Hospital Electronic Prescribing and Administration Systems: Opportunities and Challenges

Bryony Dean Franklin
BPharm MSc PhD FFRPS FRPharmS

Professor of Medication Safety
University College London

• Institute for Digital Health
• www.ucl.ac.uk/digital-health

• UCL School of Pharmacy
• www.ucl.ac.uk/pharmacy

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@school_pharmacy
Why are you still studying medication errors? There won’t be any soon, once we have electronic prescribing…
WHEN ARE YOU GONNA STOP SITTING ON THAT FENCE.

DUNNO. HAVEN’T DECIDED YET.
UK hospital electronic prescribing

The Use and Functionality of Electronic Prescribing Systems in English Acute NHS Trusts: A Cross-Sectional Survey

Zamzam Ahmed¹,², Monsey Chan McLeod¹,², Nick Barber¹, Ann Jacklin¹, Bryony Dean Franklin¹,²

¹ The Centre for Medication Safety and Service Quality, UCL School of Pharmacy, London, United Kingdom, ² Pharmacy Department, Imperial College Healthcare NHS Trust, London, United Kingdom
UK hospital electronic prescribing

165 trusts respondents

- 101 trusts (61.2%)
  - No EP
    - 31 hospitals (30.7%)
  - Some form of EP
    - 70 hospitals (69.3%)
  - More than 1 system
    - 39 hospitals (55.7%)
- 31 hospitals (44.3%)
UK hospital electronic prescribing

• Four sites had more than 4 systems.
  – 60 different systems
• Discharge prescribing in 48% (n=48) of sites
• Nearly half of respondents had EP systems supporting in-patient prescribing (30%, n=30).
  – 13 hospital-wide
• Outpatients least catered for (3%, n=3).

What are the opportunities?
No more transcribing inpatient drug charts

- Error rate similar to writing new medication orders
- “transcribing is such a boring, thankless tedious job – I am not going to sit there and use my clinical judgement at this time of night”


Mystery prescriber writes 90% of prescriptions!

Prescribers unaware of errors! We know that current practices don’t always support prescribers’ ongoing learning and wish to change that.

Revolutionary ideas not needed! Simply being able to identify prescribers and empowering pharmacists to provide feedback has been recommended as a solution.
Secondary use of data

• Eg. Does the introduction of a restricted antibacterial policy result in the delay or omission of antibacterial doses?

• Antibacterial ePA data retrieved for:
  – All doses and first doses
  – Restricted vs non-restricted
  – Ward stock vs non-stock

Powell N, Jacklin, A; Franklin BD, Wilcock M. Omitted doses as an unintended consequence of a hospital restricted antibacterial system: a retrospective observational study. Accepted for publication JAC 2015
Increased legibility?

<table>
<thead>
<tr>
<th>Forenames:</th>
<th>BLANE</th>
<th>Address:</th>
<th>9 WESTFIELD AVENUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surname:</td>
<td>ANDERSON</td>
<td>WESTHILL</td>
<td>CROYDON</td>
</tr>
<tr>
<td>D.O.B:</td>
<td>29/05/1935</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital No:</td>
<td>T000010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NHS No:</td>
<td>490 535 9113</td>
<td>CR2 5AR</td>
<td></td>
</tr>
</tbody>
</table>

**Medication on discharge:**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Frequency</th>
<th>Days</th>
<th>Route</th>
<th>GP Continue?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission drugs (unamended)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paracetamol 500mg tablets</td>
<td>1g</td>
<td>four times a day as needed</td>
<td>28</td>
<td>Oral</td>
<td>Yes</td>
</tr>
<tr>
<td>Admission drugs (amended)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bisoprolol 5mg tablets</td>
<td>10mg</td>
<td>daily</td>
<td>28</td>
<td>Oral</td>
<td>Yes</td>
</tr>
<tr>
<td>(Change Reason: increased dose)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drugs prescribed since admission</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspirin 75mg dispersible tablets</td>
<td>1 tablet</td>
<td>daily</td>
<td>28</td>
<td>Oral</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**STOPPED admission drugs - DO NOT SUPPLY!**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furosemide 40mg tablets</td>
<td>40mg</td>
<td>each morning</td>
</tr>
</tbody>
</table>
Workflow improvements?

