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Guide for Terminology Use in Prescribing

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1 Introduction

1.1 Purpose

This document provides implementation guidance on how to natively use SNOMED CT-AU (the Australian edition of SNOMED CT) and Australian Medicines Terminology (AMT) to support clinical activities within software systems in the context of healthcare provision in Australia.

This document is the first in a series of clinical terminology implementation guides. Its focus is on medication management, specifically medicines ordering and prescribing¹.

This document aims to specify a recommended approach to standardise the way that elements of medicine orders and prescriptions are codified using SNOMED CT-AU and the AMT.

Future implementation guides within the same series will cover how national clinical terminologies can support other medication management activities (such as dispensing, administration and review) as well as clinical activities (such as recording adverse reactions, requesting pathology and diagnostic imaging orders).

Section 1.4.2 provides some context on how SNOMED CT-AU and the AMT terminologies support the broader electronic medication management (eMM) ecosystem in the Australian healthcare system.

The guidance provided in this document represents a model in which clinical terminologies can be used to support or augment current clinical practices nationally. The adoption of clinical terminologies lays a foundation for improving the reuse and sharing of coded information between electronic systems in a standardised way.

This is a non-technical document, designed to enable users to understand and assess the suitability of SNOMED CT-AU and AMT content to assist their current clinical product needs.

This document must not be construed as providing recommendations regarding:

- Clinical practice
- Diagnosis and treatment
- Good prescribing practice
- Legal or regulatory requirements
- Decision support alerts or algorithms for medication management

Use of this guide should be supported by trained and experienced clinical informaticians.

¹ Definitions of a medicine order and a prescription is included in the Glossary.

1.2 Intended audience

This document is intended primarily for business and clinical stakeholders who are assessing the suitability of SNOMED CT-AU and the AMT for use within their clinical products. It may be of interest to some technical stakeholders who wish to understand the general implementation approach for using Australian clinical terminologies.

Prior to reading this document, readers should be familiar with the contents of the SNOMED CT-AU and the AMT concept models and clinical hierarchies, within the following documents:

- *AMT Concept Model and Business Use Cases* [1]
- *SNOMED CT Editorial Guide* [2]

Technical implementation guidance for the use of SNOMED CT-AU and the AMT is included in the *SNOMED CT-AU Australian Technical Implementation Guide* [3] ("the *ATIG*" hereafter).

1.3 Scope

1.3.1 In scope

This document builds on the topics covered in the *AMT Concept Model and Business Use Cases*, in particular the business use cases describing dose based prescribing (Order use case) and pack based prescribing (Prescribe use case). This document expands on these specific use cases by:

- Identifying the national terminology components (SNOMED CT-AU and the AMT) that can be used to encode portions of clinical data intended for prescribing.
- Specifying national terminology components that can enhance prescribing processes.

The scope of prescribable products as described in this document is restricted to products as contained in the AMT. The guidance in this document supports the creation of the following medication orders:

- Regular or routine
- Once only
- When required
- Loading dose
- Reducing dose
- Variable/sliding scale dose
- Intravenous fluids
 - Simple intravenous fluid orders
 - Incorporation of fluid additives to complete an order

A brief definition of these medication order types is included in the Glossary on p. 178.

Future iterations of this document will expand to cover additional SNOMED CT-AU and AMT use cases, and other more complex medication orders.

1.3.2 Out of scope

This document does not stipulate or mandate a new prescribing approach or standard. It also does not represent a new national information model for prescribing or machine readable dose, or make recommendations on software system design.

It currently does not cover clinical implementation guidance for SNOMED CT-AU and the AMT activities beyond prescribing. Guidance on the usage of national terminologies to support other clinical activities are in scope for future iterations.

The document also does not include detailed prescribing rules on specific product types that require some special handling, for example orders for warfarin, nifedipine, tramadol and certain scheduled products like drugs of addiction. Implementers should follow jurisdictional and local requirements, and clinical guidelines for these products.

The creation of more complex medication orders is not currently fully supported, such as for:

- Complex total parenteral nutrition products
- Complex intravenous protocols, especially where the dose is expressed as a rate
- Chemotherapy protocols
- Clinical trials
- Extemporaneous products and their preparation
- Intensive care protocols and other high dependency areas including dialysis
- Medical devices and consumables
- Patient Controlled Analgesia (PCA)

1.4 Overview

1.4.1 National clinical terminologies

1.4.1.1 SNOMED CT and SNOMED CT-AU

SNOMED CT is considered to be the most comprehensive multilingual health terminology in the world. SNOMED CT includes more than 350,000 active concepts with unique meanings and formal logic based definitions, organised in hierarchies, from the general to the specific.

This allows very detailed or "granular" clinical data to be recorded and later accessed or aggregated at a more general level. 'Concept descriptions' are the terms or names assigned to a SNOMED CT concept. There are currently almost 800,000 descriptions in SNOMED CT, including synonyms that can be used to refer to a concept.

In addition, there are approximately 1,360,000 links or semantic relationships between the SNOMED CT concepts. These relationships provide formal definitions and other characteristics of the concept. One type of link is the **Is a** relationship. This is used to define a concept's position within a hierarchy, for example Diabetes mellitus **Is a** Disorder of glucose regulation.

SNOMED CT concepts are organised in hierarchies with multiple levels of granularity. The broad coverage of topics included in SNOMED CT is illustrated by the range of hierarchies used to clinical finding, procedure observable entity, body structure, organism, substance, and pharmaceutical/biologic product.

SNOMED CT Australian Release (SNOMED CT-AU) is the Australian extension to SNOMED CT, and includes the International Release along with all Australian developed terminology and documentation for implementation in Australian clinical IT systems. SNOMED CT-AU provides local variations and customisations of terms relevant to the Australian healthcare community.

1.4.1.2 The AMT

The AMT delivers standardised identification of brand (trade) products and equivalent generic medicines along with associated components that are supported through standard naming conventions that accurately describe medicines.

The AMT has been developed to be fit for the purpose of unambiguously identifying commonly used medicines² for clinicians and computer systems in Australia. The AMT in conjunction with other products such as other terminologies, classifications and decision support engines can be used to deliver various aspects of electronic medications management. The AMT can be implemented in clinical information systems to assist in supporting the following activities:

- Prescribe
- Record
- Review
- Issue – including dispense
- Administer
- Transfer of information

As of Nov 2015, the AMT has been released as part of SNOMED CT-AU as a further step towards complete integration between the two national terminologies.

1.4.2 Medication management

The National Health Chief Information Officer Forum (NHCIOF) eMedications Management work program endorsed the following two projects as important enablers for Australian clinical terminology adoption by jurisdictions:

- Dose based prescribing (acute care) (DBP); and
- Clinical software user interface descriptions (synonyms, display terms) (CID).

External consultation with a broad range of organisations occurred, including federal government agencies (TGA, PBS), states and jurisdictions, the Australian Commission on Safety and Quality in Health Care (ACSQHC), clinicians from various healthcare domains, acute care prescribing and other software vendors, clinical decision support providers and research organisations. The consultations were aimed to:

² Currently this includes items from the Pharmaceutical Benefits Scheme (PBS), Repatriation Pharmaceutical Benefits Scheme (RPBS), and a range of items from the Therapeutic Goods Administration (TGA) including TGA registered items (AUST R) and TGA listed items (AUST L) in Australia.

- Identify the data elements used to support various types of medication orders and their context of use in different order types.
- Identify issues faced by vendors in supporting medication orders, with a focus on dose based prescribing.
- Confirm and validate dose based prescribing use cases that are in scope for the project.
- Ensure new terminology components to be developed are fit for purpose and have widespread applicability.

Two key observations from the NHCIOF work program that stipulate the use of SNOMED CT-AU and the AMT terminologies are:

- National clinical terminologies and standardised information models must underpin the eMM ecosystem to support healthcare providers in the use of medicines, and in the effective transfer of care.
- Providing quality medicine data with common prescribing processes often comes down to healthcare providers being able to share a patient's current medications.

Note

This document should be read in the context of the broader electronic medication management landscape within Australian healthcare.

The following diagram³ illustrates the medication management model in the Australian healthcare system and how the SNOMED CT-AU and the AMT terminologies support this ecosystem.

Refer to *Electronic Medication Management Systems - A Guide to Safe Implementation* [4] for further details on the set of architectural approaches and enablers required to deliver connected, consistent and interoperable national electronic medication management solutions.

³ This diagram is sourced from *Electronic Medication Management Systems - A Guide to Safe Implementation* [4].

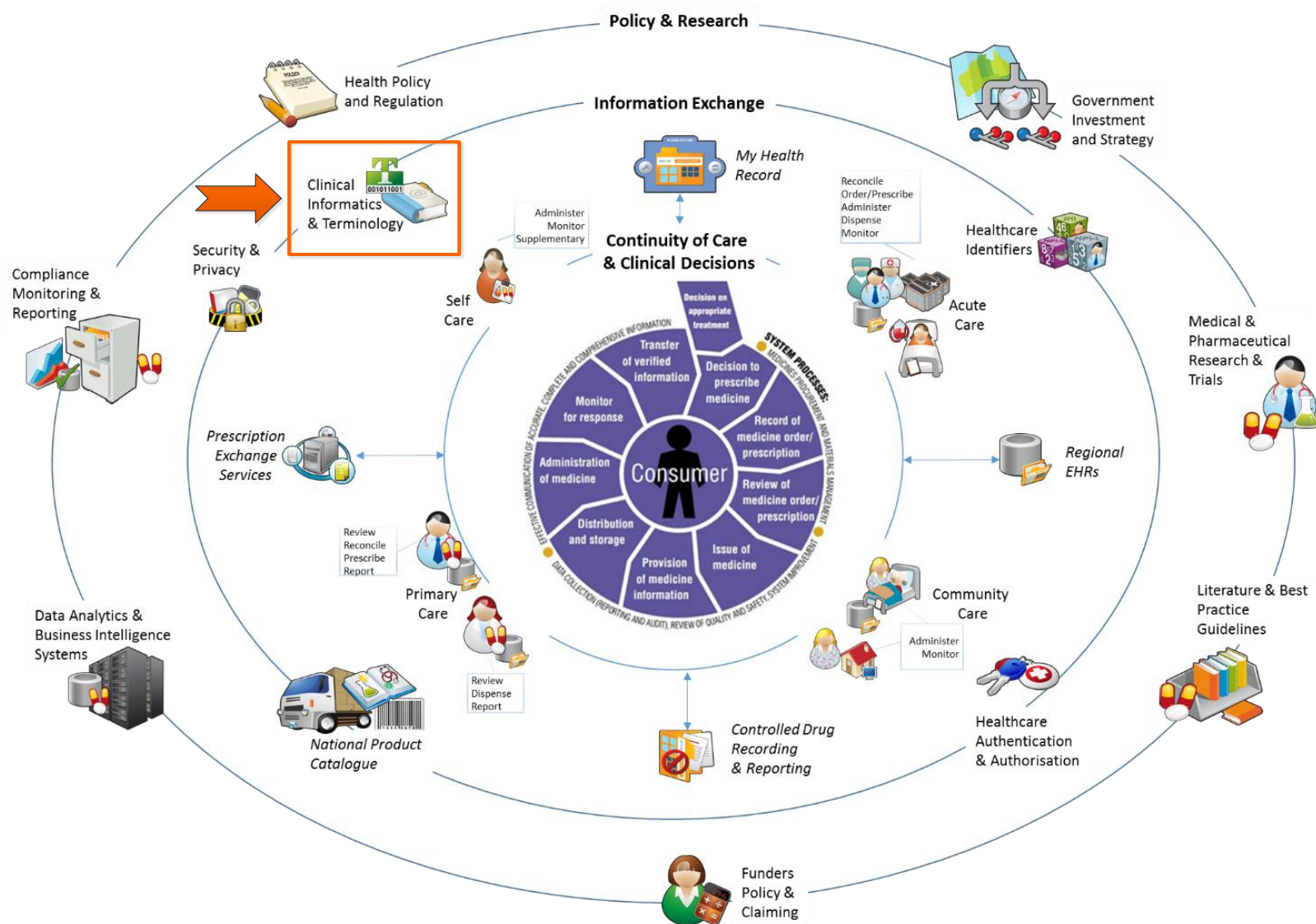


Figure 1: Medication management model⁴

⁴ Adapted from the Australian Pharmaceutical Advisory Council's medication management cycle (APAC ceased being active in 2006).

1.4.2.1 Dose based prescribing

Facilitation of prescribing is one of the main use cases supported by the AMT. The AMT model has traditionally been developed to support prescribing at the unit of use or product pack levels. The current dose based prescribing work is intended to expand the usability of AMT by delivering terminology to support non-product-based prescribing or medication ordering activity typically performed within acute care settings.

Note

A **dose-based order** of a medicine specifies a dose that does not directly translate to any single specific product strength and may be supported by a combination of commercially available products.

In comparison, a **product-based order** or **pack-based order** has a commercially available product specifically selected within its *Medicine* element, as either a product pack or a unit of use.

- If a product pack is specified, its quantity is the pack quantity of the commercially available presentation (such as 20 tablets).
- If a unit of use is specified, its quantity may reflect a single unit of use (such as 1 tablet) or multiples of the unit of use (such as 5 tablets).

However, in practice, the distinction between dose-based and product-based orders may not be apparent because most acute care prescribing systems support both dose-based and product-based ordering within a single prescribing workflow.

While the content for dose based prescribing components and reference sets are principally sourced from SNOMED CT-AU, a dose based order always includes a *Medicine* element, for which values can be drawn from AMT concepts.⁵

Refer to Section 9 for examples of various dose-based orders.

1.4.2.2 Product based prescribing

A product-based order has a commercially available product specifically recorded within its *Medicine* element – this may be at a unit of use or product pack level.

Examples include prescribing a medication that is available as an AMT concept of:

- Medicinal Product Unit of Use (MPUU) and a total pack quantity separately;
- Medicinal Product Pack (MPP);
- Trade Product Unit of Use (TPUU) and a total pack quantity separately;
- Trade Product Pack (TPP); or
- Containered Trade Product Pack (CTPP).

Refer to Section 9 for examples of various product based orders.

⁵ See Section 3.4 for more details about data elements in the prescribing model.

1.5 Format of examples

1.5.1 Medication orders

The format of all the example medication orders within this document is based on the structure used by the ACSQHC in the *National Guidelines for On-screen Display of Clinical Medicines Information* [5]:

Format	<i>Active Ingredient – Strength – Brand Name – Form – Route – Site – DOSE (label) – Dose – Administration Duration – Frequency – Frequency Qualifier – Indication – Additional Instructions – Duration of Treatment for Full Course – SUPPLY (label) – Supply.</i>
---------------	--

Note: Not all elements are always required.

1.5.2 Descriptions

The description examples contained throughout this document use the SNOMED CT presentation conventions of vertical bar delimiters around concepts, for example *[Amoxicillin]*.

Some examples reflect upcoming changes to AMT terms for substances and medicinal products that will occur shortly to align with TGA changes to ingredient names (as part of their International Harmonisation of Ingredient Names project). This will see the replacement of a number of AMT substances (and associated Medicinal products (MPs)) when International Nonproprietary Names (INN) are adopted.

In addition, the examples reflect changes to dose forms (including inversion of dose form text and simplification for non-clinically significant forms) that are being progressively made over a period of time and released in future AMT releases.

1.6 Future developments

Other clinical implementation guides are planned, broadening the scope of this advice beyond prescribing. The Agency encourages feedback and input of users in relation to this document as well as upcoming terminology components. Please contact us via email at help@digitalhealth.gov.au.

2 Terminology components supporting clinical activities

This section identifies the Australian clinical terminology components and reference sets that are available to assist clinical practice.

2.1 Reference sets supporting medication management

Reference sets are individual files published in SNOMED CT-AU and the AMT that help to:

- Provide standardised terminology concepts that can be used to encode the common data elements within healthcare software systems that capture the recording of a certain clinical activity.
- Support different parts of a clinical pathway or workflow by identifying certain subsets of concepts where further management by the user may be required.

Reference sets are typically informed by external source data and commonly developed in collaboration with clinical stakeholders.

Some reference sets are agnostic of information models and some are bound to specific elements within national specifications (for example, within Shared Health Summary clinical documents). Therefore it is necessary to analyse the suitability of a reference set's content against a system's information model prior to its adoption.

Further details on the content and inclusion/exclusion criteria used for reference sets can be found in the *SNOMED CT-AU Development Approach for Reference Sets* [6].

2.1.1 Prescribing

The following table lists all the reference sets that can be used to support prescribing. The reference sets are available in the SNOMED CT-AU terminology bundle, which includes AMT reference sets.

While some of these reference sets were developed with a focus on dose-based prescribing requirements, this does not preclude them being used for any prescribing (including pack based prescribing) as there is likely to be a large area of overlap.

Table 1: Reference sets supporting prescribing

No.	Reference set	Summary of reference set intent	Example of reference set content	Dose based order	Pack based order
1	<i>Anatomical site reference set</i>	Provides SNOMED CT-AU concepts to describe human anatomical sites.	8966001 Left eye		

No.	Reference set	Summary of reference set intent	Example of reference set content	Dose based order	Pack based order
2	<i>Calendar day and month reference set</i>	Provides SNOMED CT-AU concepts that describe all the days of the week and months, based on the Western or Gregorian calendar.	307145004 Monday		
3	<i>Containerised trade product pack reference set</i>	Lists all AMT CTPP concepts.	18381011000036101 Amoxil 250 mg tablet, 20, bottle		
4	<i>Dose based prescribing dose form reference set</i>	Provides SNOMED CT-AU concepts representing common dose forms that support dose based orders.	385055001 Tablet		
5	<i>Dose based prescribing dose frequency and interval reference set</i>	Provides SNOMED CT-AU concepts that describe common dosage frequencies or intervals.	229797004 Once a day		
6	<i>Dose based prescribing medication course type reference set</i>	Provides SNOMED CT-AU concepts that describe various medication course types relevant for clinical systems supporting dose based orders.	225761000 As required		
7	<i>Dose based prescribing route of administration reference set</i>	Provides SNOMED CT-AU concepts that describe common routes of administration. It does not include registered routes per product as identified by the TGA.	47625008 Intravenous route		
8	<i>Dose instruction verb reference set</i>	Provides SNOMED CT-AU concepts that describe a dose instruction imperative, which are fragments of a larger dose instruction.	419652001 Take		
9	<i>Dose qualifier reference set</i>	Provides SNOMED CT-AU concepts that describe qualifiers that can be applied in conjunction with dosing instructions.	311500009 Before food		

No.	Reference set	Summary of reference set intent	Example of reference set content	Dose based order	Pack based order
10	<i>Dose route and form extended association reference set</i>	Provides an association between SNOMED CT-AU <i>Routes of Administration</i> and SNOMED CT-AU <i>Dose Forms</i> as well as to AMT <i>Dose Forms</i> . The SNOMED CT-AU concepts included in the associations are derived from the <i>Dose based prescribing route of administration reference set</i> and <i>Dose based prescribing dose form reference set</i> . This assists users with implementing rules to constrain a set of selectable <i>Route</i> and <i>Form</i> values for data capture, and supports the reconciliation between a specified dose with an available commercial product.	6064005 <i>Topical route</i> is associated with 385099005 <i>Cream</i> ; and 385099005 <i>Cream</i> is associated with 111011000036103 <i>cream</i> .		
11	<i>Dose unit of measure reference set</i>	Provides SNOMED CT-AU concepts that describe common units of measure for medicines.	258684004 <i>mg</i>		
12	<i>Laterality reference set</i>	Provides SNOMED CT-AU concepts to support recording of the side of the body in relation to anatomical structures.	24028007 <i>Right</i>		
13	<i>Medicinal product unit of use reference set</i>	Lists all AMT MPUU concepts.	70143011000036109 <i>amoxicillin 500 mg injection, vial</i>		
14	<i>Medicinal product pack reference set</i>	Lists all AMT MPP concepts.	59081000036105 <i>amoxicillin 500 mg capsule, 30</i>		
15	<i>Observable entity foundation reference set</i>	Provides SNOMED CT-AU concepts to support the recording of observable entities in Australian e-health implementations.	390896004 <i>Target cholesterol level</i>		
16	<i>Problem/Diagnosis reference set</i>	Provides SNOMED CT-AU concepts to support the recording of a patient problem or diagnosis for medical records within Australia.	386661006 <i>Fever</i>		
17	<i>Qualifier value foundation reference set</i>	Provides SNOMED CT-AU concepts to support the recording of qualifying information in Australian e-health implementations.	419822006 <i>Warning. Avoid alcoholic drink</i>		

No.	Reference set	Summary of reference set intent	Example of reference set content	Dose based order	Pack based order
18	<i>Situation with explicit context foundation reference set</i>	Provides SNOMED CT-AU concepts to support the recording of clinical context-dependent information in Australian e-health implementations.	428287001 <i>History of endocarditis</i>		
19	<i>Strength reference set</i>	Provides the normalised strength value and unit for Basis of Strength Substances belonging to AMT products.	- referencedComponentId 5452331000168127 <i>Duloxetine (Pharmacor) 30 mg enteric capsule</i> Has Australian BoSS <i>duloxetine</i> - value 30 - unitId 700000801000036102 <i>mg/each</i>		
20	<i>Substance to SNOMED CT-AU mapping reference set</i>	Provides a mapping between SNOMED CT-AU and the AMT substances that are equivalent. Mappings from AMT substances to supertype SNOMED CT-AU substances also exist where equivalence cannot be found.	- referencedComponentId 32054011000036104 <i>thrombin-human</i> - mapType 291000036107 <i>Equivalent</i> - targetSnomedCtSubstance 691831000168108 <i>Human thrombin</i>		
21	<i>Trade product reference set</i>	Lists all AMT Trade product (TP) concepts.	3738011000036101 <i>Amoxil</i>		
22	<i>Trade product unit of use reference set</i>	Lists all AMT TPUU concepts.	6140011000036103 <i>Amoxil 500 mg capsule</i>		
23	<i>Trade product pack reference set</i>	Lists all AMT TPP concepts.	59071000036108 <i>Amoxycillin (PS) 500 mg capsule, 30</i>		
24	<i>Unit of time reference set</i>	Provides SNOMED CT-AU concepts that describe units of time commonly used for medication orders.	258702006 <i>hour</i>		
25	<i>Unit of use quantity reference set</i>	Provides the unit of use quantity value and unit for AMT MPP and TPP concepts.	- referencedComponentId 4263581000168127 <i>amoxicillin 250 mg capsule, 20</i> Has MPUU <i>amoxicillin 250 mg capsule</i> - value 20 - unitId 67011000036100 <i>capsule</i>		

3 Introduction to the prescribing model

This section describes the recommended prescribing model, which is a theoretical pathway that comprises the common clinical decisions and processes that are followed when an authorised prescriber performs an electronic medicines ordering or prescribing activity within a clinical information system (CIS). Additionally, the prescribing model specifies the medicine order elements that are supported by SNOMED CT-AU and the AMT, as well as the nature of this support.

3.1 High level use case

Within the high level AMT use case included below, the prescribing model applies to the "Prescribe" and "Order" use cases. More specifically, the prescribing model expands on the "Create medication order" and "Create prescription" actions by an authorised prescriber.

For more information on AMT use cases, please refer to the *AMT Concept Model and Business Use Cases* [1].

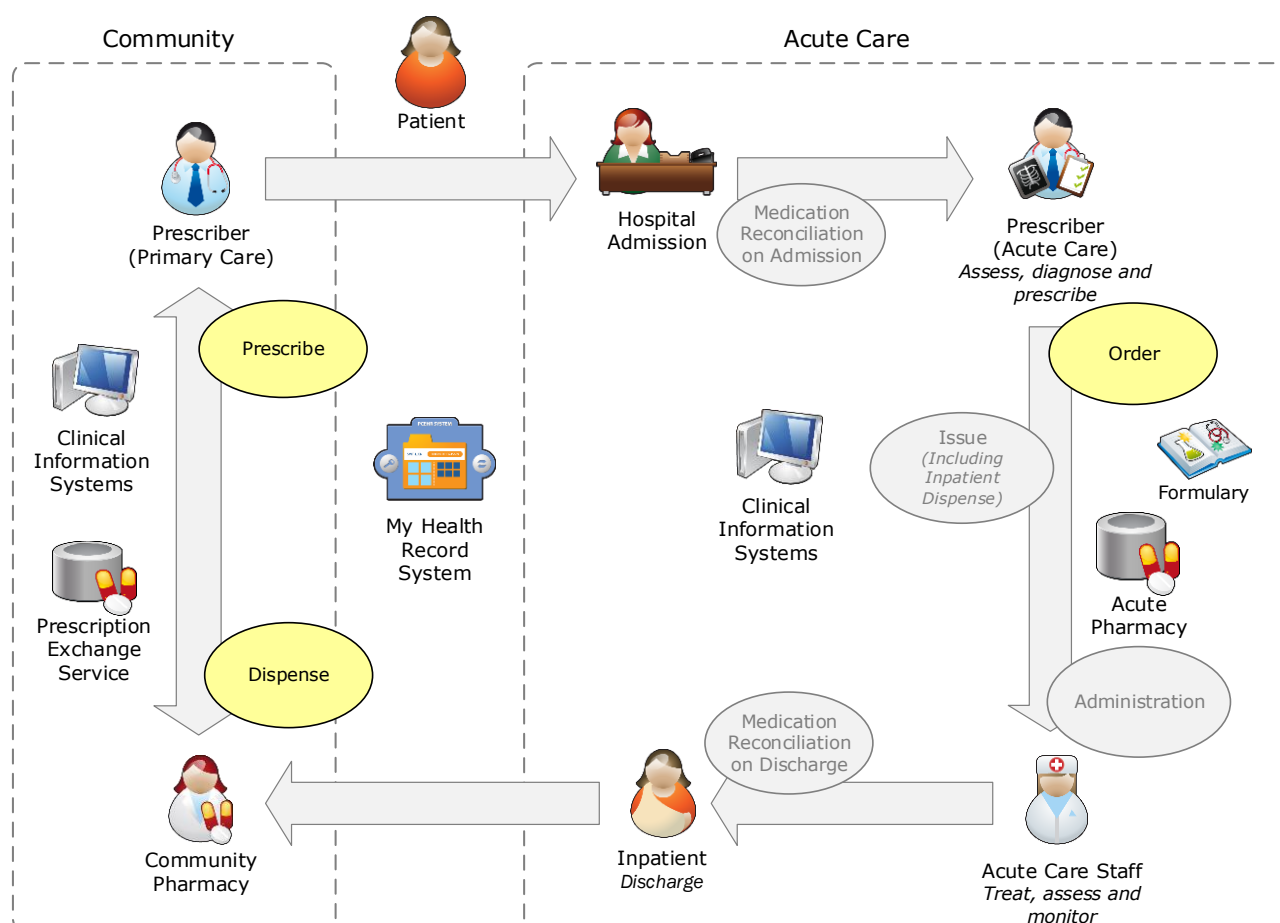


Figure 2: High-level AMT use case overview

The prescribing model was informed by stakeholder feedback, in particular dose based prescribing requirements collected from various organisations and also takes into account requirements for product based prescribing.

3.2 Associated non-terminology requirements

The prescribing model provides recommendations that specifically pertain to the usage of SNOMED CT-AU and the AMT to codify common order or prescription elements within a CIS. There are various other important non-terminology requirements underpinning an implementation, which need to be accounted for, however is out of scope of the current document. Figure 3 below illustrates the prescribing model in the context of key associated non-terminology requirements.⁶

⁶ These additional requirements are briefly described in Section 3.6, which however is not considered an exhaustive list of these requirements.

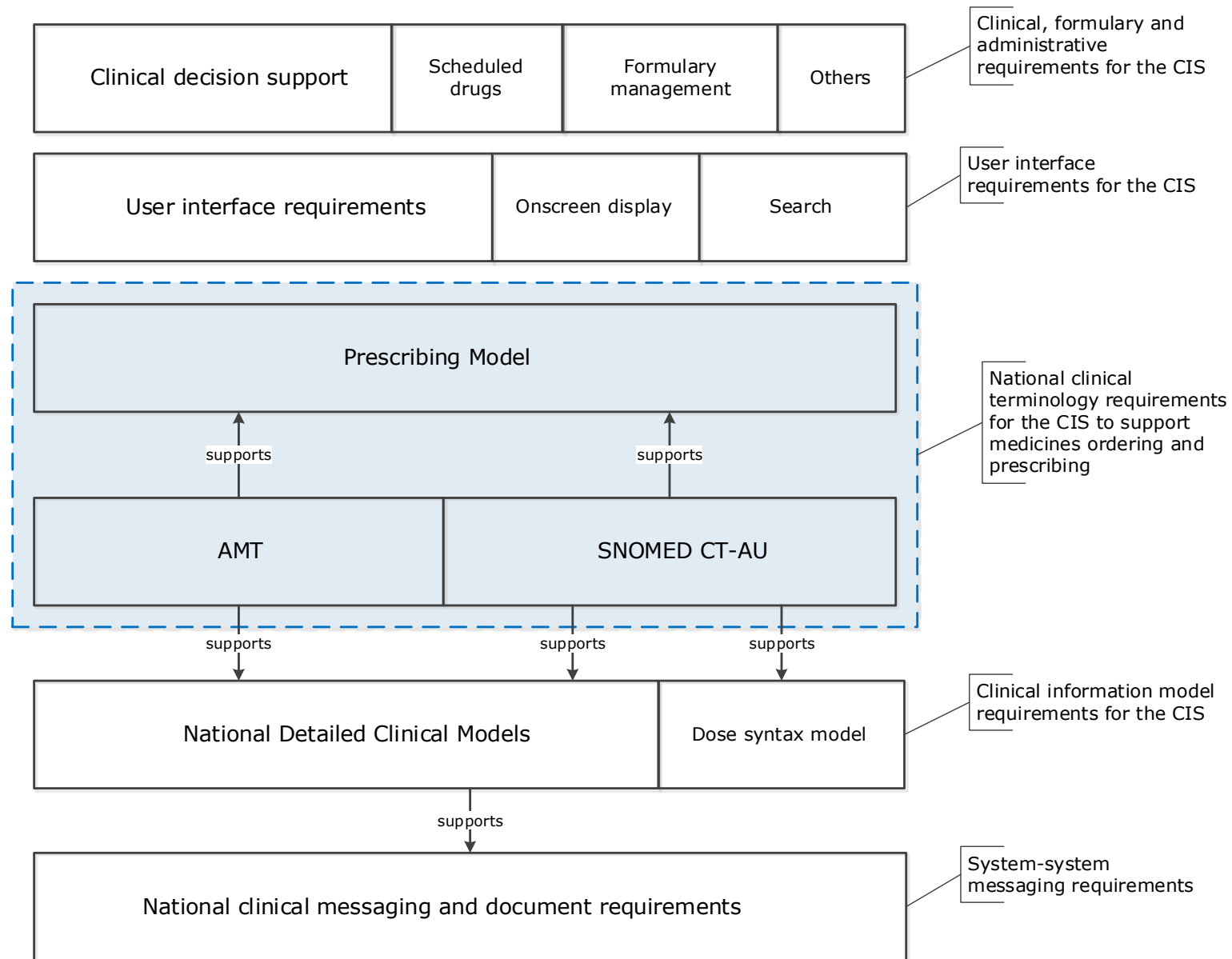


Figure 3: The prescribing model in the context of other crucial non-terminology requirements

3.3 Prescribing model figure

Figure 4 below illustrates the major steps of the prescribing model. The prescribing model defines a set of common medicine order or prescription elements along with how each element is supported by the SNOMED CT-AU and the AMT terminologies.

It describes a scenario whereby a CIS implements clinical terminologies natively by directly utilising SNOMED CT-AU and the AMT concept identifiers and Preferred Terms, and optional relationships between concepts. Concepts and Preferred Terms are sourced from various reference sets.

Please note that non-native implementations of terminologies may occur, such as mapping from a local code set to clinical terminologies for information exchange purposes. However, non-native terminology implementations are not provided for in the prescribing model.

The central elements of this figure should be regarded as the key elements of the process, but mandatory and optional steps are not stipulated.

