Towards a communal patient medication record

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SCIMP
HANDIHealth
openEHR Foundation

SCIMP Conference Oct 2014
Introduction

- Former Clydebank GP
- Health Informatician since 2000
  - freshEHR Clinical Informatics
  - Director openEHR Foundation
  - SCIMP
  - HANDIHealth
- Commercial software developer
  - ‘GP Accounts’
Community medication stakeholders

- GPs
- Nursing
- Mental health teams,
- Pharmacy
- Secondary care inpatients
- Secondary care outpatients
- Nursing homes
- Unscheduled care
- Patients

- GP prescriptions
- Anticipatory care supply
- Repeat dispensing
- Transitions of care
- Own supply
- Patient access
- Patient-led reconciliation
Current position

No clear visibility of other prescribers actions

Patient often only the knows the whole picture

No clear governance

Non- standardised representation of medication between systems
What’s the problem?

- Significant patient safety issue
- Confusion and inefficiency
- Transitions of care
- Unscheduled care
- Day to day care
What’s the solution?

‘Closing the Loop’ commission

- ‘patient medication record’
- ‘community’ record

Inpatient prescribing excluded other than at transitions of care
**Supported Meds Reconciliation**

**eMedicines Reconciliation Form - Version 1.0**

**Hospital Name:** Southern General

**Patient Details**

<table>
<thead>
<tr>
<th>Name</th>
<th>Mouse, Mickey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>257 GARDEN AVENUE</td>
</tr>
<tr>
<td></td>
<td>BONNYBRIDGE FALKIRK</td>
</tr>
<tr>
<td>Postcode</td>
<td>PA41 1YW</td>
</tr>
<tr>
<td>CHI Number</td>
<td>0101011016</td>
</tr>
</tbody>
</table>

**Sources Checked**

<table>
<thead>
<tr>
<th>Source</th>
<th>ECS</th>
<th>Relative</th>
<th>Patients own drugs</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>X</td>
<td>GP Surgery</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Carer</td>
<td></td>
<td>GP Printout</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Drug List**

<table>
<thead>
<tr>
<th>Started</th>
<th>Drug</th>
<th>Formulation</th>
<th>Dose</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>SALMETEROL cfc free inh</td>
<td>1 120 dose inhaler</td>
<td>INHALE 2 DOSES TWICE DAILY</td>
<td>INHALE 2 DOSES TWICE DAILY</td>
</tr>
<tr>
<td></td>
<td>25 micrograms/actuation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09</td>
<td>GABAPENTIN caps 300mg</td>
<td>56 capsule(s)</td>
<td>TAKE ONE 3 TIMES/DAY Instalments: D</td>
<td>isp weekly</td>
</tr>
<tr>
<td>10</td>
<td>CITALOPRAM tabs 20mg</td>
<td>28 tablet(s)</td>
<td>ONE IN THE MORNING</td>
<td>ONE IN THE MORNING</td>
</tr>
</tbody>
</table>
Danish single medication record database

From e-Prescription to Shared Medication Record
The technical challenges

Where does the medication information live?

- Single central database
- Health Board database
- GP system

Performance vs. politics?
The people challenges

How does governance work?

- What is the role of the GP?
- How are clinical conflicts resolved?
- What is the role of the patient / carer?
- “Washing our dirty laundry?”
The interoperability challenges

How do we resolve the ‘wicked’ interoperability issues?

- Standardised, computable ‘medication models’
- Product vs. dose based prescriptions
- Computable dose timings
- ‘Medication event’ vs. ‘Medication statement’
Playing all the right notes?

NHS Scotland GP messaging
- Emergency Care Summary / Key Information Summary
- SCI Referral (Gateway)
- ePharmacy
- NHS Data Services API (portals)
- GP2GP (2015)

Each developed by a different teams
- non-interoperable representations of medication
- replicated *4 around the UK
Medication models

Based on GP2GP medication models

- merge in requirements for
  - ECS / KIS / ePharmacy / SCI-GW
  - Other UK models: SCR, IHR, EPS2
  - Aligned with PRSB / RCP Headings

Can we persuade systems suppliers to adopt?
Modelling approach

Based on openEHR but technology neutral

- models of ‘clinical content’
- Exchange -> messages / APIs
  - SCI-XML, GP2GP, HL7 FHIR inte
- can be used natively inside openEHR-based systems

Aligned with dm+d, CUI
open, shared data models - ‘Archetypes

Clinically-led + collaboratively authored

- open-source ‘crowd-sourcing’ methodology
- Shared open repository ‘CC-BY-SA’ licence

Agility in response to continually changing clinical demand

- Clear ownership, change request mechanism
- Tight version control
Product vs dose based prescribing