**Drug round information: Site S01, DR06, N06**
Wednesday 6am, 6 patients on round, 6 given medications

- **Doses:** 35 (includes 2 intravenous doses)
- **Duration:** 109 min (18 min/patient, 3.1 min/dose)
- **Pedometer:** 1703 steps (283 steps/patient, 49 steps/dose)

**KEY**
- ○ ○ Travel
- ● Start of drug round
- X End of drug round
- □ Drug trolley
- ○ ○ ○ Worktop
- ○ Bed

Diagram of a hospital floor plan with labeled areas such as G-bay, F, D, C, H-bay, B-bay, A-bay, and rooms like Shower room, Storage, Kitchen, Treatments room, Sluice, and Bed.
Reduction in medication errors?

• Compared with paper-order entry, CPOE associated with half as many pADEs (pooled risk ratio (RR) = 0.47, 95% CI 0.31 to 0.71) and medication errors (RR = 0.46, 95% CI 0.35 to 0.60).

• Only 2 of 16 included studies from the UK

Figure 2. Risk ratios of 25 studies analyzing the effect of electronic prescribing on medication errors.
Figure 2. Risk ratios of 25 studies analyzing the effect of electronic prescribing on medication errors.

Ammenwerth et al, JAMIA 2008
Closed loop systems

• Likely to be additional benefits from closed loop systems
  – Automated ward based dispensing
  – Barcode verification
  – Smart pumps

What are the challenges?
New errors

• Selection errors
• Prescribers may now have to choose a specific product, not just a drug and dose
• “The computer must be right”
One error potentially affects more patients
Increased legibility at the expense of decreased contextual information

• Prescription “story” can be harder to read
• Multiple screens
• Same colour and font in lists: “all looks the same”
• Capital letters
• No subtle clues - prescription is “quite convincing”
• Too much information on each screen: “it no longer jumps out at you; you have to go looking for it”

Shemilt K.  Abstract presented at RPS Conference, Birmingham, 7 September 2014
Alert overload

- Drug safety alerts overridden in 49% to 96% of cases (Van der Sijs et al)
- On ward rounds, 48% medications triggered alerts, 17% of them read, no changes made as a result (Westbrook 2015)

“If you have too many warnings from the computer then that makes you tend to override them, you become a bit more cavalier and that's a danger.” (Practice Study, PR6-GP3)

Unintended consequences

“Unfortunately, your satellite dish is interfering with your pacemaker. The good news is: you’ll be dreaming in high definition surround sound.”
Workarounds

- Increased patient identification from 17% of doses with manual system, to 81% with barcode system
- Why only 81%?
- Staff sometimes found the wristband hard to scan, and so stuck the barcode to the patient’s table…
Patient involvement

...EP systems could potentially create a barrier if patients have reduced access to their medication records...

...or conversely, facilitate the production of patient-specific interfaces which could be used to support increased patient involvement
The challenges and opportunities for you...
Health warning

• Do not assume that benefits in other health systems / other countries will extrapolate to your own context
Systems aren’t “plug and play”
Local evaluation essential
Evaluation opportunities

- Use of standard definitions, methods etc wherever possible
- Study designs:
  - Uncontrolled before and after studies
  - Controlled before and after studies
  - Interrupted time series
  - Stepped wedge
When do we measure the effectiveness of the system?

1 week? 3 MONTHS? 1 month? 6 months? 12 months? 2 years?
When do we measure the effectiveness of the system?

With thanks to Nick Barber
Conclusions

• Huge potential benefits
• Success in achieving these is dependent on many contextual and organisational factors
• Local evaluation is essential
  – Need some form of ongoing monitoring and refining of the system. And listening to users
• Embedding systems into everyday practice is a long-term project
Resources
Electronic prescribing in hospitals
Challenges and lessons learned
www.eprescribingtoolkit.com

Welcome to the ePrescribing Toolkit for the NHS

The ePrescribing Toolkit for NHS Hospitals is designed to support NHS hospitals in the planning, implementation and use of ePrescribing and Medicines Administration systems. The toolkit offers you tools, resources and information to help you every step of the way.

Put together by the NHS funded ePrescribing Research Programme, the toolkit is aimed at NHS managers, IT specialists, doctors, nurses, pharmacists, allied health professionals and patients. Find out more by visiting our FAQ pages or by clicking on the links below.

https://www.ucl.ac.uk/digital-health
And today?

**Agenda**

UCL Institute for Digital Health, UCL School of Pharmacy and Cerner invite you to

**Achieving a World Without Medication Error:**

e-Prescribing and Medication Management Symposium
Questions?