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National Clinical Terminology and Information Service

Development Approach for Reference Sets v2.0

30 November 2015

Approved for external use

Document ID: NEHTA-2183:2015

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Acknowledgements

The National E-Health Transition Authority is jointly funded by the Australian Government and all State and Territory Governments.

IHTSDO (SNOMED CT)

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Document information

Key information

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Product version history

Product version	Date	Release comments
20080829	29 Aug 2008	Initial Release
20090416	16 Apr 2009	Revised to include updated definitions and scenarios for implementation.
20091130	30 Nov 2009	Updated for SNOMED CT-AU Release 1.0
20100531	31 May 2010	Updated for SNOMED CT-AU May 2010 Release
20100731	31 Jul 2010	Publication of Emergency department reference sets
20101130	30 Nov 2010	Updated for SNOMED CT-AU November 2010 Release
20110531	31 May 2011	Updated for SNOMED CT-AU May 2011 Release
20120531	31 May 2012	Updated for SNOMED CT-AU May 2012 Release
20121130	30 Nov 2012	Updated for SNOMED CT-AU November 2012 Release
20130531	31 May 2013	Updated for SNOMED CT-AU May 2013 Release
20131130	30 Nov 2013	Updated for SNOMED CT-AU November 2013 Release
20140531	31 May 2014	Updated for SNOMED CT-AU May 2014 Release
20141130	30 Nov 2014	Updated for SNOMED CT-AU November 2014 Release
20150531	31 May 2015	Updated for SNOMED CT-AU May 2015 Release
2.0	30 Nov 2015	Updated for SNOMED CT-AU November 2015 Release. Versioning changed due to document now being published independently of the Release File Bundle.

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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 clinical terminology community of practice.

1.2 Intended audience

This document has been written for those in the clinical terminology community of practice who have a solid understanding of SNOMED CT®[1] and the Australian Medicines Terminology (AMT), including their associated concept models, scope and underlying description logic. It is also helpful in understanding the content if readers have some knowledge of clinical information models and data modelling principles.

1.3 Clinical terminology overview

Clinical terminology contributes to the improvement of healthcare through supporting the recording, display and exchange of healthcare information and the ability to deliver decision support services to healthcare providers. Healthcare consumers benefit from the use of terminology to more clearly describe and accurately record their healthcare information. The application of clinical terminology has a range of benefits, including:

- Clinical efficiency and a consistent vocabulary across all healthcare domains.
- Reduced error rates and better recording of clinical information at the required level of granularity.
- Consistent retrieval, exchange and analysis of recorded clinical information.
- Reduced risk of incorrect interpretation of clinical information.

In addition, clinical terminology supports or enables:

- Semantic interoperability between disparate clinical information systems.
- Reusability of clinical information (e.g. record once, use many times).
- Consistent representation of clinical terms.
- Machine processing of clinical information.
- Extensibility, which in turn enables the terminology to improve and evolve to meet changing needs.

[1] "SNOMED" and "SNOMED CT" are registered trademarks of the International Health Terminology Standards Development Organisation.

These benefits are major drivers for organisations to adopt terminology. However, to support the realisation of these benefits, those working to develop, integrate and maintain terminology within a healthcare software system require a comprehensive understanding of the ontology. This is not insignificant given the amount and, at times, complex nature of the information that needs to be understood. Areas of coverage include, but are not limited to, file formats, terminology components, relationship types, hierarchies, reference sets and the interaction between the terminology and the information model.

Terminology adoption requires much more than just an in-depth understanding of terminology. Various groups of skilled professionals from different backgrounds and knowledge domains are needed to support the adoption process.

1.4 Scope of this document

The scope of this document is to provide information on reference sets developed by the NCTIS. 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* (IHTSDO, 2015).

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.

1.5 Related documents

The documents listed 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.

- *NCTIS Reference Set Library* (NEHTA, 2015)
- *SNOMED CT-AU - Australian Implementation Guidance* (NEHTA, 2015)

Both documents are available on: http://www.nehta.gov.au/implementation-resources/ehealth-foundations/snomed-ct-au-common.

2 Reference sets

2.1 About reference sets

Reference sets have a diverse range of 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 clinical terminology 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 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 Reference set implementation considerations

The scope and context within which the reference set is intended to be used needs to be fully understood. This information (much of which is included in this document) is provided as part of the release documentation of any NCTIS-produced reference set. The scope and type of the reference set are key parts of the implementer's analysis, which in turn helps to ensure that the required attributes will be correctly imported.

It is **not** possible to implement reference sets in isolation. The implementation type will determine the extent of terminology data required, but reference sets will always demand the use of additional files. Reasons for this include:

- Referenced concepts have their descriptions held within the descriptions file. The descriptions file not only enables the display of concepts' terms, but also the ability to use the wide range of Synonyms required for effective search.
- The *Australian dialect reference set* holds information about the acceptability of Synonyms for use within an Australian context. Most importantly, this language reference set can be used to determine which Synonym is preferred and therefore should be the display term of a reference set member.
- Implementations are required to understand and handle the receipt of unexpected codes. This may occur when the sender or receiver has a more recent release or version of the reference set in their system. If a concept is received, but is not a member of the expected reference set, additional information can be found either in the history of the reference set or in the core terminology files.

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

- It will assist in the maintenance processes required to keep reference sets up to date (see Section 4.6 in the *SNOMED CT-AU Australian Implementation Guidance* (NEHTA, 2015)).

2.3 Categorising reference sets

The different types of reference sets and the different contexts in which they are applied are distinguished using the following categorisations.

2.3.1 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-AU release files.

Reference set implementation is described in the *SNOMED CT Technical Implementation Guide* (IHTSDO, 2015). In particular, reference set specifications (including structural reference sets) are described in detail in Chapter 5.6 "Release Format 2 - Reference Sets Guide".

2.3.2 Clinical and administrative content reference sets

Clinical and administrative content reference sets are those that serve as subsets of content. These are the reference sets that have the most relevance to clinicians.

In distinguishing between clinical content and administrative content reference sets, we further explain these as follows: [3]

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.
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 and so on; 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.

[3] The following explanations are adapted from *AS ISO 18308:2005, Health informatics – requirements for an electronic health record architecture* (Standards Australia, 2005).

2.3.3 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 about these is available on the NEHTA website at: http://www.nehta.gov.au/implementation-resources/clinical-documents/detailed-clinical-model-library. 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 re-use 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.

2.4 Reference sets published by the NCTIS

2.4.1 Overview

An approach used for the development of content reference sets 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.

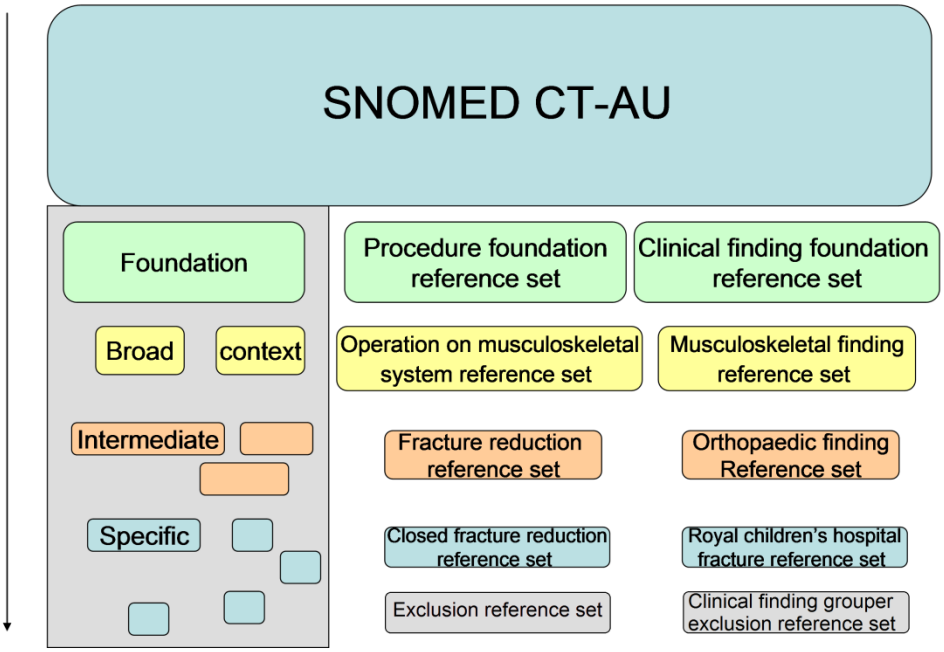

Figure 1: Reference set types

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.

2.4.2 Foundation reference sets

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

2.4.3 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.

2.4.4 Specific reference sets

Foundation, Broad context and Intermediate reference sets can be used to create reference sets for specific implementations or instances. These specific reference sets are built against specific definitions and are built to fulfil only those requirements. This means they can be:

- bound to clinical information archetype structures such as data elements; or
- built against a specific definition.

Thus specific reference sets are only ratified for their stated 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.

2.4.5 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 that certain content is not included.

Grouper exclusion reference sets are one type of these. They identify concepts which exist in the terminology to serve as aggregators but are of little clinical use. For example, the concept 249565005 |*Liver finding*| aggregates all clinical findings related to the liver. These aggregating concepts, commonly known as "Groupers", can be used as navigational concepts in clinical interfaces. While these can be useful when designing a user interface, most clinical end-users report that the presence of such concepts in fields (such as pick-lists) is distracting and clinically irrelevant. The identification of groupers is anticipated to be a useful tool so that they can be excluded in contexts where they may not be desirable, such as in end-user implementations that focus on entering health details about a patient.

2.4.6 Australian Medicines Terminology product reference sets

Australian Medicines Terminology (AMT) product reference sets provide subsets of AMT content. Each reference set is defined by concepts of a particular product type, and each product type correlates with one of the seven notable concepts defined by the AMT v3 model.[4]

2.4.7 Concrete domain reference sets

Concrete domain reference sets were developed to support the defining of numeric medication attributes. More formally, they allow for the association of a concrete (numeric) value with a component.

[4] The AMT v3 model diagram can be found in Section 2.3 of the *AMT v3 Technical Implementation Guide* (NEHTA, 2014).