**Product:**

<table>
<thead>
<tr>
<th>paracetamol</th>
<th>500 mg tablets</th>
<th>oral – <strong>DOSE</strong> take 2 – four times a day</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMP from Drug Dictionary</td>
<td></td>
<td>Dose Syntax compliant coded data</td>
</tr>
</tbody>
</table>

...can be determined by a computer as equivalent to:

**Dose:**

<table>
<thead>
<tr>
<th>paracetamol</th>
<th>oral – tablets</th>
<th><strong>DOSE</strong> 1000 mg – four times a day</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTM from Drug Dictionary</td>
<td></td>
<td>Dose Syntax compliant coded data</td>
</tr>
</tbody>
</table>

- Unavoidable

- due to difference in the process of inpatient vs. outpatient prescribing
Dose syntax??

How can we capture a prescription like …

“Co-codamol 8mg/500mg/5ml oral suspension 5-10mls 4-6hourly for 7 days for pain, maximum 40mls daily”

that makes the drug name, dose amount, timing and maximum dosage computable
Dose syntax - aims

- support automated medicines reconciliation at transitions of care
- calculate Total Daily Dose for quality assessment purposes
- explore usage as data entry method

Out of scope

- inpatient prescriptions
- complex GP prescriptions
- patient usage instructions ‘before meals’, ‘take with water’
Dose syntax - sources

Blue Wave / English NHS / CfH Dose syntax work
- Comprehensive, complex
- Low uptake

Uni. Dundee ‘EBNF’ Dose syntax
- Successful use as research tool
- Confined to GP prescriptions
Proposed solution is a mix of archetype’s structural model + parsable syntax which carries dose amount + timing

- “10mg td”
- “3 n”
Examples I

Atenolol 40mg tablets one tablet in the **morning**

```json
{
  "Medication Name": "Atenolol 40mg tabs",
  "Parsable dose direction": "1 m"
}
```

Atenolol – oral - 40mg in the morning

```json
{
  "Medication Name": "Atenolol 40mg tabs",
  "Route": "oral",
  "Parsable dose direction": "40mg m"
}
```
Examples

Paracetamol liquid oral 125mg/5mls 5-10mls up to every 4-6 hours as required for pain or fever, maximum 40mls in 24 hrs

{
    "Medication Name": "Paracetamol liquid 125mg/5mls"
    "Route": "oral"
    "Parsable dose direction": "5-10ml ^4h/6h prn [40ml h24]
    "Additional instruction": "for pain or fever"
}

Enalapril – oral - 2.5mg once daily for 2 days, then 5mg once daily for 7 days, then 10 mg once daily indefinitely

{
    "Medication Name": "Enalapril"
    "Route": "oral"
    "Parsable dose direction": "2.5mg od:2d;5mg od:7d;10mg od:ind"
}
Where are we now?

Medication models about to be published
- going through PRSB approval
- being used in some NHS England funded projects

Dose syntax near completion
- then goes to implementers for consultation
Leeds NHS Care Record: open Platform

Clinic Content “Archetypes”:

- Medication, allergies (GP2GP/ RCP/NHSS)
- Problems, procedures (International)
- End of Life content (ISB)
- Vital Signs, NEWS (International)

Open APIs:
- ESB/Spine
- ITK Integration component
- SMARTPlatforms

openEHR Foundation accredited Open Standards CDR Service layer

‘OceanEHR’ Clinical data repository

Leeds Clinical Portal via SMARTPlatform APIs

N3 hosted
NHSS Medication models in use

Renal PatientView

- Manage your condition and medications
- Monitor your symptoms and tests
- Make contact with your care team

NHS Hack Day
Geeks Who Love the NHS
Patient-driven medication reconciliation

Age: 24y 5m
Gender: Female
DOB: Mar. 9, 1990
Address: Flat 3b 123 Acacia Avenue, Leeds

Medereca Wurst

Healthcare team members:

Our records show

Beconase Aqueous 50micrograms/dose nasal spray (GlaxoSmithKline)
2 SPRAYS BD IN EACH NOSTRIL

Add a new Medication

Your updated records

✓ I take this as prescribed
△ I take a different dose
✗ I don't take this at all

Beconase Aqueous 50micrograms/dose nasal spray (GlaxoSmithKline)
2 SPRAYS BD IN EACH NOSTRIL
Changed Dose
The dose has been doubled by the renal clinic

Amlodipine 5mg tablets
ONE TAKEN DAILY

✓ I take this as prescribed
△ I take a different dose
Medsreca Wurst
Age: 24 yrs 6 months
Gender: Female
DOB: Mar. 9, 1990
Address: -

Healthcare team:

