Smart Pumps and Drug Libraries
The Way Forward

Kathryn Phillips
North West Regional MI Centre

The first stop for professional medicines advice
Outline

• The drivers behind the development/use of ‘Smart Pumps’

• What are Smart Pumps & Drug Libraries

• Where does MI fit in?
Where Medication Errors Occur

Physician
Prescribing 39%

Pharmacy
Transcribing 12%
Compounding 11%

Point of Care
Administering 38%
(NPSA 05/06 59%)

138,117 Medication errors were reported to NHS NRLS in one year  (April 12-March 13)

Medication errors at administration stage account for:
- 34% of adverse events (Bates et al 1995)
- 38% of adverse events (Kohn 1999, Rodriguez, 2011)
- 42% of adverse events (NPSA 2010)

* NHS NRLS used to be NPSA
MHRA Patient Safety Alert

20 March 2014 – Patient Safety Alert

Stage Three: Directive Improving medication error incident reporting and learning

Sign up to Safety Campaign

Launched by Health Secretary 20 March 2014
Aim to half avoidable harm in the next 3 years and save 6000 lives.
Trusts which take action to reduce harm and claims => One off reduction in clinical negligence insurance premiums

NHS urged to halve serious mistakes and save 6,000 lives

By Nick Triggle
Health correspondent, BBC News

Jeremy Hunt: “We can turn the NHS into the safest healthcare system in the world”
What are SMART Pumps?

- Smart Infusion pumps can help prevent medication errors by alerting you to a pump setting that doesn't match your drug administration guidelines.

- Drug Libraries convert a conventional IV pump into a Smart Pump.

- Smart Pumps can log data e.g. time, date, drug, concentration, rate, volume infused, near misses — allows audit, education and improvement.
Braun Infusomat® Space for infusion bags
Braun Perfusor® Space for syringes
Drug Libraries

• Let nurses and clinicians select medication and fluids from pre-set lists

• Each drug library can be tailored to specific ‘care units’

<table>
<thead>
<tr>
<th>Southport</th>
<th>Leeds</th>
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<tbody>
<tr>
<td>General Wards</td>
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<td>ICU</td>
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• Can set hard and soft limits
  • Hard – will not let infusion proceed
  • Soft – will notify clinician/nurse and ask if they want to override and proceed
### Clarithromycin

**Released by**: alam
**Priority**: High
**Released on**: Datalock 3 (disabled)
**Flow rate setting**: Rate [ml/h]

<table>
<thead>
<tr>
<th>Category</th>
<th>ITU / General Wards / Obs &amp; Gynaecology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration</td>
<td>CLARith (2 mg/ml)</td>
</tr>
<tr>
<td>Amount</td>
<td>500 mg</td>
</tr>
<tr>
<td>Volume</td>
<td>250 ml</td>
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<tr>
<td>Pump type</td>
<td>LVP</td>
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**Patient Type**: Standard patient profile

**Bolus Rate**
- **Value**: ≤
- **Soft Limit Low**: ≤
- **Soft Limit High**: ≤
- **Hard Limit Low**: ≤
- **Hard Limit High**: ≤

**Continuous Therapy**
- **Rate**: ≤ 250.0
- **Loading Dose**: disabled
- **VTBI**: 250.0 ml
- **Mode**: As primary and secondary
- **Calc rate min/max**: ml/h
- **Auto Lock Level**: ≤ 250.0
### Clarithromycin Fluid Restrict

**Released by:** Datalock 3 (disabled)

**Released on:**

**alarmPriority:** High

**Flow rate setting:** Rate [ml/h]

<table>
<thead>
<tr>
<th>Other Names</th>
<th>Drug ID</th>
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<table>
<thead>
<tr>
<th>Category</th>
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<tr>
<td>500 mg</td>
<td>100 ml</td>
<td>LVP</td>
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**Concentration:** CLARITH (5 mg/ml)

**Patient Type:** Standard patient profile

#### Continuous Therapy

<table>
<thead>
<tr>
<th>Rate</th>
<th>Hard Limit Low</th>
<th>Soft Limit Low</th>
<th>Value</th>
<th>Soft Limit High</th>
<th>Hard Limit High</th>
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<table>
<thead>
<tr>
<th>Loading Dose</th>
<th>VTBI</th>
<th>Mode</th>
<th>Calc rate min/ max</th>
</tr>
</thead>
<tbody>
<tr>
<td>disabled</td>
<td>100.0ml</td>
<td>As primary and secondary</td>
<td>ml/h</td>
</tr>
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Auto Lock Level: 100.0 ml/h
Barriers to DERS / Smart Pumps?

• Smart pumps have been widely available in the UK since 2005

• Most UK hospitals already have Smart Pumps but don’t utilise the technology

Historical Barriers

• Creation of Drug Library
  Creating the initial drug library is a significant amount of work for the hospital – usually pharmacy

• Logistics
  Before WiFi, uploading of the drug library and any changes to it would have to be carried out manually. All pumps in a hospital had to be physically located and returned to the Medical Equipment Library
Learning Points

• Need to be involved in the decision making process, tender and implementation
• Dedicated Project Team – link to Trust Board Level
• More time consuming than we thought!
• Need IT involved at the start
• More discussion with Medical Equipment Library
  • How many pumps available?
  • Which drugs to target initially?
  • Segregation between wards?
• WiFi
Real Data

Hard Limit Alerts

- Actrapid
- Ciprofloxacin
- Clarithromycin
- Vancomycin
- Furosemide
- Aciclovir
- Phenytoin

Data courtesy Graham Cox Leeds Teaching Hospitals NHS Trust
Ward Data

Critical Care

L3 | L4 | L5 | L6 | L7 | L8
---|---|---|---|---|---
Pumps in use | Pumps in DL | Pumps not in DL

Data courtesy Graham Cox Leeds Teaching Hospitals NHS Trust
Where does MI fit in?

The Tendering Process

- Needs a dedicated pharmacist to be involved from the start

Risk Minimisation

- An MI pharmacist has the skills to ensure there is a clear safe strategy for introduction of the pumps

The Drug Library

- Writing
  - The MI pharmacist has all the reference sources at their fingertips for writing the drug library but will need to liaise with clinical specialists

  QA
  - MI pharmacists are excellent at QA
A pharmacist needs to be involved both with pump training, explaining the benefits of the drug library, and with the clinical information that has been programmed.

Information from drug alerts, company information, discussion groups etc comes to the MI Pharmacists.

Reports on drug library progress: usage, changes required, incidents prevented, resulting education.

Communication at the start and throughout the process.

Succession planning.

Collaboration (Carter)
What can go wrong

• Staff not using the drug Library
• Overriding soft limits

• Infusion related errors may still occur
  * Incorrect drug chosen from the drug library
  * Right drug given to the wrong patient
  * Drug already given and given again
  * Infusion is within maximum limits but is incorrect for the patient
Future Possibilities

- A Bar-Code Medication Administration System is needed (BCMA)
  - Would ensure right patient gets the correct drug, dose, route at the right time

- All infusions given via SMART Pumps