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dm+d Implementation Guide (Secondary Care)

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Reviewers

This document must be reviewed by the following people:

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Jo Goulding	By email	Head of Pharmacy Terminology	08 July 2015	5.0

Glossary of Terms

Term / Abbreviation	What it stands for
dm+d	NHS Dictionary of Medicines and Devices
HSCIC	Health and Social Care Information Centre
NHSBSA	National Health Service Business Services Authority

SNOMED CT

Systematized Nomenclature of Medicine Clinical Terms

Document Control:

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1 Executive Summary

This document explains how dm+d might be implemented in hospital-based electronic prescribing systems. It contains information about NHS Dictionary of Medicines and Devices (dm+d) itself, the data files in which it (and supporting information) is published, and a prescribing model which may be used to enable dose-based prescribing.

The information within this document is provided to system vendors as guidance rather than a prescriptive specification for development. It illustrates one possible method for implementing dm+d.

It should be noted that this document is the product of a collaborative development between ePrescribing, Common User Interface and the Pharmacy Terminology team within Standards Delivery and was historically owned by the ePrescribing programme. Due to the closure of the ePrescribing programme ownership has by default been transferred to the Pharmacy Terminology team. Updates continue to be made but these are only in relation to the categorical information relating to dm+d to ensure currency of this information. Due to lack of a central ePrescribing team the guidance has not been tested in secondary care implementation and has not been updated in relation to any feedback in relation to ePrescribing further to v3.0.

1.1 What is the Prescribing Model?

The Prescribing Model defines the **minimum** set of information required at the time of prescribing, for prescriptions within hospital-based (secondary and tertiary) care. The model consists of a number of 'Medication Types', which work in conjunction with a set of 'Prescribing Rules'. These Types and Rules cover groups rather than individual medicines, and are complementary to the requirements for specific medicines and medicine classes contained within the ePrescribing Functional Specification <http://www.connectingforhealth.nhs.uk/systemsandservices/eprescribing/baselinefunctspec.pdf>. It should be noted that the specified minimum set of information can be arrived at (or exceeded) by a variety of different prescribing workflows. This guidance does not recommend any specific workflow.

The model is aimed at NHS sub-contracted vendors, Existing Systems vendors and the Health and Social Care Information Centre (HSCIC) / NHS teams working with them. It was produced by a joint team containing representatives from the NHS Connecting for Health (CFH) ePrescribing, Dictionary of Medicines and Devices (dm+d) and Common User Interface (CUI) programmes.

The model is implementable using HSCIC data products, principally dm+d. It is compatible with other HSCIC guidance, for example the Common User Interface design guidance. While working on the model, some new information requirements were identified; the team have therefore produced an additional data source, known as 'Marked Modifiers', which extends dm+d and will be published and maintained alongside it, as part of the SNOMED CT¹ (Systematized Nomenclature of Medicine Clinical Terms) UK Drug Extension (Available from

¹ SNOMED® and SNOMED CT® are registered trademarks of the IHTSDO® (www.ihtsdo.org)

Technology Reference Data Update Distribution service (TRUD) website
<https://isd.hscic.gov.uk/trud3/user/guest/group/0/home>).

The model has been validated by 2 rounds of consultation with HSCIC experts, electronic prescribing system vendors and representatives from NHS ePrescribing Trusts (i.e. those which have already implemented electronic prescribing in some form).

1.2 Why do we need it?

An aim of any ePrescribing system should be to promote (and enforce where necessary) known best practices for the safe and effective use of medicines. The challenge is that these best practices vary considerably depending on the drug being used. Therefore a 'one-size-fits-all' approach to electronic prescribing will never be acceptable to clinicians, and system vendors need to manage complex variations across a broad range of medicines.

Vendors must also consider the standard prescribing workflow within hospitals, which follow a 'dose-based' prescribing process in which doctors (the largest group of prescribers) will 'write up' a drug for the nursing team to administer to the patient. Typically, a prescriber will specify a drug by its generic name plus dose, route and frequency allowing for flexible interpretation at the point of administration where this is appropriate. The nurse will then use this information to select the correct quantity of an actual product, to give the patient.

However, depending on the drug being used, the nurse may carry out the prescriber's 'intent' using a range of available drug products. The challenge of dose-based prescribing is that unless safeguards are put in place, it is possible that some of the potentially-available products will not have the same effect as others, and some may be inappropriate.

The Prescribing Model provides the necessary data structures and rules to solve both these problems. It is sufficiently granular to accommodate the complexity of differing types of medicines, and provides the safeguards to allow dose-based prescribing without unsafe ambiguity for nursing teams giving medicines to patients.

1.3 How does it work?

The model works at the time of prescribing, and can be used once the prescriber has selected a drug (usually identified by its generic name or the dm+d concept, Virtual Therapeutic Moiety (VTM) e.g. 'paracetamol') to prescribe, and the route of administration.

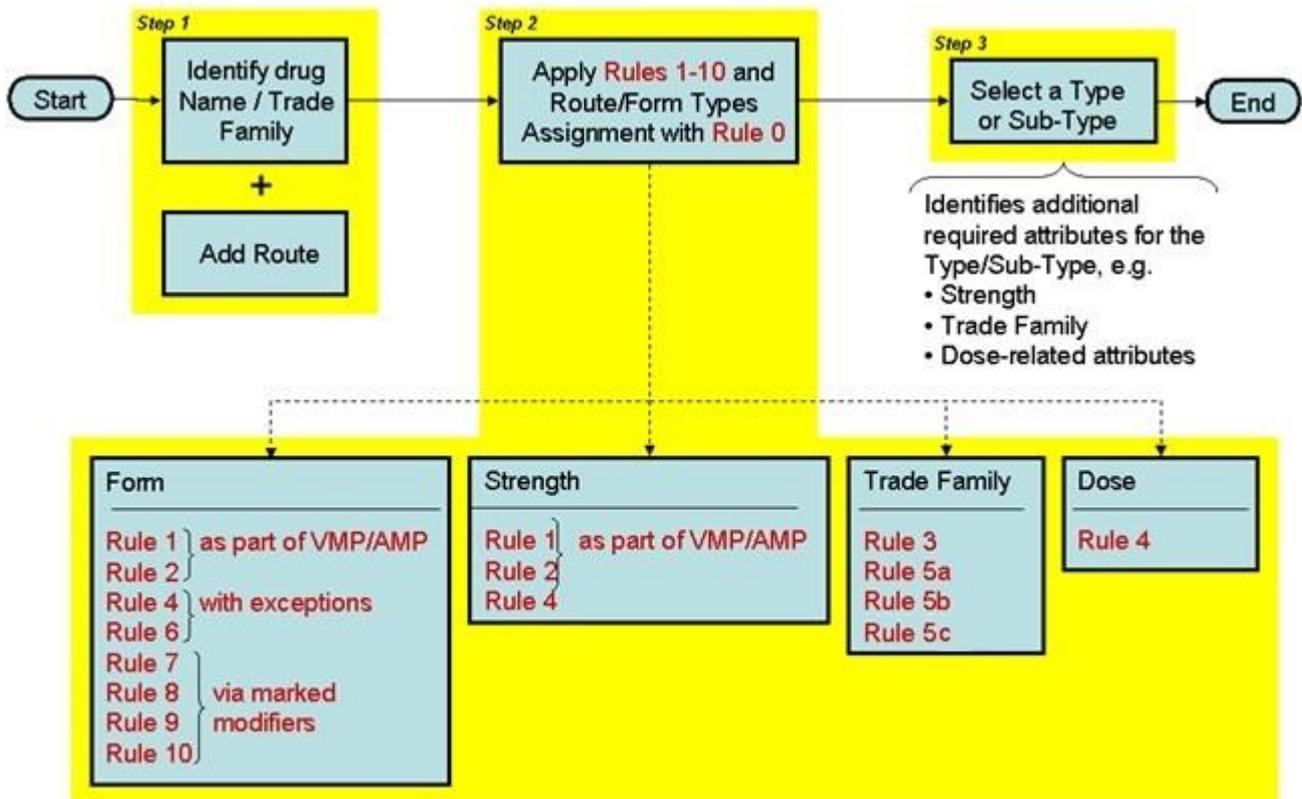


Figure 1 - Theoretical prescribing process using the Prescribing Model Types and Rules

- Once the prescriber has identified a drug (usually the dm+d VTM concept but possibly SNOMED CT UK Drug extension concept class Trade Family (TF)) and a route, the system uses the dm+d structure and the Marked Modifiers to assemble a matching 'set' of drug products (usually the dm+d concepts, Virtual Medicinal Products (VMPs) but possibly Actual Medicinal products (AMPs)) and the information provided about them. This information is used in the following steps by the Types and Rules.

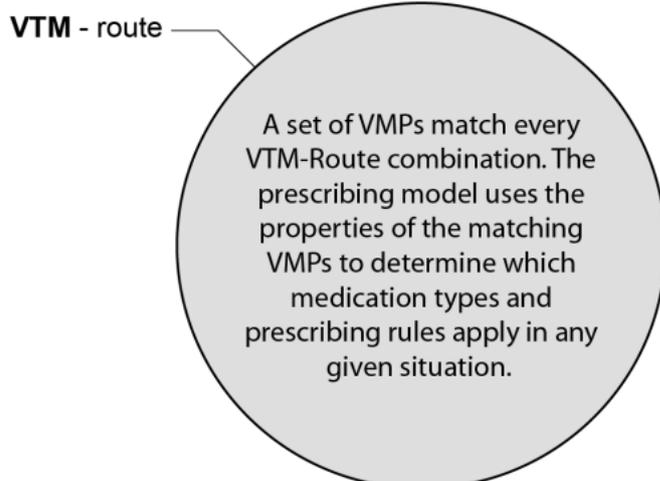


Figure 2 – VTM and Route combinations

- Using the assembled information, the system checks the Prescribing Rules for validity in the situation at hand. Depending on the Rule, specific information may be added to the minimum set required to complete the prescription.

3. Finally, the system assigns the prescription to a Type or Sub-Type. Depending on this assignment, further information may be added to the minimum set.
 - In some cases, a prescription may map to more than one Type. This is an inevitable consequence of the 'managed ambiguity' of the dose-based prescribing process.
 - Where this occurs, Prescribing Rule 0 is used to enforce a safe minimum set of information.

Please note that this process applies for a dose-based prescribing workflow. Other processes (including so-called product-based prescribing) are also valid methods of arriving at (or exceeding) the minimum information requirement.

1.4 What are the benefits?

Adoption of the Prescribing Model has a number of benefits to the HSCIC and the NHS.

- It suggests a method for assessing (in part) the safety and efficacy of ePrescribing systems
- It could act as a detailed set of requirements for (partial) acceptance of an ePrescribing system, thereby clarifying the NHS's requirements to the vendor community.
- It indicates that HSCIC data products, especially dm+d, are workable in secondary care.

2 Introduction

Note. The scope of this work is limited to hospital-based secondary and tertiary care

2.1 Audiences

The primary audiences for this document are subcontracted vendors and software developers building clinical IT systems for use within the NHS in England, and the NHS clinical teams working with them. As such it has been written assuming that the reader has a working knowledge of ePrescribing issues and the NHS Dictionary of Medicines and Devices (dm+d).

This guidance will continue to evolve in response to feedback from implementation. Please forward feedback via email to information.standards@hscic.gov.uk

2.2 Key features of this document

For clarity, the key features of this specification are listed below. The remainder of this document elaborates on these, and puts them in context. The accompanying spreadsheet then provides the detail.

- This model describes the minimum safe level of specificity for as many different types of prescription as possible.
 - However, it does **not** define the process by which this level is achieved.
- The aim is to allow dose-based prescribing at the most generic level (i.e. by Virtual Therapeutic Moiety (VTM) name or brand name (Trade Family)), thereby following existing secondary care practice, wherever it is safe and appropriate to do so.

- However, this does not exclude the possibility of product-based prescribing.
- The key requirement is that the minimum safe level of specificity is met or exceeded for all prescriptions; the process by which this is achieved is not part of this model.
- All prescriptions can be assigned to one of 29 types, and be prescribed and displayed according to the specification for that type.
 - The majority of types are defined by Form + Route combinations, with a minority being defined by the nature of the medicine itself (e.g. enteral feeds, insulin, total parenteral nutrition)
 - Lists of VMPs which map to all types and sub-types, and which are covered by the prescribing rules, will be published contemporaneously with the SNOMED CT releases of dm+d content (starting April 2009), with only minor exceptions (see accompanying spreadsheet for more detail).
 - The types for injections and infusions belong to a special category, as these must be selected specifically by the prescriber, according to one of the prescribing rules.
- Safety-critical circumstances are covered by a parallel set of 12 rules which impose further constraints.
 - These rules have the effect of constraining the flexibility inherent in dose-based prescribing, where there is either a safety-related or a practical reason to do so.
 - New data to support some of these rules, known as 'Marked Modifiers', will be provided in conjunction with this document. This data is held externally to dm+d but closely related to it.
- This specification defines rules on a group basis, not for individual medicines. While it is acknowledged that exception cases may exist, and local requirements may already have been identified, it has been judged beyond the remit of national standards to enumerate and manage them, as they can be dealt with better by ePrescribing system and decision support vendors in conjunction with local Trusts during implementation.
- Although the HSCIC requires the use of dm+d in ePrescribing systems within the NHS in England, this document has been (where possible) written in sufficiently agnostic terms so that it remains meaningful to suppliers who have not yet adopted dm+d.
 - However, basic familiarity with the fundamental concepts underlying dm+d is necessary to understand this document.
- The expectation is that ePrescribing system suppliers will either adopt these rules within their systems, or check that their own rules produce the equivalent end results.

2.3 Out of scope

The scope of this document has been deliberately constrained in a number of areas:

- The process by which a prescription is defined within a system, and the user interface for prescribing, is out of scope.
 - Any user interface illustrations shown in conjunction with this document are for information only and not part of this Prescribing Model.
- Exceptions or special rules for individual medicines, beyond the use of flags or other content contained within dm+d, are out of scope.
- Unlicensed routes of administration are not contained within dm+d² and are therefore not part of the mapping within this model.
 - The expectation is that ePrescribing systems can support configuration to cater for unlicensed routes in line with local policy decisions and clinical practice.
- The following types have been identified but not fully defined:
 - Homeopathic medicines
 - Prescriptions for dialysis solutions
 - Total Parenteral Nutrition, as an extemporaneous preparation
 - Blood products (except Albumin and commercial preparations e.g. Factor VIII, as these are the only blood products currently included within dm+d)
 - Radio-pharmaceuticals
- The following types of product, while included in dm+d, have been excluded from the mappings (see Section 6, below, for more details):
 - Items used only as ingredients
 - Items not intended for direct patient administration
 - Combination products
- The scope of this document is limited to dose-based prescribing, as typically practiced within hospital-based secondary and tertiary care.

2.4 Updates

The data files that support this guidance will be maintained in synchronisation with the dm+d data contained in the SNOMED CT UK Drug extension; currently released 4 weekly on TRUD.

² Note that at VMP level routes for imported medicines and specials may be included within the dm+d which technically are unlicensed routes. Refer to section 0 for more detail related to route of administration.

3 Supporting hospital-based prescribing

3.1 Background

The Health and Social Care Information Centre (HSCIC) has undertaken a number of initiatives to define guidance and / or requirements for prescribing systems in secondary care including:

- ePrescribing programme - secondary care functional requirements specification
- Common User Interface programme – secondary care Medications Management design guidance
- dm+d implementation trial, University Hospital Birmingham
- Work with System Suppliers

During the course of this work, it became apparent that new information models and rules (sometimes previously referred to as ‘compositional coding’) would be required to ensure safe dose-based prescribing within electronic systems.

Without this set of rules:

1. A multitude of exceptions immediately present themselves to any single ‘one-size-fits-all’ rule for managing prescriptions.
2. Safe and effective prescribing is extremely difficult.
 - a. In this circumstance, ‘safe’ is defined as ‘sufficient information to allow for correct, unambiguous interpretation of the prescribers intention, without further intervention by a pharmacist or another prescriber’.

This document is the HSCIC’s response to this situation. It sets out minimum requirements for the content of as many types of prescription as possible, without specifying the exact prescribing process.

The minimum requirement can be seen as a ‘target’ for the prescribing process - it must be achieved in order for the process to be completed and the prescription to be valid. It may be that, once a valid item has been created, that the way it is displayed may be different depending on the user’s role and the task at hand.

For user interface guidance for common prescribing processes see section 3.7 in this document.

3.2 Dose-based prescribing – on paper

At present, in-patient prescribing in hospitals in the UK is generally done using paper drug charts and follows a ‘dose-based’ approach. This means that the prescriber may typically first select a drug name and then define a dose quantity (e.g. ‘500 mg’), a route (e.g. ‘oral’) and a frequency (e.g. ‘four times a day’, commonly expressed on paper by its Latin abbreviation ‘qds’), to produce:

paracetamol 500 mg – oral – qds

NOTE:

The use of abbreviated Latin forms in this example is intended to reflect existing paper-based practice, not as an example of best practice within electronic systems.

Legally, this prescription is an ‘instruction to administer’ a drug to a patient.

In most cases this instruction will be carried out by a nurse, who will select and prepare the medicinal product to be administered – thereby selecting a form and a strength appropriate to the patient’s condition (e.g. to choose a suspension rather than tablets if the patient is having difficulty swallowing).

In an ideal world, all prescriptions would be checked by a pharmacist before the first administration. However, this verification cannot be taken for granted, especially when using an electronic system where the communication between prescriber and nurse (via an electronic administration chart) can be almost instantaneous. Therefore the instruction to the nurse has to be sufficiently safe and unambiguous to enable selection and preparation of a medicinal product which appropriately matches the prescriber’s intent.

3.3 Dose-based prescribing – using electronic prescribing systems

In electronic prescribing systems, the combination of a drug name and route can be used to ‘map’ to a set of medicinal products. This document uses the NHS Dictionary of Medicines and Devices (dm+d) structure (see next section) to capture the set of products (VMPs in dm+d) for any given drug name (VTM in dm+d) and route combination, and uses the information contained at product level (see below) to determine how to proceed.