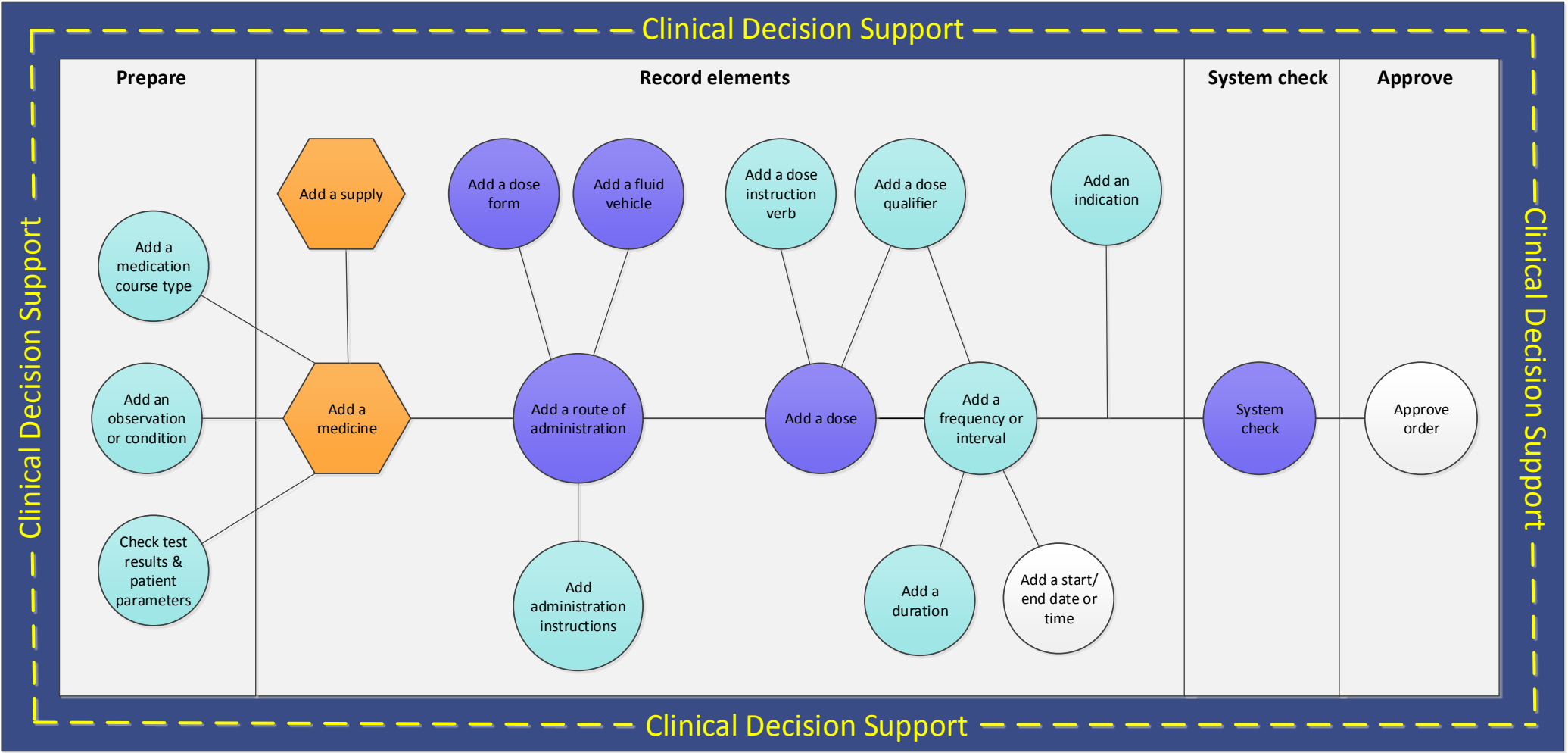
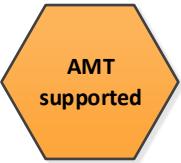
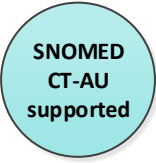
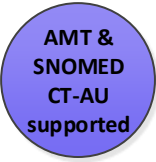


Figure 4: Prescribing model (see legend below)

3.3.1 Legend

The prescribing model steps where AMT, SNOMED CT-AU or both terminologies can be used to provide some benefit are highlighted in different colours.

Table 2: Prescribing model legend

Icon	Meaning within the prescribing model and this document
	This step is supported by using the AMT.
	This step is supported by using SNOMED CT-AU.
	This step is supported by using a combination of SNOMED CT-AU and the AMT.
	This step is not currently supported by SNOMED CT-AU or the AMT. Future enhancements to national clinical terminologies may establish support.

Note *The same icons with the same meaning have been used throughout the document to provide context to the pertaining discussions.*

3.4 Data elements in the prescribing model

A regular dose-based order will typically contain the following subset of data elements:

- *Medicine*
- *Route of Administration*
- *Dose*
- *Frequency*

A more complete set is tabulated below, and further details about each data element are described in Sections 4 and 5.

Table 3: Prescribing model data elements (alphabetical order)

Data element	Comments
<i>Administration instructions</i>	Includes <i>Method of administration</i> and <i>Site of administration</i> .
<i>Dose</i>	
<i>Dose form</i>	A <i>Dose Form</i> element may not be specified in a clinical system; dose form information may be captured by the <i>Medicine</i> element instead.
<i>Dose instruction verb</i>	
<i>Dose qualifier</i>	
<i>Duration</i>	
<i>Fluid vehicle</i>	
<i>Frequency or Interval</i>	This is a single data element that provides different options for expressing temporal components of an order.
<i>Indication</i>	
<i>Medication course type</i>	
<i>Medicine</i>	In this context, the <i>Medicine</i> element refers to a therapeutic agent comprising of an active ingredient or combination of active ingredients; or optionally a product brand name (trade product). It can be populated with a trade product where generic prescribing may not be warranted, such as products with multiple ingredients or multiple components, or differing bioequivalence. It may also include strength information.
<i>Observation or condition</i>	This is a single data element that provides different options for expressing clinical observations.
<i>Route of administration</i>	Often referred to as “ <i>Route</i> ” for ease of exposition.
<i>Start/End Date or Time</i>	This is a collective label for four related data elements: <i>Start Date</i> , <i>Start Time</i> , <i>End Date</i> and <i>End Time</i> .
<i>Supply</i>	

3.5 General sequence

The general sequence of the prescribing model is as follows:

Prepare	This is the preparation phase where preconditions are completed and factors that influence the decision to prescribe are met.
Record elements	This is the main phase where various order or prescription elements are recorded in a CIS to form a full order.
System check	This is a vital phase where a computerised check is done to ensure the principal order elements translate to commercially available products.

Approve

Upon completion of an accurate full order, this final phase sees the order signed and approved.

Table 4: Prescribing model sequence

Phase	Steps
Prepare	- The prescribing model starts when an authorised prescriber uses a CIS to record various optional preconditions to the prescribing model, which can include the following: - Add a medication course type. - Add an observation or condition. - Check test results and patient parameters. - Various other preconditions can occur, but have not been specified in the prescribing model, including: - Patient demographics and administrative information have been recorded; such as prescriber details, the patient's family/given names, date of birth, sex, Medicare number, PBS/RPBS Entitlement number, Authority Approval number, date prescribed and brand substitution details. - The prescribing model occurs after an examination of the patient is complete and any diagnoses, presenting problems, family history and adverse reaction information have been recorded. It assumes that vital signs and any required test(s) have been performed (e.g. a blood test). - The prescribing model also occurs after a medication reconciliation process has been completed. - The decision to prescribe is informed by: - an examination of the patient including any diagnoses made, family history or adverse reactions recorded; - test results, vital signs and patient parameters (e.g. age and weight); and - clinical decision support (CDS) such as contraindications and adverse reactions. Note: CDS is imperative in any clinical implementation. While not specifically called out as a prescribing model step, CDS underpins all the steps in the model. - Where approvals are required to prescribe specific products, it is assumed that the approvals have been sought by and granted to the prescriber such as in community and hospital prescribing (e.g. PBS authority approval or a restricted use antibiotic). The prescribing model does not explicitly include this as a step.
Record elements	- The authorised prescriber then selects and records the following important elements of the electronic order or prescription: <i>Medicine</i> <i>Route of administration</i> <i>Dose</i> <i>Frequency or Interval</i>

Phase	Steps
	4. The authorised prescriber may also select and record one or more elements, such as: ▪ <i>Supply</i> ▪ <i>Dose Form</i> ▪ <i>Fluid Vehicle</i> ▪ <i>Administration Instructions</i> ▪ <i>Dose Instruction Verb</i> ▪ <i>Dose Qualifier</i> ▪ <i>Duration</i> ▪ <i>Start/End Date or Time</i> ▪ <i>Indication</i> Note: Elements should be configured to occur within a logical cluster where exists. For example <i>Dose qualifier</i> will extend additional information about the <i>Dose</i> or <i>Frequency</i> element.
System check	5. After all order elements have been selected, the principal elements of the order are checked so that it suitably translates to one or more commercially available product packs or a logical subunit. ▪ This step safeguards against erroneous doses, which can result in an incorrect order or inability to dispense the order. ▪ This automated check is performed by the system and prompts the user when a translation is not successful.
Approve	6. The prescribing model ends when the authorised prescriber is satisfied with the full order or prescription and any amendments required have been made. The authorised prescriber signs and approves the electronic order or prescription. 7. The approved order or prescription is electronically transmitted from the ordering or prescribing system to a dispensing system. ▪ Notes: ○ Electronic communication of the order or prescription between the ordering or prescribing system and dispensing system is out of scope of the prescribing model. There are national specifications available that describe the standardised information structure for various clinical document types. ○ Additional review of the electronic order or prescription at the point of dispensing by a pharmacist typically occurs; however is also out of scope of the prescribing model. This will be covered by the Dispensing Model instead, to be described in future iterations of this document.

Note

In the prescribing model figure, clinical decision support is shown as a wrapper around the whole workflow because it is a critical component that underpins the whole ordering or prescribing process, and may occur at various multiple points.

3.6 Principles underpinning the prescribing model

This subsection provides a summary of the general principles that underpin the prescribing model along with the rationale for each principle.

Table 5: Prescribing model principles

No.	Topic	Principle	Rationale/sources
1	Scope of the prescribing model.	The prescribing model supports both electronic dose based ordering and pack based ordering or prescribing of medicines. It is constrained to the in-scope statement covered in Section 1.3.1 and does not cover the complete range of diverse prescribing practices and complex medicines. However, the current prescribing model does not specify the minimum set of order elements or detailed rules required for specific medicine types, such as by <i>Dose Form</i> or <i>Route of Administration</i>.	SNOMED CT-AU and the AMT contain sufficiently granular data that can be used to encode various elements of electronic medicine orders and prescriptions for these products. Future iterations of this document may cover guidance on minimum sets of order elements and rules for specific medicine types.
2	Responsibilities of an authorised prescriber.	The prescribing model specifies solely the various steps that an authorised prescriber will follow using a most common approach to order or prescribe a medicine in a computerised system. It does not specify the steps or responsibilities attributable to an authorised dispenser, clinical decision support or other actors involved in the full process of ordering or prescribing a medicine.	Future iterations of this document will cover guidance for other e-medication management and clinical activities beyond ordering and prescribing.
3	Prescribing by modular workflow or by template.	The current prescribing model has been designed to support electronic ordering or prescribing using a step-wise modular workflow. SNOMED CT-AU and the AMT can also be used to support prescribing by template (such as order sentences), however this is out of scope of the current document version.	Many ordering or prescribing systems in Australia have the functionality to create and maintain order sentences. Future iterations of this document will cover guidance on prescribing by template.

No.	Topic	Principle	Rationale/sources
4	Coded versus non-coded elements.	All data elements of an order or prescription specified in the prescribing model assumes that the elements are codified, rather than captured as free text.	One of the primary benefits of SNOMED CT-AU and the AMT is the availability of granular, coded clinical concepts underpinned by standard naming conventions that can support semantic interoperability between clinical systems. Where ordering or prescribing systems currently capture order elements as unstructured data, there are opportunities to use SNOMED CT-AU and the AMT to assist in capturing this data as standardised, structured information.
5	Sequence or linearity of prescribing steps.	The prescribing model intends to specify the most common pathway by which a modular medicine ordering or prescribing activity can occur in a clinical system. While included as a sequence of steps, the order of the prescribing model steps is not rigid and linear. The sequence of the prescribing model steps represents one approach or guide to designing a prescribing workflow. However, this sequence is not prescriptive and may be implemented differently within a clinical system. While the sequence may influence the overall workflow design, one of the most significant factors is designing correctly the intent and context of the clinical data being captured by one or more interrelated data elements of a prescribing module.	The method and extent of SNOMED CT-AU and the AMT encoding, and the degree of preconfiguration of certain steps within different implementations in vendor systems can vary considerably. Therefore, a most common approach has been chosen to demonstrate the use of SNOMED CT-AU and the AMT. A most common approach means there may be additional order or prescription elements in a CIS's information model, which are not included in the prescribing model. The order of prescribing model steps may be modified, and should be flexible to varying business needs.
6	Mandatory or optional elements of an order or prescription.	The prescribing model does not designate if an element is mandatory or optional in a medicine order or prescription. However, it does diagrammatically include the following as major elements: • <i>Medicine</i> • <i>Route of administration</i> • <i>Dose</i> • <i>Frequency or Interval</i>	Optionality information for order or prescription elements is derived from other non-terminology sources such as good prescribing or clinical practice, legal or regulatory requirements and statewide or local guidelines. Many ordering or prescribing systems in Australia designate <i>Medicine</i>, <i>Route</i>, <i>Dose</i> and <i>Frequency</i> as a minimum dataset for medicine orders. These four elements also align with the essential elements as recommended in the <i>ACSQHC National Inpatient Medication Chart</i> [7] (see also Appendix F).

No.	Topic	Principle	Rationale/sources
8	Automated system check of order elements against commercially available products.	The prescribing model recommends a mandatory automated system check that a new order suitably translates to one or more known product packs or a logical subunit. This check involves comparing the following order elements with AMT and CDS reference data: • <i>Medicine</i> • <i>Route of administration</i> • <i>Dose form</i> • <i>Dose</i> While this system check is currently at the end of the prescribing model workflow, it can equally be designed to trigger after the “Add a route of administration”, “Add a dose form” or “Add a dose” steps.	This is to ensure an erroneous dose is not specified in an order, which can result in an incorrect, unsafe order or inability to dispense the order.
9	Clinical Decision Support.	CDS systems are commonly integrated with ordering and prescribing systems to improve patient safety and ensure clinical practice is evidence-based. Typical system-generated alerts are those that prompt clinicians about dosing guidance, drug-drug, drug-food and drug-disease interactions, and drug-allergy warnings. Development and integration of active and passive CDS within ordering and prescribing systems is an essential and crucial component alongside a clinical terminology implementation. CDS can be preconfigured to trigger at any point of the prescribing model, and ideally at every step. Dynamic decision support is considered best practice, such as constraining selectable values based on a patient’s history, adverse reaction profile and by concomitant therapy, or constraining dose forms selectable for a particular medicine type. All of the prescribing model is underpinned by CDS. While this activity is partially supported by SNOMED CT-AU and the AMT, it has been considered out of scope of the current prescribing model.	Future collaborative engagement with national stakeholders is expected to analyse how SNOMED CT-AU and the AMT can support clinical decision support.

No.	Topic	Principle	Rationale/sources
10	SNOMED CT-AU and AMT substance integration.	The guidance contained in this document assumes that SNOMED CT-AU and AMT substance concepts have been fully integrated. Appendix C describes the current state where SNOMED CT-AU and AMT clinical content is distinct and has not been fully integrated.	Integration of SNOMED CT-AU and AMT substance concepts has been initiated.
11	Adoption of prescribing model terminology-supported steps.	Any number of the prescribing model's terminology-supported steps can be adopted as new, to replace existing workflow or adapted, based on the requirements of the business. Some steps rely on external non-terminology inputs such as laboratory test results. While the prescribing model may be used to inform system design, it is illustrative only and constitutes one of multiple ways to implement clinical terminology to support a prescribing pathway. Software developers must consider other local, system, clinical or technical requirements.	While the prescribing model aims to specify a recommended approach to standardise the way elements of medicine orders and prescriptions are codified using SNOMED CT-AU and the AMT, it is sufficiently flexible to allow for varying business needs and requirements.
12	Information model and machine-readable dose.	The guidance in this document focuses on how clinical terminology structures and data can be used to encode certain steps of the prescribing model. It does not provide guidance on a suitable information model to support a medicine ordering or prescribing system, or a standardised syntax to express the dose (i.e. a machine-readable dose).	Information models for prescriptions destined for the My Health Record system and point-to-point systems (like dispensing systems) are available. See Appendix G. Future iterations of this document will cover guidance on a standardised dose syntax.
13	Onscreen display, graphical user interface and search requirements.	The prescribing model includes some example medicine orders denoted using <i>ACSQHC guidelines for onscreen display of medicines information</i>. However, it is not the intent of this document to specify detailed onscreen display, graphical user interface or search functionality requirements for medicine ordering or prescribing.	Other documents beyond the <i>NCTS Clinical Implementation Guide</i> can assist, including: <i>ACSQHC National Guidelines for On-Screen Display of Clinical Medicines Information</i> [5] <i>Microsoft Design Guidance – Medications Management – Search and Prescribe</i> [8] The <i>ATIG</i> [3]

No.	Topic	Principle	Rationale/sources
14	Other clinical and administrative requirements.	There are additional clinical and administrative requirements that may be vital for a medicine ordering or prescribing system, but is considered out of scope of the current prescribing model. Examples include but not limited to the following: • Decision support system integration • PBS prescribing and Medicare claiming • Formulary and non-formulary product management • Practice Incentives Program (PIP) eHealth Incentive requirements • Minimum elements required to order products with particular dose forms • Specific requirements for ordering controlled drugs, like S8 scheduled drugs	Where the additional requirements can be supported by clinical terminologies, future iterations of this document may cover guidance on these topics.
15	Products not suitable for generic prescribing.	While the prescribing model includes some examples of products where it is not suitable to generically prescribe, it does not specify a categorical list of products that fit this criterion.	This is an implementation or system-specific requirement. Future collaborative engagement with national stakeholders is expected to analyse how such a list can be compiled and managed.

3.7 Prescribing model details

The following Sections (4 to 7 inclusive) specify the details of how each prescribing model step will occur in a typical prescribing workflow and how SNOMED CT-AU or the AMT can support each step. Refer to Appendix B for a summary of the various reference sets that can support the prescribing model steps.

Note

The guidance in this document recommends that every order element is encoded with SNOMED CT AU or the AMT, where supported by the national clinical terminologies.

Where an element is partially supported by SNOMED CT AU or the AMT, the clinical system may use additional methods for data capture such as recording local or proprietary codes or free text.

Examples on how encoded elements can be designed for data capture within an ordering or prescribing system are briefly mentioned but not detailed within this document. This may be specified in greater detail in future iterations of the document.

SNOMED CT-AU and AMT-encoded elements can be structured in the CIS in various ways, including but not limited to the following:

- A search function that supports the input of terms and identifiers for searching.
- Values for a specific element available for selection within a pick list.
- Selectable values for later elements of an order are constrained to a specific set based on earlier recorded elements.
- Autopopulation of later elements of an order based on earlier recorded elements, which are modifiable.
- Checkboxes or radio buttons specifying values or constraining the context of the data being captured.
- Preconfigured lists of commonly used order sets or sentences.
- Preconfigured workflows for specific medicine orders (such as PRN⁷, once only and warfarin orders).
- Adoption of national or international specifications for clinical information models.

⁷ “Pro re nata”, literally, “when required”.

4 Prescribing model: Prepare

Recommendation 1: Codify all order elements using SNOMED CT-AU or the AMT, where they are supported by the national clinical terminologies.

There are three terminology-supported preparatory steps that can occur prior to the first major step of “Add a medicine”, namely:

- Add a medication course type
- Add an observation or condition
- Check test results and patient parameters

4.1 Add a medication course type

This step is important for dose based orders but is generally not required for product based prescribing within non-acute care settings.

4.1.1 Example workflow

SNOMED
CT-AU
supported

- 1 The authorised prescriber considers whether the type of medicine order intended for the patient is required. For example:
 - Regular or routine order
 - When required (PRN) order
 - Once only order
 - Variable dose order (including loading dose)
 - Telephone order
 - Facsimile order
- 2 The prescriber records a medication course type.

Recommendation 2: Use the SNOMED CT-AU Descriptor concepts to specify a medication course type.

4.1.2 Relevant terminology components

4.1.2.1 SNOMED CT-AU Qualifier values

SNOMED
CT-AU
supported

Some SNOMED CT-AU *Qualifier value* concepts are suitable for this element, specifically descriptor concepts. These concepts are included in the *Dose based prescribing medication course type reference set*.

The following table lists the members of this reference set that can encode some common medication course types:

Table 6: Members of the Dose based prescribing medication course type reference set

Medication course type	Relevant SNOMED CT-AU qualifier value concept
Regular or routine order	<i>Scheduled</i>
When required (PRN) order	<i>When required</i>
Once only order	<i>Stat</i>
Variable dose order	<i>Variable dose</i>

4.1.3 Supporting reference sets

SNOMED
CT-AU
supported

The following table lists the relevant reference sets that can support this element. See Table 1 on p. 16 for additional details.

Table 7: Reference sets supporting this step

No.	Reference set
6	<i>Dose based prescribing medication course type reference set</i>

4.2 Add an observation or condition

An observation or condition may be clinically important to be captured in the CIS, as part of influencing a decision to prescribe. For example, this information may justify an out of range dose quantity, or describe a patient's current or past problems affecting a medicine to be prescribed (contraindications). In addition the efficacy or toxicity profile of certain medicines may be altered due to the patient's concomitant therapies.

While this information is typically unstructured, some observations or conditions can be terminology encoded.

Example

The cardiac glycoside digoxin is indicated for congestive heart failure and atrial fibrillation. Digoxin levels are affected by patient factors such as pregnancy or patient age (for example, children and the elderly). Digoxin levels are also affected to concomitant therapy with other medicines which may increase or decrease serum levels such as with amiodarone, captopril, gentamicin, lidocaine and St. John's wort.

Examples of observations and conditions include:

- "Pregnant patient. Dosage increased to 2 mg for initial dose."
- "Elderly patient. Assess renal function and serum level after 5 days."
- "History of mild rash."

4.2.1 Example workflow

SNOMED
CT-AU
supported

- 1 The prescriber considers whether some observation or condition is required to be captured, which influences a to-be prescribed medicine or dose.
- 2 The prescriber records one or more observations or conditions.
 - Observations or conditions that are SNOMED CT-AU encoded can be used to constrain selectable values for subsequent order elements, such as *Medicine* or *Dose*.

Recommendation 3: Use the SNOMED CT-AU Clinical finding, Observable entity and Situation with explicit context concepts to specify an observation or condition where supported.

4.2.2 Relevant terminology components

4.2.2.1 SNOMED CT-AU clinical findings

SNOMED
CT-AU
supported

Some SNOMED CT-AU *Clinical finding* concepts can be used to record the whole or part of an observation or condition. These concepts are included in the *Problem/Diagnosis reference set*. This is a large reference set; implementers can develop a more constrained set.

Some example concepts:

- |Pregnant|
- |At risk for impaired liver function|
- |Decreased renal function|

4.2.2.2 SNOMED CT-AU observable entities

SNOMED
CT-AU
supported

Some SNOMED CT-AU *Observable entity* concepts can be used to record the whole or part of an observation or condition. These concepts are included in the *Observable entity foundation reference set*. This is a large reference set; implementers can develop a more constrained set.

Some example concepts:

- |Creatinine renal clearance|
- |Liver function|

4.2.2.3 SNOMED CT-AU situations with explicit context

SNOMED
CT-AU
supported

Some SNOMED CT-AU *Situation with explicit context* concepts can be used to record the whole or part of an observation or condition. These concepts are included in the *Situation with explicit context foundation reference set*. This is a large reference set; implementers can develop a more constrained set.

Some example concepts:

- |History of depression|
- |History of glaucoma|

4.2.3 Supporting reference sets

SNOMED
CT-AU
supported

The following reference sets provide terminology to support this step. See Table 1 on p. 16 for additional details.

Table 8: Reference sets supporting this step

No.	Reference set
16	<i>Observable entity foundation reference set</i>
17	<i>Problem/Diagnosis reference set</i>
19	<i>Situation with explicit context foundation reference set</i>

4.3 Check test results and patient parameters

Some orders rely on the results of certain tests or a patient's medical parameters to specify a suitable medicine or dose. For example:

- Variable dosing regimen of warfarin based on International Normalised Ratio (INR) results
- Blood glucose levels for insulin orders
- Blood pressure readings for antihypertensive agents
- Heart rate readings for digoxin
- Renal function levels for parenteral aminoglycosides
- Creatinine clearance levels for patients with impaired renal function
- Microbiological sensitivity testing to select appropriate antibiotics
- Weight-based calculations for paediatric orders

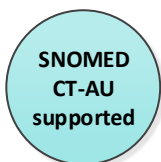
4.3.1 Example workflow

SNOMED
CT-AU
supported

- 1 Based on their clinical judgement or using the CDS system, the prescriber decides whether a to-be prescribed medicine or its dose is dependent on the patient's test results or medical parameters (such as gender, age, weight and vital signs).
- 2 If deemed appropriate the prescriber consults one or more test results or the patient's medical parameters.

Note: This assumes some precondition has been met – that is the suitable tests and medical parameters have been completed and their results are available.
- 3 The prescriber uses the relevant test results or patient parameters when recording a suitable *Medicine* or *Dose* (see Sections 5.1 and 5.2).
 - If a warfarin order is being created, some CISs may preconfigure the workflow to mandate the recording of the patient's INR results and target INR range.

4.3.2 Supporting reference sets



Various SNOMED CT-AU reference sets may provide terminology to support the codifying of orders, results, specimens or microorganisms. Most of these pertain to the pathology program of work.

Example reference sets include:

- *Anatomical location name reference set*
- *Anatomical site reference set*
- *Collection procedure reference set*
- *Imaging procedure reference set*
- *Laterality reference set*
- *Microorganism reference set*
- *Out of range indicator reference set*
- *Request test name reference set*
- *Result test name reference set*
- *Specimen characteristic reference set*
- *Specimen foundation reference set*
- *Specimen qualifier reference set*
- *Specimen quality reference set*
- *Specimen type reference set*
- *Testing method reference set*
- *Unexpected result indicator reference set*

Notes

- *While partially supported by clinical terminologies, this step is not elucidated in any detail because it is system-specific and out of scope of the prescribing model.*
- *Further work is being done with The Royal College of Pathologists of Australasia (RCPA) for the Pathology program of work. Contact the NCTS for further guidance.*

5 Prescribing model: Record elements

5.1 Add a medicine

This is the first major step of the prescribing model. The “Prepare” phase that preceded this step can influence the selection of a suitable medicine to be prescribed.

5.1.1 Example workflow

The prescriber searches for and selects an appropriate medicine. Dependent on whether the medicine is being recorded for a dose based order or a pack based prescription, this may be:

- an AMT substance concept, specifically an MPUU’s related substance that is the Basis of Strength Substance (BoSS); or
- an AMT product concept such as a MPUU or TPUU concept.
 - There are six AMT product classes that may be used including MPUU, MPP, TP, TPUU, TPP and CTPP. Refer to the Glossary for definitions of BoSS and each of the AMT product concepts.

5.1.2 Dose based orders

5.1.2.1 Single ingredient, single component products

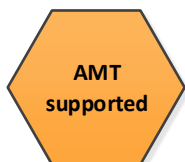
The vast majority of single ingredient, single component products have the same BoSS and MP (or its Intended active ingredient (IAI)). For these cases, the BoSS concept is recommended for use.

- In fact, the BoSS and IAI are the same substance concept.

Example For example, the BoSS *|Amoxicillin|* is the same as the IAI of an MP *|Amoxicillin|*.

- The MP concept is NOT recommended for use because there are some products where the BoSS and IAI are different, and specifying a dose or strength against such an MP can lead to an ambiguous order.

Example *For example, the BoSS of |Perindopril arginine| and |Perindopril erbumine| are different to the IAI of |Perindopril|. A dose or strength specified for |Perindopril| is ambiguous because it can be interpreted as an amount pertaining to the perindopril base entity or pertaining to either of the available arginine or erbumine salt entities. Therefore, the BoSS of |Perindopril arginine| and |Perindopril erbumine| are used instead of the MP to provide a safer way to create an order.*



- However, for a small list of products (included in Appendix C⁸) where the BoSS is less specific than the MP (IAI), it is recommended that the MPUU be used instead.
 - The additional substance modification information included in the MPUU can influence a decision to prescribe. This information is specified in the MPUU description but is not provided by the BoSS.

Example

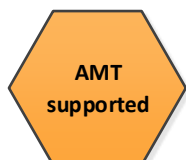
For example, the TPP |Haldol Decanoate 150 mg/3 mL injection solution, 5 x 3 mL ampoules| has a BoSS of |Haloperidol| and IAI of |Haloperidol decanoate|. The "decanoate" modification to Haloperidol is a clinically relevant information, that is, this signifies it is to be administered as a depot injection that will have prolonged release characteristics compared to just a Haloperidol injection.

In this case, the MPUU |haloperidol (as decanoate) 150 mg/3 mL injection, ampoule| is used, as it includes the clinically relevant information of "(as decanoate)".

Recommendation 4a: Use the AMT BoSS for single ingredient, single component products.

Recommendation 4b: If the BoSS is less specific than the MP (or IAI), use the MPUU. Do not use the MP as it may lead to an ambiguous order.

5.1.2.2 Multi-ingredient products with 2 or 3 ingredients



For multi-ingredient products with 2 or 3 ingredients, it is recommended that:

- The BoSS concept should be used if:
 - Multiple ingredients and dose entries can be specified for the *Medicine* element and the CIS allows an individual dose to be specified for each ingredient.
 - Multiple orders are created to describe each ingredient.
- The MPUU concept should be used – if only one entry is allowed for the *Medicine* element.

Note: Recommendations on how to express the related dose are covered in Section 5.2.

⁸ While included as a list of affected products in this version of the document, a future machine-readable reference set is expected to be developed to specify these products.

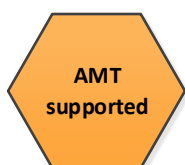
Example

For the product |Coveram 10mg/5mg (perindopril arginine/amlodipine) tablet, 30|, if a CIS allows the specifying of "10 mg" for perindopril arginine and "5 mg" for amlodipine separately, then the BoSS concepts of |Perindopril arginine| and |Amlodipine| are used.

In contrast, if a CIS only allows one entry for the Medicine element, the single MPUU |perindopril arginine 10 mg + amlodipine 5 mg tablet| is used.

Recommendation 5a: Use the AMT BoSS for multi-ingredient products (with 2 or 3 ingredients) if a CIS allows an individual dose or strength to be specified for each ingredient.

Recommendation 5b: Use the MPUU if a CIS only allows a single entry to be recorded for the Medicine element.



5.1.2.3 Multi-ingredient products with > 3 ingredients

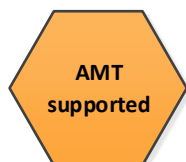
For multi-ingredient products with >3 ingredients, it is recommended that the TP concept is used.

- These products are typically well known by their brand names rather than by their list of constituent substances.

Example

For example, the TP |Centrum| is used instead of its generic equivalent because it has 11 active ingredients and an MP of |ascorbic acid + biotin + choline + cyanocobalamin + folic acid + inositol + nicotinamide + pantothenate calcium + pyridoxine + riboflavin + thiamine|.

Recommendation 6: Use the AMT TP for multi-ingredient products with more than 3 ingredients.



5.1.2.4 Multicomponent products with an active component (single ingredient) and an inactive component

For multicomponent products where the active component contains one ingredient while the other inactive (or inert) component contains a solvent or diluent, it is recommended that the BoSS concept be used.

- These products are treated as single ingredient, single component products for the purposes of ordering because:
 - the solvent or diluent component is specified and more relevant during the product's administration; or
 - there is no BoSS concept for inactive components because they do not have an associated strength due to their nature.

Example

For example, the TPP |Solu-Medrol (1 x 500 mg vial, 1 x 8 mL diluent vial), 1 pack| has a methylprednisolone injection (active) component and a diluent component. The BoSS of |Methylprednisolone| is used to specify the active component.

Recommendation 7: Use the AMT BoSS to specify the active component for multicomponent products with an active component (single ingredient) and an inactive component.

5.1.2.5 Multicomponent products with an active component (2 or 3 ingredients) and an inactive component

AMT
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For multicomponent products where the active component contains 2 or 3 ingredients while the other inactive component contains a solvent or diluent, it is recommended that:

- The BoSS concept should be used – if multiple ingredients and dose entries can be specified for the *Medicine* element and the CIS allows an individual dose to be specified for each ingredient.
- The MPUU concept should be used – if only one entry is allowed for the *Medicine* element.
 - These products are treated as multi-ingredient products (with 2 or 3 ingredients) for the purposes of ordering as the solvent or diluent component is specified during the product's administration.

Example

The paediatric vaccine |Menitorix| has an MPP of |Haemophilus influenzae type B polyribose ribitol phosphate vaccine 5 microgram + meningococcal group C polysaccharide vaccine 5 microgram injection [1 vial] (&) inert substance diluent [1 syringe], 1 pack|.

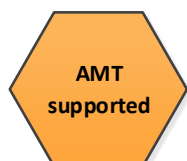
If a CIS allows the specifying of "5 microgram" for the Haemophilus substance and "5 microgram" for the meningococcal substance separately, then the BoSS concepts of |Haemophilus influenzae type B polyribose ribitol phosphate vaccine| and |meningococcal group C polysaccharide vaccine| are used.

In contrast, if a CIS only allows one entry for the Medicine element, the single MPUU |Haemophilus influenzae type B polyribose ribitol phosphate vaccine 5 microgram + meningococcal group C polysaccharide vaccine 5 microgram injection, vial| is used.

Recommendation 8a: Use the AMT BoSS to specify the active component for multicomponent products with an active component (2 or 3 ingredients) and an inactive component, if a CIS allows an individual dose or strength to be specified for each active ingredient.