AMT v3 represents the first use of reference sets of this pattern. This pattern is currently not part of the published SNOMED CT RF2 specifications, but is being considered for inclusion by the IHTSDO. If the concrete domain reference set pattern is not included in a subsequent version of the SNOMED CT RF2 specifications, the pattern will continue to be supported as an Australian extension of the RF2 specifications.

Further details on these reference sets is provided in the *AMT v3 Technical Implementation Guide* (NEHTA, 2014).

2.4.8 Mapping reference sets

Mapping reference sets allow relationships to be represented between code systems. At their simplest, mapping reference sets represent one-to-one relationships. Each of these relationships may state that a code in a source system is equivalent to a code in a target system. More complex representations are possible, such as one-to-many or many-to-one relationships; these are defined by the reference set pattern. See Section 2.5 for details.

2.4.9 Third party reference sets

The NCTIS provides a service to host and release reference sets developed and owned by licence holders. Concise summaries of these reference sets are available in the *NCTIS Reference Set Library* as part of the SNOMED CT-AU release. Detailed development information is not included in this document; however licence holders can be contacted for further information.

2.5 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*.

2.6 Methods for developing reference sets

The NCTIS is defining and refining various manual and automated methods for developing reference sets. In making the development approach more automated and transparent, our aim is to ensure that our methods in identifying content are always understandable, reproducible and useful to the clinical terminology 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.

2.6.1 Source data mapping method

This method determines suitable concepts on the basis of an existing value set, codeset or list of terms. The process involves mapping the source data to SNOMED CT-AU 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-AU concepts, which cover clinical or administrative content.

2.6.2 Source data inclusion method

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

2.6.3 Source data exclusion method

For example the *Clinical finding grouper exclusion reference set* is designed to exclude *Clinical finding* concepts that are not considered suitable for recording the findings, symptoms and disorders within a patient record. It functions as a means to further constrain any reference set built using the *Clinical finding* hierarchy.

2.6.4 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 concept models 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.

2.6.5 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-AU core files (tables) 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.

2.6.6 Simple inclusion method

This method is largely a manual method, though a dedicated software 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 that 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 or 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 expansive (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.

The key requirement for the development of content is that content must contain only concepts with active statuses.

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

3.4 Examples of permissible values

Table 1: 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 developments

Future development for these Foundation reference sets includes the development of a Foundation reference set for the *Pharmaceutical/biologic product* hierarchy (release date to be determined).

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 specific clinical settings 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 or binding but it is important to note that they can be used as they are, without any bindings. They may also be 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 Examples of permissible values

Table 2: 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 Specific reference sets

5.1 Adverse reaction agent reference set

5.1.1 Reference set definition and usage

The *Adverse reaction agent reference set* provides terminology to support the recording of the most common agents that may be responsible for causing adverse reactions.

This reference set aims to describe the range of agents (both medicinal and non-medicinal) that may be required when documenting an adverse reaction regardless of the specific pathological mechanism of the reaction. That is, no implication shall be made that the agent is associated with either an allergy, a pseudo-allergy or an intolerance. Such distinction is most often episode-specific, and is to be determined by the person recording the reaction.

5.1.2 Binding details

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

Table 3: Adverse reaction agent reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Adverse Reaction DCM (NEHTA, 2011)	*Substance/Agent* data element DE: 15521 OID: 1.2.36.1.2001.1001.101.103.15521 Definition: Identification of a substance, agent, or a class of substance that is considered to be responsible for the adverse reaction.	This reference set may be applicable for use cases outside of this specification.

5.1.3 Method for defining reference set content

The *Adverse reaction agent reference set* was developed by the source data mapping method. The original list of data sources came from multiple jurisdictions, which were collated and then subjected to pre-determined review criteria. Reviews were conducted by collaborating with jurisdictions and other stakeholders.

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

Table 4: Adverse reaction agent reference set constraints

Constraint Type	Details
Inclusions	• The majority of reference set content was sourced from the *Substance* hierarchy. • A very small number of members came from the *Pharmaceutical/biological product* hierarchy and the *Physical object* hierarchy.

Constraint Type	Details
Exclusions	• Trade products • Brand names of medications • Organisms

The *Adverse reaction agent reference set* is intended to function as a way of constraining the terminology to record the common agents responsible for causing an adverse reaction. It is not intended to be an exhaustive list. This reference set can be used in conjunction with the following reference sets to get the desired coverage:

From **SNOMED CT-AU:**

- 32570211000036100 |*Substance foundation reference set*|

From the **AMT:**

- 929360061000036106 |*Medicinal product reference set*|
- 929360081000036101 |*Medicinal product pack reference set*|
- 929360071000036103 |*Medicinal product unit of use reference set*|
- 929360021000036102 |*Trade product reference set*|
- 929360041000036105 |*Trade product pack reference set*|
- 929360031000036100 |*Trade product unit of use reference set*|
- 929360051000036108 |*Containered trade product pack reference set*|

5.1.4 Examples of permissible values

- 373529000 |*Morphine*|
- 227150003 |*Mussels*|

5.1.5 Acknowledgements

This reference set is the result of a collaborative development process between NEHTA and the following organisations, which we would like to acknowledge for their contributions:

- Queensland Department of Health
- St Vincent's Hospital Sydney
- ACT Government Health Directorate
- Victoria Department of Health
- Western Australia Department of Health
- Therapeutic Goods Administration
- Northern Territory Department of Health
- South Australia Health
- Sydney Adventist Hospital
- Healthshare NSW
- Healthcare Software

5.1.6 Future developments

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

5.2 Adverse reaction type reference set

5.2.1 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.

5.2.2 Binding details

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

Table 5: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Adverse Reaction DCM (NEHTA, 2011)	*Reaction Type* data element DE: 15554 OID: 1.2.36.1.2001.1001.101.103.15554 Definition: The type of reaction as determined by the clinician.	None

5.2.3 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 6: 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*|

5.2.4 Examples of permissible values

- 12263007 |*Hypersensitivity reaction type I*|
- 404204005 |*Drug interaction with drug*|
- 235719002 |*Food intolerance*|

5.2.5 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 7: Adverse reaction type reference set change history

Release	Changes
20150531	Addition of two new members and the retirement of four members. The Preferred Terms for two of the members were also updated. These changes were made in response to feedback from the NEHTA Clinical Governance unit.

5.3 Anatomical location name reference set

5.3.1 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, for example, 71854001 |*Colon structure*| and 302508007 |*Entire colon*|. The model defines "structure" concepts as "entire" concepts or "part of entire" concepts.[5] Therefore when selecting a concept for use, this must be kept in mind.

Essentially, this means when selecting a concept that 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] That is, in the context of *Body structure* concepts, "structure" and "entire" concepts are different. The structure of an organ is different from the organ in its entirety. However, in the context of "structure" concepts, it is meaningful to distinguish an entire structure from a part of an entire structure.

5.3.2 Binding details

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

Table 8: Anatomical location name reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Problem/Diagnosis DCM (NEHTA, 2011) *Adverse Reaction DCM* (NEHTA, 2011) *Imaging Examination Result DCM* (NEHTA, 2011) *Pathology Test Result DCM* (NEHTA, 2011) *Procedure DCM* (NEHTA, 2011)	*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.

5.3.3 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 consist of the information that represents the laterality of body structures.

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

Table 9: 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 whose descriptions 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*|.

5.3.4 Examples of permissible values

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

5.4 Anatomical site reference set

5.4.1 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, for example, 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 that 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.

5.4.2 Binding details

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

Table 10: Anatomical site reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Result Report SDT (NEHTA, 2009)	*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.

5.4.3 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 and exclusion methods.

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

Table 11: 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.

5.4.4 Examples of permissible values

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

5.4.5 Change history

Reference sets included in 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 12: Anatomical site reference set change history

Release	Changes
20130531	• The 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. • The Synonym description was changed from *Specimen anatomical site reference set* to *Anatomical site reference set* to reflect its wide range of uses. • 4764 concepts were retired from the reference set as a result of the newly defined constraints. • 127 concepts were added to the reference set as a result of the newly defined constraints.

5.5 Change status reference set

5.5.1 Reference set definition and usage

The *Change status reference set* provides terminology to identify whether a change has already been made or is a recommendation which has not been made.

5.5.2 Binding details

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

Table 13: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication Instruction and Action DCM (NEHTA, 2013)	*Change Type* data element DE: 16595 OID: 1.2.36.1.2001.1001.101.103.16595 Definition: Identifies whether the change has already been made or is a recommendation which has not been made.	This reference set may be applicable for use cases outside this specification.

5.5.3 Method for defining reference set content

The *Change status 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.

5.5.4 Examples of permissible values

- 703466009 |*Change recommended*|
- 703465008 |*Change made*|

5.6 Change type reference set

5.6.1 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.

5.6.2 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
Medication Instruction and Action DCM (NEHTA, 2013)	*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.

5.6.3 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.

5.6.4 Examples of permissible values

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

5.6.5 Change history

As a result of the collaboration between Queensland Health Medication Safety Unit and NEHTA's Clinical Information team on the harmonisation 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 15: Change type reference set values

Old values (Description ID)	New values (Description ID)
387931011 |*No change*|	494211000036112 |*Unchanged*|
391978017 |*Changed*|	494191000036113 |*Changed*|
1479858012 |*Ended*|	2995067019 |*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* (created as a child of 410523001 |*Post-starting action status*|) has now been created to support this.

Table 16: Change type reference set change history

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

5.7 Clinical manifestation reference set

5.7.1 Reference set definition and usage

The *Clinical manifestation reference set* provides terminology to support the recording of common clinical manifestations of adverse reactions within healthcare settings within Australia.

5.7.2 Binding details

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

Table 17: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Adverse Reaction DCM (NEHTA, 2011)	*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.	None.

5.7.3 Method for defining reference set content

The *Clinical manifestation reference set* was developed by the source data mapping method. The original list of data sources came from multiple jurisdictions, which were collated and then subjected to pre-determined review criteria. Reviews were conducted by collaborating with jurisdictions and other stakeholders.