VTM - route

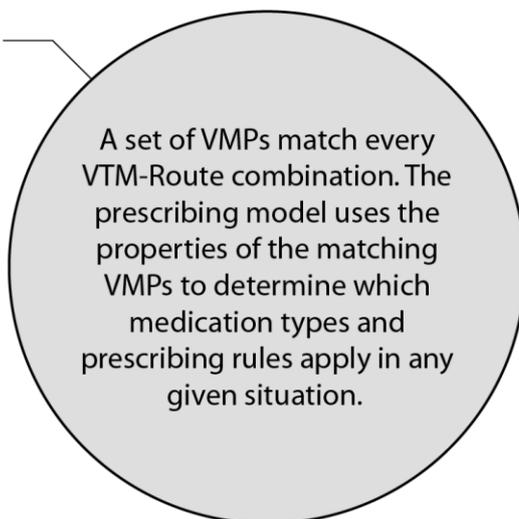


Figure 3 - The combination of drug name (VTM) and route can be used to map to virtual medicinal products (VMPs)

For many medicines, the combination of drug name, dose, route and frequency (e.g. ‘paracetamol 500 mg – oral – qds’ as per the example above) is sufficient to define a ‘set’ of products which can safely be considered equivalent to each other in terms of administration. However, the challenge of dose-based prescribing is that this is not always the case. For a significant number of prescriptions, more information may be required in order for the nurse to know precisely which products reflect the prescriber’s intent.

Therefore the main aim of this document is to define when more information must be provided by the prescriber, and to ensure that this is in line as far as possible with current clinical best-practice and knowledge. It does not represent an attempt by the HSCIC to change the fundamentals of existing ‘best-practice’ prescribing in hospital-based care. Instead, by defining a minimum level of specificity, it shows the ‘path of least resistance’ for a clinician safely to prescribe any given medicine.

Alternatively to dose-based prescribing, a number of existing electronic systems use product-based prescribing – i.e. prescriptions are created by selecting a single medicinal product (VMP or AMP in dm+d) and with the rest of the prescription then expressed in terms of that product. As noted in Section 6 (below), this will typically mean that information in excess of the minimum requirement is provided by the prescriber. The acceptability of this process is a matter for local consideration, but it is compatible with this model, which also improves product-based systems by providing a means to compute which alternative products are equivalent to the one prescribed, if for example it is not available in ward stock.

3.4 The Prescribing Model

The Prescribing Model defines the minimum set of information required at the time of prescribing, for prescriptions within hospital-based (secondary and tertiary) care. The model consists of a number of ‘Medication Types’, which work in conjunction with a set of ‘Prescribing Rules’. These Types and Rules cover groups rather than individual medicines, and are complementary to the requirements for specific medicines and medicine classes contained within the ePrescribing Functional Specification

<http://www.connectingforhealth.nhs.uk/systemsandservices/eprescribing/baselinefunctspec.pdf>

The model is implementable using HSCIC data products, principally dm+d. It is compatible with other NHS guidance, for example the Common User Interface design guidance. While working on the model, some new information requirements were identified; the team have therefore produced an additional data source, known as ‘Marked Modifiers’, which extends dm+d and will be published and maintained alongside it as part of the SNOMED CT UK Drug Extension (Available from Technology Reference Data Update Distribution service (TRUD) website <https://isd.hscic.gov.uk/trud3/user/guest/group/0/home>).

On-screen presentation requirements for all prescriptions

Common User Interface Guidance

Minimum information requirements for all prescriptions

Prescribing Model - Types, Rules & Marked Modifiers

supports

Drug Dictionary
dm+d

inter-
operate

supports

CFH
Dose Syntax

Between-system messaging requirements for all prescriptions

Message Implementation Manual

Figure 4 - Relationships between this document, a drug dictionary (dm+d) and a dose syntax

Figure 5 - The dm+d structure with associated SNOMED CT UK Drug extension Trade Family concept class, with examples (examples correct at 2007)

The area of the dm+d structure most used by the prescribing model (i.e. the relationship between VTM and VMP) and the most-used attributes at VMP level, are highlighted in the diagram below:

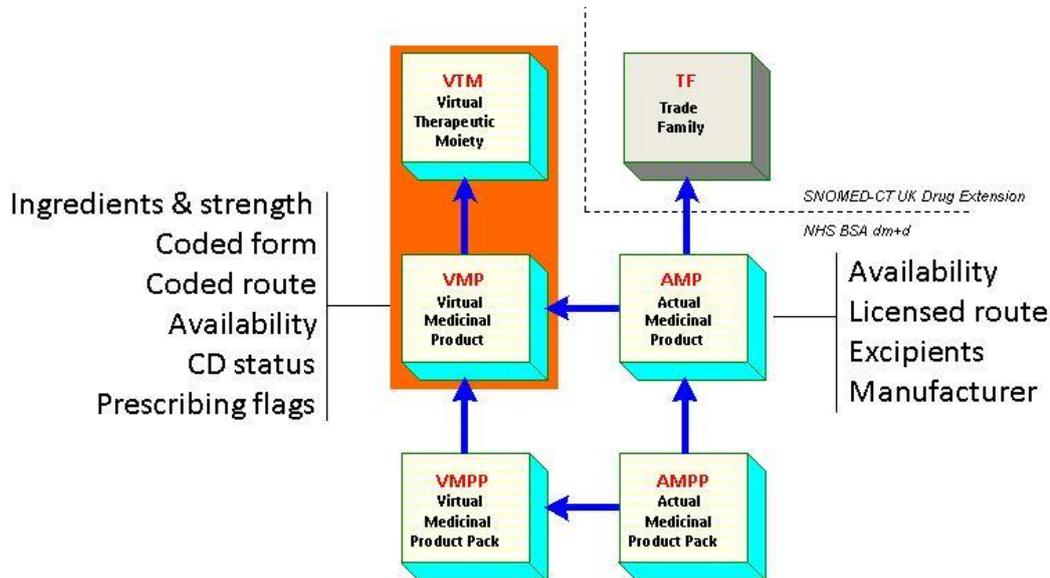


Figure 6 - The dm+d structure with associated SNOMED CT UK Drug Extension concept classes, highlighting the relationship between VTM and VMP, and the attributes at VMP level most pertinent to the Prescribing Model

Some of the mapping contained within this document has been produced directly from current dm+d content – e.g. if a Form-Route combination exists for a VMP that has actual products available, then that combination is contained within the mapping. The mapping tables will be reviewed with each SNOMED CT UK Drug Extension release and updated and republished to coincide with those releases.

While it is noted that in practice, unlicensed routes of administration may be widely used, the policy is that the national drug dictionary will only contain licensed routes for licensed medicines. The use of unlicensed routes should therefore be considered, in addition (but functioning in an identical manner) to the content and mappings available within dm+d, during local implementation.

Some data required for this document is not held within dm+d. This data, provided specifically to support dose-based prescribing, is called 'Marked Modifiers'. It is held externally to dm+d but closely related to it, and will be updated on a regular basis to coincide with new releases of the SNOMED CT UK Drug Extension.

3.7 Common User Interface (CUI) medications guidance

The CUI guidance is driven by the minimum set of data to be displayed as defined in this implementation guide and is available on <http://systems.hscic.gov.uk/data/cui>

The guidance is a suite of medications related User Interface guidance (UI) aimed at software developers of clinical systems for secondary care. The work was prioritised based on a review of WHO priorities, medications safety reports, clinical input and consideration of the implementation priorities of suppliers.

Core principles and benefits:

- Medications can be misread and misinterpreted due to unclear or inconsistent display across systems. CUI guidance enables common designs for medications display for core high volume clinical tasks will benefit clinicians using systems
- Using dm+d and NHS e-prescribing guidance it is possible to consistently format display of medications in the user interface for secondary care to enhance clinical safety, reduce errors and reduce training required.

Please see CUI documentation for detailed rationale, benefits and context for each area.

Current scope: Specific clinical tasks with medications including reviewing lists of medications, searching for and prescribing medications and recording administration in an inpatient ward setting in secondary care.

Expectations for suppliers: These are guidance documents and recommendations, safety principles and design recommendations. Supplier implementation and feedback is part of the consultation process.

Specific documents	Location
Medications line CUI guidance	http://systems.hscic.gov.uk/data/cui
Medications list CUI guidance	http://systems.hscic.gov.uk/data/cui
Medications administration CUI guidance	http://systems.hscic.gov.uk/data/cui
Search and prescribe CUI guidance	http://systems.hscic.gov.uk/data/cui
dm+d bonus file	TRUD website dm+d section

3.8 Equivalence

The prescribing model outlined above is based on the principle that the dm+d logical model can be used to map the relationships between a collection of atomic coded concepts (principally VTM and Route) and one or more VMPs or AMPs with the corresponding coded attributes.

This principle falls short of a full definition of equivalence in a number of respects. However, in the interim the following high-level summary may be useful when considering equivalence:

- When a prescription is comprised of a VTM or TF in conjunction with other atomic dm+d / SNOMED CT concepts, it will be necessary to identify the product or products (VMPs or AMPs) which can be mapped to it. This mapping may be used to support dispensing and / or administration.
- To map a VTM- or TF-based prescription to VMP or AMP concepts, the dm+d logical model can be used to identify the set of VMPs or AMPs whose coded attributes match the corresponding atomic structured or coded concepts within the prescription. The atomic concepts that currently may be used in this manner are:
 - drug name (moiety i.e. VTM)
 - brand name (trade family i.e. TF)
 - route of administration

- form
- strength
- Further information (e.g. Unit dose form, Delivery device, 'Freeness' including CFC-free and sugar-free) is held in coded form within VMP or AMP data. However, the corresponding atomic concepts for use within a VTM- or TF-based prescription have not yet been included within SNOMED CT.

Therefore for the purposes of this guidance, these concepts are not used to differentiate VMPs and AMPs when mapping from prescriptions – i.e. VMPs and AMPs with identical VTM and coded Route but differing 'freeness', delivery device or unit dose form will be considered equivalent by this model.

Please note these examples were correct in 2007 and are therefore indicative and may change over time

Dose-Based Expression	Equivalent VMP Concepts	Equivalence Notes
Ezetimibe – dose 10mg – oral – once a day	Ezetimibe 10mg tablets	Only one concept for this moiety and route combination.
Pholcodine – 10mg/5ml – oral solution - dose 10mg – oral – every 6 hours	Pholcodine 10mg/5ml linctus strong <i>or</i> Pholcodine 10mg/5ml linctus strong sugar free	Product containing sugar and sugar free variant equivalent.
Salbutamol - 100micrograms/dose – Dry powder inhaler – dose: 1 puff as required	Salbutamol 100micrograms/dose dry powder inhaler <i>or</i> Salbutamol 100micrograms/dose dry powder inhalation cartridge <i>or</i> Salbutamol 100micrograms/dose dry powder inhalation cartridge with device	Products with or without delivery devices equivalent.
Sodium chloride – 0.9% – infusion – dose: 100mL per hour – IV – for 8 hours	Sodium chloride 0.9% infusion 100ml bags <i>or</i> Sodium chloride 0.9% infusion 150ml bags <i>or</i> Sodium chloride 0.9% infusion 1litre bags <i>or</i> Sodium chloride 0.9% infusion	Products with differing sizes of container equivalent.

	250ml bags <i>or</i> Sodium chloride 0.9% infusion 2litre bags <i>or</i> Sodium chloride 0.9% infusion 500ml bags <i>or</i> Sodium chloride 0.9% infusion 50ml bags	
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4 The prescribing process

The aim of this document is for hospital-based electronic prescribing systems to be able to enforce a minimum level of safe, effective prescribing for all types of medicine. To achieve this, correct use must be made of the Rules and Types within this document, and the clinical content (i.e. dm+d and Marked Modifiers).

The secondary care prescribing process shown below is an illustration of a theoretical prescribing workflow using the Rules, Types, dm+d, SNOMED CT and the Marked Modifiers. It is not intended to be a suggestion or replacement for technical system design. The model does not currently cover certain specialist cases for prescribing, for example, extemporaneous preparations.

As noted in the section above, the model makes use of the dm+d structure to obtain and aggregate information about the available VMPs based on the selection of VTM (and ideally Route) made initially by the prescriber. This information, together with the VTM and Route, is used to apply the Rules and to assign the prescription to a Medication Type. Marked Modifiers are used for Rules 7-10.

The process depicted here follows three key steps:

- **Step 1:** Identify drug name or Trade Family together with route of administration
 - Please note that this illustrates one option for the dose-based prescribing process. Other flows, such as drug name plus form (often implying route) as a starting combination would also be acceptable provided the final outcome is equivalent.
- **Step 2:** Review rules for specific drugs by applying rules 1-10 and route/form types assignment with rule 0. This step results in the minimum safe level of specificity for the prescription.
- **Step 3:** Select a type and review usage criteria to select a sub-type if necessary.

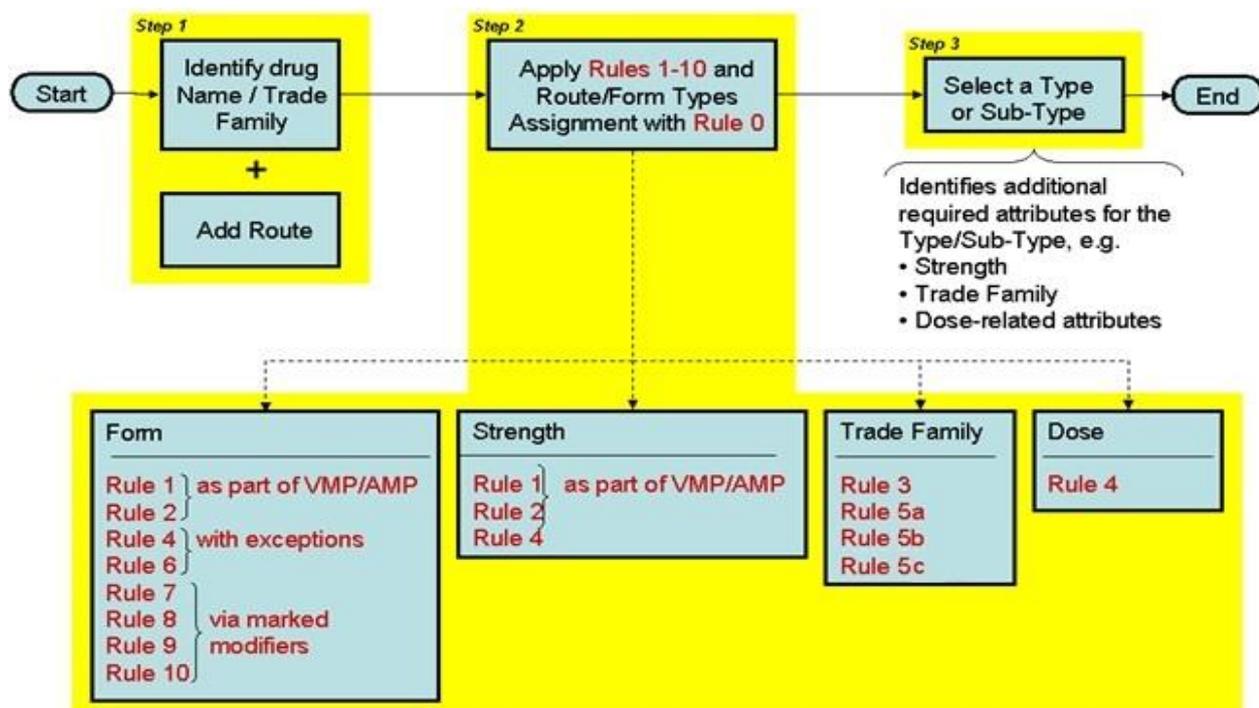


Figure 7 - Theoretical prescribing process using the Prescribing Model Types and Rules

NOTE:

The rules for specific drugs almost always require additional information, over and above the requirements given for the Medication Type. It should also be noted that these rules can act simultaneously, i.e. more than one rule may apply in any given situation. In these cases, all requirements within each of the applicable rules **MUST** be complied with.

4.1 Step 1: Specify the drug and route of administration

The identification of the drug name may be via its generic name, via a known brand name, a generic product name or an actual product name. As such, the system's medication picking list could comprise of three types of dm+d concept and one SNOMED CT concept;

1. Generic Drug Name \equiv Virtual Therapeutic Moiety (VTM) name \rightarrow from the dm+d
2. Brand Name \equiv Trade Family (TF) preferred term \rightarrow from the SNOMED CT UK Drug Extension
3. Generic Product Name \equiv Virtual Medicinal Product (VMP) name \rightarrow from the dm+d
4. Actual Product Name \equiv Actual Medicinal Product (AMP) description \rightarrow from the dm+d

A picking list containing all valid, available and prescribable items from these four concepts would probably be unwieldy and unacceptable to the user. The implementation guidance **does not** dictate which concepts should or should not be included within a prescribing picking list but does provide guidance on working with each of the four prescribable concepts.

4.1.1 Virtual Therapeutic Moiety (VTM)

Where required within prescribing picking lists, all VTM concepts should be included except where the following applies;

- VTM concepts flagged as invalid
- VTM concepts where all related VMPs are flagged as unavailable, e.g. 'Rofecoxib'.
 - For tasks other than prescribing, e.g. recording medication history, these restrictions may not be appropriate.

4.1.2 Trade Family (TF)

Normal practice within secondary care is to prescribe generically and not by brand. However it is hard to rule out rare occasions where brand-based prescribing may be necessary.

Therefore where required within prescribing picking lists, all TF concepts should be included except where the following applies;

- TF concepts with a status of inactive within SNOMED CT
- TF concepts where all related AMPs are flagged as unavailable.

Trade Family concepts as identified within rules 3, 5a, 5b & 5c will be needed to ensure safety during generic dose-based prescribing.

For the purposes of selecting a Trade Family concept, the Trade Family Group (see Section 7.3) concepts do not need to be considered. However implementers may choose to use the Trade Family Group concepts as navigational concepts within the user interface.