Recommendation 8b: Use the MPUU if a CIS only allows a single entry to be recorded for the active component for the Medicine element.

5.1.2.6 Multicomponent products with an active component (> 3 ingredients) and an inactive component



For multicomponent products where the active component contains > 3 ingredients while the other inactive component contains a solvent or diluent, it is recommended that the TP concept is used.

- These products are treated as multi-ingredient products (with > 3 ingredients) for the purposes of ordering as the solvent or diluent component is specified during the product's administration.
- These products are typically well known by their brand names rather than by their list of constituent substances.

Example

The TP |Menomune| is used instead of the generic equivalent of its active component because it has 4 active ingredients and an MP of |meningococcal group A polysaccharide vaccine + meningococcal group C polysaccharide vaccine + meningococcal group W135 polysaccharide vaccine + meningococcal group Y polysaccharide vaccine|.

Recommendation 9: Use the AMT TP to specify the active component for multicomponent products with an active component (> 3 ingredients) and an inactive component.

5.1.2.7 Multicomponent products with multiple active components



For multicomponent products where there are multiple active components, it is recommended that either the MPUU or TP concept is used.

- The *Relationship* file can be used to identify a multicomponent product with multiple active components.
- If a CIS permits or encourages ordering by a generic entity, then each of the MPUUs comprising the multicomponent product is used.
 - This is usually handled by creating multiple orders, with each MPUU recorded for each *Medicine* element.

Example

The non-sequential multicomponent product TP |Nexium Hp7| has three individual components (Nexium, Klacid and Amoxil components). It is commonly ordered by specifying each of its generic components (i.e. MPUU) as follows:

- |esomeprazole 20 mg enteric tablet|
- |clarithromycin 500 mg tablet|
- |amoxicillin 500 mg capsule|

- If a CIS does not allow ordering by a generic entity, or a product is better known by its brand name rather than by its list of constituent components, then the TP is used.
 - In this case, a single order can be created with the TP recorded in the *Medicine* element.

Example

Using the same product as the previous example, |Nexium Hp7| can be recorded in a single order instead of its MPUU components if a CIS encourages ordering by brand.

Another example is a sequential multicomponent product intended to be taken in a defined order such as the oral contraceptive |Triphasil|. It has a combination of multiple active ingredients within three separate components, an inactive tablet component and multiple identical subpacks (or monthly packs).

It has an MPP of |Triphasil (6 x 50 microgram/30 microgram tablets, 5 x 75 microgram/40 microgram tablets, 10 x 125 microgram/30 microgram tablets, 7 x inert tablets), 4 x 28|.

This product is more suited to be recorded using its brand name (TP) of |Triphasil|.

Recommendation 10a: Use the AMT MPUU for multicomponent products with multiple active components if a CIS permits ordering by a generic entity.

Recommendation 10b: Use the TP if the CIS only permits ordering by brand or the product is better known by its brand name.

5.1.2.8 Other recommendations – products not suitable for generic ordering

AMT
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There are products that are not recommended for generic ordering due to other factors, where the brand name provides the required specificity over the generic entity. For these cases, the TP, TPUU or TPP concepts can be used if deemed clinically appropriate.

This includes but is not limited to the following:

- Non-bioequivalent products (such as phenytoin and digoxin).
- Modified release forms of a product with sustained release characteristics not captured by the generic entity (such as Tramal SR and Durotram XR for sustained release tramadol).
- Insulins with specialised delivery devices that require patient education (such as Lantus and Novorapid).

For these products:

- If the TP is recorded, it should be coupled with a capturing of the *Dose Form* element with a modified release form.
- If the TPUU or TPP is recorded, the *Dose Form* element may be left unrecorded so as to avoid duplication of dose form information.

Example *For an order for a modified release tramadol tablet, it is recommended to use either the TP |Durotram XR|, TPUU |Durotram XR (once a day) 100 mg modified release tablet| or TPP |Durotram XR (once a day) 100 mg modified release tablet, 10|.*

If the TP is recorded, it should be coupled with the recording of the Dose form element with |modified release tablet|.

If the TPUU or TPP is recorded, the Dose form element should be left unrecorded to avoid duplication of dose form information.

- There are specific instances where both the generic entity and brand name are used in conjunction, due to non-bioequivalence or some safety concerns. For these cases, the BoSS and TP can be used together.

Example *A warfarin order is recommended to always include the brand name such as "Warfarin sodium (Coumadin)" or "Warfarin sodium (Marevan)".*

In this case, the BoSS of |Warfarin sodium| and TP of |Coumadin| or |Marevan| are used in conjunction.

Note *Information on products not suitable for generic ordering is usually sourced from system, CDS, state or local requirements. While the terminology does not currently specify a subset of products deemed not suitable for generic ordering, the terminology supports the recording of the Medicine element using the BoSS, TP, TPUU or TPP concepts.*

Recommendation 11a: Use the AMT TP, TPUU or TPP concepts to specify the Medicine element, where clinically appropriate such as modified release form products.

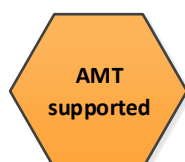
Recommendation 11b: If the TP is used, it should be coupled with a recorded Dose Form element specifying the modified release form.

Recommendation 11c: If the TPUU or TPP is used, the Dose Form element should be left unrecorded to avoid duplication of dose form information.

Recommendation 11d: Use the AMT BoSS and TP concepts in conjunction to specify the Medicine element for warfarin orders.

5.1.3 Product based orders or prescriptions

5.1.3.1 Products with pack quantity specified in a single element



The medicine recorded for a product based order or prescription typically includes the following elements:

- Active ingredient
- Strength
- Dose form
- Pack quantity

If a single *Medicine* element in a CIS allows the recording of a product together with its pack or supply quantity, the AMT MPP, TPP or CTPP concepts should be used.

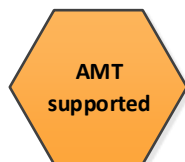
- If a generic pack entity is to be recorded, the MPP is used.
- If a branded pack entity is to be recorded, the TPP is used.
- If a branded pack entity has a container type specified, the CTPP is used.

Note: Using the CTPP is a less common approach.

Example For example, the multi-ingredient antiretroviral preparation |Kivexa| may be recorded by using either an MPP of |abacavir 600 mg + lamivudine 300 mg tablet, 30| or a TPP of |Kivexa tablet, 30| if container type information is not relevant.

Recommendation 12: Use the AMT MPP, TPP or CTPP to prescribe a product if a Supply quantity is specified within the Medicine element.

5.1.3.2 Products with pack quantity specified in separate, distinct elements



If a CIS captures the *Medicine* element separately to a *Quantity* element, then the MPUU or TPUU concept is used to record the *Medicine* element.

- If a generic entity is to be recorded, the MPUU is used.
- If a branded entity is to be recorded, the TPUU is used.

The MPUU describes the active ingredient(s), strength(s) and dose form of a product while the TPUU is the branded equivalent of the MPUU.

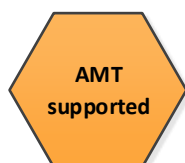
Example *Using the same |Kivexa| example, the Medicine element can be recorded by using either the MPUU of |abacavir 600 mg + lamivudine 300 mg tablet| or the TPUU of |Kivexa tablet|. A pack quantity or supply quantity of "30 tablet" can be recorded in a Supply element, separate to the Medicine element.*

Recommendation 13: Use the AMT MPUU or TPUU to prescribe a product if a separate Supply quantity is specified outside the Medicine element.

5.1.4 Relevant terminology components

These components support both dose based and product based orders.

5.1.4.1 AMT BoSS



The BoSS can be used to record the *Medicine* element for various types of dose based orders.

A BoSS concept represents the substance that is related to the strength of a product, as derived from a product's official Australian registration details.

Example *In the ARTG Summary details, the product "ALPHAMOX 500 amoxicillin 500mg (as trihydrate) capsule blister pack" has an ARTG ID of 17679. This product contains the manufactured active ingredient of amoxicillin trihydrate. However, the reported strength is "500 mg", which actually pertains to the amoxicillin base.*

Therefore, the BoSS concept in AMT is |amoxicillin| and its related machine-readable strength is "500 mg/each".

The AMT does not currently include the Pharmaceutical ingredient (or manufactured active ingredient) or its strength, where this is different to the BoSS and its strength. Using the same |amoxicillin| example, the ingredient "amoxicillin trihydrate" and its strength are not specified.

The strength of AMT products is determined by the BoSS.

Choosing the MP over the BoSS for dose based orders can be problematic for products that have different BoSS ingredients (e.g. different salts) but share the same MP (e.g. base). Specifying a dose or strength against the MP (a base) when it is usually correlated with the BoSS (a salt) can lead to an ambiguous order.

Choosing an MP over the BoSS where the MP and BoSS have the same ingredients (e.g. both are base entities) may be acceptable, however this complicates the implementation since the BoSS is required anyway.

Example *|Perindopril| is available in arginine and erbumine salts as different BoSS concepts while the MP is just the perindopril base.*

- *MP: |perindopril|*
- *MPUU: |perindopril arginine 10 mg tablet|, BoSS is |perindopril arginine|*
- *MPUU: |perindopril erbumine 8 mg tablet|, BoSS is |perindopril erbumine|*

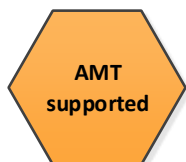
Selecting the MP |perindopril| and specifying a dose or strength of "10 mg" leads to an ambiguous order because a direct interpretation of this means 10 mg of perindopril base. This is a larger dose than is provided by each of the associated MPUU concepts.

Example |Pseudoephedrine| is available in both hydrochloride and sulfate salts.

- MP: |pseudoephedrine|
- MPUU: |pseudoephedrine hydrochloride 120 mg tablet |, BoSS is |pseudoephedrine hydrochloride|
- MPUU: |pseudoephedrine sulfate 120 mg tablet |, BoSS is |pseudoephedrine sulfate |

Both of these products are 120 mg tablets, but have different amounts of actual pseudoephedrine present as the strength is relative to the presence of the salt. Prescribing using the BoSS reduces the likelihood of miscommunication about the desired strength.

5.1.4.2 AMT products



Six of the seven AMT product classes can be used to support medicines recording for dose based and product based orders or prescriptions.

Active concepts of each AMT product class are published in individual reference sets.

These product classes have varying granularity. The following table provides an example.

Table 9: AMT product classes with examples

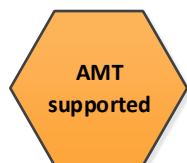
AMT product class	Example Preferred Term
MPUU	amoxicillin 250 mg capsule
MPP	amoxicillin 250 mg capsule, 20
TP	Alphamox
TPUU	Alphamox 250 mg capsule
TPP	Alphamox 250 mg capsule, 20
CTPP	Alphamox 250 mg capsule, 20, blister pack

Note Some MPUU or MPP Preferred Terms are too lengthy or not appropriate for use due to presence of multiple ingredients. Clinically intuitive names or grouper concepts will be introduced for these products instead. This is in scope of the Clinical Interface Descriptions project, due to be delivered in the near future.

For these concepts, the associated TP, TPUU, TPP or CTPP should be recorded instead.

Recommendation 14: Use the AMT TP, TPUU, TPP or CTPP if the Preferred Terms of MPUU or MPP are too lengthy or not appropriate for selection due to multiple ingredients.

5.1.4.3 Relationship file



The Relationship file can be used to identify multicomponent products with multiple active components.

For these products, their product pack concept (such as MPP, TPP and CTPP) will have >1 relationship to either an MPUU or TPUU that is not an inert substance. For example:

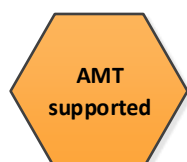
Table 10: Example TPP with multiple associated TPUUs

TPP	Relationship type	TPUU
Zolacos CP (1 x 10.8 mg implant, 28 x 50 mg tablets), 1 pack	Has TPUU	Zoladex 10.8 mg implant, 1
	Has TPUU	Cosudex 50 mg tablet, 28 tablets

5.1.5 Supporting reference sets

These reference sets support both dose based and product based orders.

5.1.5.1 AMT products



The following table lists the relevant product reference sets that can support this step. See Table 1 on p. 16 for additional details.

Table 11: Reference sets supporting this step

No.	Reference set
3	Containerised trade product pack reference set
14	Medicinal product unit of use reference set
15	Medicinal product pack reference set
22	Trade product reference set
23	Trade product unit of use reference set
24	Trade product pack reference set

5.1.5.2 AMT BoSS



The AMT BoSS concepts are not published in a reference set, however can be extracted from the terminology data by using a preprepared SQL script – refer to the ATIG [3].

5.2 Add a supply

This element is important only for product based orders where an MPUU or TPUU concept has been recorded in the *Medicine* element and a separate *Supply* quantity or volume is to be specified.

The *Supply* element comprises two components:

- The supply quantity or volume, and
- An appropriate unit of measure.

There are two ways to record the *Supply* element. It may reflect either:

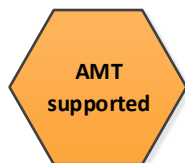
- *Supply* is the same as the pack quantity of a commercially available presentation (such as 20 tablets); or
- *Supply* is a single unit of use (such as 1 tablet) or multiples of the unit of use (such as 5 tablets).

Note *The second category (recording of single or multiples of the unit of use) reflects the common practice of ordering and administration of "broken quantity" (smaller portions of a commercially available pack) within acute care settings.*

5.2.1 Example workflow

- 1 Based on the recorded MPUU or TPUU within the *Medicine* element, the prescriber selects a preconfigured *Supply* quantity or volume, and a unit of measure; or
- 2 Based on their clinical judgement or after consulting the CDS system, the prescriber types in a *Supply* quantity or volume, and selects an appropriate unit of measure.

5.2.1.1 Supply is the same as pack quantity of a commercially available presentation



If the *Supply* element is the same as the pack quantity of a commercially available presentation, it can be wholly derived from the AMT **Unit of Use Quantity** attribute of MPP or TPP concepts.

Example *The Medicine element is recorded with the MPUU of |abacavir 600 mg + lamivudine 300 mg tablet|. This product currently only has one commercially available presentation, in a 30 tablet pack.*

A unit of use quantity of "30 tablet" is recorded in the Supply element.

The *Supply* quantity/volume and unit derived from the AMT *Unit of use quantity* can be used to constrain the list of selectable *Supply* values that are relevant to the *Medicine*. This is supported by the following:

- The association between an MPUU, an MPP and the MPP's Unit of use quantity
- The association between a TPUU, a TPP and the TPP's Unit of use quantity

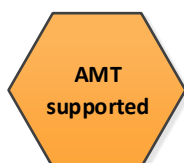
The following is an example for the MPUU |*aspirin 100 mg tablet*| recorded as the *Medicine*. It shows four related MPPs for the MPUU (using the Relationship file), and therefore four selectable Unit of use quantities for the *Supply* element, namely:

- "30 tablet"
- "90 tablet"
- "112 tablet"
- "200 tablet"

Table 12: Example MPUU with multiple associated MPPs and Unit of Use quantities

MPP	Relationship type	MPUU	Unit of use quantity
<i>aspirin 100 mg tablet, 30</i>	Has MPUU	<i>aspirin 100 mg tablet</i>	• Value "30" • Unit of measure <i>tablet</i>
<i>aspirin 100 mg tablet, 90</i>	Has MPUU		• Value "90" • Unit of measure <i>tablet</i>
<i>aspirin 100 mg tablet, 112</i>	Has MPUU		• Value "112" • Unit of measure <i>tablet</i>
<i>aspirin 100 mg tablet, 200</i>	Has MPUU		• Value "200" • Unit of measure <i>tablet</i>

5.2.1.2 Supply is different to the pack quantity of a commercially available presentation



If the *Supply* element is different to the pack quantity of a commercially available presentation (can either be a single or multiple of its unit of use), then only the *Supply* unit can be recorded using the unit field of the AMT *Unit of use quantity*.

The *Supply* quantity or volume is manually recorded.

Example

Using the same Medicine element of MPUU |abacavir 600 mg + lamivudine 300 mg tablet|, which has one commercially available presentation of 30 tablet pack, an intention to order "5 tablets" means the prescriber records a Supply quantity of "5" and selects the unit of measure of |tablet|.

- Recommendation 15a:** Use preconfigured AMT Unit of use quantity attribute of MPP or TPP concepts associated with a recorded MPUU or TPUU to specify the Supply element if a separate Supply quantity is specified outside the Medicine element for product based orders and Supply is the same as the pack quantity of a commercially available presentation.
- Recommendation 15b:** Only use the unit component of the AMT Unit of use quantity attribute if Supply is different to the pack quantity of a commercially available presentation.

5.2.2 Relevant terminology components

5.2.2.1 Unit of use quantity

The *Unit of use quantity* value and unit of an MPP or TPP concept (derived from the associated *Unit of use quantity reference set*) can be used to record the *Supply* quantity or volume and unit of measure respectively.

The following table provides two MPP examples.

Table 13: Unit of Use quantities for MPP concepts

MPP	Relationship type	MPUU	Unit of use quantity
atorvastatin 20 mg tablet, 10	Has MPUU	atorvastatin 20 mg tablet	- Value "10" - Unit of measure tablet
captopril 5 mg/mL oral liquid, 95 mL	Has MPUU	captopril 5 mg/mL oral liquid	- Value "95" - Unit of measure mL

5.2.3 Supporting reference sets

The following reference set provides terminology to support this step. See Table 1 on p. 16 for additional details.

Table 14: Reference sets supporting this step

No.	Reference set
25	Unit of use quantity reference set

5.3 Add a route of administration

This is a major prescribing model step.

5.3.1 Example workflow

The prescriber searches for and adds one or more routes of administration as appropriate for the selected medicine.

Example	<i>For example, a Route of Oral route is selected for the medicine "Amoxicillin".</i>
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Recommendation 16: Use SNOMED CT-AU Route of Administration value concepts to specify a Route.

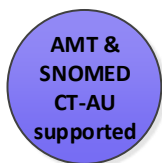
- 1 The *Route* may be autopopulated by the CIS upon the selection of a *Medicine*.
 - This is achieved by having preconfigured product-*Route* constraints. Below are some examples:
 - The list of available *Routes* is specific for a selected medicine
 - Only this is terminology supported and described below.
 - Recommended or registered *Routes* are displayed at the top of the list.
 - Permitted or prohibited *Routes* may be indicated.
 - Autopopulated *Routes* should be able to be amended by the prescriber, for example in support of off-label use of a medicine.

Note	<i>The registered routes of administration for a medicine, as approved by the TGA is currently out of scope of the prescribing model because this information can change over time and is therefore considered a non-defining attribute of AMT concepts.</i>
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5.3.1.1 Routes constrained by a selected Medicine (MPUU, MPP, TP, TPUU, TPP or CTPP recorded)

If a *Medicine* element is AMT-encoded with an MPUU, MPP, TP, TPUU, TPP or CTPP, the list of available *Routes* for recording can be constrained.

- This is achieved by checking the *Medicine*'s **Form** attribute against one or more associations between SNOMED CT-AU *Route* and AMT *Form* entries.
 - The **Form** attribute of an AMT concept belongs to MPUU and TPUU concepts, accessible from the Relationship file.
 - If the *Medicine* is an MPP, TP, TPP or CTPP, the related MPUU or TPUU is found by using relationships between these concepts.
 - SNOMED CT-AU *Route*-AMT *Form* associations are included in the *Dose route and form extended association reference set*.



- The table below describes two examples:
 - An MPUU is recorded as the *Medicine*, which has a *|tablet|* form. Using the SNOMED CT-AU *Route-AMT Form* associations result in five selectable routes for recording.
 - A TPUU is recorded as the *Medicine*, which has a *|wafer|* form. Using the SNOMED CT-AU *Route-AMT Form* associations result in four selectable Routes for recording.

Table 15: Multiple Routes of Administration for a given Medicine (product concept recorded)

AMT product (recorded in Medicine element)	AMT Form attribute (Has Manufactured Dose Form relationship)	SNOMED CT-AU Route- AMT Form association(s)	Constrained list of SNOMED CT-AU Routes for recording ⁹
MPUU <i> amoxicillin 250 mg tablet </i>	<i> tablet </i>	• <i> Enteral route - tablet </i> • <i> Gastroenteral route - tablet </i> • <i> Oral route - tablet </i> • <i> Orogastric route - tablet </i> • <i> Transplacental route - tablet </i>	• <i> Enteral route </i> • <i> Gastroenteral route </i> • <i> Oral route </i> • <i> Orogastric route </i> • <i> Transplacental route </i>
TPUU <i> Zyprexa Zydys 10 mg wafer </i>	<i> wafer </i>	• <i> Buccal route - wafer </i> • <i> Mucosal route - wafer </i> • <i> Oromucosal route - wafer </i> • <i> Sublingual route - wafer </i>	• <i> Buccal route </i> • <i> Mucosal route </i> • <i> Oromucosal route </i> • <i> Sublingual route </i>

5.3.1.2 Routes constrained by a selected Medicine (BoSS recorded)

Similarly if a *Medicine* element is recorded with a BoSS, the list of available *Routes* for recording can also be constrained.

- This is achieved by checking the associated MPUU concepts for the BoSS, the MPUU's **Form** attribute, and one or more SNOMED CT-AU *Route* and AMT *Form* associations.
 - Most MPUU concepts have a **Has Australian BoSS** relationship to one or more BoSS concepts¹⁰.
 - Every MPUU has a **Form** attribute (i.e. the **Has Manufactured Dose Form** relationship).
 - SNOMED CT-AU *Route-AMT Form* associations are included in the *Dose route and form extended association reference set*.

⁹ If the resulting constrained list of Routes has multiple entries, it may be further restricted as relevant to the Medicine. This pre-configuration is achieved by using CDS, for example restricting the list to just *|Oral route|* for the Medicine *|amoxicillin 250 mg tablet|*.

¹⁰ Some MPUU concepts do not have **Has Australian BoSS** relationships because they do not have a logical product strength, such as an inert component (example is *|Triphasil (inert substance) tablet|*).

- The table below describes an example:
 - The BoSS of |Perindopril erbumine| is recorded as the *Medicine*, which has three related MPUUs. The MPUUs have the form of |tablet|. Using the SNOMED CT-AU *Route-AMT Form* associations result in five selectable *Routes* for recording.

Table 16: Multiple Routes of Administration for a given Medicine (BoSS concept recorded)

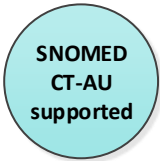
BoSS (recorded in Medicine element)	Associated MPUUs	AMT Form attribute (Has Manufactured Dose Form relationship)	SNOMED CT-AU Route-AMT Form association(s)	Constrained list of SNOMED CT-AU Routes for recording ¹¹
Perindopril erbumine	• perindopril erbumine 2 mg tablet • perindopril erbumine 4 mg tablet • perindopril erbumine 8 mg tablet	tablet	• Enteral route - tablet • Gastroenteral route - tablet • Oral route - tablet • Orogastric route - tablet • Transplacental route - tablet	• Enteral route • Gastroenteral route • Oral route • Orogastric route • Transplacental route

Recommendation 17: Use a Medicine’s Form attribute and SNOMED CT-AU Route and AMT Form associations to obtain a constrained list of Routes for recording based on an AMT-encoded Medicine.

5.3.2 Relevant terminology components

5.3.2.1 SNOMED CT-AU Routes of administration value

SNOMED CT-AU *Route of Administration* value concepts can be used to provide a list of entries suitable for selection by the prescriber. These concepts are sufficiently general to support both dose based and product based orders. These concepts are contained in the *Dose based prescribing route of administration reference set*.



Examples

- |Oral route|
- |Buccal route|
- |Topical route|
- |Intradermal route|
- |Subcutaneous route|

It should be noted that while all these concepts have the word “route” included in their Preferred Terms, an implementer may choose to exclude “route” in their

¹¹ If the resulting constrained list of Routes has multiple entries, it may be further restricted as relevant to the Medicine by using CDS, for example restricting the list to just |Oral route|.

onscreen display terms or request that a new acceptable synonym be added to SNOMED CT-AU.¹²

5.3.2.2 Relationship file

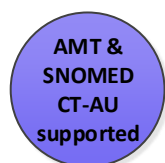


The Relationship file can be used to:

- Identify the MPUU concepts associated with a given BoSS.
 - For example, the MPUU |*amoxicillin 250 mg tablet*| **Has Australian BoSS** |*Amoxicillin*|.
- Identify the MPUU or TPUU concepts associated with an MPP, TP, TPP or CTPP.
 - For example, the MPP |*amoxicillin 250 mg tablet, 20*| **Has MPUU** |*amoxicillin 250 mg tablet*|.
- Identify the *Form* attribute of MPUU and TPUU concepts.
 - For example, the MPUU |*amoxicillin 250 mg tablet*| **Has Manufactured Dose Form** |*tablet*|.

If the *Medicine* recorded is a BoSS, MPP, TP, TPP or CTPP, navigation to the associated MPUU or TPUU is required (using the relationships between these concepts) prior to identifying the *Form* attribute.

5.3.2.3 SNOMED CT-AU Route and AMT Form associations



SNOMED CT-AU *Routes of administration* have been associated with AMT *Dose* forms to support development of product-*Route* constraints. This is an association between entries from the *Dose based prescribing route of administration reference set* and AMT dose form qualifier concepts.

These associations are accessible from the *Dose route and form extended association reference set*. For example,

Table 17: Route and form associations

SNOMED CT-AU Route	AMT Dose form
<i>Oral route</i>	<i>tablet</i>
<i>Oral route</i>	<i>modified release tablet</i>
<i>Oral route</i>	<i>effervescent tablet</i>
<i>Inhalation route</i>	<i>powder for inhalation</i>
<i>Inhalation route</i>	<i>inhalation solution</i>

¹² See the SNOMED CT-AU request submission process:
<https://www.healthterminologies.gov.au/ncts/#/request?content=snomed>

Known limitations

There are limitations to the Dose route and form extended association reference set. This reference set does not represent all available permutations of SNOMED CT-AU Route-SNOMED CT-AU Form-AMT Form associations and does not include off-label uses and non-conventional associations such as tablets which can be crushed to be delivered via a nasogastric route. There will also be associations that are not required in practice but have been included for completeness.

Refer to Appendix E for further details of the *Dose route and form extended association reference set*.

5.3.3 Supporting reference sets

The following table lists the relevant reference sets that can support this step. See Table 1 on p. 16 for additional details.

Table 18: Reference sets supporting this step

No.	Reference set
7	<i>Dose based prescribing route of administration reference set</i>
10	<i>Dose route and form extended association reference set</i>

5.4 Add a dose form

A *Dose Form* may be required when the *Medicine* element does not include dose form information and there are multiple dose form options relating to a particular *Route of Administration*. A dose form can be used to disambiguate such a medicine order. A *Dose Form* is also useful as atomically accessible data to generate an order (such as for onscreen display).

Example

An order for the medicine "Amoxicillin oral" can be administered using products available in the forms of tablet, capsule or oral liquid.

A prescriber may decide to include a dose form of "tablet" to the order to improve its clarity, therefore changing the order to "Amoxicillin oral tablet".

5.4.1 Example workflow

- 1 After specifying the *Route*, the prescriber considers whether to record a *Dose Form* for the selected medicine.
- 2 The prescriber searches for and adds a dose form that is appropriate for the selected *Medicine* or *Route*.

- If the *Medicine* element does not include *Dose form* information (i.e. BoSS or TP recorded), a *Dose Form* may be required.
- If the *Medicine* element already includes *Dose Form* information (i.e. MPUU, MPP, TPUU, TPP or CTPP recorded), a *Dose Form* is not required.

Notes

- *It is recommended that a constrained list of Forms be developed by restricting against the recorded Medicine and Route. However, Forms not restricted to the Medicine or Route can be made available for recording, for example in support of an off-label use of a medicine.*
- *While the AMT includes Form concepts, many are equivalent to SNOMED CT AU Forms. These AMT Forms will be progressively replaced with their equivalent SNOMED CT AU Forms. Therefore, SNOMED CT AU Form concepts are recommended for use, not AMT Forms.*

5.4.1.1 Forms unconstrained by a selected Medicine or Route

If selectable *Dose form* values are not constrained by an earlier recorded *Route* element, then SNOMED CT-AU *Type of drug preparation* concepts should be used.

SNOMED
CT-AU
supported

Example

For example, the Form |Tablet| is selected from a list of SNOMED CT-AU concepts for the Medicine |Paracetamol|.

Recommendation 18: Use the SNOMED CT-AU Type of drug preparation concepts to specify a Dose form if the element is not constrained by the selected Medicine or Route.

5.4.1.2 Forms constrained by a selected Medicine (MPUU, MPP, TP, TPUU, TPP or CTPP recorded) and Route

If a *Medicine* element is AMT-encoded with an MPUU, MPP, TP, TPUU, TPP or CTPP, the list of available *Dose forms* for recording can be constrained.

- This is achieved by checking the *Medicine's Form* attribute and *Route* against one or more associations between SNOMED CT-AU *Route*, SNOMED CT-AU *Form* and AMT *Form* entries.
 - The **Form** attribute of an AMT concept belongs to MPUU and TPUU concepts, accessible from the Relationship file.
 - If the *Medicine* is an MPP, TP, TPP or CTPP, the related MPUU or TPUU is found by using relationships between these concepts.
 - SNOMED CT-AU *Route*-SNOMED CT-AU *Form*-AMT *Form* associations are included in the *Dose route and form extended association reference set*.

AMT &
SNOMED
CT-AU
supported

- The table below describes an example:
 - An MPUU is recorded as the *Medicine* and the *Route* selected is |*Oral route*|. The *Medicine* has a |*tablet*| form. Using the *Dose route and form extended association reference set*, only one association is found which is |*Oral route*|-|*Tablet*|-|*tablet*|. Therefore, the SNOMED CT-AU *Form* of |*Tablet*| is recorded.

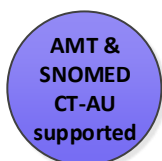
Table 19: Using the *Dose route and form extended association reference set* to obtain a list of *Forms*

AMT product (recorded in <i>Medicine</i> element)	AMT Form attribute (Has Manufactured Dose Form relationship)	SNOMED CT-AU Route	SNOMED CT-AU Route-SNOMED CT-AU Form-AMT Form association(s)	Constrained list of SNOMED CT-AU Forms for recording (see note)
MPUU <i>amoxicillin</i> 250 mg <i>tablet</i>	<i>tablet</i>	<i>Oral route</i>	<i>Oral route</i> - <i>Tablet</i> - <i>tablet</i>	<i>Tablet</i>

Note: If the resulting constrained list of forms has multiple entries, it may be further restricted as relevant to the *Medicine*.

5.4.1.3 Routes constrained by a selected *Medicine* (BoSS recorded) and *Route*

Similarly if a *Medicine* element is recorded with a BoSS, the list of available forms for recording can also be constrained.



- This is achieved by checking the associated MPUU concepts for the BoSS, the MPUU's **Form** attribute, *Route*, and one or more SNOMED CT-AU *Route*, SNOMED CT-AU *Form* and AMT *Form* associations.
 - Most MPUU concepts have a **Has Australian BoSS** relationship to one or more BoSS concepts.¹³
 - Every MPUU has a **Form** attribute (i.e. the **Has Manufactured Dose Form** relationship).
 - SNOMED CT-AU *Route*-SNOMED CT-AU *Form*-AMT *Form* associations are included in the *Dose route and form extended association reference set*.
- The table below describes an example:
 - The BoSS of |*Perindopril erbumine*| is recorded as the *Medicine* and the *Route* selected is |*Oral route*|. The *Medicine* has three related MPUUs. The MPUUs have the form of |*tablet*|. Using the SNOMED CT-AU *Route*-SNOMED CT-AU *Form*-AMT *Form* associations result in only one selectable *Form* for recording.

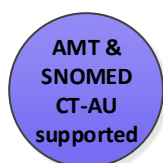
¹³ Some MPUU concepts do not have **Has Australian BoSS** relationships because they do not have a logical product strength, such as an inert component (example is |*Triphasil (inert substance) tablet*|).

Table 20: Using the Dose route and form extended association reference set to obtain a list of Forms (with BoSS)

BoSS (recorded in Medicine element)	Associated MPUUs	AMT Form attribute (Has Manufactured Dose Form relationship)	SNOMED CT-AU Route	SNOMED CT-AU Route-SNOMED CT-AU Form-AMT Form association(s)	Constrained list of SNOMED CT-AU Forms for recording ¹⁴
Perindopril erbumine	• perindopril erbumine 2 mg tablet • perindopril erbumine 4 mg tablet • perindopril erbumine 8 mg tablet	tablet	Oral route	Oral route - Tablet - tablet	Tablet

Recommendation 19: Use a Medicine's Form attribute and SNOMED CT-AU Route, SNOMED CT-AU Form and AMT Form associations to obtain a constrained list of Forms for recording based on a SNOMED CT-AU-encoded Route.

5.4.1.4 Modified release dose form products



- A *Dose Form* is recommended when a *Medicine* does not include dose form information (i.e. BoSS or TP recorded) but its available products have a form with modified release characteristics (i.e. forms that have been modified in some way to change their release characteristics).
- The same process as outlined above is followed to constrain the list of selectable forms for recording.