Allergies:
- 06-Aug-1989 - Adverse reaction to Penicillins
- 06-Aug-1989 - Adverse reaction to Penicillins

Medications:
- Beconase Aqueous 50 micrograms/dose nasal spray (GlaxoSmithKline) 2 SPRAYS BD IN EACH NOSTRIL
- Amlodipine 5mg tablet (ONE TAKEN DAILY)
- Beconase Aqueous 50 micrograms/dose nasal spray (GlaxoSmithKline) 2 SPRAYS BD IN EACH NOSTRIL
- Amlodipine 5mg tablet (ONE TAKEN DAILY)

Age: 24
Weight: 22.86 kg/m² (Normal)
Blood pressure: (Systolic) [Blue] (Diastolic) [Blue]
Saturation: [Green]
Dose syntax in trial use

Mohammed Hussain @EPSPharmacist · Oct 23
The Meds rec tool would’ve been right up @HospChiefPharm street!

@NHSOpenSource #innovation
Like the @NHSSCR link 😊
Balls and windage
Traditional standards development

- Clinical stakeholders engage through top-down governance
- Committee-based
- Late vendor engagement
- Fixed review cycles
- Unclear / unresponsive change request mechanism
Are ‘Standards’ necessary?

FAREWELL TO “RUTHLESS STANDARDISATION”

“Ruthless Standardisation” was the failed mantra of the NHS National Programme for IT. The Programme is dead, but in some places this view still persist but it is time to consign it to history as something else that “seemed a good idea at the time”

http://www.woodcoteconsulting.com/farewell-to-ruthless-standardisation/

Are standards necessary?

A common strategy for structuring complex human systems is to demand that everything be standards-based. The standards movement has taken hold in education and healthcare, and technical standards are seen as a prerequisite for information technology.

http://coiera.com/13/11/01/are-standards-necessary/
Clinically-led standards development

- Clinical stakeholders, vendors engage directly with clinically-led content service
- Continual dialogue with stakeholders via web-collaborative tooling
- No fixed review cycles
- On-demand change requests directly to clinical content service
- PRSB has high-level governance role
Web-based clinical review

Content Review Summary: Adverse reaction

Content Review Summary: Adverse reaction (Revision: 6) (3040a0f5-520b-47b2-8d57-ff2f4f45f0a7)

Invitation

Paul Miller (17-Apr-2013)
I still feel the name is fundamentally misleading to clinicians as the archetype is to be used for adverse reactions, not just immune mediated reactions.

Heather Leslie (30-Apr-2013)

There is debate in many circles, but it can commonly be agreed that allergies and intolerances are a subset of the broader notion of an adverse reaction. On the other hand it is not clinically understood that intolerances are a subset of allergies, which is implied by the naming. So being devil's advocate here - I recognise that naming this archetype is largely for historical reasons, but given that this archetype may be in use for many years to come, is it worth considering renaming the concept for posterity? Further, are you recording the allergy or evidence of the allergic reaction? There are many that argue that this is a really important distinction.

Colin Brown (29-Apr-2013)
prefer "Adverse Reaction" as a more inclusive term for titles etc, it includes "allergies".
As implied by SCT's term I think BMJ articles supported this a few years ago - could search it out...

Editor Feedback:

@Paul @Colin I agree that adverse reaction would be a better term. This archetype has its roots in the GP2GP 'Drug allergy' archetype where its use is quite limited to the recording of drug allergies and adverse reactions

@Heather
1) I agree that it is worth renaming to 'adverse reaction' in line with thinking elsewhere.

2) We are essentially recording the risk of propensity to allergy/adverse reaction, with a single code for the reaction observed. UK GP systems all simply capture a single 'allergy' record which mixes the record of the reaction with the assertion of future risk. I know this is hotly debated around the world but at least in the GP systems community we have some real consensus in recording practice.

@Sam This is also one of the aspects that is a hot topic when the recording of allergy is discussed. Should we try to distinguish allergy from adverse reaction from intolerance etc? In practice it has been found that clinicians are pretty poor at making the distinction reliably and, particularly in general practice, the nature of the underlying pathophysiology can be pretty unclear.
‘distributed Governance’
Project editors decide on formal publication, acting as “Benign Dictators”

Professional bodies, vendors, and PRSB may Endorse resource as a secondary exercise.

This does not restrain the formal publication process.

“By Royal Appointment”

PRSB hires and fires Editors.
For discussion

- Does it make sense to host a single community medication record in GP systems?
- Does it need overall governance by ?? GP?
- Are we wrong to exclude inpatient prescribing?
- Should we ‘try harder’ with the dose syntax?
- Does it make sense to try to ‘do standards’ differently?