4.1.3 Virtual Medicinal Product (VMP)

Dose-based prescribing is normal practice within secondary care. Therefore VMPs only need to be selected in a limited number of circumstances. The assumption is that prescribing systems are capable of constructing a dose-based prescription equivalent to a VMP without using the VMP term code or VMP term description. However dose-based prescribing relies on using information available at VMP level including components of the term description for which the dm+d parsed files support implementation.

Where required within prescribing picking lists, all VMP concepts should be included except where the following applies;

- VMP concepts flagged as invalid
- VMP concepts with None-Availability Ind flag of 'Actual Products not Available'

Some VMPs are flagged as not prescribable (Never Valid To Prescribe as a VMP) or not recommended to prescribe (because brands are not bioequivalent or patient training is required) within the dm+d however these still may need to be visible in prescribing picking lists to allow related AMP or TF concepts to be 'findable'.

Within a generic dose-based system, prescribing by VTM is the norm. However there are a number of VMPs that do not have a 'parent' VTM (see the dm+d Editorial Policy for allocation of VTMs), but which still need to be prescribable, for example the VMP 'Vitamin B compound strong tablets'. System designers will need to devise methods for allowing these VMPs to be 'findable' without causing confusion that may result from a mixed VTM and VMP picking list.

4.1.4 Actual Medicinal Product (AMP)

Prescribing by AMP in secondary care is generally not recommended, and only in rare circumstances is mandated by the prescribing rules. However it may be desirable in some circumstances, e.g. patient preference or product-based prescribing systems.

The reason why it is not recommended is because the full AMP description includes the supplier's name, e.g. 'Nifedipress MR 10 tablets (Teva UK Ltd)', and this is not appropriate within hospital-based medications management.

AMPs are flagged with availability restriction code which includes whether products are 'special orders'. Where all AMPs for a specific VMP have availability restrictions then consideration needs to be made locally (e.g. according to formulary status) as to whether to include the parent VMP and their coded attributes within the system.

- Some Trusts may have some 'special order' products available, whilst it is unlikely that Trusts will have all 'special order' products available.

4.1.5 Route (of administration)

Previously published implementation guidance suggested using routes defined within SNOMED CT as the dm+d routes were insufficiently granular to support prescribing. This was true at the time but since then more routes have been added where required. The assumption is the set of routes now available within dm+d are sufficient for secondary care prescribing.

Only **licensed** routes are identified within the dm+d for licensed products. Any selection of unlicensed routes must be implemented locally.

Within the dm+d, licensed route is specified at the AMP concept level, therefore through the relationships up to the VMP parent and VTM grandparent, the licensed routes for a VTM drug can be identified and one selected by the user. It is the routes derived at the VMP level that are used for the form/route mapping used within the prescribing model.

Some routes derived at the VMP are coded as 'Route of administration not applicable' (id: 3594011000001102). In the majority of cases these items should not be prescribable as they are herbal products or not intended for direct patient administration. However all VMPs of form 'cement' and some with the form of 'implant' do need to be prescribable. In these cases system designers should take measures to present appropriate choices for route within the user interface, based on coded SNOMED CT routes from the 'ePrescribing Routes' SNOMED CT subset³, and to avoid the words 'Route of administration not applicable' being visible.

There are also a subset of products that do not have a route or form defined that may be required to be prescribed as medicines e.g. Sodium hyaluronate 0.1% / Dexpanthenol 2% eye drops preservative free. There is work ongoing to add these attributes to the affected terms; however in the meantime suppliers should ensure that they have identified any such products and included them where required.

If the degree of granularity of route defined within the dm+d is not sufficient for local needs then more granular routes can be defined locally during implementation. Locally defined routes must be mapped to VMPs so that other implementation rules can be followed and so the prescribing model presented here can be followed.

Some ePrescribing systems allow alternative or discretionary routes to be specified within a single prescription. As far as this model is concerned, this is acceptable provided the minimum data attributes have been fully specified for each drug + route combination.

4.1.6 Form

The processing and rules defined within Step 2 of this process will sometimes result in the selection of the drug formulation, or form. Refer to Section 6.1 for additional guidance with the qualification of form.

³ The reference sets provided in the UK RF2 release are semantically equivalent to the respective subset in RF1. Therefore information within this document relevant to the subsets is also applicable to the reference sets provided in RF2. For consistency the term subset is used throughout unless the information is specific to RF2 when reference set will be used.

4.2 Step 2: Review rules for specific drugs

The rules for specific drugs are designed to ensure that individual medicines are prescribed safely, as described above. Rules 7-10 use Marked Modifier data which is published as part of the SNOMED CT UK Drug Extension bonus file sub-pack, see section 7.3.

NOTE: Specifying a Trade Family or a branded product is not necessary for the 'minimum requirement' unless noted otherwise in the Rules listed below, or in the accompanying spreadsheet. This should not rule out the possibility that the prescriber, using their own judgement, may wish additionally to specify a Trade Family or branded product, over and above the 'minimum requirement'. If prescribing by Trade Family, the rules below still apply to the equivalent branded concepts within dm+d.

4.2.1 Summary list of Rules

Rule	Description	Notes	Implementation Technique
0	Handling ambiguous type mapping	This rule covers the cases where the system doesn't know enough information to map precisely to a Medication Type. Rather than ask for further unnecessary information, this rule allows the prescribing process to proceed by providing logic to handle the ambiguity, thereby allowing the full flexibility of dose-based prescribing where it is safe to do so.	System logic
1	Multiple active ingredient drugs described with a '+' in their VTM name	This rule aids safe prescribing of those multiple active ingredient drugs which are described using the name of each ingredient within dm+d.	Concepts identified via a SNOMED CT UK Drug Extension subset
2	Virtual products with no top-level drug family (i.e. VTM)	This rule tells electronic prescribing systems how to cope with items which have no VTM.	Concepts identified via a SNOMED CT UK Drug Extension subset
3	Products identified as Never valid to prescribe as a VMP	This rule aids brand-only prescribing for items with unsuitable generic names.	Concepts identified via a SNOMED CT UK Drug Extension subset
4	Co-name drugs	This rule aids safe prescribing of 'co-'drugs.	Concepts identified via a SNOMED CT UK Drug Extension subset
5a	Products not recommended for generic prescribing due to non-equivalence	This rule aids safe prescribing of drugs with branded products which have been deemed not-bioequivalent.	Concepts identified via a SNOMED CT UK Drug Extension subset
5b	Products not recommended for generic prescribing due to patient training requirements	This rule aids safe prescribing of drugs with branded products which have been deemed to have differing patient training requirements.	Concepts identified via a SNOMED CT UK Drug Extension subset

Rule	Description	Notes	Implementation Technique
5c	Products not recommended for generic prescribing due to no product specification	This rule covers products which are registered as devices where there is an approved generic name but no specification. Where there is no specification it cannot be assumed that devices prescribed by a non-proprietary name will be equivalent.	Concepts identified via a SNOMED CT UK Drug Extension subset
6	Controlled drugs	This rule covers prescribing (NB not supply or pharmacy) requirements for Controlled Drugs.	Concepts identified via a SNOMED CT UK Drug Extension subset
7	Injection or infusion	This rule requires, in certain circumstances, a prescriber to choose whether a drug should be delivered using an injection or an infusion method.	Concepts identified via form-route combinations from SNOMED CT UK Drug Extension bonus file
8	Inhaled dose forms	This rule requires prescribers to choose a device type (where appropriate) for drugs delivered by inhalation.	Concepts identified via form-route combinations from SNOMED CT UK Drug Extension bonus file + Concepts identified via three SNOMED CT UK Drug Extension subsets
9	Medicines available in forms with differing release characteristics	This rule requires prescribers to choose between different release characteristics (e.g. 'modified-release'), where they are available for the selected drug.	Concepts identified via form-route combinations from SNOMED CT UK Drug Extension bonus file + 12/24 hour modified release concepts identified via SNOMED CT UK Drug Extension subsets
10	Medicines available in a variety of 'topical' forms	This rule helps create appropriate prescriptions for drugs which can be delivered using a variety of forms in a 'topical' manner.	Concepts identified via form-route combinations from SNOMED CT UK Drug Extension bonus file

To assist implementation, SNOMED CT UK Drug Extension subsets have been created to identify concepts that apply for rules 1-6, 8 & 9. Concepts that apply to rules 7 and 10 are identified by specific form-route combinations. Therefore the process for reviewing rules for specific drugs is as follows;

1. Identify the type of concept selected as part of Step 1 above. This will be either a VTM, VMP, AMP or TF concept.

2. If an AMP concept is selected, derive the parent VMP concept.
3. If a TF concept is selected, derive the related VMP concepts. Note there could be multiple derived VMP concepts for different strengths or formulations of the brand name.
4. Look-up the resulting VTM or VMP concepts within the SNOMED CT UK Drug Extension subsets for rules 1-6, 8 & 9.
5. See if rules 7 or 10 apply based on form-route combinations.
6. Apply the associated rules (defined below) for each that applies.

This process is illustrated below.

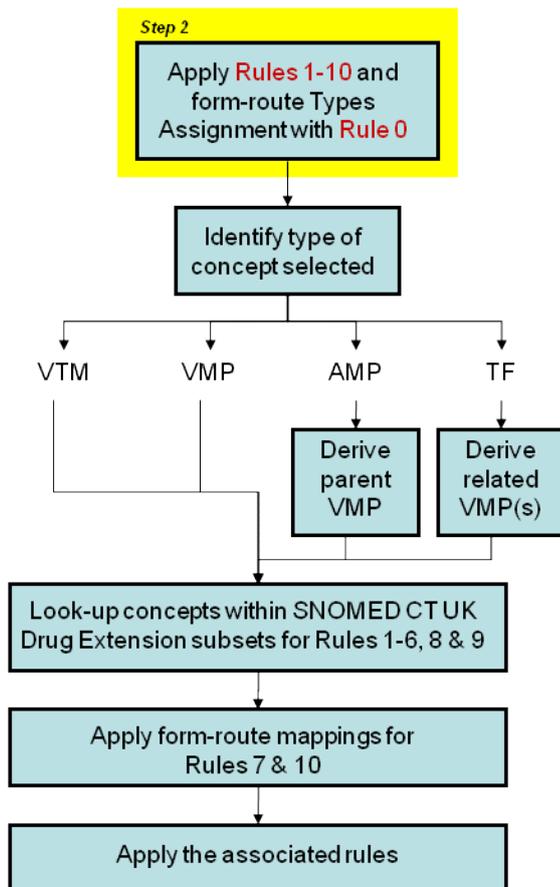


Figure 8 – Apply rules for specific drugs

4.2.2 Rule 0 – Handling ambiguous type mapping

Description & examples

- This rule covers the cases where the system doesn't know enough information to map precisely to a Medication Type.
- Rather than ask for further unnecessary information, this rule allows the prescribing process to proceed by providing logic to handle the ambiguity, thereby allowing the full flexibility of dose-based prescribing where it is safe to do so.
- It should be applied once Rules 1-10 below have been considered and their effects applied to the prescribing process.

Rules

1. Where the mapping to a Medication Type is ambiguous (based on VTM + Route), once the other rules have been applied (i.e. Rules 1-10 below), allow prescribing at the most generic level available within the set of possible mapped types
 - a. 'The most generic level available' is defined as follows:
 - i. Require only the following mandatory fields, unless one of the conditions below is also true:
 1. Drug name
 2. Route
 3. Dose quantity (or dose quantity rate if allowed by the possible medication types)
 4. Frequency
 5. Start
 - ii. If all the possible medication types contain one or more fields in addition to those listed above, then require those fields as mandatory also.
 - iii. If all the possible medication types do not allow dose quantity, then disallow it and follow the requirements for the possible medication types instead.
 - b. See worked example (Section 5 below) for more details

Implementation Technique

- This rule should be implemented as system logic.

Rationale

- This rule enables current secondary-care practice to be maintained, where it is safe and practicable to do so.

4.2.3 Rule 1 – Multiple active ingredient drugs described with a '+' in their VTM name

Description & examples

- This rule only applies to VTMs with a '+' in their name
- These drugs are described in the form 'drugname1 + drugname2 etc.'
 - e.g. 'fluticasone + salmeterol'
- They may contain either two or more active substances
- This rule covers approximately 22% of the VTMs in dm+d

Rules

1. At a minimum, these drugs MUST be prescribed at a level of detail equivalent to a virtual product (i.e. equivalent to selecting a VMP from dm+d), so that:
 - a. The dose form must be specified
 - b. The strength of each substance, where available, MUST be specified / displayed adjacent to the substance name
2. The dose MUST be expressed as a single unit/dose quantity of the resulting product form.

Implementation Technique

Apply this rule if the chosen concept(s) exist in the SNOMED CT subset 'ePrescribing multi-ingredient rule 1'.

Rationale

This rule manages products that have multiple ingredients that are commonly described using the generic components e.g. combination inhalers.

The presence of this rule will help ensure that complete descriptions are specified by the prescriber, reducing the risk of incorrect interpretation or product selection later in the workflow.

4.2.4 Rule 2 – Virtual products with no top-level drug family (i.e. VTM)

Description & examples

- In dm+d terms, these are virtual products (VMPs) with no VTM
 - e.g. ‘vitamin B compound strong tablets’
 - e.g. ‘oxygen’
 - Note that within dm+d single ingredient medical gases, available in what is for clinical purposes assumed to be pure gas, do not have VTMs, because the VMP name would be identical to the VTM, were it to exist.
- This rule covers approximately 2500 VMPs within dm+d, of which 50-60% are medicines.
 - See also comments for Rule 3, below – as for many VMPs without a VTM, Rule 3 will also apply.

Rules

1. At a minimum, these drugs **MUST** be prescribed by specifying a virtual product (i.e. equivalent to selecting a VMP from dm+d), unless one of the other rules forces prescribing at AMP level, so that:
 - a. The dose form must be specified
 - b. The strength of each substance, where available, **MUST** be specified / displayed adjacent to the substance name
2. The dose **MUST** be expressed as a number of unit doses, or a dose quantity of the resulting product form.

Implementation Technique

Apply this rule if the chosen concept(s) exist in the SNOMED CT subset ‘ePrescribing no VTM rule 2’.

Rationale

This rule manages products that typically contain a number of ingredients and either do not have nationally agreed standard names or cannot be described accurately using a single therapeutic moiety. The presence of this rule will help correct product selection and interpretation.

4.2.5 Rule 3 – Products identified as never valid for generic prescribing

Description & examples

- These drugs are currently flagged ‘Never valid to prescribe as a VMP’ within dm+d
This rule covers approx 2000 VMPs
 - Roughly 55% of these are medicines and foodstuffs; the majority of these have a description prefixed by the word ‘Generic’
 - The majority of these items (including all prefixed with the word ‘Generic’) will also be covered by Rule 2, i.e. they will have no VTM.
 - Additionally, many of these items will not have a Trade Family – this means that the only way to prescribe them is at AMP level.

Rules

1. The virtual products (i.e. VMPs) flagged in this way **MUST NOT** be prescribable.
2. Any dose-based prescription which could possibly match a flagged product (i.e. by using a combination of VTM (if available) and Route plus possibly Strength and Form) **MUST** be prescribed by specifying a brand which will be displayed in place of the generic drug name.
 - a. This can be achieved either by selecting an actual branded product (i.e. AMP within dm+d) or by selecting a Trade Family, if available for the selected VMP, and then following the rules for the appropriate Medication Type.
 - i. e.g. ‘generic abidec multi-vitamin drops’ **MUST NOT** be prescribed.
 - ii. Please note that for some Types, the use of an AMP will exceed the minimum data specification required, as it includes Strength. This is perfectly acceptable.
3. Wherever practicable to do so, this rule **SHOULD** be applied after any of the other rules, and the requirements for the Medication Types – this is to ensure that wherever possible, the prescriber is not required to specify a brand unless it is clinically necessary to do so.

Implementation Technique

- Apply this rule if the chosen concept(s) exist in the SNOMED CT subset ‘ePrescribing Never valid to prescribe as a VMP rule 3’.

Rationale

- This rule manages products that can only be prescribed by brand – because there is no equivalent acceptable generic description
 - a. either there are more than two active ingredients;
 - b. or there is no agreed co-name;
 - c. or the generic name is ambiguous;
 - d. or there is no approved generic name.
- The presence of this rule will help reduce the likelihood of confusion between products with multiple contents and/or complex unusual ingredients.

4.2.6 Rule 4 - Co-name drugs

Description & examples

- Applies to approx. 24 multi-ingredient VTM's within dm+d, which have nationally-agreed 'Co-' names.

Rules

1. When prescribing 'co-name' drugs using the generic drug family name (VTM):
 - a. The dose form **MUST** always be specified by the prescriber, except where the specification of form would otherwise be covered by Rule 7 only, in which case the resulting 'Marked Modifier' concept will suffice.
 - i. e.g. For the following example, the concept 'injection' suffices and there is no need to include the exact coded form from dm+d (in this case 'solution for injection')
 1. **co-trimoxazole** – 80 mg and 400 mg – intravenous injection – DOSE **960 mg** – twice a day
 - b. A strength **MUST** be specified for each active ingredient (i.e. '80 mg and 400 mg')
2. For solid oral dose forms, the dose **MUST** be expressed as a unit dose of the specified product form
 - i. e.g. **co-trimoxazole** – 80 mg and 400 mg – tablets – oral – DOSE **two tablets** – twice a day
3. For liquid or gelatinous oral dose forms, the dose **MUST** be expressed as a volume of the specified product strength
 - i. e.g. **co-trimoxazole** – 80 mg and 400 mg in 5 mL – oral suspension – oral – DOSE **10 mL** – twice a day
4. For injectable dose forms, the dose **MUST** be expressed as the total mass of the combined ingredients
 - i. e.g. **co-trimoxazole** – 80 mg and 400 mg – intravenous injection – DOSE **960 mg** – twice a day

Implementation Technique

- Apply this rule if the chosen concept(s) exist in the SNOMED CT subset 'ePrescribing co-name drugs rule 4'.

