Royal College of Physicians

Setting higher standards

Standards for structure and content of medications and medical device records: technical annex

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Prepared by the Royal College of Physicians on behalf of the Health and Social Care Information Centre

hscic Health & Social Care Information Centre

The Royal College of Physicians

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The Health and Social Care Information Centre

From the 01 April 2013, the Health and Social Care Information Centre became responsible for some of the functions previously undertaken by the Department of Health Informatics Directorate. This included such as the Clinical Data Standards Assurance (CDSA) programme.

The CDSA programme brought together the clinical and professional communities in health and social care, patient representatives and technology resources to ensure that electronic health records reflect professional practice, and support improved patient outcomes and safety.

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Medication and medical devices: annex to review of consistency across the record standards for admission, handover, discharge, outpatients and referrals report

Introduction

This document provides an annex to the review of consistency across the record standards for admission, handover, discharge, outpatients and referrals report. It has been produced as there are specific issues which need to be resolved in implementing a standard format for electronic medication records.

The methodology used in the review of medication and medical device headings is the same as that used in the review of consistency of all record standards, as medications form part of the wider record standards. For details of the methodology, please see the main report: *'Review of consistency across the record standards for admission, handover, outpatients and referrals'*[1].

This annex has been produced with input from an expert medications working group, whose membership was drawn from organisations and projects associated with the development of medication recording standards and the implementation of electronic medication records. Membership of this group is set out in an appendix.

This report comprises:

- Medication and medical device clinical record headings
- Issues that need to be addressed in implementing standard medication and medical device headings in electronic records
- References to additional guidance which may be helpful in implementing electronic medication records.

The report is primarily intended for informaticians, at both a national and local level and for electronic health record and pharmacy system vendors.

The scope of the medication record headings is intended to cover both hospital and community settings, including primary care and pharmacies. It does not include patient records, ie patients recording the medications that they are taking.

The report was submitted to the Academy of Medical Royal Colleges (AoMRC) for sign-off in April 2013. The AoMRC were pleased to support the standards as a fundamental catalyst for the sharing of patient data to improve patient care and experience.

Medications and medical devices clinical record headings

The medications and medical devices headings are intended to cover hospital, community and primary care prescribing and are focused on the information which needs to be communicated when a patient moves between these settings.

The table identifies clinical record headings for medications and medical devices, together with associated clinical descriptions. Technical comments are also provided which offer further technical clarification and which identify matters which require addressing in the development, implementation

[1] Royal College of Physicians. *Consistent structure and content standards for admission, handover, discharge, outpatient and referral records and communications*. London: RCP, 2013 (http://www.rcplondon.ac.uk/resources/standards-admission-handover-discharge-outpatient-and-referral).

and use of electronic health record systems over time. The technical comments included with the headings are comments and pointers to implementation rather than being a technical specification for a computer system.

The table is preceded by explanatory notes about some of the concepts used in the technical notes which accompany the medication and medical device clinical record headings:

NHS dictionary of medicines and devices (dm+d)

The table of preferred headings references the NHS dictionary of medicines and devices (dm+d). NHS dm+d was developed for use in both secondary and primary care to provide a common standard way of recording medications and medical devices so that information can be shared between healthcare organisations and data aggregated for secondary uses. It is a dictionary containing unique identifiers (codes) and associated textual descriptions for representing medicines and medical devices in information systems and electronic communications. All unique identifiers used in dm+d are SNOMED CT codes. dm+d is also the NHS standard (ISB 0052) for medicines interoperability. See www.dmd.nhs.uk, for more information.