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

Table 18: Clinical Manifestation reference set constraints

Constraint Type	Details
Inclusions	• Reference set content was sourced from the *Clinical finding foundation reference set*. • Concepts that describe different types of rashes shall be included. • Concepts that describe specific electrolyte and liver function tests shall be included.
Exclusions	• Concepts shall not contain more than one manifestation type unless considered clinically relevant. • Concepts shall be void of causative agent information. • Concepts shall be void of severity information. • Concepts not attributable to an adverse reaction shall be excluded. • Concepts that exist in combination with body sites shall be excluded unless considered clinically relevant.

5.7.4 Examples of permissible values

- 267038008 |*Oedema*|
- 62315008 |*Diarrhoea*|
- 422587007 |*Nausea*|

5.7.5 Acknowledgements

This reference set is the result of a collaborative development process between NEHTA and the following organisations, which we would like to acknowledge for their contributions:

- Queensland Department of Health
- St Vincent's Hospital Sydney
- ACT Government Health Directorate
- Victoria Department of Health
- Western Australia Department of Health
- Therapeutic Goods Administration
- Northern Territory Department of Health
- South Australia Health
- Sydney Adventist Hospital
- Healthshare NSW
- Healthcare Software

5.7.6 Future developments

- Terms requested by stakeholders that are currently not available in SNOMED CT-AU are to be reviewed for addition to this reference set.
- The *Clinical manifestation reference set* is subject to further development based on feedback from future implementations.

5.8 Collection procedure reference set

5.8.1 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.

5.8.2 Binding details

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

Table 19: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM (NEHTA, 2011)	*Collection Procedure* data element 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.

5.8.3 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 20: 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 (for example, 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 (for example, 178264009 |*Biopsy of neuromuscular junction*|).

5.8.4 Examples of permissible values

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

5.9 Dose based prescribing dose form reference set

5.9.1 Reference set definition and usage

The *Dose based prescribing dose form reference set* provides terminology to support the recording of dose forms for dose based prescribing.

While this reference set was developed with a focus of dose based prescribing, this does not preclude it being used for any prescribing (including pack based prescribing) as there is likely to be a large area of overlap.

5.9.2 Binding details

This reference set is not bound to any specifications.

5.9.3 Method for defining reference set content

The *Dose based prescribing dose form reference set* was developed by the source data mapping method. The original list of data sources came from controlled lists from various regulatory authorities including the TGA and the FDA, as well as the AMT, SNOMED CT-AU, and jurisdictional source data. Reviews were conducted by collaborating with jurisdictions and other stakeholders from the community of practice. Some new dose form concepts were added to SNOMED CT-AU to address identified gaps. The Preferred Terms for existing concepts were also reviewed for consistency and appropriateness, and revised accordingly.

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

Table 21: Dose based prescribing dose form reference set constraints

Constraint Type	Details
Inclusions	• Reference set content was sourced from the *Type of drug preparation* sub-hierarchy of the *Qualifier* hierarchy.
Exclusions	• Concepts that are deemed to be too general or too specific or not appropriate for dose based prescribing were excluded. • Concepts are void of specific sites and routes except eyes, ears or nose. • Concepts are void of qualifiers (such as film-coated or sugar coated) except where relevant to prescribing (for example, modified release, fatty, or enteric). • Concepts are void of multiple sites (for example, ear/eye ointment).

5.9.4 Examples of permissible values

- 385099005 |*Cream*|
- 385054002 |*Modified-release capsule*|

5.9.5 Future development

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

5.10 Dose based prescribing dose frequency and interval reference set

5.10.1 Reference set definition and usage

The *Dose based prescribing dose frequency and interval reference set* provides terminology to support the recording of dose frequencies and dose intervals for dose based prescribing.

While this reference set was developed with a focus of dose based prescribing, this does not preclude it being used for any prescribing (including pack based prescribing) as there is likely to be a large area of overlap.

5.10.2 Binding details

This reference set is not bound to any specifications.

5.10.3 Method for defining reference set content

The *Dose based prescribing dose frequency and interval reference set* was developed by the source data mapping method. The original list of data sources came from controlled lists from various regulatory authorities including the TGA and the FDA, as well as the AMT, SNOMED CT-AU, and jurisdictional source data. Reviews were conducted by collaborating with jurisdictions and other stakeholders from the community of practice. Some new frequency and interval concepts were added to SNOMED CT-AU to address identified gaps. The Preferred Terms for existing concepts were also reviewed for consistency and appropriateness, and revised accordingly.

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

Table 22: Dose based prescribing dose frequency and interval reference set constraints

Constraint Type	Details
Inclusions	• Reference set content was sourced from the *Qualifier* hierarchy.
Exclusions	• Concepts are void of non-specific intervals and frequencies (such as "every 4-6 hours" or "2-3 times per day"). • Concepts are void of qualifiers (for example, "with food" or "30 minutes after food"). • Concepts that are considered to be ambiguous have been excluded.

5.10.4 Examples of permissible values

- 69620002 |*Daily*|
- 307468000 |*Every 6 hours*|

5.10.5 Future development

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

Some excluded concepts that add qualifying information for frequencies are expected to be included in a separate reference set.

5.11 Dose based prescribing route of administration reference set

5.11.1 Reference set definition and usage

The *Dose based prescribing route of administration reference set* provides terminology to support the recording of the route by which a medication is administered for dose based prescribing.

While this reference set was developed with a focus of dose based prescribing, this does not preclude it being used for any prescribing (including pack based prescribing) as there is likely to be a large area of overlap.

5.11.2 Binding details

This reference set is not bound to any specifications.

5.11.3 Method for defining reference set content

The *Dose based prescribing route of administration reference set* was developed by the source data mapping method. The original list of data sources came from controlled lists from various regulatory authorities including the TGA and the FDA, as well as the AMT, SNOMED CT-AU, and jurisdictional source data. Reviews were conducted by collaborating with jurisdictions and other stakeholders from the community of practice. Some new route of administration concepts were added to SNOMED CT-AU to address identified gaps. The Preferred Terms for existing concepts were also reviewed for consistency and appropriateness, and revised accordingly.

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

Table 23: Dose based prescribing route of administration reference set constraints

Constraint Type	Details
Inclusions	• Reference set content was sourced from the *Route of administration value* sub-hierarchy of the *Qualifier* hierarchy
Exclusions	• Concepts that are deemed to be too general or too specific or not appropriate for dose based prescribing have been excluded. • Concepts are void of specific sites except eyes, ears or nose. • Concepts are void of laterality except eye, ear and nose sites. • Concepts do not contain multiple routes.

5.11.4 Examples of permissible values

- 47625008 |*Intravenous route*|
- 26643006 |*Oral route*|

5.11.5 Future development

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

5.12 Dose unit reference set

5.12.1 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* (NEHTA, 2013).

5.12.2 Binding details

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

Table 24: Dose unit reference set bindings

Detailed Clinical Models or Specifications	Details	Considerations
Medication Instruction and Action DCM (NEHTA, 2013) *Adverse Reaction DCM* (NEHTA, 2011)	*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.

5.12.3 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 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 mapping rules for this reference set is available in Section 11.2 of this document.

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

Table 25: 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.

5.12.4 Examples of permissible values

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

5.12.5 Future development

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

5.13 Emergency department reference set

5.13.1 Reference set definition and usage

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

This reference set is a superset of the Emergency department reference set (EDRS) suite, and therefore contains all of the members of the EDRS suite. The EDRS suite is comprised of the following reference sets:

- *Emergency department diagnosis in presenting problem reference set*
- *Emergency department diagnosis reference set*
- *Emergency department findings in presenting problem reference set*
- *Emergency department reason for presenting reference set.*

This reference set has been developed to assist implementers in providing a wide range of clinically relevant terms that are required for the capture of presenting problem and diagnosis information.

Feedback has shown that the partitions between the reference sets in the EDRS suite are not well-suited to clinical use and while secondary data requirements for reporting have been a driver for their previous development, the main purpose of the use of terminology should remain for clinical use. For this reason, the definition of the combined superset may be more applicable for use at the clinical level, while the partitioned suite remains linked to reporting.

Some of this feedback included requests for concepts to be added to particular Emergency department reference sets which were already available in the other reference sets. This phenomenon highlighted the overlapping content for the various fields in which the EDRS suite was being used.

5.13.2 Binding details

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

Table 26: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Emergency department information systems	*Emergency Department Stay-Principal Diagnosis, Code [X(9)]* data element. Definition: The diagnosis established at the conclusion of the patient's attendance in an emergency department to be mainly responsible for occasioning the attendance following consideration of clinical assessment, as represented by a code: see *Emergency department stay—principal diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).	Further information about the Emergency department information model is available in Section 10.1 of this document.
Emergency department information systems	*Emergency Department Stay-Additional Diagnosis, Code [X(9)]* data element. Definition: The condition or complaint coexisting with the emergency department principal diagnosis during a patient's attendance to the emergency department, as represented by a code: see *Emergency department stay—additional diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).	Further information about the Emergency department information model is available in Section 10.1 of this document.

5.13.3 Method for defining reference set content

The *Emergency Department reference set* provides terminology to support the recording of presenting problems and diagnoses within Emergency department settings within Australia.

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

Table 27: Emergency department reference set constraints

Constraint Type	Details
Inclusions	Members of the following reference sets: • *Emergency department diagnosis in presenting problem reference set* • *Emergency department diagnosis reference set* • *Emergency department findings in presenting problem reference set* • *Emergency department reason for presenting reference set*

5.13.4 Examples of permissible values

- 410429000 |*Cardiac arrest*|
- 359820003 |*Closed fracture of neck of femur*|

5.14 Emergency department diagnosis reference set

5.14.1 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.

5.14.2 Binding details

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

Table 28: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Emergency department information systems	*Emergency Department Stay-Principal Diagnosis, Code [X(9)]* data element. Definition: The diagnosis established at the conclusion of the patient's attendance in an emergency department to be mainly responsible for occasioning the attendance following consideration of clinical assessment, as represented by a code: see *Emergency department stay—principal diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).	Further information about the Emergency department information model is available in Section 10.1 of this document.

