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Leading health innovation through data

201919 Machine - readable Medications Instructions

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Summary

The NHS has developed guidance to support transmission of interoperable medications messages between clinical systems. This is now implemented using the SNOMED CT coded NHS Dictionary of Medicines and Devices (dm+d) with additional data from SNOMED CT to support the messages.

Audience

Clinical

Learning Objectives

1. Use cases for interoperable medications messages
2. How SNOMED CT can support FHIR machine readable medication instructions.
3. The benefits of interoperable medications messages.

Abstract

The manual translation and re-keying of data from one system to another is both a potential source of error and ambiguity whilst being resource intensive. By reducing the need for re-keying of information we should be able to provide safer care for patients, and more efficient, reliable and unambiguous information for healthcare professionals. In the UK a project was undertaken by NHS England and NHS Digital with the purpose of providing a way in which medication information can be shared between health and care systems in a standard machine-readable format. This would enable data to be transferred and translated into the appropriate prescribing syntax allowing healthcare professionals to review and action appropriately in the receiving system.

This project was focussed specifically on how to record the complexities of medication dosage instructions and timings in a standardised way that can be understood by different systems in the same way. Representing medication dose instructions in a machine-readable way is difficult because, in part, there is huge variety in the way dosage and timing are described across clinical care settings and between individual clinicians. In addition the scope of medications ranges from simple once a day tablets to multi-drug infusions with variable administrations, intermittent medications given in the community, dose titrations and dosing relative to other events or timings.

Recognising the complexity of the subject, although the ultimate goal is for the majority of medications instructions to be sent in a machine readable format, the aim of this project was to enable 80-90% prescription instructions to be sent in a machine-readable format. Those instructions that are not able to be sent in a machine-readable way would still be able to be sent as a message but would utilise the free text fields necessitating a human translation at the receiving end.

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As the prevalence of medications data increases and clinical systems become more connected there is an increasingly strong driver for medications data to be transmitted in a format that supports interoperability by identifying both the prescribed item and the dosage instructions.

Potential use cases for interoperable medications data.

1.The communication of medications information between GPs and hospitals

2.Electronic transfer of medicines information between hospitals

3.Electronic transfer of medicines information within hospitals between electronic prescribing and medicines administration (ePMA) and pharmacy systems

4.Hospital discharge to general practice or community pharmacy

Working in the UK with suppliers of clinical and pharmacy systems there are proof of concept implementations using the messaging standard for messages being sent between hospital systems and also hospital to G.P. systems. Ultimately we expect this work could support all medication information sharing scenarios.

How SNOMED is used in the Messaging Profile.

Fast Healthcare Interoperability Resources (FHIR) is a standard for exchanging healthcare information electronically and is the strategic standard for interoperability between systems within the NHS. The international FHIR standard is published by HL7. A set of UK specific profiles known as the UK CareConnect FHIR Profiles based upon the FHIR STU3 set of resources have been developed. This project worked to develop implementation guidance focussed on the messaging of structured dosing information within the NHS.

A messaging standard alone is not enough for this to work, there is also a requirement to reference other terminologies and or value sets.

SNOMED CT is the NHS Terminology of choice for clinical information and since 2003 NHS Dictionary of Medicines and Devices (dm+d) has been published as the UK drug dictionary. This is SNOMED coded drug dictionary that uses a fixed 5 box structure to support prescribing within the NHS. It now has extensive usage within the NHS Electronic Prescription Service but up until now all medications instructions have been sent as text strings. dm+d is expected to be the source of the Medication items in the messages although the standard does support usage of additional concept classes from the SNOMED CT UK drug Extension as the medication item.

Additional data elements are also required to support interoperable medication instructions.

There are a number of areas where SNOMED content is utilised in the message to provide interoperability. The sources of these codes are identified as below

Medications Reference.Coded data. Implementation guidance supports 3 possible ways to do this in the message.

1.As an internal reference to a FHIR medicationRequest resource, known as a "contained resource".

2.As an internal reference to a FHIR resource elsewhere within a

FHIR bundle .

3.As an external reference to a RESTful API that would return a FHIR medication resource for the dm+d concept. At the time of writing, such a terminology service does not exists so use of this method is not recommended.

All references to medication must use the NHS standard of dm+d for medicinal products.

Form. SNOMED coded. Implementation guidance proposes use member of SNOMED UK Drug Extension refset 999001081000001103 | ePrescribing dose form simple reference set (foundation metadata concept)

Additional instructions. From SNOMED CT. Example value set provided in FHIR profile.

as Needed.Two data fields. A Boolean field and a separate SNOMED coded field to provide a reason. Implementation guidance permits any coded term can be used from the SNOMED-CT hierarchy as a descendant of 404684003 | Clinical Finding (finding)

Site.SNOMED coded. Implementation guidance proposes using any descendant of the concept 123037004 | Body structure (body structure) from SNOMED CT.

Route.SNOMED coded. Implementation guidance proposes any descendant of the concept 284009009 | Route of administration value (qualifier value) from SNOMED CT

Method.SNOMED coded. Implementation guidance proposes any member of SNOMED UK Drug Extension refset 999000041000001103 ePrescribing method simple reference set (foundation metadata concept)

Potential benefits for interoperable medications data.

Supporting medicines reconciliation

•If the transfer of dose information persisted across care sector interfaces, this could help address workforce capacity issues as it could reduce the time taken in medicines reconciliation

Improving safety

•Reducing the requirement for manual transcription of information to be undertaken and the linked risk of errors being made during the transcription process;

•Machine processable instructions such as making it possible to identify medications only intended for a specific treatment course length.

•Improved communication between hospital pharmacy stock control and EPMA systems, reducing time spent and safety risks associated with transcribing information manually.

•Adding value to medication instructions on prescriptions with the aim of as to reduce "as directed" instructions.

•Machine processable instructions have the potential to identify non-compliance.

Improving communication

•Access to full medication history for a patient for all clinicians involved in the patient care

•If nominated pharmacies were in receipt of discharge data this could pre-populate the pharmacy dispensing system prior potentially reducing the risk of the patient being dispensed "old prescriptions" or "old directions"

Improving patient experience

•The potential for patient apps to prompt re-ordering, medication times or monitor compliance.

•Many people living with long-term conditions rely on one or more 'family' carers' for support and it may be the carer who manages and administers their medications. Clear and consistent prescribing/administration instructions is beneficial in this situation.

Improving dose calculation

•Automated calculation of amounts used to support stock control;

•Calculation or confirmation of correct and accurate dosage

•Potential to track dose changes over time

•Consistent identification of the medication.

•Alerts for over and under prescribing or incorrect treatment duration

Supporting secondary uses

•Ability to analyse prescribing data with other metrics/quality indicators/outcome measures to assess impact (e.g. data analysis, machine learning);

•Support more intelligent patient outcomes analyses for drug prescriptions;

•National epidemiological data;

•Audit of variation in prescribing practices;

Other

•Driver for adoption of electronic prescribing and administration systems.

•With the help of vendors this work could enable the systems to display the information different formats dependant upon the user/ use case.

•Potential for interaction of dosage information with smart devices controlling medication administration or patient monitoring.

Future plans.

Further refinements to the standard to support prescribing of:-

 *combination packs

* treatment regimens where there is a medication free interval

*chemotherapy.

Further work to translate the machine-readable message and provide the text narrative is being undertaken and also work to support the translation of dose based prescriptions to provide suggestions for product-based options is planned for the project team