Rationale

- This rule manages medicines that have nationally defined and agreed standard 'co-' names as outlined within the BP / BNF.
- The presence of this rule will help ensure that Co-name drugs which are available as products with varying strength ratios can be clearly identified and are not mistakenly interchanged.
 1. e.g. Co-amoxiclav is available in the following varying strength ratios:
 - 125 mg and 31 mg (ratio = approx. 4)
 - 250 mg and 125 mg (ratio = 2)
 - 400 mg and 57 mg (ratio = approx. 7)
 - 500 mg and 100 mg (ration = 5)

2. In many cases, only one strength ratio will be available. In these cases, electronic prescribing systems should enter this by default, requiring no further input from the prescriber.

4.2.7 Rule 5a - Products not recommended for generic prescribing due to non equivalence

NOTE:

A version of dm+d incorporating this prescribing status flag went live on Monday 8th December 2008.

Description & examples

- These drugs will be flagged “VMP not recommended to prescribe - brands not bioequivalent” within dm+d
 - These are products where the branded products of specific dose forms cannot be considered bio-equivalent e.g. nifedipine and diltiazem modified-release oral preparations

Rules

1. The virtual products (i.e. VMPs) flagged in this way MUST NOT be prescribable.
2. Any dose-based prescription which could possibly match a flagged product (i.e. by using a combination of VTM and Route plus possibly Strength and Form) MUST be prescribed by specifying a brand in addition to the drug family name.
 - a. This can be achieved either by selecting an actual branded product (i.e. AMP within dm+d) or by selecting a Trade Family, and then following the rules for the appropriate Medication Type.
3. Wherever practicable to do so, this rule SHOULD be applied after any of the other rules, and the requirements for the Medication Types – this is to ensure that wherever possible, the prescriber is not required to specify a brand unless it is clinically necessary to do so.
 - a. e.g. the following Nifedipine products are flagged:
 - i. Nifedipine 10mg modified-release tablets
 - ii. Nifedipine 20mg modified-release tablets
 - iii. Nifedipine 30mg modified-release capsules
 - iv. Nifedipine 30mg modified-release tablets
 - v. Nifedipine 40mg modified-release tablets
 - vi. Nifedipine 60mg modified-release tablets
 - b. For a dose-based prescription for Nifedipine via the Oral route, by first applying Rule 9 and the appropriate Medication Type (subject to Rule 0), it will be possible to determine if modified-release characteristics are to be chosen. If they are, then this rule will also require that a Brand be specified (even though not all the matching VMPs are flagged as “Not recommended to prescribe”). If modified-release characteristics are not chosen, then no brand will be required.

Implementation Technique

- Apply this rule if the chosen concept(s) exist in the SNOMED CT subset “ePrescribing not recommended to prescribe as VMP bio-availability rule 5a”.

Rationale

- This rule manages products where brands of specific dose forms cannot be considered bioequivalent e.g. nifedipine and diltiazem modified release oral preparations.
- The presence of this rule will help ensure that these products are not mistakenly interchanged, while still allowing dose-based prescribing where it is safe to do so.

4.2.8 Rule 5b – Products not recommended for generic prescribing due to patient training requirements

NOTE:

A version of dm+d incorporating this prescribing status flag went live on Monday 8th December 2008.

Description & examples

- These drugs will be flagged “VMP not recommended to prescribe - patient training required” within dm+d
 - These are products where the branded unit dose forms differ sufficiently to require patient training to use effectively.

Rules

1. The virtual products (i.e. VMPs) flagged in this way MUST NOT be prescribable.
 - a. Note that these items almost always include a unit dose form (e.g. “pre-filled disposable device”)
 - b. e.g. the VMP “Insulin aspart 100units/ml solution for injection 3ml pre-filled disposable devices” is not prescribable.
2. Any dose-based prescription which exactly matches a flagged product (i.e. either because all matching VMPs are flagged, or by using a combination of “VTM + form + unit dose form”) MUST be prescribed by specifying a brand in addition to the drug family name.
 - a. Please note that it is not mandatory for the prescriber to select a unit dose form as part of a dose-based prescription. Therefore this rule only applies if a prescriber chooses of his/her own volition to be more specific than the minimum requirement, or if all available VMPs are flagged.
 - b. This can be achieved either by selecting an actual branded product (i.e. AMP within dm+d) or by selecting a Trade Family, and then following the rules for the appropriate Medication Type.
3. However, please note that, unless all available VMPs are flagged, a prescription using a matching combination of “VTM + form” MUST be prescribable, because the prescription could be administered without using a flagged product.
 - a. e.g. “**insulin aspart** - dose 14 units – subcutaneous injection – as required” is prescribable, because the unit dose form has not been specified and this could match to an unflagged VMP.
4. Wherever practicable to do so, this rule SHOULD be applied after any of the other rules, and the requirements for the Medication Types – this is to ensure that wherever possible, the prescriber is not required to specify a brand unless it is clinically necessary to do so.

Implementation Technique

- Apply this rule if the chosen concept(s) exist in the SNOMED CT subset “ePrescribing not recommended to prescribe as VMP patient training rule 5b”.

Rationale

- This rule manages products where a degree of patient training is required to use a unit dose form or device. It is deliberately considerably less restrictive than Rule 5a, and only comes into operation if a prescriber opts to specify a unit dose form within a dose-based prescription, or if all available VMPs are flagged. This acknowledges the fact that patient training and device selection issues are better managed by nurses and pharmacists, and are not typically the domain of independent prescribers.
- The presence of this rule will help ensure that flagged products are not mistakenly prescribed, while still allowing dose-based prescribing where it is safe to do so.

4.2.9 Rule 5c - Products not recommended for generic prescribing due to no published specification

NOTE:

A version of dm+d incorporating this prescribing status flag went live on 22nd June 2015

Description and examples

- These products will be flagged “VMP not recommended to prescribe – no published specification”
 - Most appliances/medical devices do not have a VMP name that is an approved generic name. However some VMPs registered as devices do use an approved name; for example Sodium chloride 5% eye drops.
 - Where appliances/medical devices have an official title i.e. a Drug Tariff specification or official standard specified by an EP, BP, BPC monograph or relevant British, European or International Standards, the associated VMPs are valid prescribable concepts.
 - Where there is no specification it cannot be assumed that such products prescribed by a non-proprietary name will be equivalent and therefore the flag is set and these products should not be prescribed at VMP e.g. Liquid paraffin 11% cream.

Rules

1. The virtual products (i.e. VMPs) flagged in this way MUST NOT be prescribable.
2. Any dose-based prescription which could possibly match a flagged product (i.e. by using a combination of VTM and Route plus possibly Strength and Form) MUST be prescribed by specifying a brand.
 - a. This can be achieved either by selecting an actual branded product (i.e. AMP within dm+d) or by selecting a Trade Family, and then following the rules for the appropriate Medication Type.
 - b. This rule should be applied after any of the other rules, and the requirements for the Medication Types – this is to ensure that wherever possible, the prescriber is not required to specify a brand unless it is clinically necessary to do so.

The following list provides examples of VMPs that are flagged not for prescribing at VMP:

- i. Carmellose gelatin paste
- ii. Cyclomethicone 50% / Isopropyl myristate 50% solution
- iii. Liquid paraffin 11% cream
- iv. Liquid paraffin light 85.09% bath oil
- v. White soft paraffin 13.2% / Liquid paraffin light 10.5% cream
- vi. White soft paraffin 14.5% / Liquid paraffin 12.6% cream

- vii. White soft paraffin 30% / Liquid paraffin 40% ointment
- viii. White soft paraffin 35% / Liquid paraffin light 45% ointment
- ix. White soft paraffin 5% lotion

Implementation Technique

- Apply this rule if the chosen concept(s) exist in the SNOMED CT subset “ePrescribing not recommended to prescribe as VMP no published specification rule 5c”.

Rationale

- This rule manages products where the approved name has no specification due to the way the product has been registered (as a device rather than a medicine).
- The presence of this rule will help ensure that the intended product is prescribed as it cannot be assumed that available brands are equivalent.

4.2.10 Rule 6 – Controlled drugs

Description & examples

- These drugs and products are those covered by the Schedules 1, 2 and 3 of the Misuse of Drugs Regulations 2001. At the time of writing (2007), this covers just over 500 VMPs, corresponding to 37 VTMs.
- The rules below cover inpatient prescribing only. As noted below, further restrictions and requirements may apply over and above these rules in other settings.

Rules

1. The dose form **MUST** always be specified by the prescriber.
 - a. Except where the specification of form would otherwise be covered by Rules 7-10 below, in which case the resulting 'Marked Modifier' concept will suffice.
2. Wherever practicable to do so, this rule **SHOULD** be applied after any of the other rules, and the requirements for the Medication Types – this is to ensure that wherever possible, the prescriber is not required to specify an exact dose form when a 'Marked Modifier' concept would suffice.
3. Any requirement upon prescribing and pharmacy made by the UK Controlled Drug legislation **MUST** be considered as being in addition to any rules/requirements specified here.

Implementation Technique

- Apply this rule if the chosen concept(s) exist in the SNOMED CT subset 'ePrescribing schedule 1 to 3 rule 6'.

Rationale

- This rule manages products that are contained within Schedules 1, 2 & 3 of the Misuse of Drugs Regulations 2001. For further details see <http://www.evidence.nhs.uk/formulary/bnf/current/guidance-on-prescribing/controlled-drugs-and-drug-dependence>
- The presence of this rule will help ensure that the prescription requirements to support good practice guidance and in particular record keeping are met
- Please note that the additional legal requirements for supply to be made on discharge or when prescribing for outpatients must be complied with, in addition to the rules for the basic content of a prescription found within this document.

4.2.11 Rule 7 – Injection or infusion?

Description & examples

- This rule requires, in certain circumstances, a prescriber to choose whether a drug should be delivered using an injection or an infusion method, thereby helping systems aid prescribers in correctly specifying the (safety-critical and potentially error-prone) details of injected and infused drugs.

Rules

1. For certain Form-Route combinations the prescriber **MUST** specify the method of administration, i.e. 'Injection' or 'Infusion'
 - a. The 'Marked Modifier' data will provide systems with the list of Form-Route combinations which will trigger this rule.
 - b. The display text for these options will also be taken from the 'Marked Modifier' concepts, not from dm+d.

Implementation Technique

- Apply this rule if the form-route combination for the chosen concept(s) apply for rule 7 as defined within the SNOMED CT UK Drug Extension bonus file 'UKTC_SNOMED_CT_Marked_Modifiers_yyyymmdd.xml'. If no form has been selected apply the rule based on route information.
- There may be cases where, when using dm+d content alone, a choice between injection or infusion might be presented inappropriately because information on method of administration is not held routinely for all products within the dm+d. Therefore decision support must be available in local systems to restrict the choices available to those which are clinically appropriate for the drug selected.

Rationale

- For medicines to be given by infusion, it is not possible for an ePrescribing system to deduce the prescriber's intent from the drug and the route of administration alone – i.e. that the prescriber intends the medicine to be infused.
 - This is because many medicinal products are suitable, depending on how they are used or combined with other products, for both injection and infusion.
- Therefore this rule defines a set of situations in which the ePrescribing system needs to ask the prescriber to specify their intent, i.e. to inject or infuse the medicine.

4.2.12 Rule 8 – Inhaled dose forms

Description & examples

- This rule covers the commonly-used inhaled dose forms: powder, aerosol and nebulised liquids.
- In recent versions of dm+d, this rule covers:
 - Approx. 69 VMPs with the coded form 'inhalation powder'
 - Approx. 58 VMPs with the coded form 'pressurised inhalation'
 - Approx. 24 VMPs with the coded form 'nebuliser liquid'
 - Approx. 7 VMPs with the coded form 'powder for solution for injection' which are coded for the inhalation route and used as nebuliser liquids
 - e.g. 'Colistimethate 1 million unit powder for solution for injection vials'
 - These VMPs in total correspond to approximately 33 VTMs

Rules

1. For powder, aerosol and nebulised preparations via the inhalation route, the distinction between 'Inhaler' and 'Nebuliser' MUST be specified by the prescriber
 - a. The 'Marked Modifier' data will provide systems with the list of Form-Route combinations which will trigger this rule.
 - b. The display text for these options will be taken from the 'Marked Modifier' concepts, not from dm+d.
2. If the prescriber chooses 'Inhaler', then the prescriber MUST be required to make a further choice between 'Dry powder inhaler', 'Metered-dose inhaler' and 'Breath-actuated inhaler'.
 - a. These concepts are available within the UK extension of SNOMED CT since April 2009.
 - b. The preferred term for the chosen concept MUST be used for display, e.g. 'Breath-actuated inhaler'.
 - c. Lists of VMPs mapping to the metered-dose inhaler and breath-actuated inhaler concepts will be published and maintained as three SNOMED CT subsets by the HSCIC alongside this Prescribing Model, as these items cannot be identified by using dm+d coded information. The subsets are named as follows;
 - i. drypowderinhalermarker
 - ii. metereddoseinhalermarker
 - iii. breathactuatedinhalermarker.

Implementation Technique

- Apply this rule if the form-route combination for the chosen concept(s) apply for rule 8 as defined within the file 'UKTC_SNOMED_CT_Marked_Modifiers_yyyymmdd.xml' published within the NHS_SNOMED sub-pack. If no form has been selected apply the rule based on route information.

Rationale

- Appropriate dose quantities for inhaled drugs may vary by as much as 500% for the same drug depending on the dose form. The largest variations are where drugs could be administered by nebulisers or by inhaler devices, therefore this distinction is mandatory. Variations in dose do exist between different inhaler devices, but are smaller in relative magnitude. However, more important is the fact that some prescribers may not yet have the training necessary to make the more detailed distinctions between dry-powder and aerosol inhalers. This is the main reason for the further mandatory distinction between different types of inhaler device.
 - Feedback from clinicians and anecdotal evidence from existing electronic prescribing systems indicates that inexperienced prescribers, if faced with a choice beyond their capabilities, will tend to choose the first item on the list that they are presented with. The risk is that this may not be suitable for the patient. Additionally, by forcing the prescriber to make a choice between different types of inhaler device, there is also a risk to successful implementation because of rejection by clinicians.
 - The converse risk is that by allowing 'less specific' prescribing of inhaler devices, the onus is on pharmacists and nurses to work out what is best for the patient.
 - It is recommended that particular attention is given to this area during implementation of electronic prescribing systems, and additional measures beyond the scope of this document (e.g. local formulary restrictions, additional training) put in place to ensure optimum electronic prescribing of inhaler devices.

4.2.13 Rule 9 – Medicines available in forms with differing release characteristics

Description & examples

- Within dm+d, there are a significant number of VTMs which map to VMPs which have differing release characteristics, for the oral route. In the vast majority of cases, these have not been flagged as 'Not recommended to prescribe at VMP', because there are not proven bio-equivalence differences between the branded products mapped to individual VMPs.
 - e.g. diclofenac sodium, ibuprofen, morphine and many other commonly-prescribed drugs (available in modified-release and 'standard release' preparations)
- However, the dose and frequency for products with special release characteristics will often differ from those using the standard preparations.

Rules

1. Where the set of products defined by a 'VTM (or TF) + Route' combination contains items with different release characteristics, the release characteristic MUST be specified by the prescriber.
 - a. The 'Marked Modifier' data will provide systems with the list of Form-Route combinations which will trigger this rule.
 - i. Initially, these distinctions will only be necessary for the oral route.
 - b. At the time of writing (2007), the available release characteristic choices will be:
 - i. 'Gastro-resistant'
 - ii. 'Modified-release'
 - iii. '12-hour modified-release'
 - iv. '24-hour modified-release'
 - v. Null
 1. A null choice MUST be available (if 'normal' products are available for the selected 'VTM (or TF) + Route' combination).
 - c. These concepts will be available within the UK extension of SNOMED CT from April 2009.
 - d. The preferred term for the chosen concept MUST be used for display, e.g. 'Modified-release'.
 - e. Lists of VMPs mapping to the 12-hour and 24-hour modified-release concepts will be published and maintained by the HSCIC alongside this Prescribing Model, as these items cannot be identified by using dm+d coded information.

Implementation Technique

- Apply this rule if the form-route combination for the chosen concept(s) apply for rule 9 as defined within the SNOMED CT UK Drug Extension bonus file 'UKTC_SNOMED_CT_Marked_Modifiers_YYYYMMDD.xml'. If no form has been selected apply the rule based on route information. Products will be identified via the SNOMED CT UK Drug Extension subsets 'ePrescribing modified release 12 hour'⁴ and 'ePrescribing modified release 24hour'⁵

⁴ Filename: "xder1_SubsetMembers_Epmodifiedrelease12hour_GB1000001_YYYYMMDD.txt"

Rationale

- This rule covers the situation where there are products with varying release characteristics available for the selected 'VTM (or TF) + Route' combination. It ensures that the desired release characteristic is clearly specified by the prescriber as part of a dose-based prescription.
- This rule also helps to ensure that the prescriber clearly states that the dose specified must be administered using a product with specific release characteristics, at a frequency appropriate to those properties.
 - a. e.g. modified-release morphine: **morphine** – 12-hour modified release – dose 10mg – oral – twice a day
 - b. Any disconnect between the specified release characteristics and the frequency is immediately apparent (e.g. 24-hour modified release morphine given twice a day).
- The lists of VMPs for 12-hour and 24-hour modified release can also be used to aid correct product selection prior to administration, for both manual and bar-coded processes. This is particularly helpful as the product packaging for morphine modified-release products does not state the release duration.