Detailed Clinical Model or Specification	Details	Considerations
Emergency department information systems	*Emergency Department Stay-Additional Diagnosis, Code [X(9)]* data element. Definition: The condition or complaint coexisting with the emergency department principal diagnosis during a patient's attendance to the emergency department, as represented by a code: see *Emergency department stay—additional diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).	Further information about the Emergency department information model is available in Section 10.1 of this document.

5.14.3 Method for defining reference set content

The *Emergency department diagnosis reference set* was initially 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 mapping rules for this reference set is available in Section 11.1 of this document.

More concepts were later added, again using the simple inclusion method, as a result of identification of concepts that are clinically relevant for use in Emergency care and requested by current implementers of the reference set.

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

Table 29: 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 other relevant hierarchies were included after review based upon requests from stakeholders.

5.14.4 Examples of permissible values

These examples are drawn from the *Clinical finding* hierarchy.

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

5.14.5 Change history

Reference sets included in 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 30: Additional development work

Release	Changes
20110531	Concept additions based upon requests from the National Emergency Department Project Advisory Committee (NEDPAC).
20140531	Concept additions based upon requests by clinical users and implementers.

5.15 Emergency department diagnosis in presenting problem reference set

5.15.1 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.

5.15.2 Binding details

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

Table 31: Emergency department diagnosis in presenting problem reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Emergency department information systems	*Emergency Department Stay-Principal Diagnosis, Code [X(9)]* data element Definition: The diagnosis established at the conclusion of the patient's attendance in an emergency department to be mainly responsible for occasioning the attendance following consideration of clinical assessment, as represented by a code: see *Emergency department stay—principal diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).	Further information about the Emergency department information model is available in Section 10.1 of this document.
Emergency department information systems	*Emergency Department Stay-Additional Diagnosis, Code [X(9)]* data element. Definition: The condition or complaint coexisting with the emergency department principal diagnosis during a patient's attendance to the emergency department, as represented by a code: see *Emergency department stay—additional diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).	Further information about the Emergency department information model is available in Section 10.1 of this document.

5.15.3 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 mapping rules for this reference set is available in Section 11.1 of this document.

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

Table 32: 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.

5.15.4 Examples of permissible values

These examples are drawn from the *Disease* hierarchy.

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

5.15.5 Change history

Reference sets included in 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 33: Additional development work

Release	Changes
20110531	25 concept additions based upon requests from NEDPAC.

5.16 Emergency department findings in presenting problem reference set

5.16.1 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.

5.16.2 Binding details

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

Table 34: Emergency department findings in presenting problem reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Emergency department information systems	*Emergency Department Stay-Principal Diagnosis, Code [X(9)]* data element Definition: The diagnosis established at the conclusion of the patient's attendance in an emergency department to be mainly responsible for occasioning the attendance following consideration of clinical assessment, as represented by a code: see *Emergency department stay—principal diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).	Further information about the Emergency department information model is available in Section 10.1 of this document.
Emergency department information systems	*Emergency Department Stay-Additional Diagnosis, Code [X(9)]* data element. Definition: The condition or complaint coexisting with the emergency department principal diagnosis during a patient's attendance to the emergency department, as represented by a code: see *Emergency department stay—additional diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).	Further information about the Emergency department information model is available in Section 10.1 of this document.

5.16.3 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 mapping rules for this reference set is available in Section 11.1 of this document.

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

Table 35: 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.

Constraint Type	Details
Exclusions	Mapped concepts from the *Disease* sub-hierarchy were excluded because they were identified as content for a separate reference set.

5.16.4 Examples of permissible values

These examples are drawn from the *Clinical finding* hierarchy.

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

5.16.5 Change history

Reference sets included in 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 36: Additional maintenance work

Release	Changes
20110531	Concept additions based upon requests from NEDPAC.

5.17 Emergency department reason for presenting reference set

5.17.1 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.

5.17.2 Binding details

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

Table 37: Emergency department reason for presenting reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Emergency department information systems	*Emergency Department Stay-Principal Diagnosis, Code [X(9)]* data element Definition: The diagnosis established at the conclusion of the patient's attendance in an emergency department to be mainly responsible for occasioning the attendance following consideration of clinical assessment, as represented by a code: see *Emergency department stay—principal diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).	Further information about the Emergency department information model is available in Section 10.1 of this document.
Emergency department information systems	Emergency Department Stay-Additional Diagnosis, Code [X(9)] data element. Definition: The condition or complaint coexisting with the emergency department principal diagnosis during a patient's attendance to the emergency department, as represented by a code: see *Emergency department stay—additional diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).	Further information about the Emergency department information model is available in Section 10.1 of this document.

5.17.3 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 mapping rules for this reference set is available in Section 11.1 of this document.

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

Table 38: 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.

5.17.4 Examples of permissible values

These examples are drawn from the *Procedure* hierarchy.

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

5.17.5 Change history

Reference sets included in 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 39: Additional development work

Release	Changes
20110531	25 concept additions based upon requests from NEDPAC.

5.18 Exclusion statement reference set

5.18.1 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.

5.18.2 Binding details

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

Table 40: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Adverse Reaction DCM (NEHTA, 2011) *Medication Instruction and Action DCM* (NEHTA, 2013) *Problem/Diagnosis DCM* (NEHTA, 2011) *Procedure DCM* (NEHTA, 2011)	*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.	None.

5.18.3 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.

5.18.4 Examples of permissible values

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

5.18.5 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.

5.19 Laterality reference set

5.19.1 Reference set definition and usage

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

5.19.2 Binding details

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

Table 41: Laterality reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Problem/Diagnosis DCM (NEHTA, 2011) *Adverse Reaction DCM* (NEHTA, 2011) *Imaging Examination Result DCM* (NEHTA, 2011) *Pathology Test Result DCM* (NEHTA, 2011) *Procedure DCM* (NEHTA, 2011)	*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.

5.19.3 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 42: 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.

5.19.4 Examples of permissible values

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

5.20 Medication form reference set

5.20.1 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* (NEHTA, 2013).

5.20.2 Binding details

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

Table 43: Medication form reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication Instruction and Action DCM (NEHTA, 2013)	*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.

5.20.3 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 AMT *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 mapping rules for this reference set is available in Section 11.2 of this document.

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

Table 44: 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.

5.20.4 Examples of permissible values

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

5.21 Non-medicinal adverse reaction agent reference set

5.21.1 Reference set definition and usage

The *Non-medicinal adverse reaction agent reference set* provides terminology to support the recording of non-medicinal agents that may be responsible for causing adverse reactions.

This reference set aims to describe the range of non-medicinal agents that may be required when documenting an adverse reaction regardless of the specific pathological mechanism of the reaction. That is, no implication shall be made that the agent is associated with either an allergy, a pseudo-allergy or an intolerance. Such distinction is most often episode-specific, and is to be determined by the person recording the reaction.

5.21.2 Binding details

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

Table 45: Non-medicinal adverse reaction agent reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Adverse Reaction DCM (NEHTA, 2011)	*Substance/Agent* data element DE: 15521 OID: 1.2.36.1.2001.1001.101.103.15521 Definition: Identification of a substance, agent, or a class of substance that is considered to be responsible for the adverse reaction.	This reference set may be applicable for use cases outside of this specification.

5.21.3 Method for defining reference set content

The *Non-medicinal adverse reaction agent reference set* was developed using the simple inclusion and exclusion method.

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

Table 46: Non-medicinal adverse reaction agent reference set constraints

Constraint Type	Details
Inclusions	• Concepts from the *Adverse reaction agent reference set* were included. • Further concepts from the *Substance* hierarchy were included.
Exclusions	• Concepts that do not belong to the *Substance* hierarchy were excluded. • Concepts representing medicinal substances were excluded. • Concepts which represent detail which is more specific than required were excluded.

5.21.4 Examples of permissible values

- 256443002 |*Egg white*|
- 256307007 |*Banana*|
- 256349002 |*Peanut*|

5.21.5 Future development

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

5.22 Out of range indicator reference set

5.22.1 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 (that is, 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.

5.22.2 Binding details

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

Table 47: Out of range indicator reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM (NEHTA, 2011)	*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 (NEHTA, 2009)[6]	*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.	None.

5.22.3 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 that 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 48: 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 (for example, 281302008 |*Above reference range*|).
	• All current inclusions are descendants of the following two concepts:
	  ○ 281298000 |*Reference range comments*|
	  ○ 281299008 |*Therapeutic range comments*|

[6] SDT = "Structured Document Template".

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 (for example, 373065002 |*Z-score*|).

5.22.4 Examples of permissible values

These examples are drawn from the *Results comments* sub-hierarchy.

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

5.22.5 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.

5.23 Problem/Diagnosis reference set

5.23.1 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.

5.23.2 Binding details

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

Table 49: Problem/Diagnosis reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Problem/Diagnosis DCM (NEHTA, 2011)	*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.

5.23.3 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 50: 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* • *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 clinical state 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-hierarchies of the *Situation with explicit context hierarchy*: • *Unilateral clinical finding* • *Suspected child abuse*

Constraint Type	Details
Exclusions	Content from the following sub-hierarchies of the *Clinical finding foundation reference set*: • *Administrative statuses* sub-hierarchy • *Clinical stage finding* sub-hierarchy

5.23.4 Examples of permissible values

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

5.24 Related item relationship type reference set

5.24.1 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 (for example, diagnosis or procedure) has with the problem or diagnosis being recorded.

5.24.2 Binding details

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

Table 51: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Problem/Diagnosis DCM (NEHTA, 2011)	*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.

5.24.3 Method for defining reference set content

The values and definitions provided in the *Problem/Diagnosis DCM* (NEHTA, 2011) that have been used as a data source and requirement for this development process are shown in the table below.

Table 52: DCM values and definitions

Example value	Definition
Caused by	This identifies the direct cause or causative agent of a Problem/Diagnosis event 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.

Example value	Definition
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[7] is shown below. It lists the applicable attributes, their definition and the concept types that are applicable for the related item as per the concept model rules.

Table 53: 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.