In-patient prescribing

The table of preferred headings references different dm+d concept classes which reflect the different prescribing practices in hospitals and primary care. In hospitals, 'dose based prescribing' is commonly used, where the medication is identified by a dm+d concept, virtual therapeutic moiety (VTM). A VTM is an abstract representation of the substance(s) formulated as a medicinal product, eg atenolol, co-amoxiclav. A VTM must be associated with qualifying information, such as form (eg tablet), route (eg oral), and dose (eg 100mg). The Health and Social Care Information Centre (HSCIC) publish the *'dm+d Implementation Guide (secondary care)'*, which sets out rules which specify the level of associated qualifying information that needs to be recorded for specific groups of medications to ensure safe prescribing. A SNOMED CT UK Drug Extension is also published, which includes the rules and the additional information required for dose-based prescribing.

Primary care prescribing

In primary care 'product based prescribing' is commonly used, where the virtual medicinal product (VMP) (eg atenolol 100mg tablet) or the actual medicinal product (AMP) (eg tenormin 100mg tablets (AstraZeneca UK Ltd) is used. A VMP is an abstract concept representing the properties of one or more clinically equivalent actual medical products. Here, the medication name, form and strength are included in the same dm+d concept. An AMP is a single dose unit of a finished dose form (unless the product is presented as a continuous dosage form, eg a cream), attributable to an identified supplier that contains a specified amount of an ingredient substance. Descriptions of VTM, AMP and VMPare taken from the NHS dm+d Editorial Policy.

NHS dose syntax

NHS Connecting for Health developed an NHS dose syntax model, which sets out the full set of information that supports the correct administration of medication to patients in order to have its therapeutic effect. The syntax is in draft and has not yet been clinically assured, but may be useful in considering how to represent dosage instructions.

Heading	Clinical description	Technical comments
MEDICATIONS AND MEDICAL DEVICES		
Medication name	May be generic name or brand name (as appropriate).	Medication name is an attribute of a medication record. Use NHS Dictionary of Medicines and Devices (dm+d). Medication name could be in any of the following forms: virtual therapeutic moiety (VTM), eg atenolol, virtual medicinal product (VMP), eg atenolol 100mg tablet, or actual medicinal product (AMP), eg tenormin 100mg tablets (AstraZeneca UK Ltd).
Medication form	Eg capsule, drops, tablet, lotion etc.	Medication form is an attribute of a medication record. The dispensed form would generally be the form communicated from hospital to primary care. There may also be circumstances where the administered form is communicated. In 'dose based prescribing', where a VTM is used, form is expressed as a separate attribute, whereas in 'product based prescribing' it is usually included as part of a VMP or AMP. dm+d: form is expressed as part of a dm+d concept for a VMP or AMP. SNOMED CT: used for a VTM, where form is expressed separately.
Route	Medication administration description (oral, IM (intramuscular), IV (intravenous), etc): may include method of administration, (eg, by infusion, via nebuliser, via NG (nasogastric) tube) and/or site of use (eg, 'to wound', 'to left eye', etc).	Medication route is an attribute of medication record. In 'dose based prescribing', where a VTM is used, route is expressed as a separate attribute, whereas in 'product based prescribing' it is not generally stated. dm+d: licensed route is explicit in a dm+d concept for a VMP or AMP. SNOMED CT: used for a VTM, where the route is expressed separately. Also see NHS dose syntax. Note that route, site and method are different concepts in NHS dose syntax. NHS dose syntax could be used, but has not yet been through clinical assurance, and would need to be, for it to be recommended for use.
Dose	This is a record of the total amount of the active ingredient(s) to be given at each administration. It should include, eg, units of measurement, number of tablets, volume/concentration of liquid, number of drops, etc.	Medication dose is an attribute of medication record. This is a record of the total amount of the active ingredient(s) to be given at each administration. In 'dose based prescribing', where a VTM is used, strength is expressed as a separate attribute, whereas in 'product based prescribing', it is usually included as part of a VMP or AMP. dm+d: where strength is expressed as part of a VMP or AMP. SNOMED CT: used where a VTM is used and strength is expressed separately. Allow for mass per unit volume format, to allow for liquid preparations.