⁵ Filename: "xder1_SubsetMembers_Epmodifiedrelease24hour_GB1000001_yyyymmdd.txt"

4.2.14 Rule 10 – Medicines available in a variety of ‘topical’ forms

Description & examples

- This rule covers those VTM's which are available in a variety of forms for any given route, where at least one of the available forms will map to the following Medication Types:
 - 3 – Inhalers & sprays
 - 4 – Eye / ear / nose liquids & powders
 - 5 – Topical liquids
 - 6 – Creams, ointments & gels
- These types require the dose to be specified differently by the prescriber in order for the intent to be fully understood at the time of administration.
 - For example, Gentamicin is available in both drops and ointment formulations, for the ocular route.
 - ‘Gentamicin + ocular + drops’ maps to Type 4 – Eye / ear / nose liquids & powders
 - Dose is specified as a number of drops or a volume of liquid
 - ‘Gentamicin + ocular + ointment’ maps to Type 6 – Creams, ointments & gels
 - Dose is specified as a method, e.g. ‘apply thinly’
 - Methods are listed in SNOMED CT UK Drug extension subset `xder1_SubsetMembers_Epresmthd_GB1000001_YYYYMMDD.txt`
 - For example, Diclofenac is available in both ointment and patch formulations, for the transdermal route.
 - ‘Diclofenac + transdermal + ointment’ maps to Type 6 – Creams, ointments & gels
 - Dose is specified as a method, e.g. ‘apply sparingly’
 - ‘Diclofenac + transdermal + transdermal patch’ maps to Type 12 – Topical patches
 - Dose is specified as a quantity-rate, and the duration that the patch will be applied for is also required.

Rules

1. For those situations where BOTH the ‘VTM (or TF) + Route’ combination contains products with the ‘Precise mapping required’ marker, AND a single Medication Type cannot be determined (because the available products could map into more than one Types), then the dose form MUST be specified by the prescriber
 - a. The source of this list of mappings will be from the ‘Marked Modifier’ data.
 - b. The display text for the chosen form will come from the dm+d coded form data (NB not from the ‘Marked Modifier’ data).

Implementation Technique

- Apply this rule if the routes for the chosen concept(s) apply for rule 10 as defined within the SNOMED CT UK Drug Extension bonus file 'UKTC_SNOMED_CT_Marked_Modifiers_yyyymmdd.xml'.

Rationale

- In these cases, the combination of drug and route of administration may not be enough to completely specify the nature of the medicine to be administered, and might also not enable an ePrescribing system to guide the prescriber to an appropriate specification of dose.
 - While these are not necessarily directly safety-critical choices, there is a strong practical requirement for specificity in this area.

4.3 Step 3: Select a type/sub-type to identify the safe minimum prescribing attributes

As a result of applying rules 1-10, prescribing attributes in addition to drug and route may have been defined. However depending on the type of medication prescribed, further prescribing attributes may now be required in order to result in a safe prescription.

This is achieved via the definition of 'Medication Types', mapped to form-route combinations, with each type having a minimum data specification. The Medication Types are listed below and detailed in full in the accompanying spreadsheet which is published as part of the SNOMED CT UK Drug Extension bonus sub-pack (see Section 7.3), which contains:

- A. The minimum data specification for each medication type and sub-type.
- B. A mapping table showing which dm+d form-route combinations map to which medication types.

The mapping table, unless noted otherwise below, provides the information required to map any given prescription into a medication type. Sometimes a Rule will be required to facilitate this process. Occasionally a medication sub-type is required, and the usage criteria for these are supplied within the main data specification.

- Some sub-types will be used based on the characteristics of the medicine being prescribed. Subsets will be published to aid system vendors in identifying these cases unambiguously.
- Some sub-types are also included as options, because they can be prescribed safely in more than one way. In these cases, it is up to the system to present appropriately-structured options to the prescriber so that the prescription ends up complying with one or other of the possible types.

NOTE:

A small number of routes MUST always be qualified with additional information (e.g. Site) by the prescriber – these are listed in the accompanying spreadsheet as a supplement to those types which list Site as mandatory.

4.3.1 List of medication types and their defining characteristics

ID	Type name	Defined by route & form?	Notes
1	Oral solids	Yes	
2	Oral liquids	Yes	
3	Inhalers & sprays	Yes	
4	Eye / ear / nose liquids & powders	Yes	
5	Topical liquids	Yes	
6	Creams, ointments & gels	Yes	
7	Enemas & rectal solutions	Yes	
8	Enteral feeds	No	Defined by the SNOMED CT UK Drug

ID	Type name	Defined by route & form?	Notes
			Extension subset with the name of 'enteralfeeds8'
9	Granules & powders	Yes	
10	Suppositories & pessaries	Yes	
11	Endotracheopulmonary	Yes	
12	Topical patches	Yes	
13	Nebuliser liquids	Yes	
14	Dressings	Not fully	Medicated plasters are identifiable by route and form. Other dressings are defined by the SNOMED CT UK Drug Extension subsets with names of 'dressings14a' and 'dressings14b' .
15	Implants & sticks	Yes	
16	Intra-uterine devices (IUDs)	Yes	
17	Cements	Yes	
18	<i>Homeopathic medicines</i>	N/A	<i>NB not currently planned for inclusion within this document</i>
19	<i>Prescriptions for dialysis solutions</i>	N/A	<i>NB currently a known omission for this document, to be included in future versions</i>
20	Injections	Not fully	The prescriber must specify 'Injection' or 'Infusion'
21	Insulin	No	Defined by the SNOMED CT UK Drug Extension subset with the name of 'insulin21' .
22	Infusions	Not fully	The prescriber must specify 'Injection' or 'Infusion'
23	Total parenteral nutrition (TPN)	No	Defined by the SNOMED CT UK Drug Extension subset with the name of 'tpn23'
24	Combination infusions	Not fully	The prescriber must specify 'Injection' or 'Infusion'
25	Gases	Yes	
26	<i>Blood products</i>	N/A	<i>NB currently a known omission for this document, to be included in future versions</i>
27	<i>Radio-pharmaceuticals</i>	N/A	<i>NB currently a known omission for this document, to be included in future versions</i>
28	Foams	Yes	
29	Instillation	Yes	

4.3.2 Medication Type mappings in XML format

To support implementation the relevant information contained within the spreadsheet is published by the HSCIC in XML format within the monthly SNOMED CT UK Drug Extension bonus file (see Section 7.3). An example extract from this XML document is provided below.

```
<medication_types>
  <medication_type type='1' name='Oral solids'>
    <form_route_pair>
      <route desc=' Buccal' code='54471007' />
      <form desc='Buccal tablet' code='385085006' />
    </form_route_pair>
    <form_route_pair>
      <route desc='Oral' code='26643006' />
      <form desc='Capsule' code='385049006' />
    </form_route_pair>
    ... etc ...
  </medication_type>
</medication_types>
```

Using the example given above, where route = 'Oral' and form = 'Capsule' then the Medication Type is 'Oral solids'.

Where both route and form have been specified, a single Medication Type will always apply. Where a form has not been required, as a result of Step 2 earlier in this process, then more than one Medication Type may apply based on the identification of route only.

The minimum data specification is not contained within the XML document. Instead implementers must use the published spreadsheet and configure the minimum data specifications within their own systems.

If more than one Medication Types applies then Rule 0, as defined in Step 2, must be applied.

The resulting minimum data specification, either from the single applicable Medication Type mapping, or as a result of Rule 0, must then be applied within the user interface to enforce selection of the minimum prescribing attributes.

4.3.2.1 Worked example A

1. User selects the VTM of 'Co-trimoxazole' with route of 'Oral'.
2. As this is a 'co'-named drug, rule 4 applies which requires qualification of form and strength. The user selects a form of 'Tablet' and strength of '80mg/400mg'.
3. The form-route combination of Tablet-Oral maps to type 1 'Oral solids'
4. The minimum data specification for 'Oral solids' is;
 - o Name
 - o Route

- Dose Quantity
 - Start Time
 - Frequency
5. This results in the minimum data specification for the prescription of;
- Name [Co-trimoxazole]
 - Form [Tablet]
 - Strength [80mg/400mg]
 - Route [Oral]
 - Dose Quantity [e.g. 1 tablet]
 - Start Time [e.g. Today at 08:00]
 - Frequency [e.g. Twice daily]

4.3.2.2 Worked example B

1. User selects the VTM of 'Paracetamol' with route of 'Oral'.
2. None of the Rules 1-10 apply. As the form has not been specified, this maps to both type 1 'Oral solids' and type 2a 'Oral liquids'.
3. The minimum data specification for 'Oral solids' is;
 - Name
 - Route
 - Dose Quantity
 - Start Time
 - Frequency
4. The minimum data specification for 'Oral liquids' is;
 - Name
 - Strength
 - Route
 - Dose Volume
 - Unit Doses
 - Start Time
 - Frequency
5. As more than one type is identified, apply Rule 0.
6. This results in the minimum data specification for the prescription of;
 - Name [Paracetamol]
 - Route [Oral]
 - Dose Quantity [e.g. 1000mg]
 - Start Time [e.g. Today at 08:00]

- Frequency [e.g. Four times daily]

4.3.3 Known exclusions from Medication Types

The aim of the Prescribing Model is that every item which can be legitimately prescribed should be included. However, there are some practical limitations to the current version, which are mentioned below.

The general rule is that any VMP which has a form-route combination not explicitly mapped into one of the Medication Types should not be prescribed using this Prescribing Model. Apart from the non-specified types mentioned above, the following products within dm+d are not included:

- **Items which are used as ingredients** – a number of VMPs exist within dm+d which are typically used as ingredients in extemporaneous or local preparations. These are coded with both Route and Form 'Not applicable'.
- **Items which should never be prescribed for direct patient administration** – a small number of VMPs exist within dm+d which are not for patient use, e.g. surface sterilising products. These are coded with either or both Route and Form 'Not applicable'.
- **Combination products** - as these are most often prescribed as the individual components within hospitals.

Additionally, a very small number of specific products have been identified as known exceptions and therefore will have special mappings.

5 Worked examples of rules 0-10

These examples show the way that the Types and Rules can be applied to a range of prescriptions. They are described in a stepwise manner so that the operation of the Types and Rules can be clearly explained. They are not meant to indicate the actual process of prescribing that an electronic system would follow.

A major assumption worth restating at this stage is that electronic prescribing systems are capable of using the dm+d model to aggregate information and present options to the user. Therefore, for example (NB this is not a definitive, all-inclusive list):

- Dose-based prescribing is best done using VTM's (and possibly TF's) as the core prescribing concepts, rather than VMP's or AMP's. This best matches the prescriber's mental model and existing paper-based prescribing.
- Once a drug (typically a VTM) has been chosen, the model can be used to aggregate all the available licensed routes of administration (because this information is coded at VMP level and therefore accessible by linking from the selected VTM).
- Once a route of administration has been chosen, this additional piece of information can be used in conjunction with the selected VTM to define a 'set' of VMP's which could potentially map to the prescription.
- The system can examine the properties of the VMP's within the set, and use these properties to help define a Medication Type and as inputs to the prescribing Rules.
- If all of the VMP's within the set have the same properties, the system should default any required choices on the user interface accordingly, without requiring confirmation from the prescriber (but always making clear that this has happened).

5.1 Worked example – Rule 0

This example covers an oral medication, where none of the other Rules apply. Many commonly-prescribed medications will fall into this category.

<i>Drug</i>	<i>Paracetamol</i>
<i>Route of administration</i>	<i>Oral</i>

Scenario

1. Starting with the drug name 'paracetamol', the prescriber chooses one of the available routes, in this case 'Oral'.
 - a. At the time of writing (2007), the available routes were:
 - i. Intravenous
 - ii. Oral
 - iii. Rectal
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, the varied nature of the forms available means that this prescription could map into either Type 1 – Oral Solids or Type 2 – Oral Liquids.
 - a. At the time of writing (2007), the available forms were:
 - i. Capsule
 - ii. Effervescent powder
 - iii. Effervescent tablet
 - iv. Oral solution
 - v. Oral suspension
 - vi. Orodispersible tablet
 - vii. Powder
 - viii. Soluble tablet
 - ix. Tablet
3. The system reviews the Rules for specific drugs (Rules 1-10). Paracetamol via the Oral route is not covered by any of these Rules.
4. However, the ambiguous Type mapping condition is covered by Rule 0, which means that the system will present a detailed prescribing screen to the user with mandatory fields corresponding to the specification for Type 1 – Oral Solids, as this is the 'most generic level available' in this case.
5. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.
6. The resulting prescription might be, for example:
 - a. **paracetamol** – oral – **DOSE** 500 mg – four times a day

Further comments

Before administration, a nurse could decide to give this drug in either solid or liquid form. If liquid form was chosen, then the item would be subject to the rules governing Type 2: Oral Liquids and a strength could (depending on available system functionality) be chosen by the nurse (from a list limited to those formulations actually available in the nurses' location) in order to comply with the specification.

5.2 Worked example – Rule 1

This example covers a multiple active ingredient drug, which has no agreed ‘Co-’ name or other generic description. This example has been chosen so that none of the other Rules apply.

<i>Drug</i>	<i>Fluocinolone + Neomycin</i>
<i>Route of administration</i>	<i>Cutaneous</i>

Scenario

1. Starting with the drug name ‘Fluocinolone + Neomycin’, the prescriber chooses the only available route, ‘Cutaneous’.
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, there are only two forms available, both of which would map the prescription into Type 6 – Creams, Ointments & Gels.
 - a. At the time of writing (2007), the available forms were:
 - i. Cream
 - ii. Ointment
3. The system reviews the Rules for specific drugs (Rules 1-10). This VTM is covered by Rule 1:
 - a. The dose form must be specified (i.e. the prescriber must choose between ‘Cream’ and ‘Ointment’)
 - b. The strength must be specified (in both cases, this is the same therefore the choice is defaulted by the system)
4. As the prescription maps into Type 6, the dose is expressed as a textual (not necessarily numeric) ‘dose method’, e.g. ‘apply thinly’.
5. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.
6. The resulting prescription might be, for example:
 - a. **fluocinolone** 0.5% + **neomycin** 0.025% – cream – METHOD apply thinly to affected area – four times a day

5.3 Worked example – Rule 2

This example covers a drug which has no VTM mapped within dm+d. This example has been chosen so that none of the other Rules apply.

<i>Drug</i>	<i>Vitamin B compound strong tablets</i>
<i>Route of administration</i>	<i>Oral</i>

Scenario

1. Because dm+d contains VMPs which have no 'parent' VTM, but which still need to be prescribable, electronic prescribing systems will need to devise methods for allowing these VMPs to be 'findable' within a VTM-centric search. One possible method might be to include special 'navigation concepts' (e.g. 'Vitamin B compound strong') which would not be prescribable, but would aid prescribers in navigating to a prescribable VMP.
2. Assuming that something equivalent to this method is implemented, then starting with the drug name 'Vitamin B compound strong', the prescriber chooses the only available route, 'Oral'.
3. The system uses the dm+d structure to check the set of available VMPs for the selected 'Navigation concept' + Route combination. In this case, there is only a single VMP available, so this is provided by the system as a selection by default.
 - a. At the time of writing (2007), the available forms were:
 - i. Vitamin B compound strong tablets
4. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.
5. The resulting prescription might be, for example:
 - a. **vitamin B compound tablets** – DOSE one tablet – oral – once a day in the morning

5.4 Worked example – Rule 3

This example covers a drug which has been flagged as ‘Never valid to prescribe as a VMP’. Many of these drugs, including this one, are also covered by one or more of the other prescribing rules. In these cases, the requirements of each rule must all be complied with.

<i>Drug</i>	<i>Factor VIII + von Willebrand factor</i>
<i>Route of administration</i>	<i>Intravenous</i>

Scenario

1. Starting with the drug name ‘Factor VIII + von Willebrand factor’, the prescriber chooses the only available route, ‘Intravenous’.
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, there is only a single form available.
 - a. At the time of writing (2007), the available forms were:
 - i. Powder and solvent for solution for injection
3. The system reviews the Rules for specific drugs (Rules 1-10). This VTM is covered by Rule 1 (described above) and also links to VMPs which are covered by Rule 3. Additionally, the prescription contains a marked Form-Route combination which triggers Rule 7 (see below for full details). For Rule 3 only:
 - a. The prescriber must specify a brand which will be displayed in place of the generic drug name.
 - b. In this case, there are two Trade Families (TFs) available, and the prescriber chooses one.
 - i. At the time of writing (2007), the available TFs were:
 1. Haemate P
 2. Optivate
4. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped, and as required by Rules 1 & 7.
 - a. Note that in this case, the requirements for this rule render unnecessary the requirements for Rule 1 – i.e. once the brand name has been substituted for the generic name, the prescription no longer qualifies for Rule 1.
5. The resulting prescription might be, for example:
 - a. **HAEMATE P** – DOSE 1000 units – intravenous injection – once only

5.5 Worked example – Rule 4

This example covers a ‘Co-’ drug prescribed via the Oral route.

<i>Drug</i>	<i>Co-amilofruse</i>
<i>Route of administration</i>	<i>Oral</i>

Scenario

1. Starting with the drug name ‘Co-amilofruse’, the prescriber chooses the only available route, in this case ‘Oral’.
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, the varied nature of the forms available means that this prescription could map into either Type 1 – Oral Solids or Type 2 – Oral Liquids.
 - a. At the time of writing (2007), the available forms were:
 - i. Oral solution
 - ii. Oral suspension
 - iii. Tablet
3. The system reviews the Rules for specific drugs (Rules 1-10). This VTM is covered by Rule 4:
 - a. The dose form must be specified
 - b. A strength must be specified for each active ingredient
4. The prescriber selects ‘Tablet’. The system then presents a set of strength options, between which the prescriber must select:
 - a. At the time of writing (2007), the available strengths were:
 - i. 2.5 mg and 20 mg
 - ii. 5 mg and 40 mg
 - iii. 10 mg and 80 mg
5. Because the prescriber has selected a solid oral dose form, the system requires the dose to be expressed in the unit dose form selected, in this case ‘tablets’.

Where unit dose forms are not specified in dm+d (for products with a dose form type of ‘continuous’) it is anticipated that the selection of an appropriate unit of measure for the prescribed dose will be constrained by the implementation to ensure an appropriate prescription.

6. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.

The resulting prescription might be, for example:

- a. **co-amilofruse** – 5mg and 40 mg – tablet – DOSE 1 tablet – oral – once a day in the morning

5.6 Worked example – Rule 5a

This example covers a drug for which some or all mapped products have been flagged ‘VMP not recommended to prescribe - brands not bioequivalent’ within dm+d.