Example

|MS Contin| is recorded within the Medicine element. Given this product is available in modified release tablets or granules, a Dose form of |Modified-release tablet| or |Modified-release granules| are recorded.

- Even if the *Medicine* element is a TP that includes information that denotes modified release characteristics, the *Dose Form* should be recorded.

¹⁴ If the resulting constrained list of Form has multiple entries, it may be further restricted as relevant to the Medicine.

Example

For example, |Efexor-XR| is recorded within the Medicine element. While the characters "XR" in the brand name suggests extended release characteristics, a Dose form of |Modified-release capsule| should be recorded to ensure the distinctive Dose form is intended and to disambiguate the order.

Recommendation 20: Use a Medicine's Form attribute and SNOMED CT-AU Route, SNOMED CT-AU Form and AMT Form associations to obtain a constrained list of Forms for recording, for a Medicine that has modified release form characteristics.

Not
terminology
supported

- Some additional product-Form preconfiguration may be present in the CIS for products with a modified release form. This is not currently terminology supported. Examples include but are not limited to the following:
 - The CIS may have a "modified release" checkbox that is automatically or manually populated when a product with a modified release form is selected.
 - The Form pick list may include forms with detailed modified release characteristics. For example:
 - "12-hour modified release tablet"
 - "24-hour modified release tablet"

5.4.2 Relevant terminology components

5.4.2.1 SNOMED CT-AU Type of drug preparation

SNOMED
CT-AU
supported

SNOMED CT-AU *Type of drug preparation* concepts can be used to provide a list of suitable *Dose Form* entries, if the *Dose Form* is unconstrained to the recorded *Medicine* or *Route*. These concepts are sufficient to support both dose based and product based orders.

Examples

- |Tablet|
- |Capsule|
- |Inhalation|
- |Orally disintegrating tablet|
- |Oromucosal capsule|
- |Injection solution|

These concepts are contained in the *Dose based prescribing dose form reference set*.

5.4.2.2 SNOMED CT-AU Route, SNOMED CT-AU Form and AMT Form associations

AMT &
SNOMED
CT-AU
supported

There are SNOMED CT-AU *Routes of administration* associated with SNOMED CT-AU dose forms, and further to AMT forms. This supports the constraining of *Dose Form* values against an earlier recorded *Medicine* and *Route* elements.

These associations are contained within the file called the *Dose route and form extended association reference set*. For example:

Table 21: Route and Dose form associations

SNOMED CT-AU Route	SNOMED CT-AU Dose form	AMT Dose form
Oral route	Capsule	capsule
Oral route	Capsule	modified release capsule
Inhalation route	Inhalation	inhalation
Inhalation route	Inhalation	powder for inhalation
Inhalation route	Inhalation	inhalation solution

Refer to Appendix E for further details of the *Dose route and form extended association reference set*.

5.4.3 Supporting reference sets

AMT &
SNOMED
CT-AU
supported

The following table lists the relevant reference sets that can support this step. See Table 1 on p. 16 for additional details.

Table 22: Reference sets supporting this step

No.	Reference set
4	<i>Dose based prescribing dose form reference set</i>
10	<i>Dose route and form extended association reference set</i>

5.5 Add a fluid vehicle

- A fluid vehicle may be required for medicines intended to be administered using some fluid vehicle via the intravenous (IV) route and may be continuously infused over a period of time.
- A fluid vehicle is often not prescribed but is determined automatically by infusion protocols contained in the CIS, which is not terminology supported.

Examples

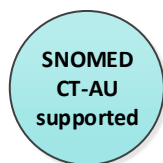
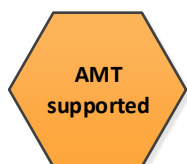
Some example medicines that require a fluid vehicle are:

- |Heparin| (e.g. 20,000 units over 24 hours)
- |Digoxin|
- *Chemotherapy products (e.g. |Cisplatin|)*

Some example fluid vehicles recorded for relevant medicines are:

- |sodium chloride 0.9% (4.5 g/500 mL) injection, bag|
- |sodium chloride 0.9% (9 g/L) + glucose 5% (50 g/L) injection, bottle|

5.5.1 Example workflow



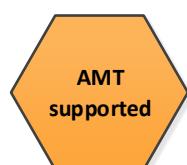
- 1 After a medicine and an IV route is selected, a range of appropriate fluid vehicles may be presented to the prescriber.
 - This list can be preconfigured to be constrained by the selected medicine or autopopulated according to local preferences.
- 2 The prescriber may record a fluid vehicle appropriate to the selected medicine in the CIS. An appropriate volume of fluid is also selected.
 - The fluid vehicle is AMT supported, while
 - The volume unit of measure is SNOMED CT-AU supported.
- 3 Additional details about administration is not typically specified at the point of ordering, such as using a secondary infusion or “piggyback”.
- 4 If a CIS does not have an additional coded element specifically for fluid vehicle selection, then:
 - The prescriber may specify the fluid vehicle and volume within an *Administration Instruction* element (or similar) as free text (see Section 5.6); or
 - The prescriber creates a separate medicine order and records the fluid vehicle within the *Medicine* element.

Recommendation 21a: Use AMT BoSS or product concepts to specify a fluid vehicle for a medicine intended to be administered via a continuous IV infusion.

Recommendation 21b: Use SNOMED CT-AU Types of drug preparation concepts to specify a dose form if the Medicine element is recorded with a BoSS or TP that has modified release form characteristics.

5.5.2 Relevant terminology components

5.5.2.1 AMT BoSS and products



The following AMT substances and products may be used to provide suitable fluid vehicle entries.

- BoSS
- MPUU
- MPP
- TP
- TPUU
- TPP
- CTPP

The following table provides examples of these AMT concepts.

Table 23: Example AMT fluid vehicle concepts

AMT concepts	Example
BoSS	sodium chloride
MPUU	sodium chloride 0.9% (9 g/L) injection, bag
MPP	sodium chloride 0.9% (9 g/L) injection, 1 L bag
TP	Sodium Chloride (Baxter)
TPUU	Sodium Chloride (Baxter) 0.9% (9 g/L) intravenous infusion injection, 1 L bag
TPP	Sodium Chloride (Baxter) 0.9% (9 g/L) intravenous infusion injection, 1 L bag
CTPP	Sodium Chloride (Baxter) 0.9% (9 g/L) intravenous infusion injection, 1 L bag

Note Some current MPUU and MPP entries may be too lengthy or not appropriate for selection due to presence of multiple ingredients (> 3 ingredients). The AMT is looking to introduce a future solution to address this issue via the Clinical Interface Descriptions work.

For these cases, a CIS should instead present the branded entries of TP, TPUU, TPP or CTPP as appropriate.

Examples

Consider the following MPUU and MPP concepts:

- |lactate sodium 9.66 g/3 L + sodium chloride 18 g/3 L + potassium chloride 1.2 g/3 L + calcium chloride dihydrate 810 mg/3 L solution, bag|; and
- |lactate sodium 9.66 g/3 L + sodium chloride 18 g/3 L + potassium chloride 1.2 g/3 L + calcium chloride dihydrate 810 mg/3 L solution, 4 x 3 L bags|.

The branded equivalents (TPUU and TPP) of the above concepts should be used instead:

- |Ringer-Lactate (Baxter) irrigation solution, 3 L bag|; and
- |Ringer-Lactate (Baxter) irrigation solution, 4 x 3 L bags|.

- The AMT BoSS concepts are not published in a reference set, however can be extracted from the terminology data by using a preprepared SQL script – refer to the ATIG [3].
- MPUU, MPP, TP, TPUU, TPP and CTPP concepts are accessible from their individual reference sets.

5.5.2.2 SNOMED CT-AU Unit concepts

Some SNOMED CT-AU *Qualifier value* concepts can be used to represent the volume unit of measure for a fluid vehicle, specifically unit concepts. These concepts are included in the *Dose unit of measure reference set*.

Examples are:

- |mL|
- |L|

5.5.3 Supporting reference sets

The following table lists the relevant reference sets that can support this step. See Table 1 on p. 16 for additional details.

Table 24: Reference sets supporting this step

No.	Reference set
3	Containerised trade product pack reference set
11	Dose unit of measure reference set
14	Medicinal product unit of use reference set
15	Medicinal product pack reference set
22	Trade product reference set
23	Trade product unit of use reference set

SNOMED
CT-AU
supported

AMT &
SNOMED
CT-AU
supported

No.	Reference set
24	Trade product pack reference set

5.6 Add administration instructions

While generally more relevant for administration rather than ordering or prescribing, there may be important instructions relating to a medicine's administration that may be recorded by the prescriber due to safety concerns or local preferences. This step encompasses various substeps that captures information including the following:

- Method of administration
- Rate of administration
- Site of administration
- Additional instructions for administration

Some of this information may not be directly recorded by the prescriber but is preconfigured in the CIS, such as included as part of infusion protocols.

Example orders where this information may be required include for some IV fluids, insulins, morphine, eye or ear drops, inhalations, intramuscular (IM) or subcutaneous (SC) injections and self-administered medicines.

5.6.1 Example workflow

- 1 The prescriber considers whether an *Administration instruction* is required to be captured for a selected medicine.
- 2 The prescriber records an *Administration instruction*.
 - Commonly used *Administration instructions* may be preconfigured in the CIS based on earlier recorded elements.
 - For example, the method, rate or site of administration may be autopopulated or a constrained list made available based on a selected *Route of [Intravenous]*. However, the terminology does not currently support this preconfiguration.
 - While more generally captured as free text, it is recommended to codify administration instructions whenever possible.

5.6.1.1 Method of administration

A method of administration provides specific information on how to administer a medicine, mainly those intended to be administered as IV injections or infusions. There are some SNOMED CT-AU *Technique* concepts that describe a method of administration.

SNOMED
CT-AU
supported

Examples

- *If a medicine is intended to be administered via a single bolus, the concept |Single bolus| can be recorded.*
- *If a medicine is intended to be administered via an intermittent bolus, the concept |Intermittent bolus| can be recorded.*
- *If a medicine is intended to be administered via a continuous infusion, the concept |Continuous infusion| can be recorded.*

Recommendation 22: Use SNOMED CT-AU Technique concepts to specify a Method of administration.

5.6.1.2 Rate of administration

SNOMED
CT-AU
supported

A rate of administration specifies how rapidly a medicine is to be administered to a patient (or is commonly called the flow rate). It specifies a quantity or volume per unit of time. It is associated with injections, infusions, gases and topical patch products.

The unit of measure for the rate of administration is terminology supported, specifically by SNOMED CT-AU *Unit of rate* concepts.

Example

An example is an infusion of Heparin 25000 units in 500 mL of 0.9% sodium chloride, where the rate of administration is 1600 units per hour.

The unit of measure for the rate of administration can be recorded using the concept |unit/hour|.

Recommendation 23: Use SNOMED CT-AU Unit of rate concepts to specify a Rate of administration.

5.6.1.3 Site of administration

SNOMED
CT-AU
supported

A site of administration specifies the body site where a medicine is to be administered into. The site of administration is terminology supported, specifically by SNOMED CT-AU *Body structure* concepts.

Examples

- |Thigh|
- |Arm|
- |Left eye|

Optionally, some SNOMED CT-AU *Topographical modifier* concepts may be used to specify laterality information for sites of administration¹⁵.

Example For example, a laterality of |Left| can be combined with a site of |Thumb| to create a new meaning of |Left thumb|.

Note: A single body structure concept of "Left thumb" does not currently exist in the terminology.

Recommendation 24a: Use SNOMED CT-AU Body structure concepts to specify a Site of administration.

Recommendation 24b: Optionally, use SNOMED CT-AU Topographical modifier concepts to specify laterality for a Site of administration.

5.6.1.4 Administration instructions

SNOMED
CT-AU
supported

An administration instruction is any additional instruction that is important to be specified in relation to a medicine's administration.

This information is typically not specified by a prescriber rather by a dispenser or administrator. This information can also be preconfigured in the CIS or integrated within the CDS.

While some administration instructions are terminology supported, most are not supported. Some SNOMED CT-AU *Additional dosage instructions* concepts can be used to encode administration instructions.

Examples

- |Warning. Avoid alcoholic drink|
- |Swallowed whole, not chewed|
- |Dissolved under the tongue|

Recommendation 25: Use SNOMED CT-AU Additional dosage instructions concepts to specify an Administration instruction.

5.6.2 Relevant terminology components

5.6.2.1 SNOMED CT-AU Technique concepts

SNOMED
CT-AU
supported

Some SNOMED CT-AU *Qualifier value* concepts can be used to represent the method of administration, specifically *Technique* concepts. These concepts are included in the *Qualifier value foundation reference set*. This is a large reference set; implementers can develop a more constrained set.

¹⁵ This requires post-coordination use of multiple different SNOMED CT-AU concepts. Contact the NCTS for further guidance on post-coordination.

Some example concepts:

- |*Single bolus*|
- |*Intermittent bolus*|
- |*Continuous infusion*|

5.6.2.2 SNOMED CT-AU Unit of rate concepts

SNOMED
CT-AU
supported

Some SNOMED CT-AU *Qualifier value* concepts can be used to represent the rate of administration, specifically *Unit of rate* concepts. These concepts are included in the *Qualifier value foundation reference set*. This is a large reference set; implementers can develop a more constrained set.

Some example concepts:

- |*mg/h*|
- |*mL/min*|
- |*unit/hour*|
- |*microgram/hour* |.

5.6.2.3 SNOMED CT-AU Body structure concepts

SNOMED
CT-AU
supported

Some SNOMED CT-AU *Body structure* concepts can be used to represent the site of administration. These concepts are included in the *Anatomical site reference set*.

Some example concepts:

- |*Eye*|
- |*Upper arm*|
- |*Lower leg*|
- |*Skin of finger*|

5.6.2.4 SNOMED CT-AU Topographical modifier concepts

SNOMED
CT-AU
supported

Some SNOMED CT-AU *Topographical modifier* concepts can be used to represent the laterality of a site of administration. These concepts are included in the *Laterality reference set*.

Some example concepts:

- |*Left*|
- |*Right*|
- |*Right and left*|

5.6.2.5 SNOMED CT-AU Additional dosage instructions concepts

SNOMED
CT-AU
supported

Some SNOMED CT-AU *Additional dosage instructions* concepts can be used to specify an administration instruction. These concepts are included in the *Qualifier value foundation reference set*. This is a large reference set; implementers can develop a more constrained set.

Some example concepts:

- |*Dissolve or mix with water before taking*|

- |Warning. May cause drowsiness|

5.6.3 Supporting reference sets

The following reference sets provide terminology to support this step. See Table 1 on p. 16 for additional details.

Table 25: Reference sets supporting this step

No.	Reference set
1	Anatomical site reference set
12	Laterality reference set
18	Qualifier value foundation reference set

SNOMED
CT-AU
supported

5.7 Add a dose

It is imperative that a *Dose* is recorded for both dose based and product based orders. This is a major step of the prescribing model.

- For the majority of products, the *Dose* will reflect a numeric quantity and a unit of measure. Depending on the product's dose form, the *Dose* may be an amount (quantity) or a volume.

Example A Dose of "750 mg" is specified for an amoxicillin tablet while a Dose of "5 mL" is specified for a lidocaine hydrochloride oral liquid.

- For product based orders, the *Dose* specified is the same as the strength of a commercially available product.

Example A Dose of "100 mg" is specified for the product |Cartia 100 mg enteric tablet|.

- However, some products may not have a *Dose* recorded because of a continuous dose form resulting in a variable *Dose* that cannot be consistently recorded.

Example A |Savlon| cream has no *Dose* recorded but may have "Apply" recorded in the *Dose instruction verb* element.

A CIS should have in place computerised patient safety mechanisms to prevent a nonsensical dose being recorded. Examples include but not limited to the following:

- A CDS alert triggers when the system cannot match the *Dose* to an available product presentation or some logical subunit.

AMT &
SNOMED
CT-AU
supported

Note: Only this action is terminology supported, while the others described here are implementation-specific.

- See Section 6 for more details.
- Autopopulation of a *Dose* upon a medicine selection.
- A CDS alert triggers when a maximum dose threshold has been exceeded.
- A CIS offers a set of appropriate order sentences with a preselected *Dose*.

An autopopulated *Dose* may be modified by the prescriber based on their clinical judgement or CDS, such as off-label prescribing for palliative care patients.

5.7.1 Example workflow

- 1 The prescriber records a numeric *Dose quantity* (e.g. "250").
 - A numeric *Dose quantity* that is not the same as a product's strength is not supported by SNOMED CT-AU or the AMT.
 - If a *Dose quantity* specified is the same as a product's strength (e.g. for product based orders), the *Dose quantity* is AMT-supported by using the Strength value of an MPUU or TPUU concept.
- 2 A suitable unit of measure is selected (e.g. "mg").
 - The unit of measure may describe SI units ("mg" and "L") or descriptive units of measure (e.g. "ampoule" and "patch").
 - Autopopulation of the unit of measure against a selected *Dose quantity* may be preconfigured to occur in some CIS.
 - The *Dose* unit of measure is supported by SNOMED CT-AU.

AMT &
SNOMED
CT-AU
supported

5.7.1.1 Appropriate Dose for a given Medicine

The *Dose quantity*, volume and unit recorded must be clinically appropriate for a selected *Medicine*.

This is not terminology supported, but is supported by the CDS system.

Not
terminology
supported

Example

For the product |Coveram 10mg/5mg (perindopril arginine/amlodipine) tablet, 30|, the BoSS concepts of |Perindopril arginine| and |Amlodipine| are recorded in separate orders (Medicine elements) in the CIS.

Consulting the CDS system, the prescriber specifies a Dose of "10 mg" for perindopril arginine and "5 mg" for amlodipine in the separate orders. Without CDS, the Dose may have been switched resulting in patient safety concerns.

5.7.1.2 Dose quantity or volume – dose versus strength

If a *Dose quantity* or volume is the same as the Strength value of a commercially available product, the *Dose quantity* can be derived from the AMT **Strength** attribute (specifically the Strength value of a BoSS).

For example, a *Medicine* and *Dose* of "Amoxicillin 500 mg" is specified. The *Dose quantity* "500 mg" is the same as the Strength of a commercially available product

AMT
supported

|amoxicillin 500 mg capsule| or |amoxicillin 500 mg injection, vial|. "500" can be derived from the **Strength** attribute.

Note

The **Strength** attribute reflects a normalised strength and in standardising the Strength unit to support machine comparability, some products have a Strength value and unit that look different than expected but is equivalent. Refer to the ATIG [3] for technical guidance on how to de-normalise the **Strength** attribute.

Example

The MPUU |metformin hydrochloride 1 g tablet| has a **Strength** attribute of "1000 mg/each" rather than "1 g/each" (both are equivalent) because a range of other Metformin tablets is available, namely 500 mg and 850 mg. To facilitate easier machine interpretation, the Strength unit has been changed to |mg/each| for the same BoSS concept of |metformin hydrochloride|.

Recommendation 26: Use the AMT Strength attribute of BoSS concepts to specify the Dose quantity if the Dose quantity or volume is the same as the Strength of a commercially available product.

5.7.1.3 Single ingredient products – a consistent dose can be specified

SNOMED
CT-AU
supported

- If a consistent *Dose quantity* or volume can be specified, the *Dose unit of measure* is recorded using an SI unit of mass or volume.
 - These can be sourced from SNOMED CT-AU *Unit* concepts.
- If a consistent *Dose quantity* or volume cannot be specified but a unit dose can be specified, the *Dose unit of measure* is recorded using a descriptive unit of measure.
 - These can be sourced from SNOMED CT-AU *Unit* dose concepts.
 - While some of these terms may read like a dose form or container type, they actually describe a unit dose or unit of product usage.
 - Example products include oral liquids, gases, inhalations, powders (in sachets) and insulins.
- The following table provides some examples.

Table 26: Dose examples for single ingredient products

Medicine	Dose quantity	Dose unit of measure
Atazanavir	300	mg

Medicine	Dose quantity	Dose unit of measure
amoxicillin 100 mg/mL powder for oral liquid	7.5	mL
Novorapid Flexpen	30	Unit
Azopt 1% eye drops	1	Drop
fentanyl 50 microgram/hour patch	1	Patch
Nicorette Inhalator	1	Cartridge

Recommendation 27: Use the SNOMED CT-AU Unit or Unit dose concepts to specify the Dose unit of measure for single ingredient products where a consistent Dose quantity or volume can be specified.

5.7.1.4 All products – a consistent dose cannot be specified (continuous form products)

Not
terminology
supported

- If a consistent *Dose quantity* or volume, or a unit dose cannot be specified for continuous form products, the *Dose* element is left blank.
 - Example products include topical liquids, creams, ointments and gels.
- Instead of a *Dose*, a *Dose instruction verb* or *Dose qualifier* is recorded.
 - For example “Apply sparingly” may be recorded and is supported by two separate SNOMED CT-AU *Qualifier value* concepts. This information is recorded within the *Dose instruction verb* or *Dose qualifier* elements of the order. Refer to Sections 5.8 and 5.9.

Recommendation 28: The Dose element is unrecorded for products where a consistent Dose cannot be specified (variable dose for continuous form products). Record a Dose instruction verb or Dose qualifier instead.

5.7.1.5 Multi-ingredient products with 2 or 3 ingredients

SNOMED
CT-AU
supported

- If multiple, individual entries are recorded in the *Medicine* element, specify the *Dose unit of measure* for each ingredient with either:
 - An SI unit of mass or volume; or
 - A descriptive unit of measure
- If the *Medicine* element is recorded with a single orderable entry, then use a descriptive unit of measure.

The following is an example for the product |Coveram 10mg/5mg (perindopril arginine/amlodipine) tablet: uncoated, 30|.

- The first table reflects a *Medicine* element with multiple entries.
- The second table reflects a *Medicine* element with a single entry.

Table 27: Describing a multi-ingredient product dose through multiple entries

Medicine	Dose quantity	Dose unit of measure
Perindopril arginine	10	mg
Amlodipine	5	mg

Table 28: Describing a multi-ingredient product dose through a single entry

Medicine	Dose quantity	Dose unit of measure
perindopril arginine 10 mg + amlodipine 5 mg tablet	1	Tablet

Recommendation 29: Use the SNOMED CT-AU Unit or Unit dose concepts to specify the Dose unit of measure for multi-ingredient products with 2 or 3 ingredients.

5.7.1.6 Multi-ingredient products with > 3 ingredients

SNOMED
CT-AU
supported

These products are better known by their brand names and specifying a dose for each of the multiple ingredients can be problematic. Therefore, the *Dose unit of measure* should reflect a descriptive unit of measure, which encompasses a whole unit of the product. The table below provides some examples.

Table 29: Dose examples for multi-ingredient products with > 3 ingredients

Medicine	Dose quantity	Dose unit of measure
Cernevix powder for injection, 1 vial	1	Vial
Codral Cold and Flu tablet	2	Tablet

Recommendation 30: Use the SNOMED CT-AU Unit dose concepts to specify the Dose unit of measure for multi-ingredient products with >3 ingredients.

5.7.1.7 Multicomponent products - active component(s) with a single ingredient

SNOMED
CT-AU
supported

These products are treated as single ingredient, single component products with the diluent component ignored for the purposes of ordering because it is more relevant for dispensing and administration. Therefore, the *Dose unit of measure* can be:

- An SI unit of mass or volume
- A descriptive unit of measure

Two examples follow.

- The first table reflects the product |*Solu-Medrol (1 x 500 mg vial, 1 x 8 mL diluent vial), 1 pack*|.

Table 30: Multicomponent product dose with a single active component (single ingredient)

Medicine	Dose quantity	Dose unit of measure
Methylprednisolone	40	mg

- The second table reflects the product |*Nexium Hp7 (14 x Nexium tablets, 28 x Amoxil capsules, 14 x Klacid tablets), 1 pack*|.

Table 31: Multicomponent product dose with multiple active components (single ingredient)

Medicine	Dose quantity	Dose unit of measure
esomeprazole 20 mg enteric tablet	20	mg
clarithromycin 500 mg tablet	500	mg
amoxicillin 500 mg capsule	1000	mg

Recommendation 31: Use the SNOMED CT-AU Unit or Unit dose concepts to specify the Dose unit of measure for the active component(s) of multicomponent products with a single ingredient.

5.7.1.8 Multicomponent products - active component(s) with 2 or 3 ingredients

SNOMED
CT-AU
supported

- If multiple, individual entries are recorded in the *Medicine* element, specify the *Dose unit of measure* for each ingredient with either:
 - An SI unit of mass or volume; or
 - A descriptive unit of measure
- If the *Medicine* element is recorded with a single orderable entry, then use a descriptive unit of measure.

The following is an example for the product |*Menitorix (1 x vaccine vial, 1 x diluent syringe), 1 pack*|.

- The first table reflects a *Medicine* element with multiple entries.
- The second table reflects a *Medicine* element with a single entry.

Table 32: Multicomponent product dose with multiple active components (2 or 3 ingredients)

Medicine	Dose quantity	Dose unit of measure
<i>Haemophilus influenzae type B polyribose ribitol phosphate vaccine</i>	5	microgram
<i>meningococcal group C polysaccharide vaccine</i>	5	microgram

Table 33: Multicomponent product dose with a single active component (2 or 3 ingredients)

Medicine	Dose quantity	Dose unit of measure
Haemophilus influenzae type B polyribose ribitol phosphate vaccine 5 microgram + meningococcal group C polysaccharide vaccine 5 microgram injection, vial	1	Vial

Recommendation 32: Use the SNOMED CT-AU Unit or Unit dose concepts to specify the Dose unit of measure for the active component(s) of multicomponent products with 2 or 3 ingredients.

5.7.1.9 Multicomponent products - active component(s) with > 3 ingredients

SNOMED
CT-AU
supported

These products are treated as multi-ingredient products (with > 3 ingredients) for the purposes of ordering. They are also better known by their brand names.

Therefore, the *Dose unit of measure* should be a descriptive unit of measure.

The following is an example for the product |Menomune-A/C/Y/W-135 (1 x vaccine vial, 1 x 0.5 mL diluent vial), 1 pack|.

Table 34: Multicomponent product dose with a single active component (> 3 ingredients)

Medicine	Dose quantity	Dose unit of measure
Menomune	1	Vial

Recommendation 33: Use the SNOMED CT-AU Unit dose concepts to specify the Dose unit of measure for the active component(s) of multicomponent products with > 3 ingredients.

5.7.1.10 Modified release form products

SNOMED
CT-AU
supported

The *Dose* for these products may be specified either as an amount or a unit of product usage, therefore the *Dose unit of measure* can reflect:

- An SI unit of mass or volume; or
- A descriptive unit of measure.

The following is an example for the product |Durotram XR (once a day) 100 mg modified release tablet|.

Table 35: Example dose for a modified release product

Medicine	Dose quantity	Dose unit of measure
Durotram XR (once a day) 100 mg modified release tablet	100	mg
	1	Tablet

Recommendation 34: Use the SNOMED CT-AU Unit or Unit dose concepts to specify the Dose unit of measure for modified release form products.

5.7.1.11 Loading dose or variable dose orders

SNOMED
CT-AU
supported

Additionally for loading dose or variable dose orders, there can be multiple *Dose quantity* and unit pairs recorded based on each condition as met. The recording of the unit is terminology supported.

- A common example is the ordering of warfarin based on INR results.

A CIS may have varying degrees of preconfiguration and codifying of each *Dose quantity* and unit per condition. These are not terminology supported. Examples are:

- Each *Dose quantity*, unit and condition is captured using a "For number of doses" or "For number of days" option.
- Each *Dose quantity*, unit and condition is captured using an "Or" statement.
- The variable doses are recorded as free text.
- Customised order entry interface for commonly prescribed products with variable dosing, with the *Dose quantity* and unit captured separately from the condition.
 - For example, the condition is the target INR range for warfarin orders.

5.7.2 Relevant terminology components

5.7.2.1 AMT product strength

AMT
supported

The *Strength* value of a BoSS **Strength** attribute for an MPUU or TPUU concept can be used to describe the *Dose quantity* or volume if the *Dose* specified is the same as the *Strength* of a commercially available product.

- This **Strength** attribute is a normalised (machine readable) strength, where the value is normalised to a denominator unit of "1". However, the strength as included in an MPUU or TPUU Preferred Term's description may be different and more human-friendly.
- Therefore, the de-normalised Strength value should be used.

Example |amoxicillin 250 mg/5 mL powder for oral liquid| has a normalised strength of "50 mg/mL" however the strength specified in the MPUU Preferred Term description text is "250 mg/5 mL".

- The de-normalised Strength can be achieved by using a set of preprepared SQL scripts, available from the *ATIG* [3].

The following table provides examples of some AMT MPUUs, BoSS and **Strength** attributes.

Table 36: BoSS Strength attribute for MPUU concepts

AMT MPUU concept	Relationship type	BoSS ¹⁶	BoSS Strength (value and unit)
amoxicillin 125 mg/5 mL powder for oral liquid	Has Australian BoSS	Amoxicillin	25 mg/mL
codeine phosphate 50 mg/mL injection, ampoule	Has Australian BoSS	Codeine phosphate	50 mg/mL
ribavirin 200 mg tablet	Has Australian BoSS	Ribavirin	200 mg/each

To access the BoSS Strength value:

- The Relationship file is used to navigate from a recorded *Medicine* element to its closest target of either an MPUU or TPUU.
- Then, the **BoSS Strength** attribute of the MPUU or TPUU's **Has Manufactured Dose Form** relationship is accessed from the *Strength reference set*.
- Within this reference set, the "value" field is the Strength value (normalised strength).
- If the Strength value is different to the Strength displayed in MPUU or TPUU Preferred Terms, modify it to the de-normalised Strength by using a set of preprepared SQL scripts.

5.7.2.2 SNOMED CT-AU Unit or Unit dose concepts

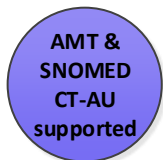
Some SNOMED CT-AU *Qualifier value* concepts can be used to represent the *Dose unit of measure* for a medicine order, specifically the *Unit* or *Unit dose* concepts. Examples are:

- |mg|
- |mL|
- |Unit|
- |Tablet|
- |Puff|

SNOMED
CT-AU
supported

¹⁶ Most of the BoSS concepts belonging to AMT products are sourced from SNOMED CT-AU substances, due to the content integration between the two terminologies.

5.7.3 Supporting reference sets



The following reference sets provide terminology to support this step. See Table 1 on p. 16 for additional details.

Table 37: Reference sets supporting this step

No.	Reference set
11	<i>Dose unit of measure reference set</i>
20	<i>Strength reference set</i>

5.8 Add a dose instruction verb

A CIS may allow for the selection of a *Dose instruction verb* in conjunction with a recorded *Dose*. When a full order is rendered, the *Dose instruction verb* typically occurs before the *Dose*.

- |Take| in the following table is an example of a *Dose instruction verb*.
- The *Dose unit of measure* of |Capsule| is a descriptive unit of measure.

Table 38: Dose instruction verb example

Medicine	Dose instruction verb	Dose quantity	Dose unit of measure
amoxicillin 250 mg capsule	Take	2	Capsule

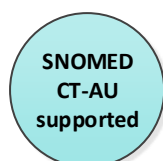
5.8.1 Example workflow

- 1 The prescriber considers whether a dose instruction verb is required for a specified *Dose*.
- 2 The prescriber records a *Dose instruction verb* appropriate for a particular recorded *Dose*.

Recommendation 35: Use the SNOMED CT-AU Dosing instruction imperative concepts to specify a Dose instruction verb.

5.8.2 Relevant terminology components

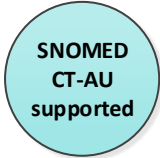
5.8.2.1 SNOMED CT-AU Dosing instruction imperatives



Some SNOMED CT-AU *Qualifier value* concepts (specifically dosing instruction imperatives) can be used to represent *Dose instruction verb* values for a medicine order. Examples are:

- |Apply|
- |Dissolve|

- |Inhale|
- |Take|



5.8.3 Supporting reference sets

The following reference set provides terminology to support this step. See Table 1 on p. 16 for additional details.

Table 39: Reference sets supporting this step

No.	Reference set
8	Dose instruction verb reference set

5.9 Add a dose qualifier

Qualifying information for a specified *Dose* or *Frequency* may be required.

- A dose qualifier value may be recorded to qualify the *Dose* element.
- A dose qualifier may also be captured in relation to the *Frequency* element or incorporated within *Frequency* values such as “3 times a day with food”.

The CIS may autopopulate this field based on a certain *Dose* and *Frequency* for a selected medicine.

5.9.1 Example workflow

- 1 The prescriber considers whether some qualifying information is required for a specified *Dose* or *Frequency*.
- 2 The prescriber records an appropriate *Dose qualifier*.

Recommendation 36: Use SNOMED CT-AU Qualifier value concepts to specify a Dose qualifier.

5.9.1.1 PRN orders

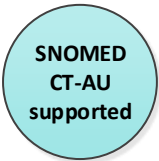


The prescriber is commonly required to record an additional maximum daily dose (per 24 hours) amount.

- This specific element is not terminology supported.

5.9.2 Relevant terminology components

5.9.2.1 SNOMED CT-AU Qualifier values



Some SNOMED CT-AU *Qualifier value* concepts (mainly temporal periods and time patterns, and some *Dosing instruction* fragments) can be used to represent *Dose qualifiers*. These are included in the *Dose qualifier reference set*.