Heading	Clinical description	Technical comments
		Where prescribing co-name drugs (eg co-trimoxazole), a strength must be specified for each active ingredient. Also see NHS dose syntax. NHS dose syntax could be used, but has not yet been through clinical assurance, and would need to be, for it to be recommended for use.
Medication frequency	Frequency of taking or administration of the therapeutic agent or medication.	Medication frequency is an attribute of medication record. It is an expression of how often or with what timing a dose should be administered. It is used in both product based and dose based prescribing. Plain text. Also see NHS dose syntax. NHS dose syntax could be used, but has not yet been through clinical assurance, and would need to be, for it to be recommended for use.
Additional instructions	Allows for: * requirements for adherence support, eg, compliance aids, prompts and packaging requirements. * additional information about specific medicines, eg, where specific brand required. * patient requirements eg, unable to swallow tablets.	'Additional instructions' is an attribute of medication record. There may be multiple additional instructions for a single medication record. They are recorded as textual additions to the dose and frequency string, where required. Where a specific brand needs to be prescribed, this will be flagged in dm+d and would result in a requirement to prescribe at an AMP level. See NHS dose syntax – additional instructions. NHS dose syntax could be used, but has not yet been through clinical assurance, and would need to be, for it to be recommended for use.
Do not discontinue warning	To be used on a case-by-case basis if it is vital not to discontinue a medicine in a specific patient scenario.	Do not discontinue warning is an attribute of medication record. Plain text, or may be coded.
Reason for medication	Reason for medication being prescribed, where known.	Reason for medication is an attribute of medication record. Plain text, or may be coded in GP systems. Where coded, text should be displayed.
Medication recommendations	Suggestions about duration and/or review, ongoing monitoring requirements, advice on starting, discontinuing or changing medication.	Medication recommendations may be recorded as an attribute of an individual medication record, eg duration or suggested review date. They may also be recorded as a textual summary. The medication that was changed (dm+d and SNOMED CT), plus plain text for the reason for the change. Medication recommendations to be communicated between healthcare settings where relevant.
Medication status	Whether or not a medication is being administered, eg, started, stopped, suspended, reinstated.	Medication status is not an agreed concept and is the subject of wider consideration than these headings. In primary care, status is generally taken as being whether a medicine is currently being actively administered. In secondary care, medicines communicated between secondary and primary care will generally

Heading	Clinical description	Technical comments
		be those which the patient is discharged on or prescribed at outpatient clinic. In some circumstances, there may also be a need to communicate medications suspended or stopped during an inpatient stay.
Medication change	Where a change is made to the medication, ie one drug stopped and another started or, eg, dose, frequency or route is changed.	Medication change is the record of any change in a prescribed medicine. This could be a complete change of medication (ie one drug stopped and another started) or it could be a change of form, dose, frequency or route. It will be recorded as a new prescription or medication line. Further work is needed on this heading to address issues such as: when the medication change is communicated, eg ongoing or only at a care transition and what types of change should be communicated, eg timing of dose, amount, route, etc, how to distinguish between discontinued and new information.
Reason for medication change	Reason for change in medication, eg sub-therapeutic dose, patient intolerant.	Reason for medication change is an attribute of the record of the medication change. Plain text or may be coded.
Medicine administered	Record of administration to the patient, including self-administration.	Part of the drug administration record. This heading does not include all attributes recorded as part of the administration record (eg batch number), only those likely to be communicated between secondary and primary care. dm+d identifier, plus date/time administered and by whom.
Reason for non-administration	Reason why drug not administered, (eg, patient refused, patient unavailable, drug not available).	Part of the drug administration record, which may need to be communicated between secondary and primary care. Plain text or may be coded.
Relevant previous medications	Record of relevant previous medications.	Needs to be clearly distinguished from current medication. Use NHS Dictionary of Medicines and Devices (dm+d), where possible, but may be plain text, eg where patient is providing the information. Relevant previous medications to be communicated between healthcare settings in addition to current medications.
Medical devices	The record of dietary supplements, dressings and equipment that the patient is currently taking or using.	Medical devices reimbursable in primary care ('applicances') are included in dm+d. An international project is expanding the population of medical devices, including those used in hospitals, in SNOMED CT. Some medical devices contain active pharmacological ingredients (less than 1% of those in dm+d), but others do not and these devices have a different data structure. Different clinical groups and different clinical uses may find it more appropriate to group medical devices with medications or separate them out.