<i>Drug</i>	<i>Nifedipine</i>
<i>Route of administration</i>	<i>Oral</i>

Scenario

1. Starting with the drug name ‘Nifedipine’, the prescriber chooses the only available route, in this case ‘Oral’.
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, the varied nature of the forms available means that this prescription could map into either Type 1 – Oral Solids or Type 2 – Oral Liquids.
 - a. At the time of writing (2007), the available forms were:
 - i. Capsule
 - ii. Drops
 - iii. Modified-release capsule
 - iv. Modified-release tablet
 - v. Oral suspension
3. The system reviews the Rules for specific drugs (Rules 1-10). This VTM links to VMPs which are covered by Rule 5a, and the prescription also contains marked Form-Route combinations which trigger Rule 9 (see below for full details). For Rule 5a only:
 - a. This drug must be prescribed by specifying a brand in addition to the drug name.
 - b. This rule should wherever possible be applied after any of the other rules, and the requirements for the Medication Types.
4. Assuming that the prescriber makes the choice ‘modified-release’ as directed by Rule 9 (see below), then (in this case), there are sixteen Trade Families (TFs) available, and the prescriber chooses one.
 - a. At the time of writing (2007), the available TFs were:
 - i. Adalat LA
 - ii. Adalat Retard
 - iii. Adipine MR
 - iv. Adipine XL
 - v. Angiopine MR
 - vi. Calchan MR
 - vii. Coracten MR
 - viii. Coracten XL
 - ix. Fortipine LA
 - x. Kentipine MR
 - xi. Neozipine XL
 - xii. Nifedipress MR
 - xiii. Nifopress Retard
 - xiv. Nimodrel XL
 - xv. Tensipine MR
 - xvi. Valni XL

- b. Please note that any local electronic prescribing system should (by default) limit the choices available to those within the local formulary. It is extremely unlikely that this full 'national' set of Nifedipine brands would ever be presented as a choice list to a prescriber in a real system.
5. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.
6. The resulting prescription might be, for example:
 - a. **nifedipine** – ADALAT RETARD – modified-release – DOSE 10 mg – oral – twice a day

5.7 Worked example – Rule 5b

This example covers a drug for which some or all mapped products have been flagged ‘VMP not recommended to prescribe - patient training required’ within dm+d.

<i>Drug</i>	<i>Insulin aspart</i>
<i>Route of administration</i>	<i>Subcutaneous</i>

Scenario

1. Starting with the drug name ‘Insulin aspart’, the prescriber chooses one of the available routes, in this case ‘Subcutaneous’.
 - a. At the time of writing (2007), the available routes were:
 - i. Intravenous
 - ii. Subcutaneous
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, there is only a single form available.
 - a. At the time of writing (2007), the available forms were:
 - i. Solution for injection
3. The system reviews the Rules for specific drugs (Rules 1-10). This VTM links to VMPs which are covered by Rule 5b, and the prescription also contains a marked Form-Route combination which triggers Rule 7 (see below for full details). For Rule 5b only:
 - a. Any dose-based prescription which exactly matches a flagged product (i.e. either because all matching VMPs are flagged, or by using a combination of ‘VTM + form + unit dose form’) must be prescribed by specifying a brand in addition to the drug family name.
 - i. As the prescriber has not (yet) selected a unit dose form, Rule 5b does not apply.
 - ii. Please note that if all the available matching VMPs were flagged, then Rule 5b would apply, as it would not be possible to administer the prescription without using a flagged product.
4. The prescriber specifies the other mandatory fields required by the medication type to which this prescription is mapped, and as required by Rule 7.
5. The resulting prescription might be, for example:
 - a. **insulin aspart** - DOSE 14 units – subcutaneous injection – as required

5.8 Worked example – Rule 5c

This example covers a product for which have been flagged ‘VMP not recommended to prescribe – no published specification’ within dm+d.

<i>Drug</i>	<i>White soft paraffin + liquid paraffin</i>
<i>Route of administration</i>	<i>Cutaneous</i>

Scenario

- 1 Starting with the drug name ‘White soft paraffin + liquid paraffin’, the prescriber chooses the route ‘cream’.
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination which map to. In this case, the available forms (creams and ointments) both map to Type 6 Creams, ointments and gels.
 - a. At the time of writing (July 2015) the available forms were:
 - i. Cream
 - ii. Ointment
3. The system reviews the Rules for specific drugs (Rules 1-10). This VTM links to VMPs which are covered by Rule 1:
 - a. The dose form must be specified (i.e. prescriber must choose between ‘cream’ and ‘ointment’)
 - b. The strength of each substance where available must be specified
4. As the prescription maps to Type 6, the dose is expressed as a textual ‘dose method’. E.g. apply to affected area
5. For Rule 5c (based on strength options)
 - a. The prescriber must specify a brand which will be displayed in place of the generic drug name.
 - b. This rule should wherever possible be applied after any of the other rules, and the requirements for the Medication Types.
 - c. At the time of writing (2015), the available brands for prescribing were:
 - i. Enopen cream
 - ii. Cetraben cream
 - iii. Soffen cream
 - d. Please note that any local electronic prescribing system should limit the choices available to those within the local formulary.
6. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.
7. The resulting prescription might be, for example:
Enopen cream – METHOD apply to affected area – four times a day

5.9 Worked example – Rule 6

This example covers a controlled drug prescribed via the Oral route. This example has been chosen so that none of the other Rules apply.

<i>Drug</i>	<i>Pethidine</i>
<i>Route of administration</i>	<i>Oral</i>

Scenario

1. Starting with the drug name 'Pethidine', the prescriber chooses one of the available routes, in this case 'Oral'.
 - a. At the time of writing (2007), the available routes were:
 - i. Intramuscular
 - ii. Intravenous
 - iii. Oral
 - iv. Rectal
 - v. Subcutaneous
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, the varied nature of the forms available means that this prescription could map into either Type 1 – Oral Solids or Type 2 – Oral Liquids.
 - a. At the time of writing (2007), the available forms were:
 - i. Capsule
 - ii. Oral solution
 - iii. Tablet
3. The system reviews the Rules for specific drugs (Rules 1-10). This VTM links to VMPs which are flagged as having a controlled drug status, and hence trigger Rule 6.
 - a. At the time of writing (2007), all Pethidine VMPs are flagged 'Schedule 2 (CD)'
4. For Rule 6:
 - a. The dose form must always be specified by the prescriber, except where the specification of form would otherwise be covered by Rules 7-10.
5. The system presents the prescriber with a choice of form, and the prescriber selects one, e.g. 'tablet'.
6. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.
7. The resulting prescription might be, for example:
 - a. **pethidine** – tablet – DOSE 100 mg – oral – every four hours

5.10 Worked example – Rule 7

This example covers a drug which could in theory be administered either by injection or by infusion, for the chosen route of administration.

<i>Drug</i>	<i>Propofol</i>
<i>Route of administration</i>	<i>Intravenous</i>

Scenario

1. Starting with the drug name 'Propofol', the prescriber chooses the only available route, in this case 'Intravenous'.
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, there is only a single form available.
 - a. At the time of writing (2007), the available forms were:
 - i. Emulsion for injection
3. The system reviews the Rules for specific drugs (Rules 1-10). This prescription contains a marked Form-Route combination which triggers Rule 7.
 - a. The prescriber must specify the method of administration, i.e. 'Injection' or 'Infusion'
4. The prescriber chooses 'Infusion'. This provides sufficient information to map the prescription to Type 22.
5. The prescriber elects to prescribe by specifying a dose rate and a dose duration (Type 22a1)
 - a. Note that for the Infusion types, a number of alternative prescribing patterns have been provided (as per Section 6, below), any of which is acceptable.
6. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.
7. The resulting prescription might be, for example:
 - a. **propofol** – 500 mg in 50 mL – DOSE 0.3 to 4 mg per kg per hour – intravenous infusion – continuous
 - b. In this example, 'continuous' is both the dose duration and the frequency (both mandatory fields); it is acceptable to only display it once.

5.11 Worked example – Rule 8

This example covers a drug which, via the inhalation route, could in theory be administered with the assistance of a variety of inhaler devices, or using a nebuliser.

<i>Drug</i>	<i>Salbutamol</i>
<i>Route of administration</i>	<i>Inhalation</i>

Scenario

1. Starting with the drug name 'Salbutamol', the prescriber chooses one of the available routes, in this case 'Inhalation'.
 - a. At the time of writing (2007), the available routes were:
 - i. Inhalation
 - ii. Intramuscular
 - iii. Intravenous
 - iv. Oral
 - v. Subcutaneous
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, there are a number of forms available.
 - a. At the time of writing (2007), the available forms were:
 - i. Inhalation powder
 - ii. Nebuliser liquid
 - iii. Pressurised inhalation
3. The system reviews the Rules for specific drugs (Rules 1-10). This prescription contains marked Form-Route combinations which trigger Rule 8.
 - a. The distinction between 'Inhaler' and 'Nebuliser' must be specified by the prescriber.
 - b. If the prescriber chooses 'Inhaler', then the prescriber must be required to make a further choice between 'Dry powder', 'Metered-dose' and 'Breath-actuated'.
4. The system requires the prescriber to choose between 'Inhaler' and 'Nebuliser'.
5. The prescriber chooses 'Inhaler'.
6. The system then requires the prescriber to choose between "Dry powder", 'Metered-dose' and 'Breath-actuated' inhalers.
7. The prescriber chooses 'Breath-actuated'.
8. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.
9. The resulting prescription might be, for example:
 - a. **salbutamol** – 100 micrograms per dose – breath-actuated inhaler – DOSE 200 micrograms – inhalation – four times a day

5.12 Worked example – Rule 9

This example covers a drug which is available in a number of formulations with varying release characteristics.

<i>Drug</i>	<i>Morphine</i>
<i>Route of administration</i>	<i>Oral</i>

Scenario

1. Starting with the drug name 'Morphine', the prescriber chooses one of the available routes, in this case 'Oral'.
 - a. At the time of writing (2007), the available routes were:
 - i. intramuscular
 - ii. intravenous
 - iii. subcutaneous
 - iv. oral
 - v. rectal
2. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, the varied nature of the forms available means that this prescription could map into either Type 1 – Oral Solids or Type 2 – Oral Liquids or Type 9 – Granules & Powders.
 - a. At the time of writing (2007), the available forms were:
 - i. Capsule
 - ii. Modified-release capsule
 - iii. Modified-release granules
 - iv. Modified-release tablet
 - v. Oral solution
 - vi. Tablet
3. The system reviews the Rules for specific drugs (Rules 1-10). This prescription contains marked Form-Route combinations which trigger Rule 9.
 - a. Where the set of products defined by a 'VTM (or TF) + Route' combination contains items with different release characteristics, the release characteristic must be specified by the prescriber
4. The system requires the prescriber to choose 'Modified-release', or not.
 - a. Note that if the prescriber chooses not to prescribe modified-release, no 'positive negative' statement is made in the prescription. It is assumed that a general convention already exists in practice where the absence of a positive statement means 'not modified-release', i.e. modified-release preparations are only used for administration when they are directly requested by the prescriber.
5. The prescriber chooses 'Modified-release'.
6. Within the set of VMPs defined by this choice, there are still two different release characteristics available, so the system requires the prescriber to choose between '12-hour modified-release' and '24-hour modified-release'.
7. The prescriber chooses '12-hour modified-release'.
8. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.
 - a. Please note that although morphine is a controlled drug, and will therefore trigger Rule 6 as described above, the selection of the marked modifier concept '12-hour modified-release' is a sufficient description of formulation to satisfy Rule 6.

- b. Please also note that there are no morphine products flagged as 'VMP not recommended to prescribe - brands not bioequivalent', so Rule 5a does not apply in this case.
9. The resulting prescription might be, for example:
 - a. **morphine** – 12-hour modified-release – DOSE 30 mg – oral – twice a day

5.13 Worked example – Rule 10

<i>Drug</i>	<i>Prednisolone</i>
<i>Route of administration</i>	<i>Rectal</i>

Scenario

1. Starting with the drug name 'Prednisolone', the prescriber chooses one of the available routes, in this case 'Rectal'.
 - a. At the time of writing (2007), the available routes were:
 - i. Auricular
 - ii. Intraarticular
 - iii. Intramuscular
 - iv. Ocular
 - v. Oral
 - vi. Periarticular
 - vii. Rectal
 - c. The system uses the dm+d structure to check the set of available VMPs for the selected VTM + Route combination. In this case, the varied nature of the forms available means that this prescription could map into either Type 7 – Enemas & Rectal Solutions or Type 11 – Suppositories & Pessaries or Type 28 – Foams.
 - a. At the time of writing (2007), the available forms were:
 - i. Enema
 - ii. Foam
 - iii. Suppository
 - d. The system reviews the Rules for specific drugs (Rules 1-10). This prescription contains marked Form-Route combinations which trigger Rule 10.
 - a. For those situations where both the 'VTM (or TF) + Route' combination contains products with the 'Precise mapping required' marker, and a single Medication Type cannot be determined (because the available products could map into more than one Types), then the dose form must be specified by the prescriber
 - i. In this particular case, both of these conditions are true, so the rule comes into effect.
 - e. The system requires the prescriber to choose a dose form.
 - f. The prescriber chooses 'Suppository'.
 - a. This choice maps the prescription to Type 11 – Suppositories & Pessaries.
 - g. The prescriber specifies the other mandatory fields as required by the medication type to which this prescription is mapped.
 - h. The resulting prescription might be, for example:
 - a. **prednisolone** – suppository – DOSE 10 mg – rectal – once a day in the morning

6 Guidance for selection of prescribing attributes

This section provides additional guidance for the specific prescribing attributes of;

- Form
- Strength
- Trade Family.

6.1 Qualification of Form

In general, within secondary care prescribing, form is not specified, except under certain circumstances. Generally these circumstances are safety related. The prescribing model used here replicates existing best practice by requiring form only when it is necessary for reason of either safety or practicality.

Where form is required, it will always be a coded value. Depending on which implementation rules apply, the form may be fully specified using a coded dm+d concept, or it may be partially specified using a coded SNOMED CT concept.

The logical sort order for a form selection list is alphabetical.

6.2 Qualification of Strength

The Medication Types Framework identifies where the qualification of a strength is required as part of the minimum prescribing data set. Often this is where the equivalent of a VMP must be specified, where a VTM must be qualified by both strength and form.

Within the dm+d, strength is defined within the VMP concept in two formats;

1. As a coded strength
2. As a written strength

The coded strength will be represented in one of the two formats;

- A quantity with associated unit of measure, e.g. '15' + '258684004' (=mg), thus the strength of the drug is 15mg. An actual VMP example is 'Codeine 15mg tablets'
- A quantity of a solid in a liquid with associated units of measure, e.g. '30' + '258684004' (=mg) / '1' + '258773002' (=ml), thus the strength of the drug is 30mg of solid per 1ml of liquid. An actual VMP example is 'Codeine 30mg/1ml solution for injection ampoules'

The dm+d Editorial Policy defines the various ways in which strength may be written. It is not possible for a system to calculate how to display strength based on the coded strength and any rules set. Therefore the VMP concept name string must be parsed for the written strength representation.

The parsing of written strength is one of the uses of the SNOMED CT UK Drug Extension 'bonus' data. The written strength from the 'bonus' data can be stored locally alongside each VMP concept so that both coded and written forms are easily accessible.

Within the system, the written representation of strength should always be that displayed to the user, for example in a strength qualification picking list.

Where a VMP comprises of more than one moiety, the strength of each is defined separately. For example;

VTM = Abacavir + Lamivudine

VMP = Abacavir 600mg / Lamivudine 300mg tablets

The coded strength definitions within the VMP are '600' + '258684004' (=mg) and '300' + '258684004' (=mg) respectively.

The sort order for strength selections in a picking list will be subject to local requirements. It may be required to display strengths in ascending or descending order of actual strength, in order of most frequency prescribed, alphabetically or in a bespoke order defined locally.

There is no need to allow the user to select a strength that is not derived from a VMP concept. For example the drug, Furosemide, when in tablet form, is available in strengths of 20mg and 40mg. If the prescriber wishes the patient to receive 60mg of Furosemide daily then the 60mg is not strength but a dose quantity and thus is defined as part of the structured dose syntax.

Some written strengths include alternative presentations within the string to aid understanding. For example;

VMP = Lidocaine 100mg/10ml (1%) solution for injection ampoules

The coded strength definition for this product is '10' + '258684004' (=mg) / '1' + '258773002' (=ml). The written representation of (1%) is only held as part of the term string.

6.3 Qualification of Trade Family (TF)

The Medication Types Framework identifies where qualification by Trade Family is required as part of the minimum data specification. If the prescriber wishes to additionally qualify a prescription by trade family then associated concepts for the VTM + Route + (optionally) other attributes can be identified via the relationship between the AMP concept and SNOMED CT trade family concepts.

For the purposes of selecting a Trade Family concept, the Trade Family Group concepts do not need to be considered. However implementers may choose to use the Trade Family Group concepts as navigational concepts within the user interface.

The logical sort order for a Trade Family selection list is alphabetical.

7 Working with dm+d and SNOMED CT data sources

This section provides guidance for handling the data sources required to implement a system based on the approach detailed within this document.

7.1 Data sources

The NHS has established a terminology publication mechanism called the 'Technology Reference Data Update Distribution Service' (TRUD) service which is hosted by the UK Terminology Centre, part of the Standards Delivery directorate of the Health and Social Care Information Centre.

Reference: <https://www.uktcregistration.nss.cfh.nhs.uk>

Two TRUD sub-packs are used within this approach to secondary care electronic prescribing. These are 'NHSBSA_DMD' and 'NHS_SNOMED'.

