How to improve the patient care and medication management process – what are we doing in Hong Kong’s public hospitals?

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Various departmental IT systems

- Non clinical systems:
  - for pharmacy
    - Pharmaceutical Supplies System

- Clinical systems:
  - for pharmacy
    - Pharmacy Management System
    - Express Dispensing System
  - for clinicians
    - Medication Order Entry System for out-patient
Characteristics of systems

• Designed & developed by users
• Original primary focus
  – To improve operation efficiencies
  – To maintain uniformity & standardisation of practice
• Enhanced over the years
  – To support policy & procedural changes
• Large user base
  – Over 3000 clinicians
  – Over 100 pharmacies locations
Current status

- Large transaction volumes in 2008/09
  - In-patient & discharges (1.25 m bed days)
  - A&E attendances (2.1 m)
  - Specialist Out-patient clinics (7.8 m)
  - General Out-patient clinics (5.1 m)

- Total reliance on the system
Drug database

• A centrally maintained drug data base for entire HA since 2 decades ago
  – 3000 drug records
  – Each record has over 80 fields
  – all items have unique in house item codes, supplier codes, manufacturer code
  – not GS1 standards
Use of drug database

• Supporting the pharmacy operations e.g.
  – Procurement & EDI with suppliers
  – Inventory management
  – Drug dispensing

• Output from system \(\rightarrow\) data analysis
  – For monitoring drug consumption pattern
    • quantity & expenditure
  – For purchasing- & contract negotiation
  – For budgeting & drug utilisation review
For the past 2 decades

- Incremental functional changes have been made to the system & database structure
- Satisfactory progress
- Several major versions of software /hardware upgrades
- Not falling behind from the industry practice
- May even be leading in some areas
  - Clinical Management System
  - ERP
  - eHR
Medication Management

• Never a simple process
• Improved patient awareness & increased expectations
• Cannot afford just to focus on operation efficiency
• Raising the bar on patient safety
• How can we achieve this?
Sources of Harm

Errors 39% 12% 11% 38%

Prescribing Transcribing Dispensing Administering

Problems in drug administration
The least mitigated risks

Problems with drug supply

<table>
<thead>
<tr>
<th>日期</th>
<th>事故</th>
<th>善後</th>
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</thead>
<tbody>
<tr>
<td>4月7日</td>
<td>藥物入口商營聯行非法出售70萬粒未註冊安眠藥「白瓜子」</td>
<td>衛生署向警方備案</td>
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<tr>
<td>4月6日</td>
<td>諾華藥廠自揭眼藥膏Cortiphenol H註冊過期</td>
<td>衛生署回收逾萬支眼藥膏</td>
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<tr>
<td>4月5日</td>
<td>聯合醫院發現使用10多年的人造淚水「活視康」未有註冊</td>
<td>衛生署指令藥廠進行回收</td>
</tr>
<tr>
<td>3月22日</td>
<td>油蔥地賽馬會分科診所及伊利沙伯醫院曾將過期藥物派發予10多名病人</td>
<td>院方致歉及安排換藥，兩名藥房員工涉人為疏忽，被口頭警告</td>
</tr>
<tr>
<td>3月22日</td>
<td>瑪麗醫院揭發一批由大塚製造的100毫升注射用淨水，實際容量較標籤多出30毫升</td>
<td>藥廠即時回收有關產品</td>
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<td>3月19日</td>
<td>源輝貿易的消炎止痛藥有效日期不符，且涉非法包裝</td>
<td>兩名源輝貿易職員被捕</td>
</tr>
<tr>
<td>3月16日</td>
<td>醫管局向琪寶製藥訂購未註冊的糖尿藥「甲福明」，並分發予近400病人</td>
<td>醫管局安排換藥</td>
</tr>
<tr>
<td>3月12日</td>
<td>萬輝藥業偷步回收多種有效日期出錯的藥物，衛生署調查發現涉及216款藥物</td>
<td>藥廠製藥牌照暫停一個月</td>
</tr>
<tr>
<td>3月6日</td>
<td>港大發現四批藥用「別嘌醇」毛細菌含量超標百倍，或與多名血癌病人死亡有關</td>
<td>醫管局即時停藥及安排約40,000名病人換藥</td>
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Apple Daily News 2009-04-12
WHAT IS OUR RESPONSE SO FAR?
<table>
<thead>
<tr>
<th>2009/10</th>
<th>2010/11</th>
<th>2011/12</th>
<th>2012/13</th>
<th>2013/14</th>
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<tr>
<td>Simple Chemotherapy function</td>
<td>IPMOE Design and Development</td>
<td>IPMOE Implementation</td>
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(IPMOE = In-Patient Medication Order Entry)
IPMOE: What risks can it address?