[7] As per the January 2011 release of the *SNOMED CT User Guide* (IHTSDO, 2011), which has been replaced by the *SNOMED CT Starter Guide* (IHTSDO, 2014).

Table 54: 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 inferences should be made:

- Problems/diagnoses that have a relationship type of "caused by" and are related to organisms, substances, physical forces, physical objects and AMT products, should be inferred to correspond to the CAUSATIVE AGENT attribute.
- Problems/diagnoses that have a relationship type of "caused by" and are related to clinical findings and procedures, 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; constraints are listed below.

Table 55: 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*|

5.24.4 Examples of permissible values

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

5.25 Relationship to subject of care reference set

5.25.1 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.

5.25.2 Binding details

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

Table 56: Relationship to subject of care reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Participation Data Specification (NEHTA, 2011)[8]	*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).	None.

5.25.3 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 that conceptually matches the reference set definition.

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

Table 57: 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 medico-legal and privacy implications, for example, *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 within 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.

[8] A "data specification" in this context is equivalent to a structured document template.

5.25.4 Examples of permissible values

- 394859001 |*Maternal grandmother*|
- 45929001 |*Half-brother*|

5.25.5 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*.

5.26 Request test name reference set

5.26.1 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*.

5.26.2 Binding details

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

Table 58: Request test name reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Result Report SDT (NEHTA, 2009)	*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.	None.

5.26.3 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 59: Identification of baseline concept for test procedures (illustration)

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 60: 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 (for example, 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 or the specimen qualifier (for example, 104935006 |*Sodium measurement, urine*|). This additional information is captured by other pathology reference sets.

5.26.4 Examples of permissible values

These examples are drawn from the *Procedure* hierarchy.

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

5.27 Result test name reference set

5.27.1 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.

5.27.2 Binding details

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

Table 61: Result test name reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Result Report SDT (NEHTA, 2009)	*Result Test Name* data element (DE-11031) within the *Result Detail* data group (DG-11007).	None.

	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.

5.27.3 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 in 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 62: 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 63: 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 (for example, 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 or the specimen qualifier as the additional information is captured by other pathology reference sets (for example, 104935006 |*Sodium measurement, urine*|).

5.27.4 Examples of permissible values

These examples are drawn from the *Procedure* hierarchy.

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

5.28 Route of administration reference set

5.28.1 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.

5.28.2 Binding details

This reference set is bound to the *Route* data element in the *Medication Administration* cluster within the *Medication Instruction and Action DCM* (NEHTA, 2013).

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

Table 64: Route of administration reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication Instruction and Action DCM (NEHTA, 2013) *Adverse Reaction DCM* (NEHTA, 2011)	*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.

5.28.3 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 65: 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*.

5.28.4 Examples of permissible values

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

5.29 Sex reference set

5.29.1 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.

5.29.2 Binding details

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

Table 66: Sex reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Participation Data Specification (NEHTA, 2011)	*Sex* data element DE: 20107 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.

5.29.3 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 67: 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, for example, one male and one female baby.

5.29.4 Examples of permissible values

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

5.30 Specimen characteristic reference set

5.30.1 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.

5.30.2 Binding details

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

Table 68: Specimen characteristic reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM (NEHTA, 2011)	*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 (NEHTA, 2009)	*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 the *Specimen Quality* data element.	None.

5.30.3 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 that 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 69: 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 (for example, 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.

5.30.4 Examples of permissible values

These examples are drawn from the *Evaluation finding* sub-hierarchy.

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

5.31 Specimen qualifier reference set

5.31.1 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.

5.31.2 Binding details

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

Table 70: Specimen qualifier reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Result Report SDT (NEHTA, 2009)	*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.	None.

5.31.3 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 and 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 that 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 71: 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:
	  ○ normal stages of human development or physiological processes (for example, 307429007 |*After menopause*|, 255407002 |*Neonatal*|); or
	  ○ a temporal relationship to some clinical event or procedure that that is relevant to the pathology investigation (for example, 115500004 |*Post-dialysis*|, 255242001 |*1 hour post-dose*|).
	• Concepts that describe temporal aspects that allow the specimen to be fully defined (for example, 123027009 |*24 hours*|).
	• Concepts used to differentiate multiple specimens (of the same specimen type) within a single pathology episode (for example, 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 do not conceptually match the definition of the data element.

5.31.4 Examples of permissible values

These examples are drawn from the *Qualifier value* hierarchy.

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

5.31.5 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 (for example, fasting, a commonly used qualifier, is absent). These issues will be addressed through the IHTSDO request submission process where appropriate.

5.32 Specimen quality reference set

5.32.1 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.

5.32.2 Binding details

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

Table 72: Specimen quality reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM (NEHTA, 2011)	*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 (NEHTA, 2009)	*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.	None.

5.32.3 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 within the *Clinical finding* hierarchy.

The simple inclusion method was used to further analyse the sub-hierarchies and identify content that 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 73: 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 (for example, 125152006 |*Specimen satisfactory for evaluation*|).
Exclusions	• Concepts that include information on the characteristics of a specimen, as this information is collected in the *Specimen Characteristic* data element. • Concepts that do not provide a clinical interpretation of the specimen's suitability for pathology testing (for example, 397314005 |*Integrity of specimen unknown*|).

5.32.4 Examples of permissible values

These examples are drawn from the *Evaluation finding* sub-hierarchy.

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

5.33 Specimen type reference set

5.33.1 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.

5.33.2 Binding details

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

Table 74: Specimen type reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM (NEHTA, 2011)	*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 (NEHTA, 2009)	*Specimen Type* data element (DE-11008) within the *Specimen Detail* data group (DG-11005).	None.

	Definition: The categorisation of the sample collected or tested in a pathology investigation in relation to the subject of care.

5.33.3 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 or 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 that 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 75: 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 (for example, 119297000 |*Blood specimen*|). • A specimen that has been refined or modified from material collected from the subject of care (for example, 119364003 |*Serum specimen*|). • Fluid specimens where the inclusion of anatomical information specifies the type of fluid (for example, 418564007 |*Pleural fluid specimen*|). • Device specimens that relate to the subject of care (for example, 119312009 |*Catheter tip specimen*|). • Donor material for which the subject of care is the recipient.
Exclusions	• Specimen concepts that include specimen collection procedure information (for example, 397077004 |*Specimen obtained by incisional biopsy*|) because the focus should be the specimen itself, not the collection procedure. • Environmental specimens (for example, 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 (for example, 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.

5.33.4 Examples of permissible values

These examples are drawn from the *Specimen* hierarchy.

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

5.34 Testing method reference set

5.34.1 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.

5.34.2 Binding details

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

Table 76: Testing method reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Test Result DCM (NEHTA, 2011)	*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 (NEHTA, 2009)	*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.	None.

5.34.3 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 that 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 77: 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 (for example, 67122001 |*Acid fast stain method*|).
Exclusions	• Concepts from the *Procedure* hierarchy that related to specimen collection and 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.

5.34.4 Examples of permissible values

These examples are drawn from the *Procedure* hierarchy.

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

5.35 Therapeutic good benefit eligibility reference set

5.35.1 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* (NEHTA, 2010) and *Prescription Request SDT* (NEHTA, 2010).

5.35.2 Binding details

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

Table 78: Therapeutic good benefit eligibility reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication Instruction and Action DCM (NEHTA, 2013)	*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 (NEHTA, 2010) *Prescription Request SDT* (NEHTA, 2010)	*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.

5.35.3 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 79: 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.

5.35.4 Examples of permissible values

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

5.36 Therapeutic good claim category reference set

5.36.1 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* (NEHTA, 2010).

5.36.2 Binding details

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

Table 80: Therapeutic good claim category reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication Instruction and Action DCM (NEHTA, 2013) *Dispense Record SDT* (NEHTA, 2010)	*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.

5.36.3 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 81: 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.

5.36.4 Examples of permissible values

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

5.37 Unexpected result indicator reference set

5.37.1 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 the *Pathology Result Report SDT* (NEHTA, 2009):

- 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).

5.37.2 Binding details

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

Table 82: Unexpected result indicator reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Pathology Result Report SDT (NEHTA, 2009)	*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).	None.

5.37.3 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 that 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 83: 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 (for example, 371927002 |*Moderately significant*|).
	• The following sub-hierarchies have been specifically targeted:
	  ○ 272520006 |*Degree findings*|
	  ○ 276800000 |*Normality findings*|
	• Concepts from the *Finding status values* sub-hierarchy, predominantly 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.

Constraint Type	Details
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 (for example, 264916000 |*Receptor defective*|). • Concepts that do not provide a clinical interpretation of the significance of the observation value (for example, 255511005 |*Long*|).

5.37.4 Examples of permissible values

These examples are drawn from the *Findings value* sub-hierarchy.

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

6 Exclusion reference sets

6.1 Clinical finding grouper exclusion reference set

6.1.1 Reference set scope and usage

The *Clinical finding grouper exclusion reference set* is designed to exclude *Clinical finding* concepts that are not considered suitable for recording the findings, symptoms and disorders within a patient record. It functions as a means to further constrain any reference set built using the *Clinical finding* hierarchy.

6.1.2 Method for defining reference set content

Table 84: Clinical finding grouper exclusion reference set constraints

Constraint Type	Details

Inclusions	Concepts with Fully Specified Names that had a semantic tag of "(finding)" and match any of the following criteria are included:
	• Fully Specified Names with:
	  ○ "Effect of exposure to"
	  ○ "Finding by" or "Finding of"
	  ○ "Finding relating to" or "Finding related to"
	  ○ "General Finding of"
	  ○ "On examination" (only where concept has descendants)
	  ○ "Named sign of"
	• Fully Specified Names ending with (ignoring semantic tag):
	  ○ "categories", "items"," observations"," state" or "statuses", "categorised by"
	  ○ "finding" or "findings"
	  ○ "of encounter"
	Additionally:
	• Concepts with fewer than two immediate descendants (that matched the above criteria) were manually assessed to confirm grouper status.
	• The first three levels of concepts within the *Clinical findings* hierarchy were reviewed for other ad hoc groupers.
	• Additional inclusion criteria may be identified, through continuous review of the reference set coverage, terminology analysis and stakeholder feedback.

