The PHARMS Study
(Patient Held Active Record of Medication Status)

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Background

• Medication errors are an important patient safety issue\(^1\)

• Errors frequently occur as patients move between hospital and the community\(^2\)


Issues

• Lack of timely communication of medication information between primary and secondary care

• Errors in medication information

• Poor patient knowledge of medication information
Intervention development

• Patient

• GP

• Information Technology (IT)
Collaboration

- Si-Key Ltd
- Department of General Practice, UCC
- Technology Transfer Office, UCC
PHARMS device
PHARMS device

GP

Patient
Feasibility study$^{1,2}$

To assess the feasibility of introducing the device at hospital discharge

- To assess the clinical impact of use of the device
- To establish acceptability to key stakeholders
- To examine the process of implementation


Methods

• **Study design:** Non-randomised intervention study (intervention and control groups)

• **Study population:** Community dwelling older adult patients (>60 yrs)

• **Setting:** Medical and surgical wards of an urban university affiliated hospital

• **Study sample:** Patients attending one of 4 selected GP practices, taking 3 or more medications admitted to the hospital
Methods

- Issued to participants
- Retained while an inpatient
- Used to generate discharge prescription
- Medication information transferred electronically to GP
Methods: Device operation

1. Inserted into the USB port of the hospital computer
2. Patient’s medications as they appear in the GP record reviewed by hospital doctor
3. Discharge prescription generated
4. Any alterations to medications while an inpatient noted
5. Prescription and notes automatically transmitted electronically to GP
6. Prescription and notes accessible in the ‘Documents’ section of the patient’s GP file
1. Clinical:
- Prevalence of prescribing error on discharge prescriptions in intervention and control arms

2. Acceptability and feasibility:
- Interviews with patients, hospital doctors, GPs, IT professionals
- Non-participant observation
Methods: Prescribing error

Results: Patient recruitment

207 Patients

- 26: No informed consent
- 38: Long term care
- 9: Refused
- 5: End of life care

64 Control

63 Intervention
# Results: Patient demographics

<table>
<thead>
<tr>
<th></th>
<th>Intervention</th>
<th>Control</th>
<th>( p ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td>54% Male</td>
<td>62% Male</td>
<td>0.507 (( \chi^2 )Yates 0.441*)</td>
</tr>
<tr>
<td><strong>Mobility</strong></td>
<td>59% Independent</td>
<td>48% Independent</td>
<td>0.375 (( \chi^2 )Yates 0.788*)</td>
</tr>
<tr>
<td><strong>Dressing</strong></td>
<td>76% Independent</td>
<td>67% Independent</td>
<td>0.490 (( \chi^2 )Yates 0.477*)</td>
</tr>
<tr>
<td><strong>Continence</strong></td>
<td>78% Continent</td>
<td>91% Continent</td>
<td>0.092 (( \chi^2 )Yates 2.842*)</td>
</tr>
<tr>
<td><strong>Feeding</strong></td>
<td>93% Independent</td>
<td>84% Independent</td>
<td>0.296 (( \chi^2 )Yates 1.092*)</td>
</tr>
<tr>
<td><strong>Socioeconomic status</strong></td>
<td>83% Public</td>
<td>71% Public</td>
<td>0.231 (( \chi^2 )Yates 1.092*)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>72.59 Mean (6.17 SD)</td>
<td>77.38 Mean (7.27 SD)</td>
<td>0.01 (t 3.46, df 1)</td>
</tr>
<tr>
<td><strong>Length of stay</strong></td>
<td>6 Median (3,10 IQR)</td>
<td>6 Median (5,13 IQR)</td>
<td>0.207 (Mann Whitney U)</td>
</tr>
<tr>
<td><strong>Meds on admission</strong></td>
<td>10 Median (8,15 IQR)</td>
<td>10 Median (7,13 IQR)</td>
<td>0.248 (Mann Whitney U)</td>
</tr>
</tbody>
</table>
# Results: Prescribing error

## Error number:

<table>
<thead>
<tr>
<th>Error number</th>
<th>Intervention</th>
<th>Control</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error number</td>
<td>1 Median (0.3 IQR)</td>
<td>8 Median (4.13.5 IQR)</td>
<td>&lt;0.001 (Mann Whitney U)</td>
</tr>
</tbody>
</table>
# Comparison of error types

<table>
<thead>
<tr>
<th>Type of Error</th>
<th>Control (n=61)</th>
<th>Intervention (n=41)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Patient Information</td>
<td>2</td>
<td>3.3%</td>
<td>0</td>
</tr>
<tr>
<td>Date</td>
<td>5</td>
<td>8.2%</td>
<td>0</td>
</tr>
<tr>
<td>Legibility/Spelling</td>
<td>5</td>
<td>8.2%</td>
<td>0</td>
</tr>
<tr>
<td>Quantity/Duration</td>
<td>22</td>
<td>36.1%</td>
<td>0</td>
</tr>
<tr>
<td>Prescriber Information</td>
<td>18</td>
<td>29.5%</td>
<td>0</td>
</tr>
<tr>
<td>Drug Interaction</td>
<td>26</td>
<td>42.6%</td>
<td>16</td>
</tr>
<tr>
<td>Frequency</td>
<td>2</td>
<td>3.3%</td>
<td>3</td>
</tr>
<tr>
<td>Dose</td>
<td>7</td>
<td>11.5%</td>
<td>4</td>
</tr>
<tr>
<td>Medication Omission</td>
<td>46</td>
<td>75.4%</td>
<td>17</td>
</tr>
</tbody>
</table>
Results: Prescribing error

Clinical significance:

<table>
<thead>
<tr>
<th>Score</th>
<th>Intervention</th>
<th>Control</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Median (0,4 IQR)</td>
<td>11 Median (5,20 IQR)</td>
<td>&lt;0.001 (Mann Whitney U)</td>
</tr>
</tbody>
</table>
Results: Feasibility

Introduction in both primary and secondary care is feasible
Results: Feasibility

63 Devices deployed

3: Hospital firewall
3: GP server
4: Hospital hardware
3: Patient transfer
9: Not used

41 Successful transmissions
Results: Acceptability

**GPs** (n=8):

- Advantage over paper-based system:
  - Accessible
  - Immediate
  - Higher quality
- Difficulty with deviation from usual practice:
  - Uncertainty re operation
- User dependent

If everyone was doing it we’d have, I suppose, solid prescriptions - we’d know what patients were really on
Results: Acceptability

Junior doctors (n=13):

• User friendly
• Useful:
  ➢ More useful at admission
• Difficulty with deviation from usual practice:
  ➢ Additional workload
  ➢ Forgetting to use device
  ➢ Inadequate hospital computer hardware
• Preference for electronic system

I’m sure it would be fine if it were the primary method for every single patient…..but when you’re writing prescriptions all day, you just forget about it
Results: Acceptability

Patients (n=12):

- Acceptable
  - Concept
  - Technology
- Difficulty in understanding mechanism of action of device
- Difficulty in retaining device as an inpatient

When a doctor’s in front of you, you lose concentration and you can’t remember the names....with the key it would be better.
Results: Acceptability

IT professionals (n=2):

• Issues pertaining to device
  ➢ Early stage
  ➢ Communication with developer
• Integration into existing IT system
  ➢ Security issues
  ➢ Hardware issues
• Acceptable technology

[We] learned a lot and we now know how the system works so implementing it again here going forward would not be a problem but it’s just a learning experience really with projects like this.
Conclusions

Reduction of medication error
Effective use of existing IT infrastructure
Acceptable to key stakeholders

Implementation issues:
> Technological
> Human factors
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