Errors
- Prescribing: 28%
- Transcribing: 11%
- Dispensing: 10%
- Administering: 51%

Enhanced management measures

• In March 2009, HA announced 7 key initiatives to enhance HA’s pharmaceutical products procurement system
  1. Introduce microbiology testing by manufacturers on drug products (including batch release report)
  2. Perform sample testing by HA
  3. Require suppliers to provide additional standard information for drug delivery documentation
  4. Work with DH on ease of access to drug registration details, etc.
  5. Introduce multi-source for high volume / high risk drugs
  6. Introduce bar-coding for automatic checking of order & receipt and prevention of expired items
  7. Establish a Drug Quality Assurance Office to monitor quality and oversee
Enhanced management measures: What risks can they address?

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Chasm in the information flow

Both the enhanced management measures and IPMOE require the product ID

Source: GS1
Chasm in the information flow

Product IDs are lost as soon as they reach the pharmacy store. Even if dispensed drugs have Auto IDs, they are lost as soon as they go out of the pharmacy.
Chasm in the information flow

- Work with HK Government to make the bar code mandate?
- Work with manufacturer to require the tagging of product ID at unit-of-use level at source (manufacturer / supplier)?
- Work with IT to provide system enhancement so that the product ID can be captured & printed by way of our normal labeling processes - Yes
WHAT MORE WILL WE DO TO CROSS THIS CHASM?
## Medication Use Process: Examining the least-mitigated risks

### Errors

- 28%
- 11%
- 10%
- 51%

### Table: Medication Use Process

<table>
<thead>
<tr>
<th>Clinician</th>
<th>Pharmacy</th>
<th>Nurse</th>
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| • Electronic prescribing  
  • Decision support | • Electronic MAR  
  • Drugs dispensed are in ready-to-use form  
  • Drugs have Auto ID  
  • Automated dispensing technologies  
  • More unit dose dispensing  
  • Less bulk supply | • Electronic MAR  
  • Drugs dispensed are in ready-to-use form  
  • Drugs have Auto ID  
  • Verify patient ID + drug ID against MAR  
  • Minimized ward stock  
  • Minimized manual handling, esp. for IV drugs |
“Closing the loop” in the Medication Use Process

- Involves electronic prescribing and MAR
- Requires Auto ID for patients
- Requires Auto ID for drugs
- Requires system and process changes in the drug distribution and administration system

Needs more attention
Crossing the chasm – Drug Auto ID

- Auto ID direct from manufacturer / supplier
  - As many products as possible
  - As many levels as possible (carton, pack, box, blister, unit-of-use)

- Strengthening the drug re-packaging and dispensing processes:
  - Keeping track of manufacturer- and supplier-assigned Auto ID
  - Tagging more Auto IDs at unit-of-use level (if not already available)

- System support for end-to-end Auto ID persistence:
  - From initiation of procurement…
  - … To goods receiving …
  - … To goods movement…
  - … To re-packaging…
  - … To dispensing…
  - … To drug administration
  - … To eHR
Multi-level Auto IDs: Where will they come from?
Will the Hospital Authority need Re-packaging centres?

Source: Zuellig Pharma
Section VI: Conclusions (Pharm)

• Barcode Readiness (cont’)
  – Most of the respondents said they were currently not capable of printing barcode labels for hospitals (77.4%).
  – For those who are capable of printing barcode, they can provide barcode in GS1 standard (62.5%). A small fraction of them can provide GS1 barcode and other type of barcode (6.3%). But some have no idea of what barcode standard they are using (31.3%).
  – For those who are not capable of printing barcode, they were asked on the time required to build up barcode capability and a majority of them claimed they have no idea of how long they would need to build up the capability (67.3%) and also a high percentage of them would need more than 1 year to provide products with barcode (20%).
Auto-ID-assisted drug administration

- Capture Auto ID to verify:
  - Patient identity
  - Drug identity

- To ensure:
  - Right Patient
  - Right Drug
  - Right Route
  - Right Dose
  - Right Time
2.7 Medicines

Figure 3. AIDC and medication

The vision: how AIDC might be used to improve medicines management in the future

Source: NHS “Coding for Success”
Immediate future plans

- System and process change for
  - Drug distribution
  - Drug administration
Conclusion

• All parties in the Supply Chain must agree with the significance and importance of the need to track and trace
• All parties must commit & contribute to this ultimate objective
• This is not just about efficiency in the supply management side but is also about the safety that extends to the user management side
• Our goals are clear and we would need much support from every player to reach our goals