Exclusions	Generally all disorder concepts are excluded from the reference set, unless they can be reliably recognised as groupers. For example: • 420881009 |*Allergic disorder by allergen type*| • 363044007 |*Connective tissue disorder by body site*|

6.1.3 Examples of permissible values

- 250171008 |*Clinical history and observation findings*|
- 123946008 |*Disorder by body site*|

6.1.4 Future development

This reference set will be subject to further refinement if feedback is received from implementations about the presence of non-grouper concepts or the absence of known groupers, upon further analysis by the NCTIS.

6.2 Procedure grouper exclusion reference set

6.2.1 Reference set definition and usage

The *Procedure grouper exclusion reference set* is designed to remove any concepts within the *Procedure* hierarchy that are deemed to not be useful for the recording of any procedures performed upon the subject of care in a clinical record or in the provision of healthcare in general. It functions as a means to further constrain any reference set built using the *Procedure* hierarchy.

6.2.2 Method for defining reference set content

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

Table 85: Procedure grouper exclusion reference set constraints

Constraint Type	Details
Inclusions	Concepts with Fully Specified Names (FSNs) that match any of the following patterns are included: • *… AND/OR … (procedure)* • *… and/or … (procedure)* • *… procedure (procedure)* • *Administrative … procedure (procedure)* • *Medical procedure on … (procedure)* • *Operation on … (procedure)* • *Operative procedure on … (procedure)* • *Procedure by … (procedure)* • *Procedure in … (procedure)* • *Procedure on … (procedure)* • *Procedure related to … (procedure)* • *Procedure relating to … (procedure)* • *Procedure with … (procedure)* • *Procedure with … focus (procedure)* In addition: • Concepts with fewer than two immediate descendants (that matched the above criteria) were manually assessed to confirm grouper status. • The first two levels of the *Procedure* hierarchy were reviewed for other potential grouper concepts that did not match the above lexical patterns of their FSNs. • Additional inclusion criteria may be identified through continuous review of the reference set coverage, terminology analysis and stakeholder feedback.
Exclusions	Concepts that had no immediate descendants (even if they matched any of abovementioned FSN lexical patterns) were excluded.

6.2.3 Examples of permissible values

- 386637004 |*Obstetric procedure*|
- 43154000 |*Medical procedure on large intestine*|

6.2.4 Future development

This reference set will be subject to further refinement if feedback is received from implementations about the presence of non-grouper concepts or the absence of known groupers, upon further analysis by the NCTIS.

7 AMT product reference sets

7.1 Contained trade product pack reference set

7.1.1 Reference set definition and usage

The *Contained trade product pack reference set* provides terminology to describe the packaged product (medication) that is supplied for direct patient use including details of the container type.

7.1.2 Binding details

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

Table 86: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication DCM	*Therapeutic Good Identification* data element DE-10194 OID: 1.2.36.1.2001.1001.101.103.10194 Definition: The medicine, vaccine or other therapeutic good that was the focus of the action.	None identified.
Adverse Reaction DCM	*Substance/Agent* data element DE-15521 OID: 1.2.36.1.2001.1001.101.103.15521 Definition: Identification of a substance, agent, or a class of substance considered to be responsible for the adverse reaction. *Specific Substance/Agent* data element DE-16349 OID: 1.2.36.1.2001.1001.101.103.16349 Definition: Specific identification of the substance/agent considered to be responsible for the adverse reaction event.	None identified.

7.1.3 Method for defining reference set content

The *Contained trade product pack reference set* provides terminology to support the recording of medicines in health records within Australia.

The reference set was developed using the "simple inclusion" method. The *Contained trade product pack* concept was identified as the ancestor of concepts for inclusion.

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

Table 87: Containered trade product pack reference set constraints

Constraint Type	Details
Inclusions	Descendant concepts of the *Containered trade product pack* concept.

7.1.4 Examples of permissible values

- 18830011000036103 |*Alphamox 250 mg capsule: hard, 20, blister pack*|
- 20675011000036100 |*Diaformin-1000 1 g tablet: film-coated, 90, bottle*|

7.2 Medicinal product reference set

7.2.1 Reference set definition and usage

The *Medicinal product reference set* provides terminology to describe the abstract representation of the active ingredients or substances (devoid of strength and form). This reference set supports "generic prescribing" in a healthcare setting.

7.2.2 Binding details

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

Table 88: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication DCM	*Therapeutic Good Identification* data element DE-10194 OID: 1.2.36.1.2001.1001.101.103.10194 Definition: The medicine, vaccine or other therapeutic good that was the focus of the action.	None identified.
Adverse Reaction DCM	*Substance/Agent* data element DE-15521 OID: 1.2.36.1.2001.1001.101.103.15521 Definition: Identification of a substance, agent, or a class of substance that is considered to be responsible for the adverse reaction. *Specific Substance/Agent* data element DE-16349 OID: 1.2.36.1.2001.1001.101.103.16349 Definition: Specific identification of the substance/agent considered to be responsible for the adverse reaction event.	None identified.

7.2.3 Method for defining reference set content

The *Medicinal product reference set* provides terminology to support the recording of a medicine in health records within Australia.

The reference set was developed using the "simple inclusion" method. The *Medicinal product* concept was identified as the ancestor of concepts for inclusion. Those concepts that are also descendants of the *Medicinal product unit of use* concept were excluded.

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

Table 89: Medicinal product reference set constraints

Constraint Type	Details
Inclusions	Descendant concepts of *Medicinal product* concept not excluded below.
Exclusions	Descendant concepts of *Medicinal product unit of use* concept.

7.2.4 Examples of permissible values

- 21823011000036103 |*adrenaline*|
- 44940011000036106 |*meropenem*|

7.3 Medicinal product pack reference set

7.3.1 Reference set definition and usage

The *Medicinal product pack reference set* provides terminology to describe an abstract concept representing the properties of one or more quantitatively and clinically equivalent Trade Product Packs (TPPs).

7.3.2 Binding details

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

Table 90: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication DCM	*Therapeutic Good Identification* data element DE-10194 OID: 1.2.36.1.2001.1001.101.103.10194 Definition: The medicine, vaccine or other therapeutic good that was the focus of the action.	None identified.

Detailed Clinical Model or Specification	Details	Considerations
Adverse Reaction DCM	*Substance/Agent* data element DE-15521 OID: 1.2.36.1.2001.1001.101.103.15521 Definition: Identification of a substance, agent, or a class of substance that is considered to be responsible for the adverse reaction. *Specific Substance/Agent* data element DE-16349 OID: 1.2.36.1.2001.1001.101.103.16349 Definition: Specific identification of the substance or agent considered to be responsible for the adverse reaction event.	None identified.

7.3.3 Method for defining reference set content

The *Medicinal product pack reference set* provides terminology to support the recording of a medicine in health records within Australia.

The reference set was developed using the "simple inclusion" method. The *Medicinal product pack* concept was identified as the ancestor of concepts for inclusion. Those concepts that are also descendants of the *Trade product pack* concept were excluded.

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

Table 91: Medicinal product pack reference set constraints

Constraint Type	Details
Inclusions	Descendant concepts of *Medicinal product pack* concept not excluded below.
Exclusions	Descendant concepts of *Trade product pack* of use concept.

7.3.4 Examples of permissible values

- 46470011000036101 |*aciclovir 5% cream, 10 g*|
- 63748011000036109 |*pseudoephedrine hydrochloride 120 mg tablet, 10*|

7.4 Medicinal product unit of use reference set

7.4.1 Reference set definition and usage

The *Medicinal product unit of use reference set* provides terminology to describe an abstract concept representing the properties of one or more equivalent Trade Product Units of Use (TPUU).

7.4.2 Binding details

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

Table 92: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication DCM	*Therapeutic Good Identification* data element DE-10194 OID: 1.2.36.1.2001.1001.101.103.10194 Definition: The medicine, vaccine or other therapeutic good that was the focus of the action.	None identified.
Adverse Reaction DCM	*Substance/Agent* data element DE-15521 OID: 1.2.36.1.2001.1001.101.103.15521 Definition: Identification of a substance, agent, or a class of substance that is considered to be responsible for the adverse reaction. *Specific Substance/Agent* data element DE-16349 OID: 1.2.36.1.2001.1001.101.103.16349 Definition: Specific identification of the substance/agent considered to be responsible for the adverse reaction event.	None identified.

7.4.3 Method for defining reference set content

The *Medicinal product unit of use reference set* provides terminology to support the recording of medicines in health records within Australia.

The reference set was developed using the "simple inclusion" method. The *Medicinal product unit of use* concept was identified as the ancestor of concepts for inclusion. Those concepts that are also descendants of the *Trade product unit of use* concept were excluded.

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

Table 93: Medicinal product unit of use reference set constraints

Constraint Type	Details
Inclusions	Descendant concepts of *Medicinal product unit of use* concept not excluded below.
Exclusions	Descendant concepts of *Trade product unit of use* concept.

7.4.4 Examples of permissible values

- 23550011000036101 |*amoxycillin 250 mg capsule*|
- 23529011000036106 |*iloprost 20 microgram/2 mL inhalation: solution, ampoule*|

7.5 Trade product reference set

7.5.1 Reference set definition and usage

The *Trade product reference set* provides terminology to describe the product (medication) brand name for either single component products or components of multi-component products regardless of ingredients.

7.5.2 Binding details

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

Table 94: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication DCM	*Therapeutic Good Identification* data element DE-10194 OID: 1.2.36.1.2001.1001.101.103.10194 Definition: The medicine, vaccine or other therapeutic good that was the focus of the action.	None identified.
Adverse Reaction DCM	*Substance/Agent* data element DE-15521 OID: 1.2.36.1.2001.1001.101.103.15521 Definition: Identification of a substance, agent, or a class of substance that is considered to be responsible for the adverse reaction. *Specific Substance/Agent* data element DE-16349 OID: 1.2.36.1.2001.1001.101.103.16349 Definition: Specific identification of the substance/agent considered to be responsible for the adverse reaction.	None identified.