Sub-Pack Name	Description (taken from the TRUD website)	Update Schedule	Contents Relevant to this Guidance
NHSBSA_DMD	NHS Dictionary of Medicines and Devices (dm+d) in a vendor neutral format.	Weekly	VTM, VMP & AMP concepts Prescribing status flags
NHS_SNOMED	SNOMED CT UK release in SNOMED CT standard format. The combined bi annual release includes subsets, developers' toolkit and added value files (also includes the latest version of SNOMED CT International Release data held within IHTSDO_SNOMED pack.) There is also a 4-weekly release of this subpack containing SNOMED CT UK Drug Extension data only.	4-weekly	Trade Family subset Up to 35 x Route/Form Type assignments subsets 12 x rules 1-10 subsets UK language and realm description subsets Parsed VMP file to identify written syntax of strength Medication Types Framework & Marked Modifiers

7.1.1 Synchronising TRUD data sources

Within the Drug Release Notes for NHS_SNOMED sub-pack is the date of the weekly NHSBSA_DMD sub-pack release from which the data was derived.⁶ Each e-prescribing spreadsheet released as part of the SNOMED CT UK Drug Extension bonus files also references the NHSBSA_DMD subpack. For example, the 1st July 2009 release of the NHS_SNOMED sub-pack is derived from Week 23 of the NHSBSA_DMD sub-pack published on the 8th June 2009.

⁶ Filename: "doc_UKTCSnomedCTDrugReleaseNotes_Current-en-GB_GB1000001_lyyyymmdd.pdf"

Weeks 24, 25, 26 or 27 of the NHSBSA_DMD sub-pack were not aligned to the 4-weekly NHS_SNOMED. Instead, the next weekly NHSBSA_DMD sub-pack that was aligned was week 28, published on the 13th July 2009.

7.2 Working with NHSBSA_DMD data

The dm+d data model, including filenames is provided below, where 'ddmmyy' is replaced by the publication date of the file. Refer to the NHS Dictionary of Medicines and Devices Data Model (<http://www.dmd.nhs.uk/documentation/index.html>) for complete definitions of these data files.

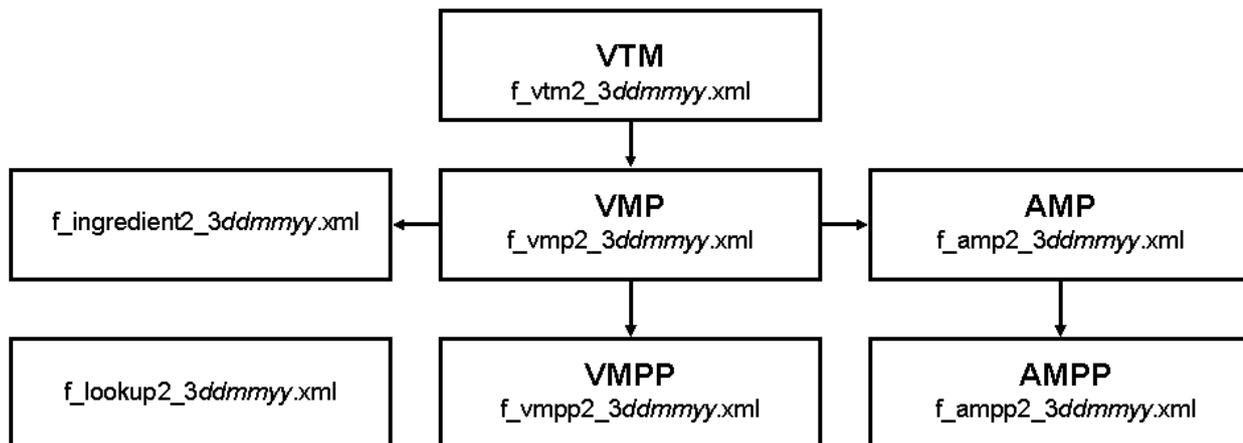


Figure 9 – The dm+d data file model

Note. The date contained within the filename is the only reference to the publication date available within dm+d data published in XML format.

Importing the XML data files into a relational database can be problematic depending on which database tools are in use. Import routines may have to be configured to ensure all data is accepted. Take care when importing SNOMED CT identifiers as these can exceed the range on a Long Integer value and may have to be stored as strings. Some of the XML element naming may also conflict with reserved words used by a relational database. Some databases also incorrectly interpret the provided xsd schemas as part of default import routines.

Only certain dm+d attributes are published with historic information; the most recent previous name, description or code, together with a change date is available.

7.2.1 Synonyms

Synonyms are not provided in dm+d. The foundation principle of dm+d is to provide one standard, unique description for each concept. Where synonyms are required, they must be implemented locally.

7.3 Working with NHS_SNOMED data

SNOMED CT data files are in comma separated format, where 'yyyymmdd' is replaced by the publication date of the file. Both are in the SNOMED CT UK Drug Extension release and the Combined Terminology Bi-annual release subpacks:

- sct1_Concepts_National_GB1000001_yyyymmdd.txt
- sct1_Descriptions_en-GB_GB1000001_yyyymmdd.txt

- sct1_Relationships_National_GB1000001__yyymmdd.txt

In the SNOMED CT International Release

- sct1_Concepts_Core_INT_yyyymmdd.txt
- sct1_Descriptions_en_INT_yyyymmdd.txt
- sct1_Relationships_Core_INT_yyyymmdd.txt

Although large, these files can be imported into a relational database structure aligned to the logical data model of SNOMED CT, be aware that numerical SNOMED CT identifiers may be incorrectly formatted when imported into some systems as they may exceed the bounds of a Long Integer within some systems and might have to be processed as text values.

Documentation provided as part of the IHTSDO SNOMED CT International Release (also available for download from TRUD) such as the Technical Reference Guide and Technical Implementation Guide will provide further details if required.

Whilst the SNOMED CT UK Drug Extension contains concepts also defined within the NHS BSA dm+d as concept classes of VMP, AMP, VMPP and AMPP, the NHS BSA dm+d must be used as the primary source. Where equivalent attributes are defined within both terminologies but differ, the dm+d definition takes precedence.

Examples of where differences may occur are with SNOMED CT 'preferred term' and dm+d 'name' or 'description', or where concepts are marked as invalid. Refer to section 7.2.1 Synonyms for related information.

The approach to secondary care prescribing described in this document uses two aspects of SNOMED CT. The first is subsets. The second is the use of new SNOMED CT concepts including the Trade Family concepts and concepts that identify a group of dm+d coded forms, thus allowing a prescription to qualify from using a more generic term than that defined within the dm+d.

7.3.1 SNOMED CT subsets

A subset is a simple list of member concept ids.

The SNOMED CT UK Drug Extension subsets are published as individual comma separated files, where '*name*' is the subset name and '*yyymmdd*' is replaced by the publication date of the file. For example;

- xder1_SubsetMembers_*name*_GB1000001_yyyymmdd.txt

Subsets that are used as part of this guidance are;

- 1 subset for Trade Family concepts
- 36 subsets for form-route type assignment subsets
- 12 subsets to support implementation of rules 1-6, 8 & 9
- 1 subset for ePrescribing Routes containing both coded dm+d and SNOMED CT routes
- 1 subset to identify dm+d descriptions⁷, see section 7.3.3.

⁷ Filename: xder1_SubsetMembers_NHSRealmDescription_GB1000001_yyyymmdd.txt

7.3.1.1 General implementation guidance for subsets

Whilst the structure of a subset is inherently simple; a simple list of member concept ids, there are important implementation considerations to factor into systems.

- SNOMED CT UK Drug Extension e-Prescribing subsets are derived from dm+d data. It may be possible for a dm+d allocated identifier to be used within a subset which has been replaced by a SNOMED CT International Release identifier. The net result of this scenario would be a subset member that is valid within dm+d but retired within SNOMED CT. The SNOMED CT relationships will contain the retired identifier and the identifier that has replaced or superseded it.
- A subset cannot be empty of members. If, for whatever reason, all the members of a subset become irrelevant then the subset will not be published. Thus the absence of a known subset should be interpreted as the subset existing but with no members.

7.3.1.2 Trade Family subset

Trade Family (TF) concepts are identified within the SNOMED UK Drug Extension Trade Family subset (filename: 'xder1_SubsetMembers_TF_GB1000001_yyyymmdd.txt'). This references SNOMED CT UK Drug Extension concepts that share the same identifier as the AMPs in dm+d.

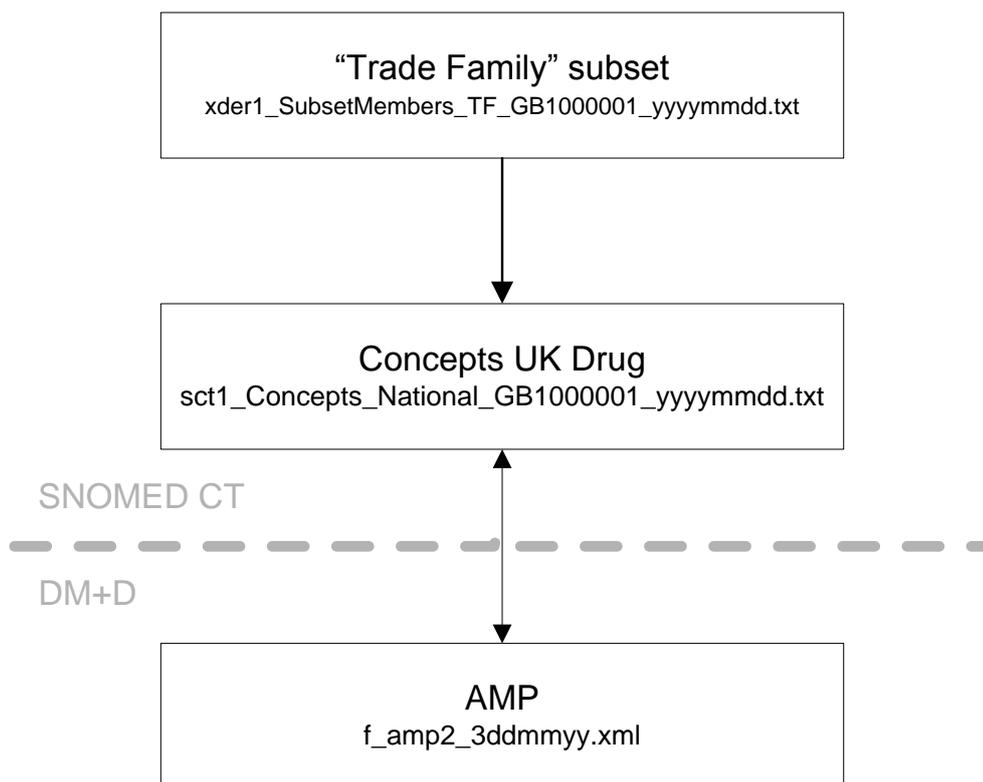


Figure 10 - The relationship between the Trade Family subset and dm+d

Each TF concept is related to 1→n AMP concepts. The majority of TFs relate to AMPs with the same VMP parent and hence the same VTM grandparent. However a small number relate to different VMP parents and therefore potentially different VTM grandparents.

Note. A 'Trade Family Group' (TFG) concept class is also defined within SNOMED CT. Each TFG concept is related to 1→n TF concepts.

7.3.1.3 Form-Route Type assignments subsets

Thirty seven SNOMED CT UK Drug Extension subsets cover each distinct form-route combination that maps to a Medication Type assignment. These subsets were first published within the April 2009 SNOMED CT release.

Each subset contains a list of SNOMED CT concept identifiers for VMP concepts that apply to each Medication Type assignment.

Refer to Appendix C – ePrescribing Subset Definitions for definitions of these subsets.

These subsets only contain VMPs where actual products are known to be available. Combination products have been excluded, but the components within a combination product are included. If all VMPs applicable to a Form-Route combination become unavailable then the subset will not be published (as it cannot be published without members) however the Form-Route combination will be preserved within the medications framework as actual products may be become available again in the future.

7.3.1.4 Subsets to support implementation of rule 1-6, 8 & 9

Twelve subsets support implementation of rule 1-6, 8 & 9 as detailed in section 4.2.

Each subset contains a list of SNOMED CT concept identifiers for VMP concepts that apply to implementation rule.

Note. Rules 7 and 10 can be implemented without the use of a SNOMED CT subset.

Refer to Appendix C – ePrescribing Subset Definitions for definitions of these subsets.

7.3.2 Concepts and terms added to support implementation

New concepts

Fully Specified Name	Preferred Term	SNOMED CT Parent
9906201000001107 Dosage form qualifier (qualifier value)	Dosage form qualifier	105904009 Type of drug preparation (qualifier value)
9906401000001106 12-hour modified-release dosage form (qualifier value)	12-hour modified-release	9906301000001103 Modified release dosage form (qualifier value)
9906901000001102 24-hour modified-release dosage form (qualifier value)	24-hour modified-release	9906301000001103 Modified release dosage form (qualifier value)
9906701000001104 Gastro-resistant dosage form (qualifier value)	Gastro-resistant	9906201000001107 Dosage form qualifier (qualifier value)
9906801000001108 Nebuliser administered dose form (qualifier value)	Nebuliser	385288002 Inhalation dosage form (qualifier value)
9906001000001101 Dry powder inhaler (qualifier value)	Dry powder inhaler	420317006 Inhaler (qualifier value) 385207009 Inhalation powder (qualifier value)
9907001000001103 Line lock route of administration (qualifier value)	Line lock	284009009 Route of administration value (qualifier value)

New terms

Fully Specified Name	New Term	SNOMED CT Parent
422059006 Metered dose inhaler (qualifier value)	Metered-dose inhaler	420317006 Inhaler (qualifier value)
422197009 Breath activated inhaler (qualifier value)	Breath-actuated inhaler	422059006 Metered dose inhaler

7.3.3 Synonyms

Synonyms are widely used within SNOMED CT, including within the hierarchies used for the dm+d content in SNOMED CT UK Drug Extension (i.e. Pharmaceutical and Biologic Product, Substances, Physical Object, Qualifier Value). In order to prevent conflict language and realm description subsets are provided with the SNOMED CT UK Drug Extension to facilitate the display of the current dm+d terms as the preferred term for a given concept.

The members of these description subsets are SNOMED CT **description** identifiers. This is different to the majority of other subsets as these contain SNOMED CT **concept** identifiers.

For further information on these subsets please see the documentation provided in the SNOMED CT UK Drug Extension release

It is the preferred terms as allocated by these realm description subsets that should be utilised for implementations of dm+d.

Part of the process of creating the SNOMED CT UK Drug Extension requires the retirement of some dm+d originated concepts with a SAME_AS relationship to a SNOMED CT International Release concept. Where the dm+d content is retired status 2 (duplicate) in the SNOMED CT UK Drug Extension the dm+d term will be allocated to the SNOMED CT International Release replacement concept and given a status of preferred term in the realm description subset.

Invalid concepts in dm+d may be given a retired status in the process of creating the SNOMED CT UK Drug Extension. Where this relationship is anything other than status 2 (duplicate) to a current SNOMED CT concept the dm+d allocated preferred term should not be added to the current concept.

7.3.3.1 Exceptions to the dm+d term becoming the preferred term

Where the retired concept is status 2 (duplicate) to a current concept that already has a dm+d allocated preferred term the term from the retired concept should be added to the current concept but only as a synonym status description in the dm+d realm description subset.

There are exceptions where the dm+d allocated term is not deemed appropriate for use in prescribing systems. These are listed below and were created specifically at the request of ePrescribing (NHS Connecting for Health work-stream).

SNOMED CT concept ID	dm+d Preferred term	dm+d realm description subset preferred term	Comments
10547007	otic	auricular	e-Prescribing team request
420254004	body cavity use	body cavity	e-Prescribing team request

6064005	cutaneous	topical	e-Prescribing team request
8941501000001109	Not applicable	Legal category not applicable	dm+d term too ambiguous in the context of the larger terminology.

The VMP abbreviated name (also known as the short name or label name) from dm+d are not included in SNOMED CT.

7.4 Working with SNOMED CT UK Drug Extension bonus data

The SNOMED CT UK Drug Extension bonus data contains four different types of file relevant for this guidance.

No historic information is published within the SNOMED CT UK Drug Extension bonus data.

7.4.1 Parsed VMP / AMP concepts XML documents

The NHS SNOMED CT UK Drug Extension bonus data contains parsed VMP and AMP name fields in XML format together with supporting documentation, where 'ddmmyy' is replaced by the publication date of the file.

- f_vmp2_3ddmmyy_parsed.xml
- f_amp2_3ddmmyy_parsed.xml

The XML structure is simple and can be easily importing into a relational database. The VPID or APID field provides the relationship between the parsed data and the main dm+d data.

For the purposes of this guidance, only the parsed VMP file is required.

7.4.2 Medication Types and Marked Modifiers XML documents and spreadsheets

To support the implementation of the prescribing model described in this document, the following files will be published monthly as part of the SNOMED CT UK Drug Extension bonus files.

Four Microsoft Excel spreadsheets;

- UKTC_SNOMED_CT_Medicament_Types_Spec_Data_Specifications_YYYYMMDD.xls
 - The minimum data specification for each Medicament Type assignment.
- UKTC_SNOMED_CT_Medicament_Types_Spec_Form_Route_Combinations_YYYYMMDD.xls
 - A cross reference of form-route combinations that map to Medicament Type assignments, published in Microsoft Excel spreadsheet format.
- UKTC_SNOMED_CT_Marked_Modifiers_YYYYMMDD.xls
 - A cross reference of form-route combinations that map to Marked Modifier rules, published in Microsoft Excel spreadsheet format.
- UKTC_SNOMED_CT_Routes_Requiring_Qualification_YYYYMMDD.xls
 - A list of routes available within dm+d that require additional qualification with information on site for usage or laterality.

Two XML documents;

- UKTC_SNOMED_CT_Medication_Types_Form_Route_Pairs_YYYYMMDD.xml
 - An XML document that lists form-route combinations that apply to each of the 36 Medication Type assignments.
- UKTC_SNOMED_CT_Marked_Modifiers_YYYYMMDD.xml
 - An XML document that lists form-route combinations that apply for when rules 7, 8, 9 or 10 apply. For rules 8 and 9, a SNOMED CT UK Drug Extension subset is also used as part of the logic for the implementation rule

For each published file, within the filename 'YYYYMMDD' is replaced by the publication date of the file.