Examples	<i>Some examples of Dose qualifier are:</i> • With or without food • At night • Sparingly • Until finished • Monday • January
-----------------	---

The *Dose qualifier* concepts that describe a day or month are included in the *Calendar day and month reference set*.

5.9.3 Supporting reference sets

The following reference sets provide terminology to support this step. See Table 1 on p. 16 for additional details.

Table 40: Reference sets supporting this step

No.	Reference set
2	<i>Calendar day and month reference set</i>
9	<i>Dose qualifier reference set</i>

5.10 Add a frequency or interval

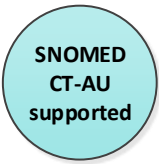
This is a major prescribing model step. The *Frequency or Interval* element can be preconfigured to a constrained list or autopopulated per the selected *Medicine* or *Dose* values.

5.10.1 Example workflow

- 1 After specifying the *Medicine* and *Dose*, the prescriber searches for and selects a suitable *Frequency or Interval*.
- 2 Optionally, a *Dose qualifier* may be recorded to provide additional information for a *Frequency* such as "3 times a day with food".
 - Refer to Section 5.9 for *Dose qualifier*.

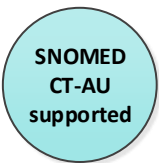
Recommendation 37: Use SNOMED CT-AU Frequencies concepts to specify a Frequency or Interval.

5.10.1.1 Once only orders



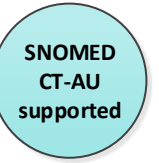
- 1 If the “Once only” value is selected for an earlier *Medication course type* element, a *Frequency* value of “Once” may be selected or autopopulated.
 - The *Frequency* value of |Once| is SNOMED CT-AU supported.
- 2 Alternatively, a CIS may include functionality to allow the prescriber to check a “Once only” or “As a single dose” option (e.g. radio button).
 - “Once only” is currently supported by |Stat|¹⁷ but “As a single dose” is not terminology supported.

5.10.1.2 Modified release form products



- 1 A CIS may offer for selection or autopopulate a specific *Frequency* value for certain modified release form products due to patient safety concerns.
 - For example, “Every 12 hours” may be autopopulated for the opioid analgesic |Targin 10/5 mg modified release tablet|.

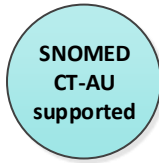
5.10.2 Relevant terminology components



Some SNOMED CT-AU *Qualifier value* concepts (specifically frequencies) can be used to record a *Frequency or Interval*.

Examples	• Twice a day • Three times a day • Every 12 hours • Every night
-----------------	--

5.10.3 Supporting reference sets



The following reference set provides terminology to support this step. See Table 1 on p. 16 for additional details.

Table 41: Reference sets supporting this step

No.	Reference set
5	Dose based prescribing dose frequency and interval reference set

¹⁷ While this SNOMED CT-AU *Qualifier value* concept has a current Preferred Term of |stat|, this may be revised in line with ACSQHC guidelines.

5.11 Add a duration

A *Duration* can be recorded for medicine orders, such as “For 5 days”.

The *Duration* will reflect a numeric quantity and a unit of measure. The unit of measure can be coded.

Similar to frequencies, the duration may be preconfigured to a constrained list or autopopulated per the selected *Medicine* or *Dose* entries.

SNOMED
CT-AU
supported

5.11.1 Example workflow

- 1 The prescriber considers whether a *Duration* is required.
- 2 The prescriber specifies a *Duration* magnitude (numeric quantity) and selects an appropriate *Duration* unit of measure (which is SNOMED CT-AU encoded).

Recommendation 38: Use SNOMED CT-AU Unit of time concepts to specify a Duration.

5.11.1.1 Variable dose orders

- 1 For loading, reducing or variable dose orders, the prescriber is typically required to record a *Duration* for every change in the dose within a single order.
 - Each *Duration* is captured together with its relevant Dose.
 - This information may be implemented in a CIS using the following (but not limited to) options. Only the first is terminology supported:
 - Then (e.g. separate *Durations* specified in between “THEN” characters)
 - |*Then*| can be encoded using a SNOMED CT-AU Dosing instruction fragment concept.
 - For number of doses (e.g. a pick list available and separate durations specified)
 - For number of days (e.g. a pick list available and separate durations specified)
 - Taper dosing (e.g. a radio button available and separate durations specified)

SNOMED
CT-AU
supported

5.11.2 Relevant terminology components

Some SNOMED CT-AU Unit of time concepts can be used to record a *Duration*.

SNOMED
CT-AU
supported

Examples

- |*minute*|
- |*hour*|
- |*day*|

5.11.3 Supporting reference sets

SNOMED
CT-AU
supported

The following reference set provides terminology to support this step. See Table 1 on p. 16 for additional details.

Table 42: Reference sets supporting this step

No.	Reference set
25	Unit of time reference set

5.12 Add a start/end date or time

Not
terminology
supported

Many medicine orders require a Start date. Optionally, a Start time, End date or End time may be specified.

- For example, regular, loading dose and once only orders may require a Start/End date.
- PRN orders may not require a Start/End date.
- A CIS may autopopulate the Start Time(s) based on a selected Frequency, which is commonly based on the times of ward rounds or site-specific preferences.

Example A CIS may autopopulate the Start times of 06:00, 14:00 and 22:00 after a Frequency of "Three times a day" is selected.

Note: This step is not terminology supported.

5.12.1 Example workflow

- 1 The prescriber considers whether a *Start date*, *End date*, *Start time* or *End time* is required.
- 2 The prescriber enters a *Start Date*, *End Date*, *Start Time* or *End Time*.
 - The CIS may autopopulate Start and End times for selected *Medicine* or *Frequency* entries.

5.13 Add an indication

A clinical indication or reason to prescribe a medicine is highly recommended due to its importance.

Quote The ACSQHC's NIMC User Guide [9] states that "Indication is critical clinical information for other health professionals involved in medicines management. It allows the order to be reviewed in the context of why the medicine was prescribed, reducing the risk of misinterpretation of the order e.g. medicines with look-a-like names or incorrect doses and for medicines which have different doses for different indications".

- This step may occur at the Prepare stage at the beginning of the prescribing model workflow, as it can influence the *Medicine* or *Dose* elements of an order.

It is recommended that a coded clinical indication be recorded for a selected medicine using SNOMED CT-AU *Clinical finding (Disorder)* concepts.

Note: As an additional data source, the TGA has a code table listing of indications¹⁸ that may be of use as reference data.

5.13.1 Example workflow

The prescriber searches for and records an *Indication* for the selected *Medicine*.

5.13.1.1 PRN reason - When required (PRN) orders

When a PRN order is initiated, the prescriber is typically required to enter a "PRN Reason" as an indication for the selected medicine.

While commonly captured as free text, it is recommended that encoded *Indications* are implemented in a CIS using SNOMED CT-AU *Disorder* concepts where supported.

Examples

- |Influenza |
- |Migraine |
- |Type 1 diabetes mellitus |

SNOMED
CT-AU
supported

5.13.1.2 Warfarin orders

When a warfarin order is initiated, the prescriber is typically required to enter an indication.

Example

|Venous thrombosis|

SNOMED
CT-AU
supported

Recommendation 39: Use SNOMED CT-AU Disorder concepts to specify an Indication for the selected medicine.

5.13.2 Relevant terminology components

5.13.2.1 SNOMED CT-AU Disorder concepts

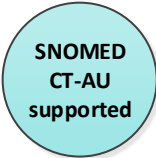
Some SNOMED CT-AU *Clinical finding* concepts can be used to specify an indication, specifically *Disorder* concepts. These concepts are included in the *Problem/Diagnosis reference set*. This is a large reference set; implementers can develop a more constrained set.

SNOMED
CT-AU
supported

¹⁸ Refer to <https://www.ebs.tga.gov.au/>.

Examples

- |*Respiratory tract infection*|
- |*Congestive heart failure*|
- |*Type 1 diabetes mellitus*|



5.13.3 Supporting reference sets

The following reference set provides terminology to support this step. See Table 1 on p. 16 for additional details.

Table 43: Reference sets supporting this step

No.	Reference set
17	<i>Problem/Diagnosis reference set</i>

6 Prescribing model: System check

This is a major prescribing model step.

It is an automated safety check by the CIS that aims to prevent a nonsensical *Medicine*, *Dose* or *Route* being recorded in an order that can result in an inability to dispense an actual product, accidental overdosing or under-dosing, or incorrect administration of the medicine.

This step is **not** imposing a product selection step (i.e. selecting a branded product ready to be dispensed) rather a system prompt to ensure correctness of a medicine order to address potential human errors.

Upon completion of an order but prior to its approval, the CIS performs an automated check using certain elements of the order and its CDS data. An alert triggers when the system cannot find a match between these order elements and a commercially available product presentation or some logical subunit (if a dose form can be safely divided).

6.1 Example workflow

- 1 When all the order elements have been recorded, an automated computerised check is performed by the CIS.
 - This check may occur at various stages of the prescribing model as relevant.
- 2 The CIS uses the four order elements *Medicine*, *Route*, *Dose Form* and *Dose* along with its CDS system to assess whether they can be translated to one or more commercially available products.
- 3 If these elements translate successfully to one or a combination of commercially available products, the workflow leads to approval of the order (Section 7).
- 4 If these elements do not translate successfully to one or a combination of commercially available products, a system alert is triggered.
 - a Based on their clinical judgement the prescriber may dismiss the alert without changing any order elements, leading to approval of the order.
 - b Alternatively, the prescriber amends some part of the order before approving the order.

6.2 Summary of rules for translation

The following table provides a summary of the rules for the recommended system check.

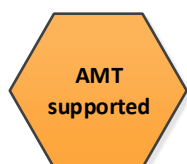
Table 44: Summary of the rules for the system check

Check no.	Order element	Data to be compared with	Criteria for a successful translation
1	<i>Medicine</i>	AMT product or BoSS concept	<i>Medicine</i> is an exact match of AMT product or BoSS.

Check no.	Order element	Data to be compared with	Criteria for a successful translation
2	<i>Route</i>	AMT product form	- Valid association between SNOMED CT-AU <i>Route</i> and AMT <i>Form</i>. - AMT <i>Form</i> is an exact match of AMT product form.
3	<i>Dose Form</i>	AMT product form	- Valid association between SNOMED CT-AU <i>Form</i> and AMT <i>Form</i>. - AMT <i>Form</i> is an exact match of AMT product form.
4	<i>Dose</i>	- AMT product strength <i>Dose Form</i> divisibility (from CDS)¹⁹	<i>Dose Form</i> divisibility - If form is divisible – Dose is an exact match, fraction or multiple of AMT product strength. - If form is not divisible – Dose is an exact match or multiple of AMT product strength. - A <i>Dose</i> may not exist for products where a consistent dose cannot be specified (variable dose). For example topical liquids, creams, ointments and gels. - This <i>Dose</i> check is omitted for these cases.

6.3 Detailed rules for translation

6.3.1 Check 1: Medicine element vs. AMT product or BoSS



The CIS compares the *Medicine* element with an appropriate AMT product or BoSS concept, checking for an exact match. The following AMT concepts can be used to compare with the *Medicine* element.

- BoSS
- MPUU
- MPP
- TP
- TPUU
- TPP; or
- CTPP

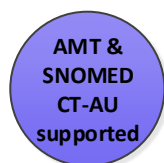
It is recommended that the comparison is performed on the concept identifiers (SNOMED CT identifiers).

- **Note:** The **BoSS** is an ingredient attribute of one or more associated MPUU concept(s). See table below.
- AMT products are accessible from their individual reference sets. See Section 2.1.1.

¹⁹ This assumes that the CDS system consulted by the prescriber includes dose form divisibility information.

Recommendation 40: Use the AMT BoSS or product concepts to compare with the Medicine element.

6.3.2 Check 2: Route element versus AMT product form



- The *Route* element is first translated to an AMT *Form*.
 - This is facilitated by the *Dose route and form extended association reference set*.
 - A *Route* can have many associations to AMT *Form*, as illustrated in the following table.

Table 45: Multiple AMT Forms associated with a single SNOMED CT-AU Route

SNOMED CT-AU Route	AMT Form
Oral route	tablet
	effervescent tablet
	modified release tablet

- The AMT *Form* is then compared with the **Form** attribute of the same AMT product from Check 2.
 - The comparison is performed on the concept identifiers (SNOMED CT identifiers).
 - The **Form** attribute of an AMT product is also sourced from an MPUU or TPUU, via the **Has Manufactured Dose Form** relationship (in the AMT Relationship file).
 - A TPUU may have a more specific form than its MPUU. See the codeine phosphate example in the table below.
- Where there are multiple associated AMT forms, if any matches the AMT product's form then this check is considered successful. For example,

Table 46: Successful matching of AMT product Forms with AMT Forms derived from the Dose route and form extended association reference set

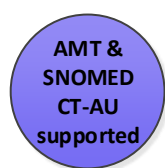
AMT product (MPUU or TPUU)	Relationship type	AMT Form
MPUU amoxicillin 125 mg/5 mL powder for oral liquid	Has Manufactured Dose Form	powder for oral liquid
TPUU Alphamox 125 mg/5 mL powder for oral liquid, 5 mL	Has Manufactured Dose Form	powder for oral liquid
MPUU codeine phosphate 50 mg/mL injection, ampoule	Has Manufactured Dose Form	injection
TPUU Codeine Phosphate (Phebra) 50 mg/mL injection solution, ampoule	Has Manufactured Dose Form	injection solution
MPUU ribavirin 200 mg tablet	Has Manufactured Dose Form	tablet

AMT product (MPUU or TPUU)	Relationship type	AMT Form
TPUU Copegus 200 mg tablet	Has Manufactured Dose Form	tablet

Recommendation 41a: Use the SNOMED CT-AU Route - AMT Form associations to translate the Route to an AMT Form.

Recommendation 41b: Use the AMT MPUU or TPUU's Form to compare with the Route element.

6.3.3 Check 3: Dose form element vs. AMT product form



- If the optional *Dose Form* element is recorded, it is first translated to an AMT Form.
 - This is facilitated by the *Dose route and form extended association reference set*.
 - A *Dose Form* can have many associations to AMT Form. For example:

Table 47: Multiple AMT Forms associated with a single SNOMED CT-AU Form

SNOMED CT-AU Form	AMT Form
	tablet
Tablet	effervescent tablet
	modified release tablet

- The AMT *Forms* are then compared with the **Form** attribute of the same AMT product from Check 2.
 - The comparison is performed on the concept identifiers (SNOMED CT identifiers).
- Where there are multiple associated AMT *Forms*, if any matches the AMT product's form then this check is considered successful.

Note: This check may be performed in conjunction with Check 2 (*Dose element*) where appropriate.

Recommendation 42a: Use the SNOMED CT-AU Form - AMT Form associations to translate the Dose form to an AMT Form.

Recommendation 42b: Use the AMT MPUU or TPUU's Form to compare with the Dose form element.

6.3.4 Check 4: Dose element vs. AMT product strength and dose form divisibility (from CDS)

There are two parts to this *Dose* element check:

- a *Dose Form* divisibility information is derived from the CDS, which influences how divisible a *Dose quantity* or volume can be.
- b Comparison with the AMT product strength.

6.3.4.1 Part 1

Not
terminology
supported

The *Dose* is affected by the divisibility of the medicine's *Dose Form*, which may be sourced from the CDS system.

- The CIS assesses whether a medicine's *Dose Form* (whether present within the *Medicine* or *Dose Form* element) is divisible (e.g. a scored tablet or liquid is divisible).
 - A divisible dose form allows for a more flexible (i.e. fractions of) *Dose quantity* or volume to be recorded in relation to the product's strength (e.g. $\frac{1}{4}$, $\frac{1}{2}$ or $\frac{3}{4}$ of a product strength is supported).
 - A non-divisible dose form restricts the *Dose quantity* or volume to only a single or exact multiple of the product's strength (e.g. 1, 2 or 4 times of a product strength is supported).
- *Dose Form* divisibility information is not terminology supported.

Recommendation 43: Use the dose form divisibility information from the CDS system to compare with the Dose element.

6.3.4.2 Part 2

AMT
supported

The *Dose* element is compared with the strength of the same AMT product from Check 1.

- The AMT product strength is the **BoSS Strength** attribute for an MPUU or TPUU, which is accessible from the *Strength reference set*.
- This **Strength** attribute is a normalised (machine readable) strength, where the value is normalised to a denominator unit of "1". However, the strength as included in an MPUU or TPUU Preferred Term's description may be different and more human-friendly.

Example

|amoxicillin 250 mg/5 mL oral liquid: powder for| has a normalised strength of "50 mg/mL" however the strength specified in the MPUU Preferred Term description text is "250 mg/5 mL".

- It is this normalised **BoSS Strength** attribute that should be used for this check.

The following table provides examples of some AMT MPUUs, BoSS and **Strength** attributes.

Table 48: Deriving the BoSS Strength attribute from MPUU concepts

AMT MPUU concept	Relationship type	BoSS ²⁰	BoSS Strength (value and unit)
amoxicillin 125 mg/5 mL powder for oral liquid	Has Australian BoSS	Amoxicillin	25 mg/mL
codeine phosphate 50 mg/mL injection, ampoule	Has Australian BoSS	Codeine phosphate	50 mg/mL
ribavirin 200 mg tablet	Has Australian BoSS	Ribavirin	200 mg/each

The following table provides additional information for deriving the BoSS Strength based on the *Medicine* element value. The target is always either an MPUU or TPUU concept's **Has Australian BoSS** relationship. More than one relationship may be used to trace from an AMT product to MPUU or TPUU (using the *AMT Relationship* file).

Table 49: Deriving the BoSS Strength, based on different concepts recorded in the Medicine element

If a Medicine element is recorded with...	Go to the target concept of...	Using this relationship(s) to derive BoSS Strength...
BoSS	MPUU	MPUU Has Australian BoSS
MPUU	MPUU	MPUU Has Australian BoSS
MPP	MPUU	• MPP Has MPUU • MPUU Has Australian BoSS
TP	TPUU	• TPUU Is a TP • TPUU Has Australian BoSS
TPUU	TPUU	• TPUU Has Australian BoSS
TPP	TPUU	• TPP Has TPUU • TPUU Has Australian BoSS
CTPP	TPUU	• CTPP Has TPUU • TPUU Has Australian BoSS

²⁰ Most of the BoSS concepts belonging to AMT products are sourced from SNOMED CT-AU substances, due to the content integration between the two terminologies.

Note: If the *Medicine* element has a BoSS recorded, there may be multiple MPUU concepts that the BoSS can belong to. All the relevant associated MPUU concepts are used for comparison.

Recommendation 44a: Find the associated AMT MPUU or TPUU for a Medicine element.

Recommendation 44b: Use the Strength attribute of AMT BoSS concepts to compare with the Dose element.

6.4 Example scenarios for successful translation

This section describes three examples of successful translation of order elements to available product. They include the following example orders:

- amoxicillin – oral – DOSE 400 mg - every 8 hours
- ciclosporin – oral – DOSE 85 mg - twice a day
- Tramal SR 200 mg tablet - DOSE one tablet - twice a day

Notes

- Even though comparison of order elements with SNOMED CT-AU or AMT data is usually via concept identifiers, the examples below show related Preferred Term descriptions instead for ease of understanding.
- There may be other possible combinations of products that support a particular Dose, however only one combination has been chosen to illustrate each example.

6.4.1 amoxicillin – oral – DOSE 400 mg - every 8 hours

Table 50: Successful translation scenario

Check no.	Order element	AMT, SNOMED CT-AU or CDS data found for comparison	Successful translation	Comments
1	Medicine - amoxicillin	BoSS - amoxicillin		Exact match found in a BoSS concept.
2	Route - Oral route	• Oral route - powder for oral liquid association exists. • The Form for the associated MPUU is powder for oral liquid .		• The Route of Oral route is validly associated with the AMT Form of powder for oral liquid . • AMT Form of powder for oral liquid is an exact match with the MPUU Form of powder for oral liquid .

Check no.	Order element	AMT, SNOMED CT-AU or CDS data found for comparison	Successful translation	Comments
4	Dose - 400 mg	- The BoSS <i>amoxicillin</i> has 11 related MPUUs, however one MPUU is selected that can achieve the intended <i>Dose</i> and <i>Route</i>. - MPUU <i>amoxicillin 250 mg/5 mL powder for oral liquid</i> with a BoSS strength of 50 mg/mL - Per CDS the <i>Dose Form</i> "powder for oral liquid" is divisible, therefore <i>Dose</i> can be an exact match, fraction or multiple of strength.		A <i>Dose</i> of 400 mg <i>amoxicillin</i> can be delivered by 8 mL of the selected MPUU.

6.4.2 ciclosporin – oral – DOSE 85 mg - twice a day

Table 51: Successful translation scenario

Check no.	Order element	AMT, SNOMED CT-AU or CDS data found for comparison	Successful translation	Comments
1	Medicine - <i>ciclosporin</i>	BoSS - <i>ciclosporin</i>		Exact match found in a BoSS concept.
2	Route - <i>Oral route</i>	<i>Oral route</i> - <i>capsule</i> association exists. - The <i>Form</i> for the associated MPUUs is <i>capsule</i> .		- The <i>Route</i> of <i>Oral route</i> is validly associated with the AMT <i>Form</i> of <i>capsule</i> . - AMT <i>Form</i> of <i>capsule</i> is an exact match with the MPUU <i>Form</i> of the three concepts of <i>capsule</i> .
4	Dose – 85 mg	- The BoSS <i>ciclosporin</i> has seven related MPUUs, however three were selected to achieve the intended <i>Dose</i> and <i>Route</i>. - MPUU <i>ciclosporin 50 mg capsule</i> with a BoSS strength of 50 mg/each - MPUU <i>ciclosporin 25 mg capsule</i> with a BoSS strength of 25 mg/each - MPUU <i>ciclosporin 10 mg capsule</i> with a BoSS strength of 10 mg/each - Per CDS the <i>Dose form</i> "capsule" is not divisible, therefore <i>Dose</i> can be an exact match or multiple of strength.		- A <i>Dose</i> of 85 mg <i>ciclosporin</i> can be delivered by a combination of three MPUU concepts associated with the BoSS <i>ciclosporin</i> , which provide 50 mg, 25 mg and 10 mg in each capsule respectively. - The MPUU <i>ciclosporin 50 mg capsule</i> delivers 50 mg of <i>ciclosporin</i> in a capsule. - The MPUU <i>ciclosporin 25 mg capsule</i> delivers 25 mg of <i>ciclosporin</i> in a capsule. - The MPUU <i>ciclosporin 10 mg capsule</i> delivers 10 mg of <i>ciclosporin</i> in a capsule.

6.4.3 Tramal SR 200 mg modified release tablet – oral - DOSE 200 mg – twice a day

Table 52: Successful translation scenario

Check no.	Order element	AMT, SNOMED CT-AU or CDS data found for comparison	Successful translation	Comments
1	Medicine - Tramal SR 200 mg modified release tablet	TPUU - Tramal SR 200 mg modified release tablet		Exact match found in a TPUU concept.
2	Route - Oral route	• Oral route - modified release tablet association exists. • The Form for the associated TPUU is modified release tablet .		• The Route of Oral route is validly associated with the AMT Form of modified release tablet . • AMT Form of modified release tablet is an exact match with the TPUU Form of modified release tablet .
4	Dose - 200 mg	• The TPUU is selected as it can achieve the intended Dose and Route. ◦ It has a BoSS strength of 200 mg/each • Per CDS the Dose Form “modified release tablet” is not divisible (to be swallowed whole), therefore Dose can be an exact match or multiple of strength.		• A Dose of 200 mg tramadol hydrochloride can be delivered by one tablet of the selected TPUU.

6.5 Example scenarios for unsuccessful translation

This section describes two examples of unsuccessful translation of order elements to available product. They include the following example orders:

- haloperidol – injection – intramuscular – DOSE 3.75 mg – once – short-acting IM
- abacavir – tablet - oral – DOSE 450 mg – once daily

Note *The Dose in both examples has been deliberately altered from their usual clinical doses to illustrate inaccurate orders.*

6.5.1 haloperidol – injection – intramuscular – DOSE 3.325 mg – once – short acting IM

Table 53: Unsuccessful translation scenario

Check no.	Order element	AMT, SNOMED CT-AU or CDS data found for comparison	Successful translation	Comments
1	Medicine - haloperidol	BoSS - haloperidol		- Exact match found in a BoSS concept. - There exists another BoSS of haloperidol decanoate . However, per clinical judgement and CDS it was not selected by the prescriber because a haloperidol decanoate product is a depot injection (with slow release characteristics) that is not suitable for a short-acting IM injection as intended.
2	Route - Intramuscular	- Intramuscular route - injection association exists. - The Form for the associated MPUUs is injection .		- The Route of Intramuscular route is validly associated with the AMT Form of injection . - AMT Form of injection is an exact match with the MPUU Form of injection . Note: The “short acting” component cannot be codified because it is not modelled as a defining characteristic of concepts in SNOMED CT.
3	Dose Form - Injection	- Injection - injection association exists. - The Form for the associated MPUUs is injection .		- The Dose Form of Injection is validly associated with the AMT Form of injection . - AMT Form of injection is an exact match with the MPUU Form of injection .
4	Dose - 3.325 mg	- The BoSS haloperidol has seven related MPUUs, however only three has a Dose Form of injection that matches the intended Dose Form of Injection as recorded for the order. - MPUU haloperidol 10 mg/mL injection, ampoule with a BoSS strength 10 mg/mL - MPUU haloperidol 5		- Only three possible MPUU concepts are identified to deliver the Dose. - Even though the dose form is divisible, a Dose of 3.325 mg cannot be accurately delivered by any of the three possible MPUU concepts or a combination of them. 0.3325 mL of either the 10 mg/mL or 20 mg/2 mL product is required to deliver a Dose of 3.325 mg. 0.665 mL of the 5 mg/mL product is required to deliver a Dose of 3.325 mg. - However, 0.3325 mL and 0.665 mL may be estimated but not accurately administered such as using a 1 mL syringe with graduations of 0.01.

Check no.	Order element	AMT, SNOMED CT-AU or CDS data found for comparison	Successful translation	Comments
		<i>mg/mL injection, ampoule</i> with a BoSS strength <i> 5 mg/mL </i> - MPUU <i> haloperidol 20 mg/2 mL injection, ampoule </i> with a BoSS strength <i> 10 mg/mL </i> - Per CDS the <i>Dose Form</i> of <i> injection </i> is divisible, therefore <i>Dose</i> can be an exact match, fraction or multiple of strength.		Note: This information is derived from CDS or other clinical knowledge bases and not sourced from terminology. Therefore a system alert is triggered for the prescriber to check the recorded <i>Dose</i>.

6.5.2 abacavir - tablet - oral – DOSE 500 mg – once daily

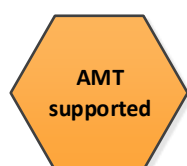
Table 54: Unsuccessful translation scenario

Check no.	Order element	SNOMED CT-AU and the AMT data to be compared with	Successful translation	Comments
1	Medicine - <i> Abacavir </i>	BoSS - <i> abacavir </i>		Exact match found in a BoSS concept.
2	Route - <i> Oral route </i>	<i> Oral route </i>-<i> tablet </i> association exists. - The <i>Form</i> for the associated MPUU is <i> tablet </i>.		- The <i>Route</i> of <i> Oral route </i> is validly associated with the AMT <i>Form</i> of <i> tablet </i>. - AMT <i>Form</i> of <i> tablet </i> is an exact match with the MPUU <i>Form</i> of <i> tablet </i>.
3	Dose Form - <i> Tablet </i>	<i> Tablet </i> -<i> tablet </i> association exists. - The <i>Form</i> for the associated MPUU is <i> tablet </i>.		- The <i>Dose Form</i> of <i> Tablet </i> is validly associated with the AMT <i>Form</i> of <i> tablet </i>. - AMT <i>Form</i> of <i> tablet </i> is an exact match with the MPUU <i>Form</i> of <i> tablet </i>.

Check no.	Order element	SNOMED CT-AU and the AMT data to be compared with	Successful translation	Comments
4	Dose - 500 mg	- The BoSS <i>abacavir</i> has two related single ingredient MPUUs (a tablet and an oral liquid), however one MPUU is selected that can achieve the closest intended <i>Dose</i> and <i>Route</i>, and the specified <i>Form</i> of <i>Tablet</i> . - MPUU <i>abacavir 300 mg tablet</i> with a BoSS strength of <i>300 mg/each</i> - Per CDS the <i>Dose Form</i> "Tablet" is divisible (Ziagen tablets are scored and can be halved), therefore <i>Dose</i> can be an exact match, a fraction (1/2) or multiple of strength.	✗	- Only one possible MPUU concept is identified to deliver the <i>Dose</i>, based on the specified <i>Form</i> of <i>Tablet</i> . - Even though the dose form is divisible (halved), a <i>Dose</i> of <i>500 mg</i> cannot be accurately delivered by this MPUU concept. - The closest <i>Dose</i> that can be achieved is one and a half tablets, which only delivers 450 mg abacavir. - The <i>Dose</i> of 500 mg cannot be accurately achieved. - Therefore a system alert is triggered for the prescriber to check the recorded <i>Dose</i>.

6.6 Relevant terminology components

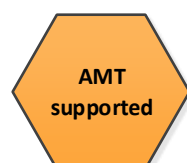
6.6.1 AMT BoSS



The AMT BoSS concepts can support the comparison with the *Medicine* element (Check 1).

The BoSS concepts are not published in a reference set, however can be extracted from the terminology data by using a preprepared SQL script – refer to the *ATIG* [3].

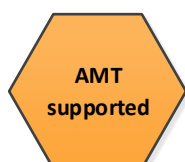
6.6.2 AMT products



The following AMT products can support the comparison with the *Medicine* element (Check 1). Each is included in an individual reference set:

- MPUU
- MPP
- TP
- TPUU
- TPP; or
- CTPP

6.6.3 AMT product strength

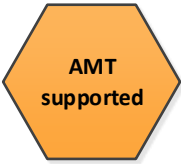


The **BoSS Strength** attribute of an MPUU or TPUU concept can support the comparison with the *Dose* element (Check 2).

- The *Relationship* file is used to navigate from a recorded *Medicine* element to its closest target of either an MPUU or TPUU.

- Then, the **BoSS Strength** attribute of the MPUU or TPUU's **Has Manufactured Dose Form** relationship is accessed from the *Strength reference set*.

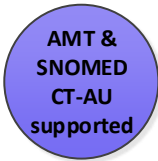
6.6.4 AMT product form



The *Form* of an AMT product (recorded *Medicine* element) can support the comparison with the *Route* and *Dose Form* elements (Checks 3 and 4).

- The **Form** attribute of an AMT product is sourced from the *Medicine* element's related MPUU or TPUU, via the **Has Manufactured Dose Form** relationship (in the AMT Relationship file).

6.6.5 SNOMED CT-AU Route and AMT Form associations



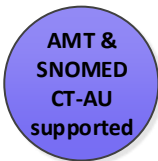
Associations between SNOMED CT-AU *Routes of administration* and AMT *Dose Forms* can support the comparison with the *Route* element (Check 3).

This is an association between entries from the *Dose based prescribing route of administration reference set* and AMT dose form qualifier concepts. These associations are accessible from the *Dose route and form extended association reference set*. For example:

Table 55: Multiple AMT product forms associated with a single SNOMED CT-AU Route

SNOMED CT-AU Route	AMT Dose form
Oral route	tablet
	modified release tablet
	effervescent tablet

6.6.6 SNOMED CT-AU Form and AMT Form associations



Associations between SNOMED CT-AU *Forms* and AMT *Forms* can support the comparison with the *Dose Form* element (Check 4).

These associations are between entries from the *Dose based prescribing dose form reference set* and AMT dose form qualifier concepts. These associations are accessible from the *Dose route and form extended association reference set*.

There are entries in this file that do not strictly describe concept equivalence (see *Tablet* and *Nebuliser solution* examples below). Some differences in form specificity is due to entries from the *Dose based prescribing dose form reference set* representing administered dose forms while AMT dose forms only describe manufactured dose forms.

Some example associations are described in the following table, along with some comments.

Table 56: Relative similarities of SNOMED CT-AU and AMT Forms

SNOMED CT-AU Form	AMT Dose form	Comments
Capsule	capsule	Both concepts are equivalent
Tablet	tablet	Both concepts are equivalent
Tablet	effervescent tablet	SNOMED CT-AU Form is less specific than AMT Form.
Nebuliser solution	inhalation solution	SNOMED CT-AU Form is more specific than AMT Form.

6.7 Supporting reference sets

AMT &
SNOMED
CT-AU
supported

The following reference sets provide terminology to support this step. See Table 1 on p. 16 for additional details.

Table 57: Reference sets supporting this step

No.	Reference set
3	Containerised trade product pack reference set
10	Dose route and form extended association reference set
14	Medicinal product unit of use reference set
15	Medicinal product pack reference set
20	Strength reference set
22	Trade product reference set
23	Trade product unit of use reference set
24	Trade product pack reference set

7 Prescribing model: Approve

This is the final prescribing model step. It is not terminology supported.