7.5.3 Method for defining reference set content

The *Trade product reference set* provides terminology to support the recording of a medicine in health records within Australia.

The reference set was developed using the "simple inclusion" method. The *Trade product* concept was identified as the ancestor of concepts for inclusion. Those concepts that are also descendants of the *Trade product unit of use* concept were excluded.

Table 95: Trade product reference set constraints

Constraint Type	Details
Inclusions	Descendant concepts of *Trade product* concept not excluded below.
Exclusions	Descendant concepts of *Trade product unit of use* concept.

7.5.4 Examples of permissible values

- 34821000168106 |*Panadeine Forte*|
- 53236011000036103 |*Paraderm Plus*|

7.6 Trade product pack reference set

7.6.1 Reference set definition and usage

The *Trade product pack reference set* provides terminology to describe the packaged product (medication) that is supplied for direct patient use.

7.6.2 Binding details

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

Table 96: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication DCM	*Therapeutic Good Identification* data element DE-10194 OID: 1.2.36.1.2001.1001.101.103.10194 Definition: The medicine, vaccine or other therapeutic good that was the focus of the action.	None identified.
Adverse Reaction DCM	*Substance/Agent* data element DE-15521 OID: 1.2.36.1.2001.1001.101.103.15521 Definition: Identification of a substance, agent, or a class of substance that is considered to be responsible for the adverse reaction. *Specific Substance/Agent* data element DE-16349 OID: 1.2.36.1.2001.1001.101.103.16349 Definition: Specific identification of the substance/agent considered to be responsible for the adverse reaction event.	None identified.

7.6.3 Method for defining reference set content

The *Trade product pack reference set* provides terminology to support the recording of a medicine in health records within Australia.

The reference set was developed using the "simple inclusion" method. The *Trade product pack* concept was identified as the ancestor of concepts for inclusion. Those concepts that are also descendants of the *Contained trade product pack* concept were excluded.

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

Table 97: Trade product pack reference set constraints

Constraint Type	Details
Inclusions	Descendant concepts of *Trade product pack* concept not excluded below.
Exclusions	Descendant concepts of *Containered trade product pack* concept.

7.6.4 Examples of permissible values

- 12167011000036107 |*Adalat 20 mg tablet: film-coated, 60*|
- 11482011000036107 |*Diazepam (DBL) 10 mg/2 mL injection: solution, 5 x 2 mL ampoules*|

7.7 Trade product unit of use reference set

7.7.1 Reference set definition and usage

The *Trade product unit of use reference set* provides terminology to describe a single dose unit of a finished dose form that contains a specified amount of an active ingredient substance and is grouped within a particular Trade Product.

7.7.2 Binding details

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

Table 98: Reference set bindings

Detailed Clinical Model or Specification	Details	Considerations
Medication DCM	*Therapeutic Good Identification* data element DE-10194 OID: 1.2.36.1.2001.1001.101.103.10194 Definition: The medicine, vaccine or other therapeutic good that was the focus of the action.	None identified.

Detailed Clinical Model or Specification	Details	Considerations
Adverse Reaction DCM	*Substance/Agent* data element DE-15521 OID: 1.2.36.1.2001.1001.101.103.15521 Definition: Identification of a substance, agent, or a class of substance that is considered to be responsible for the adverse reaction. *Specific Substance/Agent* data element DE-16349 OID: 1.2.36.1.2001.1001.101.103.16349 Definition: Specific identification of the substance/agent considered to be responsible for the adverse reaction event.	None identified.

7.7.3 Method for defining reference set content

The *Trade product unit of use reference set* provides terminology to support the recording of a medicine in health records within Australia.

The reference set was developed using the "simple inclusion" method. The *Trade product unit of use* concept was identified as the ancestor of concepts for inclusion.

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

Table 99: Trade product unit of use reference set constraints

Constraint Type	Details
Inclusions	Descendant concepts of *Trade product unit of use* concept.

7.7.4 Examples of permissible values

- 6355011000036103 |*Alprim 300 mg tablet: uncoated*|
- 65669011000036108 |*Nurofen 5% gel*|

8 Concrete domain reference sets

8.1 Strength reference set

8.1.1 Reference set definition and usage

The *Strength reference set* is a concrete domain reference set type; it provides a machine-computable strength representation of the Medicinal Product Unit of Use (MPUU) as the stated HAS AUSTRALIAN BoSS relationship to Substance.

It also provides the strength representation of Trade Product Unit of Use (TPUU) as an inferred relationship.

8.1.2 Method for defining reference set content

The *Strength reference set* provides a machine-computable strength representation. It was developed using the concrete domain reference set type.[9] The constraints that were applied to develop this reference set are tabulated below.

Table 100: Strength reference set constraints

Constraint Type	Details
References	The AMT components being referenced must be MPUU as the stated HAS AUSTRALIAN BoSS relationships to *Substance* with an active status. The AMT components being referenced must be TPUU as inferred HAS AUSTRALIAN BoSS relationships to *Substance* with an active status. The value and units included represent the active ingredient strength (specifically the BoSS) of these MPUU concepts.
Permissible values	• "operatorId" should always be "Equal to". • "value" is the concrete value to be associated with the referenced concept, which are to be rational numbers that are greater than 0. • "unitId" should always be the concept ID of a Unit of Measure (UOM) concept.
Example	• acamprosate 300 mg tablet HAS AUSTRALIAN BoSS acamprosate (referencedComponentId) • Equal to (operatorId) • 300 (value) • mg/each (unitId) • Campral 333 mg tablet: enteric HAS AUSTRALIAN BoSS acamprosate (referencedComponentId) • Equal to (operatorId) • 300 (value) • mg/each (unitId)

[9] Refer to the *AMT v3 Technical Implementation Guide* (NEHTA, 2014) for further information on the *Concrete Domain reference set* pattern (an extension to the SNOMED CT® RF2 specifications).

8.2 Unit of use size reference set

8.2.1 Reference set definition and usage

- The *Unit of use size reference set* is a concrete domain type reference set; it denotes the size of each unit of use of the MPUU as the stated relationship HAS UNIT OF USE relationship to *Unit of Use*.
- It also denotes the size of each unit of use of the TPUU as an inferred relationship.

8.2.2 Method for defining reference set content

The *Unit of use size reference set* represents the size of an MPUU's unit of use. It was developed using the concrete domain reference set type. The constraints that were applied to develop this reference set are tabulated below.

Table 101: Unit of use size reference set constraints

Constraint Type	Details
References	The AMT components being referenced must be MPUU as stated HAS UNIT OF USE relationships with an active status. The AMT components being referenced must be TPUU as inferred HAS UNIT OF USE relationships with an active status. The value and units included represent the unit of use size value or units of these MPUU concepts.
Permissible values	• "operatorId" should always be "Equal to". • "value" is the concrete value to be associated with the referenced concept, which are rational numbers that are > 0. • "unitId" should always be the concept ID of a UOM concept.
Example	• aspirin 500 mg + codeine phosphate hemihydrate 9.5 mg tablet HAS UNIT OF USE tablet (referencedComponentId) • Equal to (operatorId) • 1 (value) • tablet (unitId) • Disprin Forte tablet: dispersible HAS UNIT OF USE tablet (referencedComponentId) • Equal to (operatorId) • 1 (value) • tablet (unitId)

8.3 Unit of use quantity reference set

8.3.1 Reference set definition and usage

The *Unit of use quantity reference set* is a concrete domain type reference set; it defines the quantity or number of MPUUs within a Medicinal Product Pack (MPP) as described by the MPP HAS MPUU relationship to MPUU.

8.3.2 Method for defining reference set content

The *Unit of use quantity reference set* determines the quantity or number of units of use of an MPP and TPP. It was developed using the concrete domain reference set type.

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

Table 102: Unit of use quantity reference set constraints

Constraint Type	Details
References	The AMT components being referenced must be MPP HAS MPUU relationships to MPUU with an active status. The AMT components being referenced must be TPP HAS TPUU relationships to TPUU with an active status. The value and units included represent the unit of use quantity value orunits of these MPP concepts.
Permissible values	• "operatorId" should always be "Equal to" • "value" is the concrete value to be associated with the referenced concept, which are rational numbers that are > 0 • "unitId" should always be the concept ID of a UOM concept
Examples	• amoxycillin 250 mg capsule, 20 HAS MPUU amoxycillin 250mg capsule (referencedComponentId) • Equal to (operatorId) • 20 (value) • capsule (unitId) • Amoxil 250 mg capsule: hard, 20 HAS TPUU Amoxil 250 mg capsule: hard (referencedComponentId) • Equal to (operatorId) • 20 (value) • capsule (unitId)

8.4 Subpack quantity reference set

8.4.1 Reference set definition and usage

The *Subpack quantity reference set* is a concrete domain type reference set; it defines the quantity or number of subpacks contained within a sequential multi-component item at the product pack level. It typically relates to hormone replacement therapy and oral contraceptive products.

8.4.2 Method for defining reference set content

The *Subpack quantity reference set* represents the quantity or number of subpacks contained within a sequential multi-component item to facilitate decision support within Australia. It was developed using the concrete domain reference set type. The constraints that were applied to develop this reference set are tabulated below.

Table 103: Subpack quantity reference set constraints

Constraint Type	Details
References	The AMT components being referenced must be Medicinal Product Pack (MPP) concepts representing oral contraceptives, hormone replacement therapy products, and any other multi-packs that are presented in multiple subpacks. The AMT components being referenced must be Trade Product Pack (TPP) **and** Containered Trade Product Pack (CTPP) concepts representing oral contraceptives and hormone replacement therapy products that are presented in multiple subpacks. The value included represents the subpack quantity value of these MPP concepts.
Exclusions	Cold and flu products and other products not represented in subpacks.
Permissible values	• "operatorId" should always be "Equal to". • "value" is the concrete value to be associated with the referenced concept, which are rational numbers that are > 0. • "unitId" should always be the concept ID of "Each".
Example	• norethisterone 500 microgram + ethinyloestradiol 35 microgram tablet [84] (&) inert substance tablet [28], 112 [4 x 28] HAS SUBPACK norethisterone 500 microgram + ethinyloestradiol 35 microgram tablet [21] (&) inert substance tablet [7], 28 (referencedComponentId) • Equal to (operatorId) • 4 (value) • each (unitId) • Microgynon 30 ED, 112 tablets [4 x 28], blister pack HAS SUBPACK Microgynon 30 ED, 28 tablets, blister pack (referencedComponentId) • Equal to (operatorId) • 4 (value) • each (unitId)

9 Mapping reference sets

9.1 Substance to SNOMED CT-AU mapping reference set

9.1.1 Reference set definition and usage

The *Substance to SNOMED CT-AU mapping reference set* is developed for the implementers of AMT, SNOMED CT-AU and NEHTA DCMs to enable rule development within decision support systems.