Notes:

1. Controlled drugs are identified by dm+d concepts.
2. Complementary medicines. Homeopathic and licensed complementary medicines are included in dm+d. Unlicensed medicines are not included and so would need to be recorded as plain text, but using the same headings as above.
3. Medicine-like devices are treated like devices. Eg, synovial fluids which a clinician would probably think of as a medicine are licensed as devices and therefore dm+d handles them like devices.

Issues

Different prescribing practices and recording between primary and secondary care

Differences between secondary and primary care prescribing practices mean that there are differences in the way that medication is recorded in primary and secondary care. In hospital, a prescriber will record a medication for the nursing team to administer to the patient. This will usually be the generic name, plus dose, quantity, route and frequency. The nurse administering the medication will use this information to select the correct quantity of an actual product to give to the patient. In primary care, prescriptions are created by selecting a single medicinal product, with the rest of the prescription expressed in terms of that product.

Primary care medication records are product based:

- virtual medicinal product (VMP) - eg “amoxicillin 500mg capsule”
  or
- actual medicinal product (AMP) – eg “amoxil 500mg capsules (Dowelhurst Ltd)”.

The VMP code for “amoxicillin 500mg capsule” includes the active ingredient (amoxicillin), the strength (500 mg) and the form (capsule).

The following information is included in the structure of the medication record:

– dosage instructions (eg one, three times daily)
– quantity (eg 15 capsules)
– duration (eg five days).

Hospital prescribing records are dose based:

- Virtual therapeutic moiety (VTM) – eg amoxicillin

The following information is included in the structure of the medication record:

– medication form (eg capsule)
– dose (eg 500mg)
– route (eg oral)
– medication frequency (eg one, three times daily).

The differences in coding structure can be illustrated as follows:

Hospital	Amoxicillin	Capsules	500mg	Oral	One TDS
Primary care	Amoxicillin 500 mg capsules			One TDS	

HSCIC publishes guidance for a prescribing model for secondary care, set out in the 'dm+d implementation guide (secondary care)', which includes mappings between VTMs, VMPs and AMPs. They also produce SNOMED CT subsets for drugs, which include prescribing rules, which set the minimum data set required for safely prescribing specific groups or types of drugs and which include the relationships between VTMs, VMPs and AMPs.

The relationships between VTM, VMP and AMP are:
-a VTM may be linked to one or more VMPs
-a VMP may be linked to one or more AMPs.

In terms of SNOMED CT, relationships between VTM, VMP and AMP can be described as:
-"amoxil 500mg capsules (Dowelhurst Ltd)" (AMP) is a "amoxicillin 500mg capsule" (VMP)
-"amoxicillin 500mg capsule" (VMP) is a "oral form amoxicillin" which is a "amoxicillin" (VTM).

Although the way in which medications are prescribed in primary and secondary care differs, they will be comprehensible to clinicians when communicated between settings provided they are recorded in both settings using common codes (dm+d).

Discharge medications may be prescribed as 'dose-based' (eg paracetamol – 1g – orally – QDS) but will have to be turned into an AMP by the pharmacy to be dispensed to the patient to take home with them. Similarly if a medicine has been given on the ward an actual product would have been given, so the AMP or VMP would be recorded as the medicine that was administered. Thus, an electronic discharge summary message can carry the medicine in a form which can be used electronically in the GP practice computer system, eg paracetamol 500mg tablets. Outpatient prescribing would also need to be product-based for the medication to be communicated to primary care.