7.1 Example workflow



- 1 Upon the finalisation of a complete and accurate medicine order, the prescriber electronically signs and approves the order.
- 2 This marks the end of the prescribing model.
 - While the approved order is then transmitted to a dispensing system, it is not specifically covered by the prescribing model.
 - There are national specifications that detail the standardised communication of orders or prescriptions to other electronic systems – refer to Appendix G.

8 Order sentences

8.1 Overview

As an alternative to creating a medicine order using an atomic, modular fashion (as described in the prescribing model in Sections 4 to 7), preconfigured order sentences may be developed as shortcuts. This is useful to describe commonly ordered medicines, to enforce consistency or provide safety aspects in an ordering workflow.

Example elements that comprise an order sentence may include (but are not limited to) the following:

- *Medicine name*
 - Either at a generic or branded level
 - At different levels of specificity
 - May describe a product or substance
- *Dose*
- *Frequency or Interval*
- *Route of Administration*
- *Dose Form*
- *Indication; or*
- Any other additional elements, as required.

Order sentences should be developed with the assistance of clinical users and clinical decision support resources, for example by using relevant data such as typical adult doses and maximum daily doses.

Order sentences are used in conjunction with patient-contextual factors such as weight-based calculations, duplicate therapy checks, known adverse reactions, drug-drug and drug-disease interactions.

Order sentences may also be affected by jurisdictional, local or site-specific requirements.

Note *A national set or standardised syntax for order sentences has not been developed. However, the terminology building blocks for order sentences are available as described in the prescribing model (Sections 3 to 5). Implementers can use the relevant terminology components to develop their own set of order sentences.*

8.2 Example workflow

- 1 When a prescriber selects a *Medicine* entry, it can bring up any number of preconfigured order sentences that are associated with the selected entry.
- 2 Upon selection of a particular order sentence, the system may populate the appropriate fields with the data underpinning the order sentence. The prepopulated fields may be individually changed to result in another existing

order sentence or a new entry. The system may prompt the prescriber to add new entries or automatically saves it to the prescriber's profile.

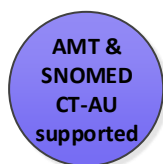
- The following table includes an example PRN order sentence of "*metoclopramide – oral – DOSE 10 mg – Three times a day – nausea*" that can repopulate certain system fields upon its selection.

Table 58: Example PRN order sentence fields

Order sentence element	Prepopulated system field
metoclopramide	<i>Medicine</i>
10 mg	<i>Dose</i>
Oral	<i>Route of Administration</i>
Three times a day	<i>Frequency or Interval</i>
nausea	<i>Indication or PRN reason</i>

- 3 Other information not captured within the order sentences may be populated by the prescriber using discrete elements in the CIS. For example,
 - *Dose qualifier*
 - *Duration*
 - *Start/End Date or Time*
 - *Dose form*
 - *Administration Instruction*
- 4 Between the selection and confirmation of an order sentence will be any number of decision support alerts. These may include alerts for the specified dose, duplicate therapy, and checks against the patient's indications, adverse reaction profile, drug-drug interactions and contraindications.
- 5 When all decision support alerts have been resolved, the prescriber confirms the full details of the order.
- 6 The prescriber signs and approves the order.

8.3 Relevant terminology components



Any of the SNOMED CT-AU and the AMT components supporting the prescribing model described in Sections 3 to 7 can be used to assist in creating order sentences, as required:

- AMT BoSS concepts
- AMT product concepts
- AMT product strength
- AMT product form
- AMT unit of use quantity
- SNOMED CT-AU *Body structure* concepts
- SNOMED CT-AU Clinical finding and Disorder concepts
- SNOMED CT-AU *Observable entity* concepts

- SNOMED CT-AU *Qualifier value* concepts
 - *Additional dosage instructions*
 - *Descriptor*
 - *Dosing instruction fragment*
 - *Dosing instruction imperative*
 - *Frequencies*
 - *Technique*
 - *Temporal periods*
 - *Time patterns*
 - *Type of drug preparation*
 - *Unit*
 - *Unit dose*
 - *Unit of rate*
 - *Unit of time*
- SNOMED CT-AU *Route of administration value* concepts
- SNOMED CT-AU *Situation with explicit context* concepts
- SNOMED CT-AU *Topographical modifier* concepts
- Associations between SNOMED CT-AU *Route*, SNOMED CT-AU *Form* and AMT *Form* concepts

9 Example medication orders

This section describes a range of example dose based and pack based orders. It focuses on the elements of a particular medication order or prescription and the extent of terminology encoding that is possible using SNOMED CT-AU and the AMT.

Medicine orders are typically referenced in acute care settings while medicine prescriptions are more applicable in primary and community care settings.

The examples emphasise the medication ordering or prescribing workflow as described in the prescribing model in the previous section. They do not include the full clinical context for prescribing a particular medication, list all assumptions or pre-existing conditions required or include information recorded by a clinician dispensing or administering the order.

9.1 Dose based orders

This section includes six example dose based orders for various medicines.

9.1.1 Regular or routine order

9.1.1.1 Textual representation

The following is a textual representation of a routine order:

furosemide - oral - DOSE 40 mg - once a day - in the morning

9.1.1.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

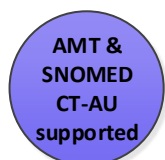


Table 59: Illustrative terminology coding for a regular or routine order

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Furosemide		387475002 Furosemide	BoSS concepts	
Oral		26643006 Oral route	Dose based prescribing route of administration reference set	
DOSE		-	-	This is an onscreen display label and is not codeable.

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
40		value field	<i>Strength reference set</i>	- Usually a numeric dose quantity is not codeable (terminology supported). - However, there is an available MPUU <i>furosemide 40 mg tablet</i> with a Strength value that is equal to the <i>Dose quantity</i> of "40" specified. Therefore, this element can be derived from the AMT.
mg		258684004 <i>mg</i>	<i>Dose unit of measure reference set</i>	
Once a day		229797004 <i>Once a day</i>	<i>Dose based prescribing dose frequency and interval reference set</i>	
In the morning		73775008 <i>Morning</i>	<i>Dose qualifier reference set</i>	This concept will be assigned an Australian Preferred Term of <i>In the morning</i> .

9.1.1.3 Prescribing model steps

The table below describes one way this order can be created using the prescribing model.

AMT & SNOMED CT-AU supported

Table 60: Example prescribing model steps for a regular or routine order

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medication course</i> type	- Although not specified in the example, <i>Medication course</i> type is considered an important element for dose based orders. - The prescriber selects the term <i>Scheduled</i> .		416774000 <i>Scheduled</i>	<i>Dose based prescribing medication course type reference set</i>
Add a <i>Medicine</i>	The prescriber selects the BoSS concept <i>Furosemide</i> .		387475002 <i>Furosemide</i>	BoSS concepts
Add a <i>Route of Administration</i>	The prescriber selects the term <i>Oral route</i> .		26643006 <i>Oral route</i>	<i>Dose based prescribing route of administration reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Dose</i>	- The prescriber selects a preconfigured <i>Dose quantity</i> of "40" as the <i>Dose</i> is the same as the Strength of a suitable MPUU concept <i> furosemide 40 mg tablet </i>. - The prescriber selects a unit of measure of <i> mg </i>.		- Strength value 258684004 <i> mg </i>	<i>Strength reference set</i> <i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i> Once a day </i> .		229797004 <i> Once a day </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add a <i>Dose qualifier</i>	The prescriber selects the term <i> In the morning </i> .		73775008 <i> Morning </i>	<i>Dose qualifier reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i> Hypertension </i>.		38341003 <i> Hypertension </i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT MPUU concept <i> furosemide 40 mg tablet </i>.		387475002 <i> Furosemide </i> - Strength value "40" 258684004 <i> mg </i> 26643006 <i> Oral route </i> <i> Oral route </i>-<i> tablet </i> association 23106011000036104 <i> furosemide 40 mg tablet </i>	- BoSS concepts <i>Strength reference set</i> <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i> <i>Medicinal product unit of use reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.1.2 Once only order

9.1.2.1 Textual representation

There are two separate orders in this example. The following is a textual representation of the once only orders:

- *haloperidol - short-acting injection - intramuscular – DOSE 5 mg – once - acute psychosis*
- *lorazepam – oral – DOSE 2 mg - once*

9.1.2.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

AMT &
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CT-AU
supported

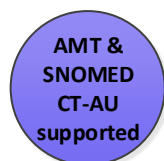
Table 61: Illustrative terminology coding for a once only order

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Haloperidol		386837002 Haloperidol	BoSS concepts	
Short-acting injection		385218009 Injection	Dose based prescribing dose form reference set	• Partially supported with a less specific dose form concept of Injection . • “Short-acting” is not a defining characteristic of a dose form concept and is not included in SNOMED CT-AU or AMT. Therefore, this information is captured using free text in an appropriate element or a local concept created.
Intramuscular		78421000 Intramuscular route	Dose based prescribing route of administration reference set	
DOSE		-	-	This is an onscreen display label and is not codeable.

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
5		value field	<i>Strength reference set</i>	- Usually a numeric dose quantity is not codeable (terminology supported). - However, there is an available MPUU <i> haloperidol 5 mg/mL injection, ampoule </i> with a <i>Strength</i> value that is equal to the <i>Dose</i> quantity of "5" specified. Therefore, this element can be derived from the AMT.
mg		258684004 <i> mg </i>	<i>Dose unit of measure reference set</i>	
Once		422114001 <i> Once </i>	<i>Dose based prescribing dose frequency and interval reference set</i>	
Acute psychosis		69322001 <i> Psychotic disorder </i>	<i>Problem/Diagnosis reference set</i>	- Partially supported - A single, exact concept describing "Acute psychosis" cannot be found in SNOMED CT-AU. "Acute" is not a defining characteristic of concepts in SNOMED CT-AU. - However, a less specific concept of <i> Psychotic disorder </i> is found which has a synonym of "Psychosis".
Lorazepam		387106007 <i> Lorazepam </i>	BoSS concepts	
Oral		26643006 <i> Oral route </i>	<i>Dose based prescribing route of administration reference set</i>	
2		-	-	- The MPUU <i> lorazepam 1 mg tablet </i> can deliver the <i>Dose</i> of "2 mg". However, its <i>Strength</i> value is not equal to the <i>Dose quantity</i> of "2" specified. Therefore, this element cannot be derived from the AMT. - The numeric dose quantity "2" is not codeable (terminology supported).

9.1.2.3 Prescribing model steps

The tables below describe one way the two separate orders can be created using the prescribing model.

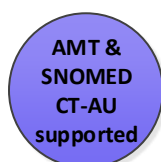


First order: haloperidol - short-acting injection - intramuscular – DOSE 5 mg – once - acute psychosis

Table 62: Example prescribing model steps for a once only order (first order)

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medication course type</i>	- Although not specified in the example, <i>Medication course type</i> is considered an important element for dose based orders. - The prescriber selects the term Stat .		49499008 Stat	<i>Dose based prescribing medication course type reference set</i>
Add a <i>Medicine</i>	The prescriber selects the BoSS Haloperidol .		386837002 Haloperidol	BoSS concepts
Add a <i>Route</i>	The prescriber selects the term Intramuscular route .		78421000 Intramuscular route	<i>Dose based prescribing route of administration reference set</i>
Add a <i>Dose Form</i>	The prescriber selects the term Injection .		385218009 Injection	<i>Dose based prescribing dose form reference set</i>
Add an <i>Administration instruction</i>	- The prescriber types in free text "Short-acting" within this element or a Comments field. - Alternatively, a local concept is selected if it is available.		-	-
Add a <i>Dose</i>	- The prescriber selects a preconfigured <i>Dose quantity</i> of "5" as the <i>Dose</i> is the same as the Strength of a suitable MPUU concept haloperidol 5 mg/mL injection, ampoule . - The prescriber selects a unit of measure of mg .		- Strength value 258684004 mg	<i>Strength reference set</i> <i>Dose unit of measure reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i> Once </i> .		422114001 <i> Once </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add an <i>Indication</i>	The prescriber selects the term <i> Psychotic disorder </i> .		69322001 <i> Psychotic disorder </i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Route, Dose Form</i> and <i>Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> association, SNOMED CT-AU <i>Form-AMT Form</i> association and its CDS system in its calculations. - The order elements successfully translate to the AMT MPUU concept <i> haloperidol 5 mg/mL injection, ampoule </i>.		386837002 <i> Haloperidol </i> - Strength value "5" 258684004 <i> mg </i> 78421000 <i> Intramuscular route </i> 385218009 <i> Injection </i> <i> Intramuscular route - injection </i> association <i> Injection - injection </i> association 21986011000036107 <i> haloperidol 5 mg/mL injection, ampoule </i>	- BoSS concepts <i>Strength reference set</i> <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose based prescribing dose form reference set</i> <i>Dose route and form extended association reference set</i> <i>Medicinal product unit of use reference set</i>
Approve order	The prescriber signs and approves the order.		-	-



Second order: lorazepam – oral – DOSE 2 mg – once

Table 63: Example prescribing model steps for a once only order (second order)

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medication course type</i>	Although not specified in the example, <i>Medication course type</i> is considered		49499008 <i> Stat </i>	<i>Dose based prescribing medication course type reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
	an important element for dose based orders. The prescriber selects the term <i> Stat </i>.			
Add a <i>Medicine</i>	The prescriber selects the BoSS <i> Lorazepam </i> .		387106007 <i> Lorazepam </i>	BoSS concepts
Add a <i>Dose</i>	- The prescriber types in a <i>Dose quantity</i> of "2" as the <i>Dose</i> is not the same as the Strength of the closest suitable MPUU concept <i> lorazepam 1 mg tablet </i>. - The prescriber selects a unit of measure of <i> mg </i>.		258684004 <i> mg </i>	<i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i> Once </i> .		422114001 <i> Once </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add a <i>Route</i>	The prescriber selects the term <i> Oral route </i> .		26643006 <i> Oral route </i>	<i>Dose based prescribing route of administration reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i> Anxiety </i>.		48694002 <i> Anxiety </i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Dose, Route</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT MPUU concept <i> lorazepam 1 mg tablet </i>.		387106007 <i> Lorazepam </i> 258684004 <i> mg </i> 26643006 <i> Oral route </i> <i> Oral route </i>-<i> tablet </i> association 37826011000036106 <i> lorazepam 1 mg tablet </i>	- BoSS concepts <i>Dose unit of measure reference set</i> <i>Strength reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i> <i>Medicinal product unit of</i>

Prescribing model step	Terminology supported?	Terminology component(s) used	Source reference set or file
			<i>use reference set</i>
Approve order	The prescriber signs and approves the order.		-

9.1.3 When required (PRN) order

9.1.3.1 Textual representation

The following is a textual representation of a PRN order:

Paracetamol – oral – DOSE 500 mg - every 4 hours – when required for back pain

9.1.3.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

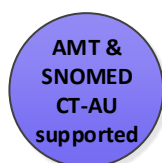


Table 64: Illustrative terminology coding for a PRN order

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Paracetamol		387517004 Paracetamol	BoSS concepts	
Oral		26643006 Oral route	<i>Dose based prescribing route of administration reference set</i>	
DOSE		-	-	This is an onscreen display label and is not codeable.

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
500		value field	<i>Strength reference set</i>	- Usually a numeric dose quantity is not codeable (terminology supported). - However, there are two relevant MPUU concepts with a Strength value that is equal to the <i>Dose quantity</i> of "500" specified. <i>paracetamol 500 mg capsule</i> or <i>paracetamol 500 mg tablet</i> . - Therefore, this element can be derived from the AMT.
mg		258684004 mg	<i>Dose unit of measure reference set</i>	
Every 4 hours		225756002 Every 4 hours	<i>Dose based prescribing dose frequency and interval reference set</i>	
When required		225761000 When required	<i>Dose based prescribing medication course type reference set</i>	
For back pain		161891005 Backache	<i>Problem/Diagnosis reference set</i>	This concept has an acceptable synonym of <i>Back pain</i> , which may be used in searching.

9.1.3.3 Prescribing model steps

The table below describes one way this order can be created using the prescribing model.

AMT &
SNOMED
CT-AU
supported

Table 65: Example prescribing model steps for a PRN order

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medication course type</i>	The prescriber selects the term <i>When required</i> .		225761000 <i>When required</i>	<i>Dose based prescribing medication course type reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medicine</i>	The prescriber selects the BoSS <i> Paracetamol </i> .		387517004 <i> Paracetamol </i>	BoSS concepts
Add a <i>Route</i>	The prescriber selects the term <i> Oral route </i> .		26643006 <i> Oral route </i>	<i>Dose based prescribing route of administration reference set</i>
Add a <i>Dose</i>	- The prescriber selects a preconfigured <i>Dose quantity</i> of "500" as the <i>Dose</i> is the same as the Strength of two suitable MPUU concepts. <i> paracetamol 500 mg capsule </i> or <i> paracetamol 500 mg tablet </i>. - The prescriber selects a unit of measure of <i> mg </i>.		- Strength value 258684004 <i> mg </i>	<i>Strength reference set</i> <i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i> Every 4 hours </i> .		225756002 <i> Every 4 hours </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add an <i>Indication</i>	The prescriber selects the term <i> Backache </i> , which has an acceptable synonym of "Back pain".		161891005 <i> Backache </i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine</i>, <i>Route</i>, <i>Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to two AMT MPUU concepts: <i> paracetamol 500 mg capsule </i> or <i> paracetamol 500 mg tablet </i>.		387517004 <i> Paracetamol </i> - Strength value "500" 258684004 <i> mg </i> 26643006 <i> Oral route </i> <i> Oral route </i>-<i> tablet </i> association <i> paracetamol 500 mg capsule </i> <i> paracetamol 500 mg tablet </i>.	- BoSS concepts <i>Strength reference set</i> <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i> <i>Medicinal product unit of use reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.1.4 Loading dose or reducing dose order

9.1.4.1 Textual representation

There are three separate orders in this example – a loading dose, a reduced dose followed by a maintenance dose. The following is a textual representation of the orders:

- *prednisolone – DOSE 40 mg - once daily - for 5 days - loading dose*
- *prednisolone – DOSE 15 mg - once daily – for 3 days*
- *prednisolone – DOSE 5 mg - once daily - maintenance dose*

9.1.4.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

AMT &
SNOMED
CT-AU
supported

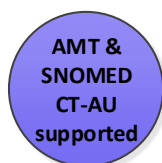
Table 66: Illustrative terminology coding for a reducing dose order

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Prednisolone		116601002 Prednisolone	BoSS concepts	
DOSE		-	-	This is an onscreen display label and is not codeable.
40		-	-	• A combination of two relevant MPUU concepts can deliver the Dose of “40 mg”. However, their Strength values do not equal the Dose quantity of “40” specified. ◦ prednisolone 5 mg tablet and ◦ prednisolone 25 mg tablet . • Therefore, this element cannot be derived from the AMT and the numeric dose quantity “40” is not codeable (terminology supported).
mg		258684004 mg	Dose unit of measure reference set	
Once daily		229797004 Once a day	Dose based prescribing dose frequency and interval reference set	

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
For 5 days		258703001 day	<i>Unit of time reference set</i>	- Partially supported with the unit of time portion encoded. - The numeric value "5" is not terminology encoded.
Loading dose		-	-	- This information is not currently included in the terminologies. - It can be captured using free text in an appropriate element or a local concept created.
15		-	-	The numeric dose quantity "15" is not codeable (terminology supported).
For 3 days		258703001 day	<i>Unit of time reference set</i>	- Partially supported with the unit of time portion encoded. - The numeric value "3" is not terminology encoded.
5		-	-	The numeric dose quantity "5" is not codeable (terminology supported).
Maintenance dose		-	-	- This information is not currently included in the terminologies. - It can be captured using free text in an appropriate element or a local concept created.

9.1.4.3 Prescribing model steps

The tables below describe one way the three separate orders can be created using the prescribing model.

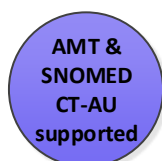


First order: prednisolone – DOSE 40 mg - once daily - for 5 days - loading dose

Table 67: Example prescribing model steps for a reducing dose order (first order)

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medication course type</i>	- Although not specified in the example, <i>Medication course type</i> is considered an important element for dose based orders. - The prescriber selects the term <i> Variable dose </i>.		745291000168108 <i> Variable dose </i>	<i>Dose based prescribing medication course type reference set</i>
Add a <i>Medicine</i>	The prescriber selects the BoSS <i> Prednisolone </i> .		116601002 <i> Prednisolone </i>	BoSS concepts
Add a <i>Route</i>	- Although not specified in the example, <i>Route</i> is an important element. - The prescriber selects the term <i> Oral route </i>.		26643006 <i> Oral route </i>	<i>Dose based prescribing route of administration reference set</i>
Add an <i>Administration instruction</i>	- The prescriber types in free text "Loading dose" in this element or a Comments field. - Alternatively, a local concept is selected if it is available.		-	-
Add a <i>Dose</i>	The prescriber types in a <i>Dose</i> quantity of "40" and selects a unit of measure of <i> mg </i> .		258684004 <i> mg </i>	<i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i> Once a day </i> .		229797004 <i> Once a day </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add a <i>Duration</i>	The prescriber types in a <i>Duration</i> quantity of "5" and selects a unit of time of <i> day </i> .		258703001 <i> day </i>	<i>Unit of time reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i> Acute adrenal insufficiency </i>.		24867002 <i> Acute adrenal insufficiency </i>	<i>Problem/Diagnosis reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to a combination of the two MPUU concepts - prednisolone 5 mg tablet and - prednisolone 25 mg tablet .		116601002 Prednisolone 258684004 mg 26643006 Oral route - Oral route - tablet association 22412011000036109 prednisolone 5 mg tablet 33670011000036107 prednisolone 25 mg tablet	- BoSS concepts <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i> <i>Medicinal product unit of use reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

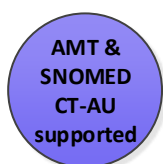


Second order: prednisolone – DOSE 15 mg - once daily – for 3 days

Table 68: Example prescribing model steps for a reducing dose order (second order)

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medication course</i> type	- Although not specified in the example, <i>Medication course</i> type is considered an important element for dose based orders. - The prescriber selects the term Variable dose .		745291000168108 Variable dose	<i>Dose based prescribing medication course type reference set</i>
Add a <i>Medicine</i>	The prescriber selects the BoSS Prednisolone .		116601002 Prednisolone	BoSS concepts

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Route</i>	- Although not specified in the example, <i>Route</i> is an important element. - The prescriber selects the term <i> Oral route </i>.		26643006 <i> Oral route </i>	<i>Dose based prescribing route of administration reference set</i>
Add a <i>Dose</i>	The prescriber types in a <i>Dose</i> quantity of "15" and selects a unit of measure of <i> mg </i> .		258684004 <i> mg </i>	<i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i> Once a day </i> .		229797004 <i> Once a day </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add a <i>Duration</i>	The prescriber types in a <i>Duration</i> quantity of "3" and selects a unit of time of <i> day </i> .		258703001 <i> day </i>	<i>Unit of time reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i> Acute adrenal insufficiency </i>.		24867002 <i> Acute adrenal insufficiency </i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to a combination of the two MPUU concepts <i> prednisolone 5 mg tablet </i> and <i> prednisolone 25 mg tablet </i>.		116601002 <i> Prednisolone </i> 258684004 <i> mg </i> 26643006 <i> Oral route </i> <i> Oral route </i>-<i> tablet </i> association 22412011000036109 <i> prednisolone 5 mg tablet </i> 33670011000036107 <i> prednisolone 25 mg tablet </i>	- BoSS concepts <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i> <i>Medicinal product unit of use reference set</i>
Approve order	The prescriber signs and approves the order.		-	-



Third order: prednisolone – DOSE 5 mg - once daily - maintenance dose

Table 69: Example prescribing model steps for a reducing dose order (third order)

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medication course type</i>	- Although not specified in the example, <i>Medication course type</i> is considered an important element for dose based orders. - The prescriber selects the term <i> Variable dose </i>.		745291000168108 <i> Variable dose </i>	<i>Dose based prescribing medication course type reference set</i>
Add a <i>Medicine</i>	The prescriber selects the BoSS <i> Prednisolone </i> .		116601002 <i> Prednisolone </i>	BoSS concepts
Add a <i>Route</i>	- Although not specified in the example, <i>Route</i> is an important element. - The prescriber selects the term <i> Oral route </i>.		26643006 <i> Oral route </i>	<i>Dose based prescribing route of administration reference set</i>
Add an <i>Administration instruction</i>	- The prescriber types in free text "Maintenance dose" in this element or a Comments field. - Alternatively, a local concept is selected if it is available.		-	-
Add a <i>Dose</i>	The prescriber types in a <i>Dose</i> quantity of "5" and selects a unit of measure of <i> mg </i> .		258684004 <i> mg </i>	<i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i> Once a day </i> .		229797004 <i> Once a day </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i> Acute adrenal insufficiency </i>.		24867002 <i> Acute adrenal insufficiency </i>	<i>Problem/Diagnosis reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to a combination of the two MPUU concepts - prednisolone 5 mg tablet and - prednisolone 25 mg tablet .		116601002 Prednisolone 258684004 mg 26643006 Oral route - Oral route - tablet association 22412011000036109 prednisolone 5 mg tablet 33670011000036107 prednisolone 25 mg tablet	- BoSS concepts <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i> <i>Medicinal product unit of use reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.1.5 Variable dose order

9.1.5.1 Textual representation

There are two separate orders in this example. The orders are informed by known target INR ranges and INR results.

The following is a textual representation of the variable dose orders:

- warfarin sodium - Coumadin – DOSE 7 mg - once daily – Thursday at 4 pm - for 2 days*
 - Target INR range 1.5 to 2*
 - INR result 1.9*
- warfarin sodium - Coumadin – DOSE 6 mg - once daily – Friday at 4 pm*
 - Target INR range 1.5 to 2*
 - INR result 2.1*

9.1.5.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

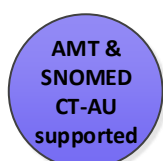


Table 70: Illustrative terminology coding for a variable dose order

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Warfarin sodium		63167009 Warfarin sodium	BoSS concepts	
Coumadin		3322011000036101 Coumadin	Trade product reference set	
DOSE		-	-	This is an onscreen display label and is not codeable.
7		-	-	- A combination of two relevant TPUU concepts can deliver the <i>Dose</i> of "7 mg". However, their <i>Strength</i> values do not equal the <i>Dose quantity</i> of "7" specified. - Coumadin 2 mg tablet and - Coumadin 5 mg tablet . - Therefore, this element cannot be derived from the AMT and the numeric dose quantity "7" is not codeable (terminology supported).
mg		258684004 mg	Dose unit of measure reference set	
Once daily		229797004 Once a day	Dose based prescribing dose frequency and interval reference set	
Thursday		307149005 Thursday	Calendar day and month reference set	
4 pm		-	-	- A time of day is not codeable (terminology supported). - This may be a selectable value in a CIS or free text.
2		-	-	The numeric quantity "2" is not codeable (terminology supported).
Days		258703001 day	Unit of time reference set	

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
6		-	-	- A multiple (3 times) of a relevant TPUU concept can deliver the <i>Dose</i> of "6 mg". However, its Strength value does not equal the <i>Dose quantity</i> of "6" specified. - Coumadin 2 mg tablet - Therefore, this element cannot be derived from the AMT and the numeric dose quantity "6" is not codeable (terminology supported).
Friday		307150005 Friday	Calendar day and month reference set	

9.1.5.3 Prescribing model steps

The tables below describe one way the two separate orders can be created using the prescribing model.

First order: warfarin sodium - Coumadin – DOSE 7 mg - once daily – Thursday at 4 pm - for 2 days

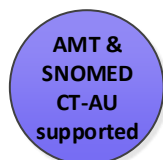
AMT &
SNOMED
CT-AU
supported

Table 71: Example prescribing model steps for a variable dose order (first order)

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a Medication course type	- Although not specified in the example, <i>Medication course type</i> is considered an important element for dose based orders. - The prescriber selects the term Variable dose .		745291000168108 Variable dose	Dose based prescribing medication course type reference set
Add a Medicine	- The prescriber selects the BoSS Warfarin sodium . - A further selection step occurs where the prescriber selects the TP concept Coumadin .		63167009 Warfarin sodium 3322011000036101 Coumadin	- BoSS concepts - Trade product reference set

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Route</i>	- Although not specified in the example, <i>Route</i> is an important element. - The prescriber selects the term <i> Oral route </i>.		26643006 <i> Oral route </i>	<i>Dose based prescribing route of administration reference set</i>
Add a <i>Dose</i>	The prescriber types in a <i>Dose</i> quantity of "7" and selects a unit of measure of <i> mg </i> .		258684004 <i> mg </i>	<i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i> Once a day </i> .		229797004 <i> Once a day </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add a <i>Dose qualifier</i>	The prescriber selects the term <i> Thursday </i> .		307149005 <i> Thursday </i>	<i>Calendar day and month reference set</i>
Add a <i>Start/End Date or Time</i>	The prescriber types in the free text "4 pm" or selects the value if available.		-	-
Add a <i>Duration</i>	The prescriber types in a <i>Duration</i> quantity of "2" and selects a unit of time of <i> day </i> .		258703001 <i> day </i>	<i>Unit of time reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i> Venous thrombosis </i>.		111293003 <i> Venous thrombosis </i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the two AMT TPUU concepts <i> Coumadin 2 mg tablet </i> and <i> Coumadin 5 mg tablet </i>.		63167009 <i> Warfarin sodium </i> 3322011000036101 <i> Coumadin </i> 258684004 <i> mg </i> 26643006 <i> Oral route </i> <i> Oral route </i>-<i> tablet </i> association 5434011000036105 <i> Coumadin 2 mg tablet </i> 5424011000036108 <i> Coumadin 5 mg tablet </i>	- BoSS concepts <i>Trade product reference set</i> <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i> <i>Trade product unit of use reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Approve order	The prescriber signs and approves the order.		 -	-



Second order: warfarin sodium - Coumadin – DOSE 6 mg - once daily – Friday at 4 pm

Table 72: Example prescribing model steps for a variable dose order (second order)

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medication course type</i>	- Although not specified in the example, <i>Medication course type</i> is considered an important element for dose based orders. - The prescriber selects the term <i> Variable dose </i>.		745291000168108 <i> Variable dose </i>	<i>Dose based prescribing medication course type reference set</i>
Add a <i>Medicine</i>	- The prescriber selects the BoSS <i> Warfarin sodium </i>. - A further selection step occurs where the prescriber selects the TP concept <i> Coumadin </i>.		63167009 <i> Warfarin sodium </i> 3322011000036101 <i> Coumadin </i>	- BoSS concepts <i>Trade product reference set</i>
Add a <i>Route</i>	- Although not specified in the example, <i>Route</i> is an important element. - The prescriber selects the term <i> Oral route </i>.		26643006 <i> Oral route </i>	<i>Dose based prescribing route of administration reference set</i>
Add a <i>Dose</i>	The prescriber types in a <i>Dose</i> quantity of “6” and selects a unit of measure of <i> mg </i> .		258684004 <i> mg </i>	<i>Dose unit of measure reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a Frequency or Interval	The prescriber selects the term <i> Once a day </i> .		229797004 <i> Once a day </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add a Dose qualifier	The prescriber selects the term <i> Friday </i> .		307150005 <i> Friday </i>	<i>Calendar day and month reference set</i>
Add a Start/End Date or Time	The prescriber types in the free text "4 pm" or selects the value if available.		-	-
Add an Indication	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i> Venous thrombosis </i>.		111293003 <i> Venous thrombosis </i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to a multiple of the AMT TPUU concept <i> Coumadin 2 mg tablet </i>.		63167009 <i> Warfarin sodium </i> 3322011000036101 <i> Coumadin </i> 258684004 <i> mg </i> 26643006 <i> Oral route </i> <i> Oral route </i>- <i> tablet </i> association 5434011000036105 <i> Coumadin 2 mg tablet </i>	- BoSS concepts <i>Trade product reference set</i> <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i> <i>Trade product unit of use reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.1.6 Intravenous fluid order

9.1.6.1 Textual representation

The following is a textual representation of a simple IV fluid order:

Sodium chloride 0.9% – intravenous - DOSE 1000 mL – infuse at 100 mL/hr

9.1.6.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

AMT &
SNOMED
CT-AU
supported

Table 73: Illustrative terminology coding for an intravenous fluid order

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Sodium chloride 0.9%		22566011000036102 sodium chloride 0.9% injection, bag	Medicinal product unit of use reference set	- Even though the prescribing model recommendation for a single ingredient product is to use a BoSS concept to encode the <i>Medicine</i> element, in this case a strength has also been specified along with an ingredient. Therefore, the closest single concept describing an ingredient and strength is an MPUU concept of sodium chloride 0.9% injection, bag . Note: The MPUU concept selected has more information than the original medicine text specified, and the alternate strength representation of "0.9%" is not atomically accessible in the current AMT data. - It is acknowledged that a more simplified entity may be required to be developed and the alternate strength representation made available i.e. a BoSS and strength or BoSS and alternate strength (for example, "sodium chloride 0.9%").
Intravenous		47625008 Intravenous route	Dose based prescribing route of administration reference set	
DOSE		-	-	This is an onscreen display label and is not codeable.
1000		-	-	A numeric dose quantity "1000" is not codeable (terminology supported).
mL		258773002 mL	Dose unit of measure reference set	

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Infuse		261754007 Continuous infusion	Qualifier value foundation reference set	This may be partially supported by a more specific concept (than specified in the order) or alternatively be recorded as free text.
100		-	-	A numeric dose quantity "100" is not codeable (terminology supported).
mL/hr		258989006 mL/h	Qualifier value foundation reference set	The rate of administration is codeable using a SNOMED CT-AU Unit of rate concept.

