Implementation of RFID

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"Ladies and gentlemen, welcome aboard Flight Number 743, bound for Jena. This is your captain speaking. My name is Michael Hartmann. Our flight time will be 30 minutes, and I am pleased to report both that you have a 97% chance of reaching your destination without being significantly injured during the flight and that our chances of making a serious error during the flight, whether you are injured or not, is only 6.7%. Please fasten your seatbelts, and enjoy the flight. The weather Jena is sunny."

Berwick DM, Leape LL, BMJ, 1999
Definition: medication error

- Every mistake, which occurs during prescription, distribution, preparation or dispensing of drugs – independent of the fact that the patient is harmed or not.

*Van den Bemt et al, Drug safety 2000*
“MAKING SURE THE CURE ISN’T WORSE THAN THE DISEASE”

Sheldon S. Sones, Newington, CT
The `typical` hospital medication-use system...

...has, at minimum, 80 distinct steps
Where do medication errors occur?

- **Physician Order**
- **MAR Transportation**
- **Nurse Review**
  - Physician Ordering: 39% - 49%
  - Transcription: 11% - 12%
  - Pharmacy Dispensing: 11% - 14%
  - Nursing Administration: 26% - 38%
- **Chart copy sent to Pharmacy**
- **Order Entry (Rx System)**
  - Medication Administered
  - Nurse confirms drug, dose, route, time, patient
  - Medication Dispensed
  - Pharmacist Verification

D. Rucker, F. Eisenberg, K. Stewart, electromedica 69 (2001) Heft 1
Drug prescription

Picking
Transport

Intake and documentation

The doctor told me to take this in water.
Medication errors can occur everywhere in the process:

But:

How can we improve the system?
Best practices

- Computerised Physician Order Entry (CPOE)
- Pharmacists review of prescriptions
- Drug packed individually for each patient (unit-doses)
- Special Attention for drugs with high risk
- Point of care verification
- Selection of drugs used in a hospital with respect to medication safety
- Usage of patient-owned drugs in hospital
Best Practice: Pharmacists review of prescriptions
Best Practice: Pharmacists review of prescriptions
How to increase return on investment of the intensive care pharmacist – fear of flying

\[
\text{ROI \%} = \frac{\text{Cost Savings}}{\text{Costs}} - \frac{\text{Costs}}{\text{Costs}} \times 100
\]
<table>
<thead>
<tr>
<th></th>
<th>Intervention on the rounds</th>
<th>Intervention by computer (e-mail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepted</td>
<td>104 (75.9%)</td>
<td>293 (75.5%)</td>
</tr>
<tr>
<td>Not accepted</td>
<td>33 (24.1%)</td>
<td>95 (24.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>137 (100%)</td>
<td>388 (100%)</td>
</tr>
<tr>
<td></td>
<td>(n = 137)</td>
<td>(n = 388)</td>
</tr>
<tr>
<td>Savings per intervention</td>
<td>12.93</td>
<td>8.52</td>
</tr>
<tr>
<td>Costs per intervention</td>
<td>4.65</td>
<td>2.79</td>
</tr>
<tr>
<td>Profit per intervention</td>
<td>8.28</td>
<td>5.73</td>
</tr>
<tr>
<td>ROI (%)</td>
<td>178.1</td>
<td>205.4</td>
</tr>
</tbody>
</table>

Hartmann u. Meier-Hellmann, 2006
Special attention towards drugs with high risk
Medication errors linked to administration in an intensive care unit

2009 medication administration interventions by nurses

<table>
<thead>
<tr>
<th>Error types</th>
<th>Fatal</th>
<th>Life-threatening</th>
<th>Significant</th>
<th>Minor</th>
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</thead>
<tbody>
<tr>
<td>Preparation (n=24)</td>
<td>0</td>
<td>10</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Dose (n=41)</td>
<td>0</td>
<td>5</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Administration technique (n=10)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Physiochemical incompatibility (n=19)</td>
<td>0</td>
<td>5</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Rate of administration (n=29)</td>
<td>0</td>
<td>4</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Time of administration (n=9)</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>26</td>
<td>55</td>
<td>51</td>
</tr>
</tbody>
</table>

Tissot E, et al., Intensive Care Med, 1999
Drug packed individually for each patient (unit-doses)

With a Unit-Dose-System the rate of errors is 2.4% (Taxis K, Dean B, Barber N. Pharm World Sci 1999)

A hospital using the traditional German System, errors occur in 5.1%
“With a Unit-Dose-System, the rate of errors is 2.4%“

Challenge: RFID technology to eliminate even this rate

“A hospital using the traditional German System, errors occur in 5.1%“

Taxis K., Dean B., Barber N. Pharm World Sci 1999
Picking
RFID in short

**RFID:** Radio Frequency IDentification
- Technology for identification and location of single items and patients with radio waves

- **RFID-Tags:**
  - consist of a chip and an antenna (+ battery)
  - is active and/or passive
  -Readable and writable
  - Consists of a Smart Label, Smart Item, Transponder

- **AutoID:**
  - Automatic Identification
RFID - Technology is connecting

- **Comfort**
  - Scanning without line of sight
  - Data can be changed

- **Efficiency**
  - Multiple tags can be read at the same time (>> 100 per sec)
  - Lower error rate than with bar codes

- **Speed**
  - Tags readable up to 80 km/h

- **Localisation**
  - Localisation of devices and persons
  - Greater read distance

- **Data protection**
  - Data can be encrypted
  - Kill commando possible
Transport

Pharmacy
- Prescription Drug
- Picking
- Container
- Leaving pharmacy

Intensive ward
- Entry Intensive ward
- Optional: Entry room
- Issued from drawer
- Patient and drugs matching

Fixed Scanner
Intake and documentation
How can RFID help?

- Right drug dispensed
- Right – patient, drug, dose, route, and time
- Data collection for Quality Improvement
- Product recall (if…)
- Product expiration (if…)
- Inventory control and billing
- Nurse satisfaction

RFID is increasing the quality of care
The doctor is prescribing the drug in the Clinical Physician Order Entry. The pharmacist supervises the prescribing doctor.

Digital communication to the pharmacy. The pharmacy is commissioning unit-dose labelled with RFID tags.

The whole transport of the drug is controlled by scanning and followed digitally.

It is checked by the RFID tag, if the right drug is at the right patient. Documentation in patient file is done automatically when dispensing.
For the first time there is a continuous/digital/by software supported process from the prescription of the drug to the intake by the patient.

- inclusive automatic documentation,

consultation and ordering
Best practice in medical care

- Software for electronic prescription
- Control of prescription by pharmacist
- Drug packed individually for each patient (unit-dose)
- Special Attention for drugs with high risk
- Verification at point of care
- Selection of drugs used in a hospital with respect to medication safety
- Usage of patient-owned drugs in the hospital
Selection of drugs used in a hospital with respect to security
Usage of patient-owned drugs in the hospital
safety barriers

https://www.cirsmedical.ch/start/default.htm
Lessons from a Leader

“Safety is not a priority, it’s a way of life”

Paul O’Neill
CEO Alcoa Steel
Treasury Secretary
Safety culture means a change in paradigm

**OLD**
- Who has caused the mistake?
- Focus on mistake
- Upside-down
- Punish the originator

**NEW**
- What happened?
- Focus on near miss
- Bottom-up
- Improve the process
"Phew! I narrowly avoided a near miss."
The END and...

many thanks for your interest