Hospitals receiving information as VMP and AMP will be able to aggregate data up to the corresponding VTM if they wish (or use the ingredients links if they prefer this in their solution), because of the mappings in the prescribing model in dm+d between VTMs, VMPs and AMPs. The dose will need to be taken into consideration in doing so, as it is not included in the VTM concept.

Recommendations

- **It is recommended that dm+d is used for all medication records in primary and secondary care.**
- **Where medication records are communicated between care settings, the VMP or, where clinically relevant, the AMP, should be communicated. The SNOMED CT term should be carried as well as the code and the term should be displayed in the communication.**
- **Medication records communicated between care settings should be reviewed by an appropriately qualified recipient prior to inclusion in the medical record.**

NHS dose syntax

In order to fully communicate information about administration and/or supply of a medication to a patient for therapeutic purposes, there must be a clear and unambiguous description of both the medicine itself, and the instructions for its use. The first of these is addressed by the NHS dm+d, which provides standard textual descriptions and electronic identifiers for all medicines used in the NHS. The second of these, the 'instructions for use' can be termed the 'dosage instructions'. 'Dose syntax' refers to a defined structure (message) that allows consistent and interoperable communication of

dosage instructions. The syntax therefore deals with concepts such as 'how much' of the medicine, 'how often' to give it, 'where and how' to administer it, and for 'how long'.

The way in which dose instructions are conveyed currently differs between clinical system suppliers, with some use of plain text and local/proprietary coding as there is no common model for dose syntax.

In 2008, NHS CFH built on work done by the NHS Information Authority in 2004 and developed a common model for dose syntax to be used in both primary and secondary care. This would enable this information to be conveyed between settings in a structured format and hence re-used in the receiving application. The model is terminology agnostic however as SNOMED CT and dm+d are NHS terminological standards their use is recommended as the terminology to support the model. It is still in draft, with no plans to take it forward as a standard at this time. To do so, would require clinical and technical assurance.

It is understood that implementing the NHS dose syntax in full is likely to be challenging to systems vendors, but that there is appetite amongst systems vendors to take forward the dose syntax to some extent.

Recommendations

- **It is recommended that the draft NHS dose syntax is developed and taken through clinical assurance as a standard.**
- **It is recommended that to enable progress to be made on implementing the NHS dose syntax, that a limited achievable, but extensible, scope be agreed with system vendors as a practical initial implementation.**

Implementation strategy on communicating medication records

Implementation of electronic medication records in secondary care is currently limited and it will take time to reach a point where records are available to be communicated to/from primary care in a common structured format. Rather than delay until all systems are ready, benefits could be obtained more quickly through an evolutionary approach to communicating medication records between primary and secondary care, where those organisations which are able to handle coded data can do so, but also where those that cannot, can at least benefit from having textual representation of medications available:

- Medications included in referrals, outpatient and discharge communications in a standard format, in line with the headings proposed in this document, as text, to view and, if necessary, re-entered in recipient system. (The electronic discharge summary toolkit provides a good basis for this: www.connectingforhealth.nhs.uk/systemsandservices/clinrecords/24hour).
- Medications included in referrals, outpatient and discharge communications in a standard format, in line with the headings proposed in this document AND recorded using SNOMED CT, where a drug is represented in human readable form by the SNOMED CT text, so it can be reviewed by a clinician, prior to upload, with the upload automated by system suppliers, where feasible, based on the SNOMED CT identifiers.
- Further refinements, eg to identify differences in what medications a person came into hospital on and was discharged on.

Recommendations

- **It is recommended that consideration be given to an evolutionary path to communicating medications electronically between primary and secondary care, so that progress can be made more quickly.**

Reference information

To implement medication records electronically, in addition to a common structure, there are other matters relating to the way that medication is recorded and displayed, so that it is clinically safe. This includes technical specifications for different fields in the medication and how they should be displayed. This section provides references to documentation that covers this area. The material does not provide a definitive specification for systems vendors.