9.1.6.3 Prescribing model steps

The table below describes one way this order can be created using the prescribing model.

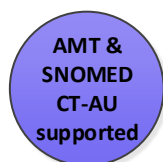


Table 74: Example prescribing model steps for an intravenous fluid order

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a Medication course type	- Although not specified in the example, Medication course type is considered an important element for dose based orders. - The prescriber selects the term Scheduled .		416774000 Scheduled	Dose based prescribing medication course type reference set
Add a Medicine	The prescriber selects the MPUU sodium chloride 0.9% injection, bag .		22566011000036102 sodium chloride 0.9% injection, bag	Medicinal product unit of use reference set
Add a Route	The prescriber selects the term Intravenous route .		47625008 Intravenous route	Dose based prescribing route of administration reference set
Add an Administration instruction	- The prescriber records a rate of administration by typing a quantity of "100" and selects a unit of measure of mL/h . - If the CIS allows a second entry to be recorded, the prescriber selects the		258989006 mL/h 261754007 Continuous infusion	Qualifier value foundation reference set

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
	term <i>Continuous infusion</i> .			
Add a <i>Dose</i>	The prescriber types in a <i>Dose quantity</i> of "1000" and selects a unit of measure of <i>mL</i> .		258773002 <i>mL</i>	<i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	- Although not specified in the example, <i>Frequency or Interval</i> is an important element for dose based orders. - The prescriber selects the term <i>Once</i> .		422114001 <i>Once</i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i>Isonatraemic dehydration</i> .		190894003 <i>Isonatraemic dehydration</i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT MPUU concept <i>sodium chloride 0.9% injection, bag</i> , which is the same value as recorded in the <i>Medicine</i> element.		22566011000036102 <i>sodium chloride 0.9% injection, bag</i> 258773002 <i>mL</i> 47625008 <i>Intravenous route</i> <i>Intravenous route</i> - <i>irrigation solution</i> association	<i>Medicinal product unit of use reference set</i> <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.2 Product based orders or prescriptions

This section includes seven example product based orders or prescriptions for various medicines. Specifically, the *Medicine* element is recorded with a commercially available branded product (i.e. TPUU, TPP or CTPP) or a generically equivalent concept (i.e. MPUU or MPP).

9.2.1 Solid oral preparation

9.2.1.1 Textual representation

The following is a textual representation of a prescribed solid oral preparation:

amoxicillin 500 mg capsule – oral – DOSE 500 mg - 3 times a day - for 5 days – SUPPLY 20

9.2.1.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

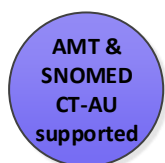


Table 75: Illustrative terminology coding for a prescribed solid oral preparation

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Amoxicillin 500 mg capsule		23551011000036108 amoxicillin 500 mg capsule	Medicinal product unit of use reference set	
Oral		26643006 Oral route	Dose based prescribing route of administration reference set	
DOSE		-	-	This is an onscreen display label and is not codeable.
500		value field	Strength reference set	- Usually a numeric dose quantity is not codeable (terminology supported). - However, the <i>Dose quantity</i> of "500" specified is the same as the Strength value of the recorded medicine amoxicillin 500 mg capsule . - Therefore, this element can be derived from the AMT.
mg		258684004 mg	Dose unit of measure reference set	
3 times a day		229798009 Three times a day	Dose based prescribing dose frequency and interval reference set	

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
For 5 days		258703001 day	<i>Unit of time reference set</i>	- Partially supported with the unit of time portion encoded. - The numeric value "5" is not terminology encoded.
SUPPLY		-	-	This is an onscreen display label and is not codeable.
20		value field	<i>Unit of use quantity reference set</i>	- Usually a numeric quantity is not codeable (terminology supported). - However, the <i>Supply</i> quantity of "20" specified is the same as the <i>Unit of use quantity value</i> of one of the MPP associated with the recorded medicine <i>amoxicillin 500 mg capsule</i> . - MPP <i>amoxicillin 500 mg capsule, 20</i> has unit of use quantity of "20 capsule". - Therefore, this element can be derived from the AMT.

9.2.1.3 Prescribing model steps

The table below describes one way this order can be created using the prescribing model.

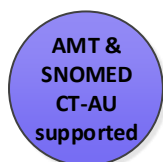


Table 76: Example prescribing model steps for a prescribed solid oral preparation

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a Medicine	The prescriber selects the MPUU <i>amoxicillin 500 mg capsule</i> .		23551011000036108 <i>amoxicillin 500 mg capsule</i>	<i>Medicinal product unit of use reference set</i>
Add a Supply	The prescriber selects a preconfigured <i>Unit of use quantity value</i> of "20" and a unit of measure of <i>capsule</i> , which belongs to an associated MPP <i>amoxicillin 500 mg capsule, 20</i> .		- Unit of use quantity value of "20" 67011000036100 <i>capsule</i>	<i>Unit of use quantity reference set</i>
Add a Route	The prescriber selects the term <i>Oral route</i> .		26643006 <i>Oral route</i>	<i>Dose based prescribing route of administration reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Dose</i>	- The prescriber selects a preconfigured <i>Dose quantity</i> of "500", as the <i>Dose</i> is the same as the Strength of the recorded MPUU concept <i>amoxicillin 500 mg capsule</i> . - The prescriber selects a unit of measure of <i>mg</i> .		- Strength value of "500" 258684004 <i>mg</i>	<i>Strength reference set</i> <i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i>Three times a day</i> .		229798009 <i>Three times a day</i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add a <i>Duration</i>	The prescriber types in a Duration quantity of "5" and selects a unit of time of <i>day</i> .		258703001 <i>day</i>	<i>Unit of time reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i>Streptococcal infection</i> .		85769006 <i>Streptococcal infection</i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT MPUU concept <i>amoxicillin 500 mg capsule</i> , which is the same value as recorded in the <i>Medicine</i> element.		23551011000036108 <i>amoxicillin 500 mg capsule</i> - Strength value of "500" 258684004 <i>mg</i> 26643006 <i>Oral route</i> <i>Oral route</i> - <i>capsule</i> association	<i>Medicinal product unit of use reference set</i> <i>Strength reference set</i> <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.2.2 Oral liquid preparation

9.2.2.1 Textual representation

The following is a textual representation of a prescribed oral liquid preparation:

cefalexin 250 mg oral liquid – DOSE 5 mL - every 6 hours – SUPPLY 60 mL

9.2.2.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

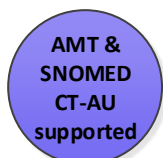


Table 77: Illustrative terminology coding for a prescribed oral liquid preparation

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Cefalexin 250 mg oral liquid		23587011000036106 cefalexin 250 mg/5 mL powder for oral liquid	Medicinal product unit of use reference set	- This MPUU concept is suitable for selection because its ingredient and strength attributes match the intended medicine. - The form of this MPUU concept is powder for oral liquid . Since the AMT only models manufactured dose forms for products, this is considered suitable for the intended medicine's form of "oral liquid".
DOSE		-	-	This is an onscreen display label and is not codeable.
5		-	-	- There are no MPUU or TPUU concepts with a Strength value that equal the <i>Dose quantity</i> specified of "5". - Therefore, this element cannot be derived from the AMT and the numeric dose quantity "5" is not codeable (terminology supported).
mL		258773002 mL	Dose unit of measure reference set	
Every 6 hours		307468000 Every 6 hours	Dose based prescribing dose frequency and interval reference set	

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
SUPPLY		-	-	This is an onscreen display label and is not codeable.
60		value field	<i>Unit of use quantity reference set</i>	- Usually a numeric quantity is not codeable (terminology supported). - However, the <i>Supply</i> quantity of "60" specified is the same as the <i>Unit of use quantity value</i> of one of the MPP associated with the recorded medicine <i>cefalexin 250 mg/5 mL powder for oral liquid</i> . - MPP <i>cefalexin 250 mg/5 mL powder for oral liquid, 60 mL</i> has unit of use quantity of "60 mL". - Therefore, this element can be derived from the AMT.

9.2.2.3 Prescribing model steps

The table below describes one way this order can be created using the prescribing model.

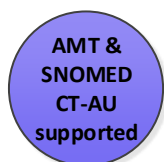


Table 78: Example prescribing model steps for a prescribed oral liquid preparation

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a Medicine	The prescriber selects the MPUU <i>cefalexin 250 mg/5 mL powder for oral liquid</i> .		23587011000036106 <i>cefalexin 250 mg/5 mL powder for oral liquid</i>	<i>Medicinal product unit of use reference set</i>
Add a Supply	The prescriber selects a preconfigured <i>Unit of use quantity value</i> of "60" and a unit of measure of <i>mL</i> , which belongs to an associated MPP <i>cefalexin 250 mg/5 mL powder for oral liquid, 60 mL</i> .		- Unit of use quantity value of "60" 30011000036107 <i>mL</i>	<i>Unit of use quantity reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Route</i>	- Although not specified in the example, <i>Route</i> is an important element. - The prescriber selects the term <i> Oral route </i>.		26643006 <i> Oral route </i>	<i>Dose based prescribing route of administration reference set</i>
Add a <i>Dose</i>	The prescriber types in a <i>Dose</i> quantity of "5" and selects a unit of measure of <i> mL </i> .		258773002 <i> mL </i>	<i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i> Every 6 hours </i> .		307468000 <i> Every 6 hours </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i> Otitis media </i>.		65363002 <i> Otitis media </i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT MPUU concept <i> cefalexin 250 mg/5 mL powder for oral liquid </i>, which is the same value as recorded in the <i>Medicine</i> element.		23587011000036106 <i> cefalexin 250 mg/5 mL powder for oral liquid </i> 258773002 <i> mL </i> 26643006 <i> Oral route </i> <i> Oral route - powder for oral liquid </i> association	<i>Medicinal product unit of use reference set</i> <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.2.3 Diagnostic agent

9.2.3.1 Textual representation

The following is a textual representation of a prescribed diagnostic agent:

Accu-check Performa test strip – DOSE 1 strip - use as directed – SUPPLY 50

9.2.3.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

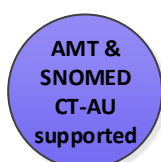


Table 79: Illustrative terminology coding for a prescribed diagnostic agent

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Accu-chek Performa test strip		48502011000036105 Accu-Chek Performa diagnostic strip	Trade product unit of use reference set	- This TPUU concept is the closest suitable product as intended. - The form "test strip" is considered the same as the AMT form diagnostic strip .
DOSE		-	-	This is an onscreen display label and is not codeable.
1		-	-	- There are no suitable MPUU or TPUU concepts with a Strength value that equal the Dose quantity specified of "1". - Therefore, this element cannot be derived from the AMT and the numeric dose quantity "1" is not codeable (terminology supported).
strip		1671000175104 Strip	Dose unit of measure reference set	
Use as directed		422135004 As directed for	Qualifier value foundation reference set	
SUPPLY		-	-	This is an onscreen display label and is not codeable.

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
50		value field	<i>Unit of use quantity reference set</i>	- Usually a numeric quantity is not codeable (terminology supported). - However, the <i>Supply</i> quantity of "50" specified is the same as the <i>Unit of use quantity value</i> of one of the TPP associated with the recorded medicine <i>Accu-Chek Performa diagnostic strip</i> . - TPP <i>Accu-Chek Performa diagnostic strip, 50</i> has unit of use quantity of "50 diagnostic strip". - Therefore, this element can be derived from the AMT.

9.2.3.3 Prescribing model steps



The table below describes one way this order can be created using the prescribing model.

Table 80: Example prescribing model steps for a prescribed diagnostic agent

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medicine</i>	The prescriber selects the TPUU <i>Accu-Chek Performa diagnostic strip</i> .		48502011000036105 <i>Accu-Chek Performa diagnostic strip</i>	<i>Trade product unit of use reference set</i>
Add a <i>Supply</i>	The prescriber selects a preconfigured <i>Unit of use quantity value</i> of "50" and a unit of measure of <i>diagnostic strip</i> , which belongs to an associated TPP <i>Accu-Chek Performa diagnostic strip, 50</i> .		- Unit of use quantity value of "50" 48072011000036104 <i>diagnostic strip</i>	<i>Unit of use quantity reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Route</i>	The prescriber selects the term <i> Topical route </i> .		6064005 <i> Topical route </i>	<i>Dose based prescribing route of administration reference set</i>
Add an <i>Administration instruction</i>	The prescriber selects the term <i> As directed for </i> .		422135004 <i> As directed for </i>	<i>Qualifier value foundation reference set</i>
Add a <i>Dose</i>	The prescriber types in a <i>Dose quantity</i> of "1" and selects a unit of measure of <i> Strip </i> .		1671000175104 <i> Strip </i>	<i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	- Although not specified in the example, <i>Frequency or Interval</i> is an important element. - The prescriber selects the term <i> Once </i>.		422114001 <i> Once </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i> Impaired glucose tolerance </i>.		9414007 <i> Impaired glucose tolerance </i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT TPUU concept <i> Accu-Chek Performa diagnostic strip </i>, which is the same value as recorded in the <i>Medicine</i> element.		48502011000036105 <i> Accu-Chek Performa diagnostic strip </i> 1671000175104 <i> Strip </i> 6064005 <i> Topical route </i> <i> Topical route </i>-<i> diagnostic strip </i> association	<i>Trade product unit of use reference set</i> <i>Dose unit of measure reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.2.4 Multi-ingredient preparation

9.2.4.1 Textual representation

The following is a textual representation of a prescribed multi-ingredient preparation:

Panadeine Forte tablet, 20 - DOSE take 2 tablet - every 4 hrs - as required

9.2.4.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

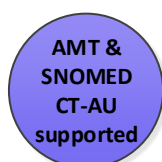


Table 81: Illustrative terminology coding for a prescribed multi-ingredient preparation

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Panadeine Forte tablet, 20		13362011000036106 Panadeine Forte tablet, 20	Trade product pack reference set	This is a suitable TPUU concept as Panadeine Forte is only available in a manufactured form of tablet .
DOSE		-	-	This is an onscreen display label and is not codeable.
Take		419652001 Take	Dose instruction verb reference set	
2		-	-	- There are no suitable MPUU or TPUU concepts with a Strength value that equal the Dose quantity specified of "2". - Therefore, this element cannot be derived from the AMT and the numeric dose quantity "2" is not codeable (terminology supported).
Tablet		428673006 Tablet	Dose unit of measure reference set	
Every 4 hrs		225756002 Every 4 hours	Dose based prescribing dose frequency and interval reference set	
As required		225761000 When required	Qualifier value foundation reference set	This concept has an acceptable synonym of As required , which may be used in searching.

9.2.4.3 Prescribing model steps

The table below describes one way this order can be created using the prescribing model.



Table 82: Example prescribing model steps for a prescribed multi-ingredient preparation

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medicine</i>	The prescriber selects the TPP <i>Panadeine Forte tablet, 20</i> .		13362011000036106 <i>Panadeine Forte tablet, 20</i>	<i>Trade product pack reference set</i>
Add a <i>Route</i>	- Although not specified in the example, <i>Route</i> is an important element. - The prescriber selects the term <i>Oral route</i> .		26643006 <i>Oral route</i>	<i>Dose based prescribing route of administration reference set</i>
Add an <i>Administration instruction</i>	The prescriber selects the term <i>When required</i> .		225761000 <i>When required</i>	<i>Qualifier value foundation reference set</i>
Add a <i>Dose</i>	- The prescriber selects the <i>Dose instruction verb</i> term of <i>Take</i> . - The prescriber types in a <i>Dose quantity</i> of "2" and selects a unit of measure of <i>Tablet</i> .		419652001 <i>Take</i> 428673006 <i>Tablet</i>	<i>Dose instruction verb reference set</i> <i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i>Every 4 hours</i> .		225756002 <i>Every 4 hours</i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i>Severe pain</i> .		76948002 <i>Severe pain</i>	<i>Problem/Diagnosis reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT TPP concept <i> Panadeine Forte tablet, 20 </i>, which is the same value as recorded in the <i>Medicine</i> element.		13362011000036106 <i> Panadeine Forte tablet, 20 </i> 428673006 <i> Tablet </i> 26643006 <i> Oral route </i> <i> Oral route - tablet </i> association	<i>Trade product pack reference set</i> <i>Dose unit of measure reference set</i> <i>Relationship file</i> <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.2.5 Preparation with an active component and a solvent component

9.2.5.1 Textual representation

The following is a textual representation of a prescribed reparation with an active and solvent components:

Enbrel (4 x 50 mg vials), pack – injection - intramuscular – DOSE 50 mg - once a week – SUPPLY 4

9.2.5.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

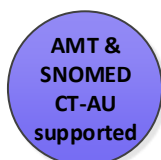


Table 83: Illustrative terminology coding for a prescribed preparation with an active component and a solvent component

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Enbrel (4 x 50 mg vials), pack		4553011000036109 Enbrel (etanercept 50 mg) powder for injection, 50 mg vial	Trade product unit of use reference set	- Since a <i>Supply</i> element is recorded, the relevant entries for the <i>Medicine</i> element are MPUU or TPUU concepts. - Enbrel has an active component of 50 mg injection, vial. Therefore, the most suitable concept is a TPUU which describes the active component. - The solvent component of Enbrel is to be recorded separately.
Injection		385218009 Injection	Dose based prescribing dose form reference set	
Intramuscular		78421000 Intramuscular route	Dose based prescribing route of administration reference set	
DOSE		-	-	This is an onscreen display label and is not codeable.
50		value field	Strength reference set	- Usually a numeric dose quantity is not codeable (terminology supported). - However, the <i>Dose quantity</i> of "50" specified is the same as the Strength value of the TPUU recorded in the <i>Medicine</i> element Enbrel (etanercept 50 mg) powder for injection, 50 mg vial . - Therefore, this element can be derived from the AMT.
mg		258684004 mg	Dose unit of measure reference set	
Once a week		225769003 Once a week	Dose based prescribing dose frequency and interval reference set	
SUPPLY		-	-	This is an onscreen display label and is not codeable.

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/ concepts	Comment
4		value field	<i>Unit of use quantity reference set</i>	- Usually a numeric quantity is not codeable (terminology supported). - However, the <i>Supply</i> quantity of "4" specified is the same as the <i>Unit of use quantity value</i> of "4 vial" of the TPP associated with the recorded <i>Medicine</i> TPUU <i>Enbrel (etanercept 50 mg) powder for injection, 50 mg vial</i> . - TPP is <i>Enbrel (4 x 50 mg vials, 4 x 1 mL diluent syringes), 1 pack</i> . - Therefore, this element can be derived from the AMT. Note: The <i>Supply</i> quantity of 4 pertains to the <i>Medicine</i> recorded (a single component TPUU describing the active component only) not the TPP (which is a multicomponent concept that has an active and a solvent component).

9.2.5.3 Prescribing model steps

The table below describes one way this order can be created using the prescribing model.

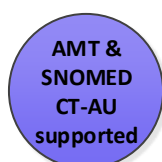


Table 84: Example prescribing model steps for a prescribed preparation with an active component and a solvent component

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medicine</i>	The prescriber selects the TPP <i>Enbrel (4 x 50 mg vials, 4 x 1 mL diluent syringes), 1 pack</i> .		11367011000036101 <i>Enbrel (4 x 50 mg vials, 4 x 1 mL diluent syringes), 1 pack</i>	<i>Trade product pack reference set</i>
Add a <i>Supply</i>	The prescriber selects a preconfigured <i>Unit of use quantity value</i> of "4" and a unit of measure of <i>vial</i> , which belongs to an associated TPP <i>Enbrel (4 x 50 mg vials, 4 x 1 mL diluent syringes), 1 pack</i> .		- Unit of use quantity value of "4" 74011000036100 <i>vial</i>	<i>Unit of use quantity reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Route</i>	The prescriber selects the term <i> Intramuscular route </i> .		78421000 <i> Intramuscular route </i>	<i>Dose based prescribing route of administration reference set</i>
Add a <i>Dose Form</i>	The prescriber selects the term <i> Injection </i> .		385218009 <i> Injection </i>	<i>Dose based prescribing dose form reference set</i>
Add a <i>Dose</i>	- The prescriber selects a preconfigured <i>Dose quantity</i> of "50" as the <i>Dose</i> is the same as the Strength of the active component belonging to the recorded TPP concept <i> Enbrel (4 x 50 mg vials, 4 x 1 mL diluent syringes), 1 pack </i>. - The prescriber selects a unit of measure of <i> mg </i>.		- Strength value of "50" 258684004 <i> mg </i>	<i>Strength reference set</i> <i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i> Once a week </i> .		225769003 <i> Once a week </i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i> Juvenile idiopathic arthritis </i>.		410502007 <i> Juvenile idiopathic arthritis </i>	<i>Problem/Diagnosis reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
System check	- The system uses the <i>Medicine</i>, <i>Dose</i>, <i>Route</i> and <i>Dose Form</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT TPP concept <i>[Enbrel (4 x 50 mg vials, 4 x 1 mL diluent syringes), 1 pack]</i>, which is the same value as recorded in the <i>Medicine</i> element.		11367011000036101 <i>[Enbrel (4 x 50 mg vials, 4 x 1 mL diluent syringes), 1 pack]</i> - Strength value of "50" 258684004 <i>[mg]</i> 78421000 <i>[Intramuscular route]</i> 385218009 <i>[Injection]</i> <i>[Intramuscular route]-[Injection]</i> association	<i>Trade product pack reference set</i> <i>Strength reference set</i> <i>Dose unit of measure reference set</i> <i>Relationship file</i> <i>Dose based prescribing route of administration reference set</i> <i>Dose based prescribing dose form reference set</i> <i>Dose route and form extended association reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.2.6 Sequential multicomponent – oral contraceptive

9.2.6.1 Textual representation

The following is a textual representation of a prescribed oral contraceptive:

Triphasil-28 – DOSE 1 tablet - once daily

9.2.6.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

AMT &
SNOMED
CT-AU
supported

Table 85: Illustrative terminology coding for a prescribed sequential multicomponent preparation

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Triphasil-28		11272011000036104 Triphasil (6 x 50 microgram/30 microgram tablets, 5 x 75 microgram/40 microgram tablets, 10 x 125 microgram/30 microgram tablets, 7 x inert tablets), 28 or 11271011000036105 Triphasil (6 x 50 microgram/30 microgram tablets, 5 x 75 microgram/40 microgram tablets, 10 x 125 microgram/30 microgram tablets, 7 x inert tablets), 4 x 28	Trade product pack reference set	- While a Dose of "1 tablet" is specified, a medicine text of "Triphasil-28" is supported by two possible TPP concepts. - The prescriber may select either the concept representing a 1-month supply or a 4-month supply.
DOSE		-	-	This is an onscreen display label and is not codeable.
1		-	-	- There are no suitable MPUU or TPUU concepts (associated with MPP or TPP concepts) with a Strength value that equal the Dose quantity specified of "1". - Therefore, this element cannot be derived from the AMT and the numeric dose quantity "1" is not codeable (terminology supported).
Tablet		428673006 Tablet	Dose unit of measure reference set	
Once daily		229797004 Once a day	Dose based prescribing dose frequency and interval reference set	

9.2.6.3 Prescribing model steps

The table below describes one way this order can be created using the prescribing model.

AMT &
SNOMED
CT-AU
supported

Table 86: Example prescribing model steps for a prescribed sequential multicomponent preparation

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medicine</i>	The prescriber makes a decision to select the 1-month supply TPP concept <i>Triphasil</i> (6 x 50 microgram/30 microgram tablets, 5 x 75 microgram/40 microgram tablets, 10 x 125 microgram/30 microgram tablets, 7 x inert tablets), 28 .		11272011000036104 <i>Triphasil</i> (6 x 50 microgram/30 microgram tablets, 5 x 75 microgram/40 microgram tablets, 10 x 125 microgram/30 microgram tablets, 7 x inert tablets), 28	<i>Trade product pack reference set</i>
Add a <i>Route</i>	- Although not specified in the example, <i>Route</i> is an important element. - The prescriber selects the term <i>Oral route</i> .		26643006 <i>Oral route</i>	<i>Dose based prescribing route of administration reference set</i>
Add a <i>Dose</i>	The prescriber types in a <i>Dose</i> quantity of "1" and selects a unit of measure of <i>Tablet</i> .		428673006 <i>Tablet</i>	<i>Dose unit of measure reference set</i>
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i>Once a day</i> .		229797004 <i>Once a day</i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i>Oral contraception</i> .		5935008 <i>Oral contraception</i>	<i>Problem/Diagnosis reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT TPP concept <i>Triphasil (6 x 50 microgram/30 microgram tablets, 5 x 75 microgram/40 microgram tablets, 10 x 125 microgram/30 microgram tablets, 7 x inert tablets)</i>, 28 , which is the same value as recorded in the <i>Medicine</i> element.		11272011000036104 <i>Triphasil (6 x 50 microgram/30 microgram tablets, 5 x 75 microgram/40 microgram tablets, 10 x 125 microgram/30 microgram tablets, 7 x inert tablets)</i>, 28 428673006 <i>Tablet</i> 26643006 <i>Oral route</i> <i>Oral route</i> - <i>tablet</i> association	<i>Trade product pack reference set</i> <i>Dose unit of measure reference set</i> <i>Relationship file</i> <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

9.2.7 Nonsequential multicomponent – multiple active components

9.2.7.1 Textual representation

The intention of the prescriber is to prescribe a pack of Canesoral Duo (a multicomponent preparation with two separate active components - fluconazole 150 mg capsule and clotrimazole 1% cream).

One of the prescribing model recommendations is that two separate orders be recorded for multicomponent products with multiple active components, provided the individual components are able to be prescribed as single component items. This example describes the approach of creating two separate orders. This example also assumes that a pack quantity is able to be specified outside of the *Medicine* element.

The following is a textual representation of the orders:

- fluconazole 150 mg - Canesoral – oral - DOSE 150 mg – once - swallow whole with water – SUPPLY 1*
- clotrimazole 1% – cream - topical – 3 times a day - apply to affected area – for 2 days*

9.2.7.2 Order elements that can be terminology coded

The following table lists all the elements of the order. It also shows which element can or cannot be terminology coded.

AMT &
SNOMED
CT-AU
supported

Table 87: Illustrative terminology coding for a prescribed nonsequential multicomponent preparation

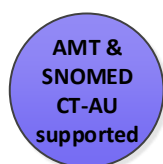
Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
fluconazole 150 mg		37820011000036108 fluconazole 150 mg capsule	Medicinal product unit of use reference set	- There is no single AMT concept describing "fluconazole 150 mg". The closest suitable concept is an MPUU of fluconazole 150 mg capsule . - Since this is the only available presentation of a fluconazole 150 mg product and the Route is "oral", this MPUU concept is suitable for recording.
Canesoral		53220011000036104 Canesoral	Trade product reference set	
Oral		26643006 Oral route	Dose based prescribing route of administration reference set	
DOSE		-	-	This is an onscreen display label and is not codeable.
150		value field	Strength reference set	- Usually a numeric dose quantity is not codeable (terminology supported). - However, the Dose quantity of "150" specified is the same as the Strength value of the MPUU recorded in the Medicine element fluconazole 150 mg capsule . - Therefore, this element can be derived from the AMT.
mg		258684004 mg	Dose unit of measure reference set	
Once		422114001 Once	Dose based prescribing dose frequency and interval reference set	

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
Swallow whole with water		420004004 Swallowed whole 419303009 With plenty of water	Qualifier value foundation reference set	This element can be described using two separate SNOMED CT-AU Qualifier value concepts of Swallowed whole and With plenty of water .
SUPPLY		-	-	This is an onscreen display label and is not codeable.
1		value field	Unit of use quantity reference set	- Usually a numeric quantity is not codeable (terminology supported). - However, the Supply quantity of "1" specified is the same as the Unit of use quantity value of one of the MPP associated with the recorded Medicine MPUU fluconazole 150 mg capsule . - MPP fluconazole 150 mg capsule, 1 has unit of use quantity of "1 capsule". - Therefore, this element can be derived from the AMT.
clotrimazole 1%		23418011000036101 clotrimazole 1% cream	Medicinal product unit of use reference set	- There is no single AMT concept describing "clotrimazole 1%". The closest suitable concept is an MPUU of clotrimazole 1% cream . - Since a Dose Form of "cream" has been specified, this MPUU concept is suitable for recording.
Cream		385099005 Cream	Dose based prescribing dose form reference set	
Topical		6064005 Topical route	Dose based prescribing route of administration reference set	
3 times a day		229798009 Three times a day	Dose based prescribing dose frequency and interval reference set	
Apply to affected area		-	-	While this element is partially supported by a SNOMED CT-AU Dosing instruction imperative concept of Apply , this information is considered to be

Elements of the order	Terminology supported?	Concept identifier and Preferred Term	Source reference set/concepts	Comment
				more an <i>Administration instruction</i> .
				A new Qualifier value concept "Apply to affected area" can be requested using a new terminology request submission.
For 2 days		258703001 day	<i>Unit of time reference set</i>	- Partially supported with the unit of time portion encoded. - The numeric value "2" is not terminology encoded.

9.2.7.3 Prescribing model steps

The tables below describe one way the two separate orders can be created using the prescribing model.



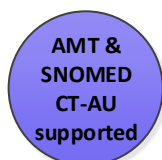
First order: fluconazole 150 mg - Canesoral – oral - DOSE 150 mg – once - swallow whole with water – SUPPLY 1

Table 88: Example prescribing model steps for a prescribed nonsequential multicomponent preparation (first order)

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a Medicine	- The prescriber selects the MPUU fluconazole 150 mg capsule . - If the CIS allows the recording of an additional, separate brand element (or equivalent), the prescriber selects the TP Canesoral .		37820011000036108 fluconazole 150 mg capsule 53220011000036104 Canesoral	- Medicinal product unit of use reference set - Trade product reference set
Add a Supply	The prescriber selects a preconfigured <i>Unit of use quantity value</i> of "1" and a unit of measure of capsule , which belongs to an associated MPP fluconazole 150 mg capsule, 1 .		- Unit of use quantity value of "1" 67011000036100 capsule	<i>Unit of use quantity reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a Route	The prescriber selects the term Oral route .		26643006 Oral route	Dose based prescribing route of administration reference set
Add an Administration instruction	- The prescriber selects the term Swallowed whole . - If the system allows more than one administration instruction to be selected, the prescriber also selects the term With plenty of water . - Alternatively, if the CIS has a single preconfigured concept of "Swallowed whole with plenty of water" (achieved through postcoordination), the prescriber selects this term.		420004004 Swallowed whole 419303009 With plenty of water	Qualifier value foundation reference set
Add a Dose	- The prescriber selects a preconfigured Dose quantity of "150" as the Dose is the same as the Strength of the recorded MPUU concept fluconazole 150 mg capsule . - The prescriber selects a unit of measure of mg .		- Strength value of "150" 258684004 mg	- Strength reference set - Dose unit of measure reference set
Add a Frequency or Interval	The prescriber selects the term Once .		422114001 Once	Dose based prescribing dose frequency and interval reference set
Add an Indication	- Although not specified in the example, Indication is an important element. - The prescriber selects the term Candidiasis .		78048006 Candidiasis	Problem/Diagnosis reference set

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
System check	- The system uses the <i>Medicine, Route, Dose</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT MPUU concept <i> fluconazole 150 mg capsule </i>.		37820011000036108 <i> fluconazole 150 mg capsule </i> - Strength value of "150" 258684004 <i> mg </i> 26643006 <i> Oral route </i> <i> Oral route -capsule </i> association	<i>Medicinal product unit of use reference set</i> <i>Strength reference set</i> <i>Dose unit of measure reference set</i> <i>Relationship file</i> <i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i>
Approve order	The prescriber signs and approves the order.		-	-



Second order: clotrimazole 1% – cream – topical – 3 times a day – apply to affected area – for 2 days

Table 89: Example prescribing model steps for a prescribed nonsequential multicomponent preparation (second order)

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add a <i>Medicine</i>	The prescriber selects the MPUU <i> clotrimazole 1% cream </i> .		23418011000036101 <i> clotrimazole 1% cream </i>	<i>Medicinal product unit of use reference set</i>
Add a <i>Route</i>	The prescriber selects the term <i> Topical route </i> .		6064005 <i> Topical route </i>	<i>Dose based prescribing route of administration reference set</i>
Add a <i>Dose Form</i>	The prescriber selects the term <i> Cream </i> .		385099005 <i> Cream </i>	<i>Dose based prescribing dose form reference set</i>

Prescribing model step	Details	Terminology supported?	Terminology component(s) used	Source reference set or file
Add an <i>Administration instruction</i>	The prescriber types in the free text "Apply to affected area".		-	-
Add a <i>Frequency or Interval</i>	The prescriber selects the term <i>Three times a day</i> .		2297980 <i>Three times a day</i>	<i>Dose based prescribing dose frequency and interval reference set</i>
Add a <i>Duration</i>	The prescriber types in the free text "2" and selects the term <i>day</i> .		258703001 <i>day</i>	<i>Unit of time reference set</i>
Add an <i>Indication</i>	- Although not specified in the example, <i>Indication</i> is an important element. - The prescriber selects the term <i>Candidiasis</i> .		78048006 <i>Candidiasis</i>	<i>Problem/Diagnosis reference set</i>
System check	- The system uses the <i>Medicine, Route, Dose Form</i> elements, SNOMED CT-AU <i>Route-AMT Form</i> associations and its CDS system in its calculations. - The order elements successfully translate to the AMT MPUU concept <i>clotrimazole 1% cream</i> , which is the same value as recorded in the <i>Medicine</i> element.		23418011000036101 <i>clotrimazole 1% cream</i> 6064005 <i>Topical route</i> 385099005 <i>Cream</i> <i>Topical route</i> -<i>cream</i> association	<i>Medicinal product unit of use reference set</i> - Relationship file <i>Dose based prescribing route of administration reference set</i> <i>Dose based prescribing dose form reference set</i> <i>Dose route and form extended association reference set</i>
Approve order	The prescriber signs and approves the order.		-	-

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Appendix B Reference sets that support prescribing model steps

The following table summarises the SNOMED CT-AU and the AMT reference sets that can be used to support the steps within the prescribing model (as described in Sections 4 to 7).