7.5 Pre-processing of data

All necessary data query/manipulation can be performed against dm+d and SNOMED CT data in its raw form once held in a relational database. However for efficiency, simplicity and improved system performance, suppliers should consider the selective pre-processing of data as part of scheduled data import processes.

Suggestions are provided below but these are not comprehensive and local requirements of systems architecture may require the need for more or less data pre-processing.

Pre-Processing Suggestion	Rationale / Benefits
Create a single table of all prescribable concepts.	Prescribable items could be a mix of VTM, TF, VMP and AMP concepts, plus prescribable concepts not known within the dm+d, then all constrained by any local formularies. Implementing a system medication picking list via a simple table look-up rather than a complex query has performance advantages.
Hold product written strength values alongside coded strength values.	As detailed earlier in this document, written and coded strengths may be different therefore storing these within the same database entity should simplify data queries and have performance advantages.
Create an entity for Trade Family concepts with relationships to dm+d AMP concepts pre-populated from SNOMED CT.	TF concepts logically sit above AMP concepts within the dm+d data model (see section 3.6). Error! Reference source not found. Removing the need to query SNOMED CT tables would simplify queries and have performance advantages.

Appendix A – Support for dose-based prescribing

The examples below show how dm+d data has been revised or utilised to support dose based prescribing in the development of this guidance. This information is provided for background and reference purposes only.

Application	Motivation
<p>Parsed files at VMP and AMP level</p> <p>(Utilisation of data)</p>	<p>Required to implement Common User Interface guidelines and to identify the written syntax for a medications strength</p> <p>The 'parsed' files split the dm+d VMP and AMP term string into its constituent parts, e.g. drug name, strength, form, sugar free attribute, etc. CUI guidance recommends that the drug name is formatting differently to other aspects of the term string. Without the parsed file, the written syntax for medication strength cannot be easily determined using the dm+d.</p>
<p>Trade Family names and Trade Family Group concept classes included in the SNOMED CT UK Drug Extension</p> <p>(Extending the 5 box model to a 6 box model)</p>	<p>Necessary for the qualification of a specific brand without the selection of a specific AMP concept</p> <p>For some medication types, e.g. modified release formulations, a specific brand or trade family needs to be specified as different brands of the same medication have different clinical characteristics.</p>
<p>Prescribing status values</p>	<p>Amended to allow greater differentiation.</p> <p>The previous value of 'not recommended to prescribe as a VMP' covered two separate use cases:</p> <p>Products which are not recommended for generic prescribing by the BNF due to non-equivalence</p> <p>Products which are not recommended for generic prescribing as the AMPs attached require patient training in their use and the AMPs are not considered interchangeable.</p> <p>It is not always necessary to prescribe products that require patient training by brand in secondary care as the administration of medicine is performed by the nursing staff. Separate flags now exist to cover the different use cases.</p>
<p>Identification of Infusions</p>	<p>Parenteral product descriptions differentiate between injections that are given as a bolus versus those that are to be administered as an infusion to reduce the risk associated with mis-selection and mis-administration.</p>

Appendix B – Data files used within this guidance

A list of all data files, together with their TRUD sub-pack source, used within this guidance.

Description	Filename	TRUD Sub-Pack
dm+d in XML format	f_vtm2_3ddmmyy.xml f_vmp2_3ddmmyy.xml f_vmpp2_3ddmmyy.xml f_amp2_3ddmmyy.xml f_ampp2_3ddmmyy.xml f_ingredient2_3ddmmyy.xml f_lookup2_3ddmmyy.xml	NHSBSA_DMD
Parsed dm+d VMP data	f_vmp2_3ddmmyy_parsed.xml	NHS_SNOMED
Medication Types & Marked Modifiers documentation	UKTC_SNOMED_CT_Marked_Modifiers_yyyymmdd.xls UKTC_SNOMED_CT_Marked_Modifiers_yyyymmdd.xml UKTC_SNOMED_CT_Medication_Types_Form_Route_Pairs_yyyymmdd.xml UKTC_SNOMED_CT_Medication_Types_Spec_Data_Specifications_yyyymmdd.xls UKTC_SNOMED_CT_Medication_Types_Spec_Form_Route_Combinations_yyyymmdd.xls UKTC_SNOMED_CT_Routes_Requiring_Qualification_yyyymmdd.xls	NHS_SNOMED
SNOMED CT International Release	sct1_Concepts_Core_INT_yyyymmdd.txt sct1_Descriptions_en_INT_yyyymmdd.txt sct1_Relationships_Core_INT_yyyymmdd.txt	NHS_SNOMED
SNOMED CT UK & UK Drug Extension Release	sct1_Concepts_National_GB1000001_yyyymmdd.txt sct1_Descriptions_en-GB_GB1000001_yyyymmdd.txt sct1_Relationships_National_GB1000001_yyyymmdd.txt	NHS_SNOMED
Trade	xder1_SubsetMembers_TF_GB1000001_yyyymmdd.txt	NHS_SNOMED

<p>Family, dm+d realm description, route & method subsets</p>	<p>xder1_SubsetMembers_DMDRealm_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epresrout_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epresmthd_GB1000001_yyyymmdd.txt</p>	
<p>Subsets to support implementation of rules 1-6, 8 & 9</p>	<p>xder1_SubsetMembers_Epmultiingredientrule1_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epnovtmrule2_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epnevervalidasavmprule3_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epconamedrugsrule4_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epnotrecasvmpbioavailrule5a_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epnotrecasvmptrainingrule5b_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epschedule1to3rule6_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epbreathactuatedinhalermarker_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epdrypowderinhalermarker_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epmetereddoseinhalermarker_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epmodifiedrelease12hour_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epmodifiedrelease24hour_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epnotrecasnopubspecrules_GB1000001_yyyymmdd.txt</p>	<p>NHS_SNOMED</p>
<p>Subsets for form-route type assignment</p>	<p>xder1_SubsetMembers_Epcements17_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epcreamsointmentandgels6a_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epcreamsointmentandgels6b_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epdressings14a_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epdressings14b_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Ependotracheopulmonary11a_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Ependotracheopulmonary11b_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epenemasandrectalsolutions7a_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epenemasandrectalsolutions7b_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epenteralfeeds8_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epeyeeanoseliquidsandpowders4_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epfoams28_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epgases25a_GB1000001_yyyymmdd.txt xder1_SubsetMembers_Epgases25b_GB1000001_yyyymmdd.txt</p>	<p>NHS_SNOMED</p>

xder1_SubsetMembers_Epgranulesandpowders9a_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epgranulesandpowders9b_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epimplantsandsticks15_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epinfusions22a_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epinfusions22b_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epinhalersandsprays3_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epinjections20_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epinstillations29a_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epinstillations29b_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epinsulin21_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epiuds16_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epnebuliserliquids13a_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epnebuliserliquids13b_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Eporalliquids2a1_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Eporalliquids2a2_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Eporalliquids2b_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Eporalsolids1_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Epsuppositoriesandpessaries10_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Etopicalliquids5a_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Etopicalliquids5b_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Etopicalpatches12a_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Etopicalpatches12b_GB1000001_yyyymmdd.txt	
xder1_SubsetMembers_Etpn23_GB1000001_yyyymmdd.txt	

Please note: Subsets may be omitted from the SNOMED CT UK Drug Extension release if the subset contains no members.

Appendix C – ePrescribing Subset Definitions

General definitions for rule, marked modifier and type subsets:

1. All subsets shall only contain VMPs, except the 'modified release' 'marked modifier' subsets which shall only contain AMPs.
2. All subset members shall be drawn from dm+d content regardless of the status of the matching concept within SNOMED CT.
3. All subset members must be valid in the dm+d data.
4. All subsets containing VMPs shall only contain VMPs that have actual products available.
5. All subsets containing VMPs shall only contain VMPs that are not combination products.
6. All subsets containing VMPs shall only contain VMPs that are not component only products.
7. The 'rule' and 'marked modifier' subsets shall be constrained to only contain concepts that are within the entire content of the 'type' subsets, except the 'modified release' 'marked modifier' subsets which shall only contain the hand crafted list of AMPs
8. The dm+d flag of 'Invalid as a prescribable product' is defined for one of two reasons; where products are available as component only products, or because the product is not used within primary care. All subsets containing VMPs shall exclude products where this flag is set for component only products and include those products are not used within primary care.

Definitions for 'rule' subsets:

The definitions of these subsets are taken from section 4.2.1 of this guidance document.

Implementation Guide Rule	Description	Constraints
1	Multiple active ingredient drugs described with a '+' in their VTM name	VMP in dm+d data shall have a reference to a VTM that contains a '+' symbol in its name.
2	Virtual products with no top-level drug family (i.e. VTM)	VMP in dm+d data shall have no reference to a VTM.
3	Products identified as Never valid to prescribe as a VMP	VMP in dm+d data shall have a prescribing status value of '0004'.
4	Co-name drugs	VMP in dm+d data shall have a name beginning with either 'co-' or 'Co-'.
5a	Products not recommended for generic prescribing due to Non-equivalence	VMP in dm+d data shall have a prescribing status value of '0006' VMP not recommended to prescribe - brands not bioequivalent.
5b	Products not recommended for generic prescribing due to Patient training requirements	VMP in dm+d data shall have a prescribing status value of '0007'. VMP not recommended to prescribe - patient training required

Implementation Guide Rule	Description	Constraints
5c	Products not recommended for generic prescribing due to no product specification	VMP in dm+d data shall have prescribing status value of '0008'. VMP not recommended to prescribe –no published specification
6	Controlled drugs	VMP in dm+d data shall have a controlled drug category value between '0001' and '0007'

Definitions for 'marked modifier' subsets:

These are the subset created to support rules 8 and 9 defined within this guidance document.

Subset	Definition	Constraint
Modified Release 12 Hour	Medicines available in forms with differing release characteristics	Hand crafted subset with QA rules identifying potential new members
Modified Release 24 Hour		Hand crafted subset with QA rules identifying potential new members
Dry Powder Inhaler	Inhaled dose forms	VMP in dm+d data has form 'Inhalation powder' and route 'Inhalation'
Breath Actuated Inhaler		VMP in dm+d data has form 'Pressurised inhalation' and name contains 'breath actuated'
Metered Dose Inhaler		VMP in dm+d data has form 'Pressurised inhalation' and name does not contain 'breath actuated'

Definitions for 'type' subsets:

The content of the 'type' subsets is defined by the spreadsheets;

- UKTC_SNOMED_CT_Medication_Types_Spec_Form_Route_Combinations_yyyymmdd.xls
- UKTC_SNOMED_CT_Medication_Types_Spec_Data_Specifications_yyyymmdd.xls.

In the table below only additional constraints above the externally defined route / form pairs are specified, 'N/A' in this situation means 'No additional constraint'.

Subset	Definition	Constraint
Oral Solids (1)	Oral Solids	N/A
Oral Liquids (2a1)	Oral Liquids	VMP from dm+d data where ingredient strength is specified in the term and the ontology form route is neither 'liquidfood.oral' or 'liquidfood.gastroenteral' and the VMP is not an Enteral Feed as identified below
Oral Liquids (2a2)	Use when strength is specified and duration.	VMP from dm+d data where ingredient strength and duration are specified in the term and the ontology form route is neither 'liquidfood.oral' or 'liquidfood.gastroenteral' and the VMP is not an Enteral Feed as identified below (Currently this is done by hand crafting the required items out of 2a1 and into 2a2 – only one member)
Oral Liquids (2b)	Oral Liquids Use when no strength specified within VMP, e.g. standardised compound preparations, when the prescriber specifies a dose quantity / volume Use when no strength specified within VMP, e.g. standardised compound preparations, when the prescriber specifies a dose rate	VMP from dm+d data where ingredient strength is not specified in the term and the ontology form route is neither 'liquidfood.oral' or 'liquidfood.gastroenteral' and the VMP is not an Enteral Feed as identified below
Inhalers and Sprays (3)	Inhalers and Sprays	N/A
Eye Ear Nose Liquids and Powders (4)	Eye Ear Nose Liquids and Powders	N/A
Topical Liquids (5a)	Topical Liquids	VMP from dm+d data where form and route pair is not either of these combinations: 'Mouthwash' / 'Dental' 'Mouthwash' / 'Oromucosal'
Topical Liquids (5b)	Topical Liquids Use for mouth washes	VMP from dm+d data where form is 'Mouthwash' and route is either 'Dental' or 'Oromucosal'
Cream Ointments and Gels (6a)	Cream Ointments and Gels	VMP from dm+d data where ingredient strength is specified in the term

Subset	Definition	Constraint
Cream Ointments and Gels (6b)	Cream Ointments and Gels Use when no strength specified (e.g. aqueous cream) at product level	VMP from dm+d data where ingredient strength is not specified in the term
Enemas and Rectal Solutions (7a)	Enemas and Rectal Solutions	VMP from dm+d data where ingredient strength is specified in the term
Enemas and Rectal Solutions (7b)	Enemas and Rectal Solutions Use when no strength specified at product level	VMP from dm+d data where ingredient strength is not specified in the term
Enteral Feeds (8)	Enteral Feeds Option A1 - prescribed by rate, use for naso-gastric tubes Option A2 - prescribed by dose / volume, use for drinking (Sip feeds)	Ontology form route is either 'liquidfood.oral' or 'liquidfood.gastroenteral'
Granules and Powders (9a)	Granules and Powders	VMP from dm+d data where dose form indicator value is not '1' and the VMP is not an Enteral Feed as identified above
Granules and Powders (9b)	Granules and Powders Use for items which come in unit doses, e.g. sachets	VMP from dm+d data where dose form indicator value is '1' and the VMP is not an Enteral Feed as identified above
Suppositories and Pessaries (10)	Suppositories and Pessaries	N/A
Endotracheopulmonary (11a)	Endotracheopulmonary For powders	VMP from dm+d data where form is 'powder'
Endotracheopulmonary (11b)	Endotracheopulmonary For liquids & sprays	VMP from dm+d data where form is not 'powder'
Topical Patches (12a)	Topical Patches Option A - used for single active ingredient patches expressed as a measurable quantity per unit time	VMP from dm+d data shall not have a reference to a VTM that contains a '+' symbol in its name and VMP name contains 'hour'
Topical Patches (12b)	Topical Patches Option B - used for all other patches	VMP from dm+d data shall have a reference to a VTM that contains a '+' symbol in its name or VMP name does not contain 'hour'
Nebuliser Liquids (13a)	Nebuliser Liquids	VMP from dm+d data where name does not contain a '%' symbol.
Nebuliser Liquids (13b)	Nebuliser Liquids Use for products where amount per unit dose expressed as percentage, e.g. sodium chloride 0.9%	VMP from dm+d data where name contains a '%' symbol.

Subset	Definition	Constraint
Dressings (14a)	Dressings Use for non-medicated dressings	VMP from dm+d data where form is neither 'Medicated plaster' or 'Impregnated dressing' and the name contains one of the following words: dressing bandage plaster sheet felt tape stocking stockinette wipes hosiery pressure system
Dressings (14b)	Dressings Use for impregnated dressings and medicated plasters	VMP from dm+d data where form is 'Medicated plaster' or 'Impregnated dressing'
Implants and Sticks (15)	Implants and Sticks	N/A
IUDs (16)	Intrauterine devices	N/A
Cements (17)	Cements	N/A
Injections (20)	Injections	Excludes members of the Insulin and TPN subsets identified below Note. This subset contains a number of products with the word 'infusion' in their description. This is to ensure that it remains possible for a portion of these products to be injected rather than infused, i.e. to allow local flexibility in the way that the products are used.
Insulin (21)	Insulin	N/A

Subset	Definition	Constraint
Infusions (22a)	<p>Infusions Use for single ingredient infusions prescribed by rate Use for single ingredient infusions prescribed by dose</p> <p>Note: will also contain multi-ingredient products that do not have a VTM.</p>	<p>VMP from dm+d data shall not have a reference to a VTM that contains a '+' symbol and excludes members of the Insulin and TPN subsets identified elsewhere</p> <p>Note. This subset contains a number of products with the word 'injection' in their description. This is to ensure that it remains possible for a portion of these products to be infused rather than injected, i.e. to allow local flexibility in the way that the products are used.</p>
Infusions (22b)	<p>Infusions Use for multiple ingredient infusions prescribed by rate Use for multiple ingredient infusions prescribed by dose</p>	<p>VMP from dm+d data shall have a reference to a VTM that contains a '+' symbol and excludes members of the Insulin and TPN subsets identified elsewhere</p> <p>Note. This subset contains a number of products with the word 'injection' in their description. This is to ensure that it remains possible for a portion of these products to be infused rather than injected, i.e. to allow local flexibility in the way that the products are used.</p>
TPN(23)	<p>Total Parenteral Nutrition Use for proprietary products prescribed by rate Use for proprietary products prescribed by dose Use for proprietary products plus additive(s) prescribed by rate Use for proprietary products plus additive(s) prescribed by dose</p>	<p>Hand crafted subset, with quality assurance rules identifying potential new members</p>
Gases (25a)	<p>Gases Use for gases prescribed by flow rate, e.g. Oxygen 4L per minute</p>	<p>VMP from dm+d data where the VMP does not match the definition (is the inverse) of subset 25b below and either the name of the VTM is not 'Eucalyptus + Menthol' or the name of the VMP is not 'Menthol and Eucalyptus inhalation'.</p>

Subset	Definition	Constraint
Gases (25b)	Gases Use for volatile liquids	VMP from dm+d data where form is 'Inhalation vapour' and route is 'Inhalation' and either the name of the VTM is not 'Eucalyptus + Menthol' or the name of the VMP is not 'Menthol and Eucalyptus inhalation'
Foams (28)	Foams	N/A
Instillations (29a)	Instillations	VMP from dm+d data where name does not contain a '%' symbol.
Instillations (29b)	Instillations Where strength is expressed as a % at VMP level	VMP from dm+d data where name contains a '%' symbol.