Documents/resource	Location	Outline of content
Recording and display of medications		
NPSA design for patient safety (on-screen display of medications)	www.nrls.npsa.nhs.uk/resources/?entryid45=66713&q=0%ACdesign+for+patient+safety%AC	Guidance for vendors and those procuring e-prescribing systems on safe on-screen display of medications to avoid misinterpretation.
Common User Interface - medications management guidance	www.cui.nhs.uk/Pages/NHSCommonUserInterface.aspx	Guidance for vendors on display of and interaction with medication records, including format and layout of medication lines and lists, prescribing, drug administration and timelines. Note that this guidance has been found difficult to implement and it has not been approved as a standard.
Medication record content, syntax and coding		
Dictionary of Medicines and Devices (dm+d): • dm+d implementation guidance (secondary care) • dm+d implementation guidance (primary care) • dm+d implementation guidance (extemporaneous preparations)	http://www.dmd.nhs.uk/documentation/index.html **dm+d XML** Editorial Policy Release 2 Version 3.0 - March 2012 dm+d Technical Specifications of Data Files Release 2.0 Version 3.0 dm+d Data Model Release 2.0 Version 3.0 **dm+d implementation guidance** dm+d Implementation Guidance (Primary Care) (PDF, 1Mb) dm+d Implementation Guidance (Secondary Care) (PDF, 1Mb) dm+d Extemporaneous Preparation Implementation Guidance (PDF, 184Kb) **SNOMED CT UK drug extension** SNOMED CT UK Drug Extension Editorial Policy v1.6 (PDF, 679Kb)	Guidance for vendors implementing NHS dm+d in secondary and primary care systems. Also implementing medications requiring recipe or formula preparation (eg parenteral preparations).
dm+d XML files (weekly) SNOMED CT UK Drug Extension	www.uktcregistration.nss.cfh.nhs.uk/trud3/user/guest/group/0/	Files containing updated dm+d and SNOMED CT items.

Documents/resource	Location	Outline of content
(four weekly)plus UK drug bonus files and e-prescribing subset files	home	Downloadable from Technology Reference data Update Distribution (TRUD). (HSCIC).
Draft NHS dose syntax model v0.8	Not published. Available from Health and Social Care Information Centre (information.standards@hscic.gov.uk)	A model for the way in which medication administration instructions should be recorded.
NHS Scotland – a medication and allergies OpenEHR archetypes model, available for review	www.clinicalmodels.org.uk	A review of outpatient medication and allergy clinical information models being developed as part of the work led by SCIMP in NHS Scotland to update and align the way that these concepts are handled in clinical messages.
Procuring e-prescribing systems		
NHS CFH e-prescribing system guidance	www.connectingforhealth.nhs.uk/eprescribing	Various resources for those procuring e-prescribing systems, including a functional specification for an e-prescribing system and lessons learnt.
Medication transfer between care settings		
RPS 'Keeping patients safe when they transfer between care providers: getting the medicines right' report, 2012	www.rpharms.com/getting-the-medicines-right/keeping-patients-safe-report.asp	Guidance for vendors and pharmacists on implementing electronic transfer of pharmaceutical records.
Technical specifications for transfer of medication information between care settings	Available from Health and Social Care Information Centre (information.standards@hscic.gov.uk)	Various technical specifications, including: medications carried within the GP2GP record transfers, medication records sent to the Summary Care Record and prescriptions sent from GP to pharmacy.

Appendix – strategic medications working group membership

Name	Organisation
Iain Carpenter	Royal College of Physicians
Jo Goulding	Health and Social Care Information Centre
Stephen Jackson	Kings College Hospital/ Academy of Medical Royal Colleges
Emyr Jones	Department of Health Informatics Directorate
Ian McNicoll	Royal College of General Practitioners
John Williams	Royal College of Physicians
John Williams	Royal College of General Practitioners
Heidi Wright	Royal Pharmaceutical Society