episode—presenting problem* [11].
Diagnosis or Principal Diagnosis	The diagnosis mainly responsible for occasioning a person's non-admitted patient emergency department service episode: see *Non-admitted patient emergency department service episode—principal diagnosis* [10].

7.2 Pathology episode data group

7.2.1 Data group overview

This data group is now out of date, but the following information is retained here until further understanding of developments in the pathology area are understood.

This data group pertains to the communication and exchange of information relating to pathology result reporting from a pathology provider to a requesting clinician or other approved recipient, as stated in the *Pathology Result Report SDT* [8].

There are two purposes to this data group:

1. to provide a structured representation of the clinical information requirements associated with pathology result reporting, and
2. to enable the support of message specifications.

The *Pathology Episode* data group represents the contents of a pathology result report for a single request relating to a particular single point in time healthcare event for a patient. Further requests, as in amended requests, each occur as a new episode, however they may still relate to the original healthcare event.

7.2.2 Scope and data group identifier

The scope of this data group pertains to the communication and exchange of information pertaining to pathology result reporting from a pathology provider to a requesting clinician or other approved recipient, as stated in the *Pathology Result Report SDT* [8].

The *Pathology Episode* data group identifier is DG-11001.

7.2.3 Data group definitions

Table 74: Pathology episode data group definitions

Data group name	Definition
Result Grouping	A data group to allow related requests and results to be grouped together.
Request Detail	Details pertaining to one or more requests for pathology services.
Specimen Detail	Details of the specimen provided for pathology testing in association with a single requested test. The *Specimen Detail* data group provides important information contributing to the correct pathology testing, and subsequent result analysis and interpretation.
Result Detail	Details of a pathology test result.
Structured Result Entry	The results of a pathology test to determine an aspect of the health status of a subject of care acquired through examination of specimens, such as tissue, fluid or cells, that are able to be reported and received in a structured (atomic) format.

8 Mapping principles for reference set development

8.1 Mapping principles used in the development of the Emergency department reference sets

For the consistent mapping from the NCCH Emergency Department Termset to SNOMED CT, the following principle was applied:

- One-to-one maps from the ED Termset to SNOMED CT-AU.

  A one-to-one map means mapping one term from the ED Termset to one SNOMED CT concept. There are three types of mapping relationships: 'exact'; 'generalise'; and 'specialise'. Examples of these relationships are outlined in the following table.

Table 75: Examples of mapping relationships

Mapping relationship	Original termset	SNOMED CT-AU concept
Exact	Abrasion – ankle	211334007 |*Abrasion, ankle*|
Generalise	Abrasion – leg, shin	211333001 |*Abrasion, lower leg*|
Specialise	Abrasion – lip	262632000 |*Abrasion of intraoral surface of lip*|

Some mapping considerations were:

- One-to-one maps from SNOMED CT to ICD-10-AM (as tendered for by DoHA).
- The hierarchies used to map the source ED term to SNOMED CT concepts were initially constrained to *Clinical findings* (including disorders) and *Situation with explicit context*. The restriction to use these two hierarchies was to meet the use case requirements and definitions for *Presenting Problem* and *Principal Diagnosis* in an emergency department setting.
- The hierarchies used to map non-diagnostic terms to SNOMED CT were *Procedures* and *Events*.
- More specific mapping rules used when mapping the EDRS were as follows:
- No assumptions were made regarding the meaning of the source clinical term other than what was stated.

  This principle is similar to the practice used in the clinical classification of medical records.
- Exceptions to the abovementioned rule or clarification of meanings include:
  - Amputation – if not stated traumatic, assume it is.
  - Cancer = malignant neoplasm.
  - Tumour = neoplasm.
  - Toxicity = poisoning.
  - Blocked = obstruction.

- Terms that contained ‘or’ were mapped to the first term listed, and if no map was available for the first term listed, then the second term was mapped. For example:
  - ‘Crush injury of ankle or foot’, has been mapped to 65896005 |*Crushing injury of ankle*|; and
  - ‘Chemical burn – wrist or hand’ has been mapped to 438786003 |*Chemical burn of hand*|.
- Initially procedures and non-diagnostic terms in the ED Termset were unable to be mapped as the target concepts were restricted to the hierarchies of *Clinical findings* and *Situation with explicit context*, as previously mentioned. However, the development of the *Reasons for presenting reference set* allowed these previously unmapped terms to form the basis of the new *Emergency department reason for presenting reference set* from the *Procedures* and *Events* hierarchies.

Suspected conditions are mapped as actual conditions for the purpose of identifying required SNOMED CT concepts for the EDRS. There will be no actual map provided for the suspected conditions contained in the ED Termset; however, the SNOMED CT concepts will remain. The difficulty with recording suspected conditions using a single SNOMED CT concept is due to SNOMED CT not containing wide coverage of pre-coordinated suspected conditions.

8.2 Mapping principles used in the development of the Dose unit reference set

The principles applied for the consistent mapping from the AMT *Units of measure* hierarchy to SNOMED CT-AU were as follows:

- One-to-one equivalence map from suitable AMT *Unit of measure* hierarchy concepts to SNOMED CT-AU.
- AMT concepts where there was no equivalent SNOMED CT-AU concept were not mapped at this time.

Table 76: Examples of mapping relationships

Mapping relationship	AMT Unit of Measure hierarchy concept	SNOMED CT-AU concept
Exact	*Capsule*	428641000 |*Capsule – unit of product usage*|
Exact	*Mmol*	258718000 |*mmol*|

8.3 Mapping principles used in the development of the Medication form reference set

The principles applied for the consistent mapping from the *AMT medication form* hierarchy to SNOMED CT-AU were as follows:

- One-to-one equivalence map from suitable AMT Medication from concepts that have current relationships with a type of HAS MANUFACTURED DOSE FORM to SNOMED CT-AU.
- AMT concepts where there was no equivalent SNOMED CT-AU concept were not mapped at this time.

Table 77: Examples of mapping relationships

Mapping relationship	AMT hierarchy concept	SNOMED CT-AU concept
Exact	*Inhalation: solution*	420641004 |*Solution for inhalation*|
Exact	*Injection: intravenous infusion*	385228000 |*Intravenous infusion*|

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Appendix A Glossary

Acronym	Term	Notes
AMT	Australian Medicines Terminology	
DCM	Detailed Clinical Model	
NCCH	National Centre for Classification in Health	
NCTIS	National Clinical Terminology and Information Service	
NEDPAC	National Emergency Department Project Advisory Committee	
SDT	Structured Document Template	Sometimes referred to as a 'data specification'. See *Data Specifications and SDTs: Guide for Use* [17] for more information.