Table 90: Reference sets supporting each prescribing model step

Prescribing model step	Supporting reference sets
4.1 Add a medication course type	<i>Dose based prescribing medication course type reference set</i>
4.2 Add an observation or condition	<i>Observable entity foundation reference set</i> <i>Problem/Diagnosis reference set</i> <i>Situation with explicit context foundation reference set</i>
5.1 Add a medicine	<i>Containerised trade product pack reference set</i> <i>Medicinal product unit of use reference set</i> <i>Medicinal product pack reference set</i> <i>Trade product reference set</i> <i>Trade product unit of use reference set</i> <i>Trade product pack reference set</i>
5.2 Add a supply	<i>Unit of use quantity reference set</i>
5.3 Add a route of administration	<i>Dose based prescribing route of administration reference set</i> <i>Dose route and form extended association reference set</i>
5.4 Add a dose form	<i>Dose based prescribing dose form reference set</i> <i>Dose route and form extended association reference set</i>
5.5 Add a fluid vehicle	<i>Containerised trade product pack reference set</i> <i>Dose unit of measure reference set</i> <i>Medicinal product unit of use reference set</i> <i>Medicinal product pack reference set</i> <i>Trade product reference set</i> <i>Trade product unit of use reference set</i> <i>Trade product pack reference set</i>
5.6 Add administration instructions	<i>Anatomical site reference set</i> <i>Laterality reference set</i> <i>Qualifier value foundation reference set</i>
5.7 Add a dose	<i>Dose unit of measure reference set</i> <i>Strength reference set</i>
5.8 Add a dose instruction verb	<i>Dose instruction verb reference set</i>
5.9 Add a dose qualifier	<i>Calendar day and month reference set</i> <i>Dose qualifier reference set</i>
5.10 Add a frequency or interval	<i>Dose based prescribing dose frequency and interval reference set</i>

Prescribing model step	<i>Supporting reference sets</i>
5.11 Add a duration	• <i>Unit of time reference set</i>
5.13 Add an indication	• <i>Problem/Diagnosis reference set</i>
Prescribing model: System check	• <i>Containerised trade product pack reference set</i> • <i>Dose route and form extended association reference set</i> • <i>Medicinal product unit of use reference set</i> • <i>Medicinal product pack reference set</i> • <i>Strength reference set</i> • <i>Trade product reference set</i> • <i>Trade product unit of use reference set</i> • <i>Trade product pack reference set</i>

Appendix C Instances where the BoSS is less specific than the MP (IAI)

The following table lists the currently affected concepts where the BoSS is less specific than the MP (IAI)²¹. There are nine BoSS and 15 IAI concepts in total (based on the AMT May 2016 release).

For these concepts the recommendation is to record the *Medicine* element of an order with the associated MPUU concept rather than the BoSS, as the MPUU includes clinically relevant information about the substance that can influence a decision to prescribe.

Table 91: Using MPUU instead of BoSS concepts to record the Medicine element

No.	BoSS	IAI	MPUU concepts to be used for recording
1	Amphotericin B	• Amphotericin B lipid complex • Amphotericin B liposomal	• amphotericin B (as lipid complex) 100 mg/20 mL injection, vial • amphotericin B (as liposomal) 50 mg injection, vial
2	Betamethasone	• Betamethasone dipropionate • Betamethasone valerate	• betamethasone (as dipropionate) 0.05% cream • betamethasone (as dipropionate) 0.05% lotion • betamethasone (as dipropionate) 0.05% modified cream • betamethasone (as dipropionate) 0.05% modified ointment • betamethasone (as dipropionate) 0.05% ointment • betamethasone (as valerate) 0.02% cream • betamethasone (as valerate) 0.02% ointment • betamethasone (as valerate) 0.05% cream • betamethasone (as valerate) 0.05% ointment • betamethasone (as valerate) 0.1% cream • betamethasone (as valerate) 0.1% ointment
3	Calcium	• Calcium carbonate • Calcium citrate	• calcium (as carbonate) 1 g tablet • calcium (as carbonate) 500 mg tablet • calcium (as carbonate) 500 mg tablet • calcium (as carbonate) 600 mg tablet • calcium (as citrate) 250 mg tablet
4	Erythromycin	• Erythromycin ethylsuccinate • Erythromycin lactobionate	• erythromycin (as ethylsuccinate) 200 mg/5 mL powder for oral liquid • erythromycin (as ethylsuccinate) 400 mg tablet • erythromycin (as ethylsuccinate) 400 mg/5 mL powder for oral liquid • erythromycin (as lactobionate) 1 g injection, vial

²¹ This information may be published in a machine readable format in the future.

No.	BoSS	IAI	MPUU concepts to be used for recording
5	Iron	- Ferric carboxymaltose - Iron polymaltose - Iron sucrose	- iron (as ferric carboxymaltose) 100 mg/2 mL injection, vial - iron (as ferric carboxymaltose) 500 mg/10 mL injection, vial - iron (as polymaltose) 100 mg/2 mL injection, ampoule - iron (as sucrose) 100 mg/5 mL injection, ampoule
6	Haloperidol	Haloperidol decanoate	- haloperidol (as decanoate) 150 mg/3 mL injection, ampoule - haloperidol (as decanoate) 50 mg/mL injection, ampoule
7	Hydrocortisone	Hydrocortisone sodium succinate	- hydrocortisone (as sodium succinate) 100 mg injection, vial - hydrocortisone (as sodium succinate) 250 mg injection, vial - hydrocortisone (as sodium succinate) 500 mg injection, vial
8	Prednisolone	Prednisolone sodium phosphate	- prednisolone (as sodium phosphate) 20 mg/100 mL enema - prednisolone (as sodium phosphate) 5 mg suppository - prednisolone (as sodium phosphate) 5 mg/mL oral liquid
9	Zinc	Zinc sulfate monohydrate	zinc (as sulfate monohydrate) 50 mg capsule

Appendix D Distinction between SNOMED CT-AU and the AMT prior to content integration

At the time of publication, there are known equivalent concepts in the SNOMED CT-AU and the AMT. While these separate concepts have the same meaning, they have different unique concept identifiers. These include most AMT medicinal substances, some MP, MPUU, *Form*, *Unit of measure*, *Unit of use* and *Container type* concepts.

The AMT clinical content is not currently fully integrated with SNOMED CT-AU clinical content. The aim is to retain only one set of these equivalent concepts since AMT is a part of SNOMED CT-AU. Where equivalence is found, AMT concepts will be progressively retired and replaced with the equivalent SNOMED CT-AU concepts. The initial set of equivalent concepts to be addressed is the substance concepts.

The following table lists several equivalent substance concepts between SNOMED CT-AU and the AMT.

Table 92: Equivalent substance concepts in SNOMED CT-AU and the AMT

SNOMED CT-AU Substance	AMT Substance
372687004 Amoxicillin	1799011000036105 amoxicillin
261000 Codeine phosphate	1979011000036106 codeine phosphate
395733003 Bupropion hydrochloride	1883011000036106 bupropion hydrochloride

Within this context, the following sections describe:

- AMT products and their associated AMT substances.
- How to navigate between SNOMED CT-AU and the AMT.

D.1 AMT substances for AMT products

AMT MP and MPUU concepts are defined by their substance attributes (or relationships).

- The relationships are **Has Australian BoSS** and **Has Intended Active Ingredient**.
- The following table provides an example of the associations between AMT substances and their AMT MP and MPUU concepts.

Table 93: Substance attributes for AMT concepts

AMT product (source)	Relationship type	AMT Substance (destination)
MP 21821011000036104 codeine	700000081000036101 Has Intended Active Ingredient	1978011000036103 codeine

AMT product (source)	Relationship type	AMT Substance (destination)
MPUU 22456011000036101 codeine phosphate 30 mg tablet	700000081000036101 Has Intended Active Ingredient	1978011000036103 codeine
MPUU 22456011000036101 codeine phosphate 30 mg tablet	30364011000036101 Has Australian BoSS	1979011000036106 codeine phosphate

D.2 Navigating between SNOMED CT-AU and the AMT

If a system includes SNOMED CT-AU substances (which are distinct from AMT substances, i.e. they have different concept identifiers), the system may need to reconcile these to the relevant AMT MPs that contain these equivalent substances.

To do so requires the use of the *AMT Substance to SNOMED CT-AU mapping reference set* to traverse between the two terminologies. This file contains a mapping of AMT substances that are equivalent to or a subtype of SNOMED CT-AU substances.

The following figure describes the association between SNOMED CT-AU substances, AMT substances and AMT products. The example used has equivalent substance concepts found in SNOMED CT-AU and the AMT.

- To navigate from SNOMED CT-AU substances to AMT products will require the use of the:
 - **Is a** relationships between SNOMED CT-AU substance concepts;
 - various relationship types between AMT substance and product concepts; and
 - the *Substance to SNOMED CT-AU mapping reference set*.
 - In most cases equivalent entries should be used.
 - Some nonequivalent entries may also be used if the reader deems it safe to do so where misinterpretation is not likely (for example, a single less specific SNOMED CT-AU concept is mapped to a single more specific AMT concept). However, some caution and prior analysis is recommended.
- This process is not trivial, therefore we recommend that the reader contact the NCTS for further guidance.

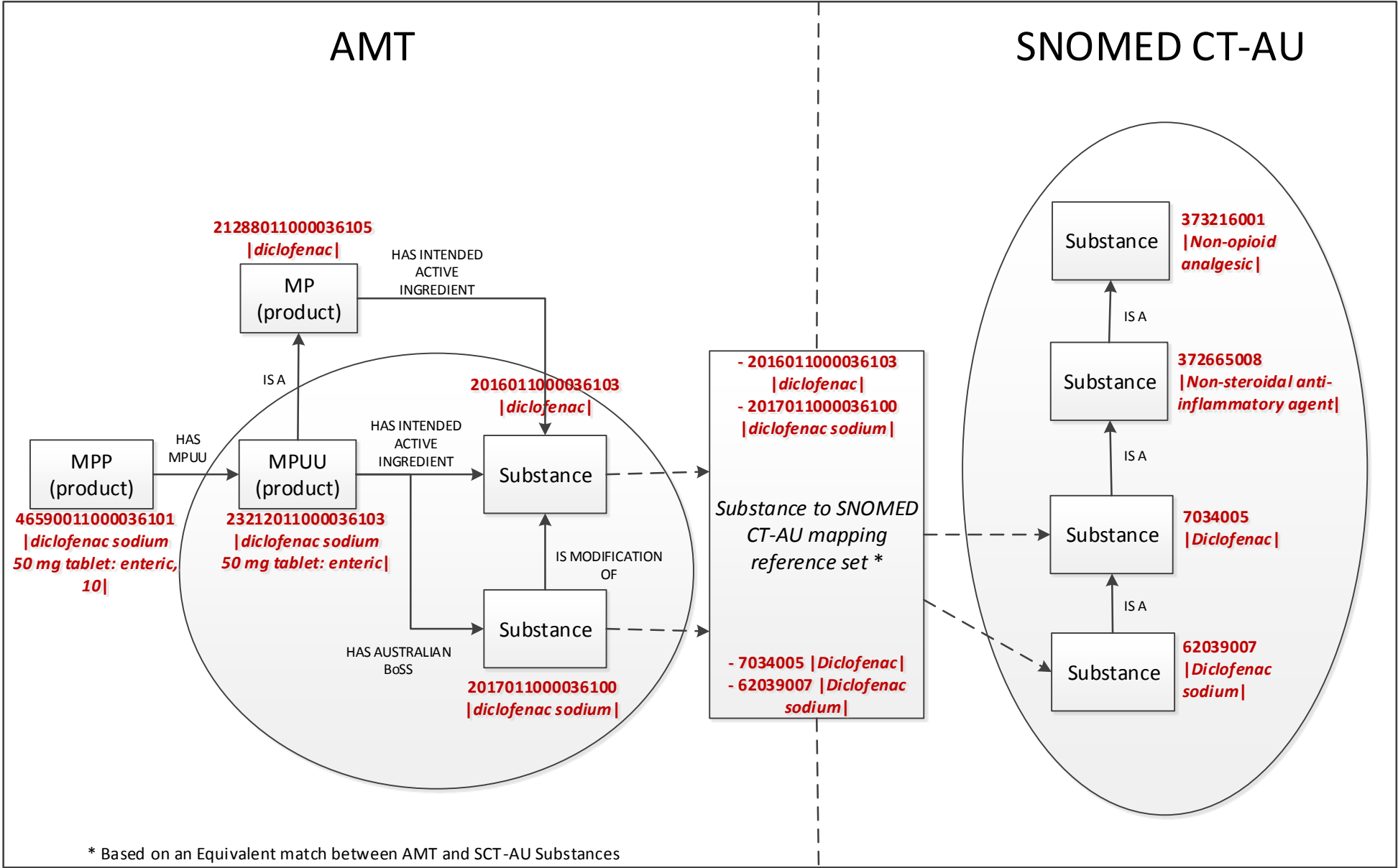


Figure 5: Mapping the AMT to SNOMED CT-AU

Appendix E Dose route and form extended association reference set

In the prescribing model, the following recommendations pertain to the *Medicine*, *Route*, *Dose Form* elements and the “System check” step:

- Recommendation 17** Use a *Medicine’s Form* attribute and SNOMED CT-AU *Route* and AMT *Form* associations to obtain a constrained list of *Routes* for recording based on an AMT-encoded *Medicine*.
- Recommendation 19** Use a *Medicine’s Form* attribute and SNOMED CT-AU *Route*, SNOMED CT-AU *Form* and AMT *Form* associations to obtain a constrained list of forms for recording based on a SNOMED CT-AU-encoded *Route*.
- Recommendation 41a** Use the SNOMED CT-AU *Route* - AMT *Form* associations to translate the *Route* to an AMT *Form*. Use the AMT MPUU or TPUU’s *Form* to compare with the *Route* element.
- Recommendation 42a** Use the SNOMED CT-AU *Form* - AMT *Form* associations to translate the *Dose Form* to an AMT *Form*. Use the AMT MPUU or TPUU’s *Form* to compare with the *Dose Form* element.

To support these recommendations, associations between SNOMED CT-AU *Route* and *Form* concepts, as well as between SNOMED CT-AU *Form* and AMT *Form* concepts have been created. They are contained in a single reference set called the *Dose route and form extended association reference set*.

- The SNOMED CT-AU *Route* entries are derived from the *Dose based prescribing route of administration reference set* and are SNOMED CT-AU *Route of Administration* value concepts.
- The SNOMED CT-AU *Form* entries are derived from the *Dose based prescribing dose form reference set* and are SNOMED CT-AU *Type of drug preparation* concepts.
 - Where an administered form is different to a manufactured form, these entries reflect the administered form (for example, SNOMED CT-AU form of *|Injection|* is associated with one or more manufactured forms such as *|powder for injection|*, *|injection solution|* and *|concentrated injection|*).
- The AMT *Form* entries are derived from the AMT *Form* qualifier concepts.
 - Where an administered form is different to a manufactured form, these entries reflect the manufactured form as AMT concepts only currently represent manufactured forms (for example, the AMT form of *|powder for oral liquid|* is associated with a SNOMED CT-AU form of *|Liquid|*).

The following table describes some example rows of this reference set (only Preferred Term descriptions are included for brevity).

Table 94: Excerpts from the Dose route and form extended association reference set

SNOMED CT-AU Route	SNOMED CT-AU Form	AMT Form
Inhalation route	Inhalation	powder for inhalation
Intrapulmonary route	Inhalation	powder for inhalation
Enteral route	Enteric granules	enteric coated granules
Enteral route	Enteric granules	granules
Gastroenteral route	Enteric granules	enteric coated granules
Gastroenteral route	Enteric granules	granules
Oral route	Enteric granules	enteric coated granules
Oral route	Enteric granules	granules
Orogastric route	Enteric granules	enteric coated granules
Orogastric route	Enteric granules	granules
Transplacental route	Enteric granules	enteric coated granules
Transplacental route	Enteric granules	granules

Some SQL queries are available to help with implementing this reference set. Refer to the *ATIG* [3].

Appendix F Alignment of the prescribing model with National Inpatient Medication Chart elements

A suite of national standard medication charts that standardise the presentation of information on the intended use of medicines for an individual patient and in high risk healthcare settings is available. These are collectively known as the National Inpatient Medication Charts (NIMC) [7].

While the NIMC was originally developed for paper based systems many elements are applicable to electronic systems.

The following table describes which prescribing model element (or step) is comparable to certain NIMC elements. While some of these may not be strictly equivalent the intent of the clinical data being captured by the different elements is similar. The table also lists which NIMC element is considered essential to be recorded for prescribing.

Table 95: Comparison of prescribing model steps and NIMC elements

Prescribing model element/step	NIMC element	NIMC essential element in medication order
Check test results and patient parameters	- Target INR - INR Result	No – Essential for warfarin orders
Add a <i>Medication course type</i>	Label for the medicine order type. For example: Regular medicines, As required PRN medicines and Once only medicines.	Yes – Essential by default, representing sections of a chart
- Add a <i>Medicine</i> - Add a <i>Dose Form</i> - Add a fluid vehicle	- Medicine (print generic name)/form - Warfarin - Marevan / Coumadin (select brand) - Slow or modified release indicator - Quantity	Yes - Generic (active ingredient) medicine name
Add a <i>Route of Administration</i>	<i>Route</i>	Yes
- Add a <i>Dose</i> - Add a <i>Dose qualifier</i>	<i>Dose</i> - Max PRN dose/24hr	Yes - <i>Dose</i>
Add a <i>Frequency or Interval</i>	- Hourly frequency - Frequency	Yes - Frequency
Add a <i>Duration</i>	Duration	No

Prescribing model element/step	NIMC element	NIMC essential element in medication order
Add a Start/End Date or Time	• Start Date • Stop Date • Date - As required PRN medicines • Time - As required PRN medicines • Date/time of dose – Once only and nurse initiated medicines and premedications • Time to be given – Variable dose medicine	Yes – Administration times
Add an <i>Indication</i>	<i>Indication</i>	No – But is essential for regular, PRN, variable dose and warfarin orders.

Appendix G Alignment of prescribing model with prescription record elements

National specifications are available that describe the information structure of nationally compliant records about prescriptions. For example, prescription records destined for the My Health Record and Electronic Transfer of Prescription between prescribing and dispensing systems. One such document is the Structured Content Specification, which specifies the essential and optional clinical data groups and elements to be captured in a My Health Record Prescription Record exchange and the constraints that should be applied.

Refer to the following links respectively:

<https://www.digitalhealth.gov.au/implementation-resources/clinical-documents/ehealth-prescription-record> and

<https://www.digitalhealth.gov.au/implementation-resources/clinical-documents/electronic-transfer-of-prescription>.

Note *The Electronic Transfer of Prescription specifications have been superseded by Australian Technical Specification 4888.x for Electronic Transfer of Prescription [10], which encompasses a suite of documents.*

The following table describes which prescribing model element (or step) aligns with certain prescription record elements. While some may not be strictly equivalent, the intent of the clinical data being captured by the different elements is similar.

Note *The terminology binding values for certain prescription record elements vary slightly to the available SNOMED CT-AU and the AMT terminology as described in the prescribing model (in this document). The Comments column describes this difference and further information in the context of the prescription record element.*

Table 96: Prescription record alignment with the prescribing model

Prescription record element	Current terminology binding to prescription record element	Relevant prescribing model element/step	Comments (for the prescription record element)
- DE-10194 Therapeutic Good Identification - DE-16769 Additional Therapeutic Good Detail (Therapeutic Good Strength) - DE-16769 Additional Therapeutic Good Detail (Therapeutic Good Generic Name)	- DE-10194 Therapeutic Good Identification – In the context of prescribing, the permissible coded values are the following AMT concepts: - MPUU - MPP - TPUU - TPP - CTPP - DE-16769 Additional Therapeutic Good Detail (Therapeutic Good Strength) – Not coded/ not bound to terminology. - DE-16769 Additional Therapeutic Good Detail (Therapeutic Good Generic Name) – Not coded/ not bound to terminology.	- Add a medicine - Add a fluid vehicle	- The current permissible values for Therapeutic Good Identification in the context of prescribing have been specified for product based orders. However, dose based orders can also be supported by the AMT concepts of BoSS and TP. - The Additional Therapeutic Good Detail (Therapeutic Good Strength) is currently not coded. However, the AMT <i>Strength reference set</i> (and preprepared SQL scripts to obtain the de-normalised strength) can be used to populate this element. - The Additional Therapeutic Good Detail (Therapeutic Good Generic Name) is currently not coded. However, the AMT MP concepts can be used to populate this element.
DE-16525 Quantity Description	Not coded/ not bound to terminology.	Add a supply	- The data type of this prescription record element is currently specified as Text. However, its meaning can be coded using the <i>Unit of use quantity reference set</i> (refer to Section 4). - However, this information cannot be stored as a coded value in the prescription record due to its Text data type.

Prescription record element	Current terminology binding to prescription record element	Relevant prescribing model element/step	Comments (for the prescription record element)
DE-10147 <i>Route</i>	Permissible values are SNOMED CT-AU concepts from the <i>Route of administration reference set</i> .	Add a route	- The concepts included in the <i>Route of administration reference set</i> is a list of all <i>Route</i> concepts found in SNOMED CT-AU. - The <i>Dose based prescribing route of administration reference set</i> (described in this document) is a subset of this reference set, and includes concepts intended to specifically support prescribing. The <i>Dose based prescribing route of administration reference set</i> may be more suitable to use.
DE-10186 Form	Permissible values are SNOMED CT-AU concepts from the <i>Medication form reference set</i> .	Add a dose form	- The concepts included in the <i>Medication form reference set</i> is a list of all <i>Form</i> concepts found in SNOMED CT-AU. - The <i>Dose based prescribing dose form reference set</i> (described in this document) is a subset of this reference set, and includes concepts intended to specifically support prescribing. The <i>Dose based prescribing dose form reference set</i> may be more suitable to use.
DE-16429 <i>Directions</i>	Not coded/not bound to terminology.	- Add a <i>Dose</i> - Add a <i>Dose Qualifier</i> - Add a <i>Dose Instruction Verb</i> - Add a <i>Frequency or Interval</i> - Add a <i>Duration</i> - Add a <i>Start/End Date or Time</i>	- The data type of this prescription record element is currently specified as Text. However, some portion of its meaning can be coded using concepts in the various reference sets developed to support prescribing (refer to Section 4). - However, this information cannot be stored as a coded value in the prescription record due to its Text data type.
DE-10141 <i>Clinical Indication</i>	Not coded/not bound to terminology.	Add an <i>Indication</i>	- The data type of this prescription record element is currently specified as Text. However, its meaning can be coded using the <i>Problem/Diagnosis reference set</i> (refer to Section 4). - However, this information cannot be stored as a coded value in the prescription record due to its Text data type.

Prescription record element	Current terminology binding to prescription record element	Relevant prescribing model element/step	Comments (for the prescription record element)
DE-16044 Medication Instruction Comment (Comment)	Not coded/ not bound to terminology.	Add <i>Administration Instructions</i>	- The data type of this prescription record element is currently specified as Text. However, some portion of its meaning can be coded using concepts in the various reference sets developed to support prescribing (refer to Section 4). - However, this information cannot be stored as a coded value in the prescription record due to its Text data type.

Acronyms

Acronym	Description
ACSQHC	Australian Commission on Safety and Quality in Health Care
AMT	Australian Medicines Terminology
APAC	Australian Pharmaceutical Advisory Council
ARTG	Australian Register of Therapeutic Goods
ARTG ID	Australian Register of Therapeutic Goods Identifier
BoSS	Basis of Strength Substance
CDS	Clinical decision support
CID	Clinical Interface Descriptions
CIS	Clinical information system
CTPP	Containerised Trade Product Pack
DBP	dose based prescribing
eMM	Electronic medication management
IAI	Intended active ingredient
IHTSDO	International Health Terminology Standards Development Organisation
IM	Intramuscular
INN	International Nonproprietary Names
INR	International Normalised Ratio
IT	Information technology
IV	Intravenous
MP	Medicinal Product
MPP	Medicinal Product Pack
MPUU	Medicinal Product Unit of Use
NCTS	National Clinical Terminology Service
NHCIOF	National Health Chief Information Officer Forum
NIMC	National Inpatient Medication Charts
PBS	Pharmaceutical Benefits Scheme
PCA	Patient-controlled analgesia
PIP	Practice Incentives Program
PRN	"pro re nata" meaning "when necessary" in Latin
RPBS	Repatriation Pharmaceutical Benefits Scheme
RCPA	Royal College of Pathologists of Australasia

Acronym	Description
SC	Subcutaneous
SI	“Système international d'unités” meaning “The International System of Units” in French
SNOMED CT-AU	SNOMED CT, Australian release
SQL	Structured Query Language
TGA	Therapeutic Goods Administration
TP	Trade Product
TPP	Trade Product Pack
TPUU	Trade Product Unit of Use

Glossary

Term	Meaning
AUSTL	Type of ARTG ID assigned to “listed” items on the Australian Register of Therapeutic Goods. Listed medicines are much lower risk self-medication products than those listed as AUSTR medicines. Listed medicines include sunscreens over SPF4 and many vitamin, mineral, herbal and homeopathic products.
AUSTR	Type of ARTG ID assigned to “registered” items on the Australian Register of Therapeutic Goods. Registered medicines include all prescription only medicines and many over-the-counter products such as pain relief, coughs and colds and antiseptic creams.
Australian Digital Health Agency	Established as a statutory authority in the form of a corporate Commonwealth entity, the Agency reports to State and Territory Health Ministers through the COAG Health Council. The Agency leads and provides direction in developing digital health, bringing the Australian health system into the digital century. It is responsible for the national digital health strategy including the design, development, delivery and national operations, while the Commonwealth Department of Health is responsible for national digital health policy.
Australian Medicines Terminology	National terminology that identifies medicines used in Australia, using unique codes to deliver unambiguous, accurate and standardised names for both branded (trade) and generic (medicinal) products.
Australian Register of Therapeutic Goods	Australian register on which all therapeutic goods must be registered before they can be lawfully supplied in Australia. Managed by the Therapeutic Goods Administration.
Basis of Strength Substance	Ingredient strengths are always represented in terms of a Basis of Strength Substance (BoSS). The BoSS may be a base, salt or modified salt, and may be the same or different to the actual ingredient being measured.
Containerised Trade Product Pack	A category of AMT concepts representing marketable medical entities available for patient use, with details of container type.
Dose based order	A medicine order that specifies a dose that does not directly translate to any single specific product strength and may be supported by a combination of commercially available products.
Electronic medications management	Use of electronic systems to facilitate and enhance the communication of a prescription or medication order, aiding the choice, administration and supply of a medication through knowledge and decision support, and providing a robust audit trail for the entire medications use process.
International Health Terminology Standards Development Organisation	International not for profit organisation which owns and administers the rights to SNOMED CT and related terminology standards.
Intravenous fluid order	A medicine order that specifies an intravenous administration of a fluid usually to maintain appropriate fluid balance and rehydration. These fluids may be used as a vehicle for administration of other active ingredients intravenously.

Term	Meaning
Loading dose order	A medicine order that specifies an initial higher dose of a medicine that may be given at the beginning of a course of treatment before being reduced to a lower maintenance dose.
Medication order	For the purpose of this document a medication order is the documented electronic set of instructions (usually on a medication chart) to inform carers regarding the administration of medicine to a person. It is not the same as a prescription although in some settings the document may also serve the purpose of a prescription.
Medicinal Product	Category of AMT concepts representing abstract formulated representations of therapeutic active ingredients used in treatment of human patients in Australia.
Medicinal Product Pack	Category of AMT concepts representing the abstract concept of marketable medicinal entities available for patient use, devoid of brand and container type.
Medicinal Product Unit of Use	Category of AMT concepts representing abstract formulations containing active ingredient, strength and form in a single dose form or unit of use component of a multicomponent formulation, devoid of brand.
My Health Record	Australia's national electronic health record system.
National Clinical Terminology Service	Group within the Australian Digital Health Agency responsible for development, publication and maintenance of national clinical terminology products for Australia.
Once only order	A medicine order that specifies a medicine intended to be administered in a single occurrence and immediately. Also known as a "Stat" order.
Pharmaceutical Benefits Scheme	Australian government subsidy system for medicines managed by the Department of Health's Pharmaceutical Benefits Division.
Preferred Term	The preferred description for use when referring to a SNOMED CT-AU or AMT concept, which is the most appropriate term in the context of clinical use within the Australian healthcare system.
Prescription	A compliant electronic document, produced by an authorised person, to be used by a pharmacist for the purpose of meeting the legal requirements for the supply of a medicine to an individual patient. Describes the medication that the prescriber (i.e. a doctor in most cases, though a nurse practitioner, pharmacist, or physiotherapist can also be prescriber) wants to be taken by the patient. It is input to the dispense process. Prescriptions are also used as input for the patient or the nurse on how to use the medication. A prescription is not the same as a medication order (see separate definition) although in some settings the same document may serve both purposes.
Product-based order	A medicine order that has a commercially available product specifically selected within its <i>Medicine</i> element, as either a product pack or a unit of use. If a product pack is specified, its quantity is the pack quantity of the commercially available presentation (such as 20 tablets). If a unit of use is specified, its quantity may reflect a single unit (such as 1 tablet) or multiples of the unit of use (such as 5 tablets).

Term	Meaning
Reducing dose order	A medicine order that specifies an initial higher dose of a medicine that may be given at the beginning of a course of treatment before being progressively reduced to one or more lower doses.
Reference set	A flexible standard approach used by SNOMED CT to support a variety of requirements for customisation and enhancement of SNOMED CT and national extensions. These include the representation of subsets, language preferences for use of particular terms and mapping from or to other code systems. Also commonly shortened to "Refset".
Regular or routine order	A standing order for a medicine to be given on a regular frequency until a patient is discharged or the order is otherwise cancelled.
SNOMED CT	The international, parent clinical terminology of which SNOMED CT-AU and the AMT are national extensions. The most comprehensive and precise clinical health terminology product in the world, owned and distributed by The International Health Terminology Standards Development Organisation (IHTSDO). SNOMED CT is designed to underpin clinical data recording and meaning-based retrieval and use.
SNOMED CT-AU	The Australian edition of SNOMED CT, and of which the AMT is part of.
SNOMED CT Identifier	Identifier scheme defined for distributed components (concepts, descriptions, relationships) of a SNOMED CT or national extension release.
Structured Query Language	Programming language originally based on relational algebra and tuple relational calculus, designed to manage data in relational databases.
Synonym	Type of description that is comfortable and natural for use by clinicians and end users. This differs from the Fully Specified Name, which by contrast is intended as the formal, definitive and unambiguous definition of a concept not intended for everyday use.
Therapeutic Goods Administration	Australia's regulatory authority for therapeutic goods, which among other duties, maintains the Australian Register of Therapeutic Goods.
Trade Product	Category of AMT concepts representing product brand names.
Trade Product Pack	Category of AMT concepts representing marketable medicinal entities available for patient use devoid of container type.
Trade Product Unit of Use	Category of AMT concepts representing marketable formulations containing active ingredient, strength and form in a single dose form or unit of use component of a multicomination pack.
Unit of use	The <i>Unit of use</i> describes a discrete unit dose form (such as tablet or capsule) or a continuous substance where a consistent physically measurable unit or subunit cannot be identified (such as cream or eye drops).
Variable dose order	A medicine order that specifies a dose that vary according to a patient's test results or certain observations and conditions being met.

Term	Meaning
When required order	A medicine order that specifies a medicine intended to be administered whenever the condition it was prescribed for arises. It has an irregular frequency and is distinct from the regular frequency of administration for a regular (or routine) order. Also known as a PRN order.

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