Historically, the AMT and SNOMED CT-AU were published as separate terminologies. Therefore, the relationships between AMT products (and their ingredients) and SNOMED CT-AU substances are not currently stated. The *Substance to SNOMED CT-AU mapping reference set* will contain all AMT substances (AU substances) that are used in a modelled AMT product with a corresponding equivalent or supertype[10] map to a substance in SNOMED CT-AU.

Decision support systems can utilise the relationship or the map for identification of potential allergies, drug-drug and drug-disease interactions:

- **Adverse drug reaction and allergy**

  Within the *Adverse Reactions* DCM, the element capturing the agent or substance can utilise the *Substance to SNOMED CT-AU mapping reference set* to link the recorded product that caused the reaction to the substances (as described in SNOMED CT-AU) that the patient might have had a reaction to. This map can then be used for the purpose of adverse drug reaction reporting and decision support alerts.

- **Drug-drug and drug-disease interaction**

  Decision support alerts embedded in medication dispensing software or electronic clinical reference materials are able to utilise the *Substance to SNOMED CT-AU mapping reference set* for identification of potential interactions between drugs and diseases.

A mapping file containing both the equivalent and supertype maps will be released as part of the AMT release, including:

- Equivalent (bi-directional) mapping of non-orphaned AMT substances to SNOMED CT-AU substances. (See "Equivalent Map" in Section 9.1.2.1 below.)
- Supertype (uni-directional) mapping of non-orphaned AMT substances that have no equivalent SNOMED CT-AU substances, are mapped to the nearest parent (supertype) concept in the SNOMED CT-AU *Substance* hierarchy. This is a directional map and must only be used from the AMT to SNOMED CT-AU.

[10] That is, the nearest relevant parent concept.

9.1.2 Method for defining reference set content and permissible values

9.1.2.1 Inclusions

All AMT substances that are used in a modelled AMT product are possible candidates for inclusion, unless otherwise stated in Section 9.1.2.2.

Equivalent map

Every AMT substance that has an exact concept match in SNOMED CT-AU is mapped as equivalent. Note that the definition of "exact concept match" is not only restricted to a simple description match but also includes semantic equivalence. See "Spelling difference" and "Same meaning different expression" types in the following table. This table lists different types of equivalent mapping, categorised in three groups.

Table 104: Inclusions – equivalent map types

Map type	Explanation and permissible values	AMT Preferred Term (example)	SNOMED CT-AU (example)
Exact match	Substance descriptions in AMT and SNOMED CT-AU are exact (word for word) matches. • Example: nicotine	2393011000036109 |*nicotine*|	68540007 |*Nicotine*|
Spelling difference	Substance descriptions in SNOMED CT-AU FSN, PT or Synonym have the exact same meanings but have accepted spelling variations compared to the AMT description (for example, Australian spelling). • Example: amoxicillin	1799011000036105 |*amoxycillin*|	372687004 |*Amoxicillin*|
Same meaning different expression	A substance description in SNOMED CT-AU FSN, PT or Synonym uses a different expression to represent an equivalent AMT substance. • Example: Vitamin K	31759011000036100 |*phytomenadione*|	66656000 |*Vitamin K*|

Supertype map

Where a substance in AMT has no equivalent concept in SNOMED CT-AU, it will be mapped to the nearest supertype substance, and an equivalent concept will be modelled in a future release. The following table lists different types of supertype mapping, categorised in six groups.

Table 105: Inclusions – supertype map

Substance type	Explanation and permissible values	AMT Preferred Term (example)	SNOMED CT-AU (example)
Vaccine Substances	An AMT substance concept representing a vaccine component is more granular than a comparable SNOMED CT-AU substance concept. • Example: Pertussis vaccine	73654011000036109 |*Bordetella pertussis, acellular pertactin vaccine*|	396433007 |*Pertussis vaccine*|
Substance hydration	An AMT substance has a specific hydration but does not exist in SNOMED CT-AU. **Note:** SNOMED CT-AU substances that do not specify a hydration are considered to be "anhydrous". • Example: ipratropium bromide monohydrate	2231011000036105 |*ipratropium bromide monohydrate*|	386881005 |*Ipratropium bromide*|
Antivenin/ Antivenom	An AMT antivenin substance concept is more specific than a comparable SNOMED CT-AU substance concept. • Example: king brown snake antivenom	73617011000036106 |*king brown snake antivenom*|	398809003 |*Antivenin*|
Nutritional/ Dietary Supplements	AMT contains substances that represent a combination of substances contained in a nutritional/dietary supplement. In the mapping file, a map to the nearest supertype substance will be provided. • Example: multi-ingredient supplement	78583011000036109 |*high fat formula with vitamins, minerals and trace elements and low in protein and carbohydrate*|	373453009 |*Nutritional supplement*|

9.1.2.2 Exclusions

Any AMT substance concept that has been identified as erroneous will be excluded. The following table lists different types of AMT substance concepts that are excluded from the *Substance to SNOMED CT-AU mapping reference set*.

Table 106: Exclusion types

Substance type	Explanation and examples	AMT Preferred term (example)	SNOMED CT-AU (example)
Dressings	No map will be provided for AMT substances representing dressing products.	50757011000036108 |*dressing foam heavy exudate*|	N/A

9.2 Australian Register of Therapeutic Goods Identifier (ARTGID) reference set

9.2.1 Reference set definition and usage

The ARTG ID is the primary identifier used to identify therapeutic goods as included in the Australian Register of Therapeutic Goods (ARTG). It is used for review process internally. It may also be used externally for mapping purposes and identification of products.

9.2.2 Method for defining reference set content

The *ARTG ID reference set* provides a map between CTPP concepts and their associated ARTG Ids to support review processes and product identification internally. It can also be used externally for mapping purposes.

The *ARTG ID reference set* is a simple map reference set. A CTPP can be mapped to zero or more ARTG Ids, that is, some CTPPs do not have any associated ARTG Ids, most CTPPs are associated with one ARTG Id and some CTPPs have multiple associated ARTG Ids.

Table 107: ARTG ID reference set constraints

Constraint Type	Details
Inclusions	The content must contain only ARTG Id values associated with the CTPP, as derived from the Australian Register of Therapeutic Goods.

9.2.3 Examples

- ARTG ID 90925 |*Abilify 5 mg tablet: uncoated, 7, blister pack*|
- ARTG ID 115547 |*Ablavar 4.88 g/20 mL injection: solution, 10 x 20 mL vials*|

10 Information model details

10.1 Emergency department information model

10.1.1 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 were defined as part of the EDRS (Emergency Department Reference sets) project undertaken in collaboration with the Department of Health and endorsed by NEDPAC.

10.1.2 Scope

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

10.1.3 Definitions

Table 108: 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* (Australian Institute of Health and Welfare, n.d.).
Diagnosis or Principal Diagnosis	The diagnosis established at the conclusion of the patient's attendance in an emergency department to be mainly responsible for occasioning the attendance following consideration of clinical assessment, as represented by a code: see *Emergency department stay—principal diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).
Additional Diagnosis	The condition or complaint coexisting with the emergency department principal diagnosis during a patient's attendance to the emergency department, as represented by a code: see *Emergency department stay—additional diagnosis, code [X(9)]* (Australian Institute of Health and Welfare, n.d.).

10.2 Pathology episode data group

10.2.1 Data group overview

This data group is now out of date, but the following information is retained here until developments in the pathology area are better 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* (NEHTA, 2009).

There are two purposes for this data group:

- to provide a structured representation of the clinical information requirements associated with pathology result reporting; and
- 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. Each additional request occurs as a new episode, however they may still relate to the original healthcare event.

10.2.2 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* (NEHTA, 2009).

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

10.2.3 Data group definitions

Table 109: 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.

11 Mapping principles for reference set development

11.1 Mapping principles used in the initial development of the Emergency department reference sets

During initial development of the Emergency department reference sets (EDRSs) only one general mapping rule was applied to ensure consistent mapping from the NCCH Emergency Department (ED) Termset to SNOMED CT. Details are as follows:

- 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 110: 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 the Department of Health).
- 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.

Please note that due to requests for new content within the EDRS, these mapping principles are not valid for all EDRS content.

11.2 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 without equivalent SNOMED CT-AU concepts were not mapped at this time.

Table 111: 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	*mg*	258684004 |*mg*|

11.3 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 form* concepts that have current relationships with a type of HAS MANUFACTURED DOSE FORM to SNOMED CT-AU.
- AMT concepts without equivalent SNOMED CT-AU concepts were not mapped at this time.

Table 112: 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*|

Acronyms

Acronym	Description
AMT	Australian Medicines Terminology
BoSS	Basis of Strength Substance
CTPP	Containered Trade Product Pack
DCM	Detailed Clinical Model
ED	Emergency Department
EDRS	Emergency department reference set (reference set suite)
IHTSDO	International Health Terminology Standards Development Organisation
MP	Medicinal Product
MPP	Medicinal Product Pack
MPUU	Medicinal Product Unit of Use
NCCH	National Centre for Classification in Health
NCTIS	National Clinical Terminology and Information Service
NEDPAC	National Emergency Department Project Advisory Committee
RF2	SNOMED CT Release Format 2.0
SDT	Structured Document Template
SNOMED CT-AU	SNOMED CT, Australian Release
SNOMED CT	Systematized Nomenclature of Medicine, Clinical Terms
TP	Trade Product
TPP	Trade Product Pack
TPUU	Trade Product Unit of Use

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