The Supply Chain Modernisation of Pharmaceutical Products in the Hospital Authority in Hong Kong
the “why, what, how and when”

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• A statutory body established on 1 December ‘90

• Manages all public hospitals in HK
  = 41 public hospitals (= 27,900 hospital beds)
  + 49 specialist + 74 general clinics

• Total of 59,970 staff
  = 5,475 Doctors + 20,522 Nurses + 5,834 Allied Health

• 2011/12 Government Funding: ~ USD 4.74B

• Annual Drug budget = USD 387millions (about 8-10% of HA’s overall budget)

• Covers all drug dispensed to in-patients and out-patients

• About 1200 drug items in the drug list

* Data as of Dec 2011
## Magnitude of our daily business

<table>
<thead>
<tr>
<th>Transaction types</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispensed Items</td>
<td>215,000</td>
</tr>
<tr>
<td>Dispensed Prescriptions</td>
<td>66,000</td>
</tr>
<tr>
<td>No. of Patients Served</td>
<td>58,000</td>
</tr>
<tr>
<td>No. of Suppliers dealt with</td>
<td>60</td>
</tr>
<tr>
<td>No. of Purchase Orders made</td>
<td>845</td>
</tr>
<tr>
<td>Stock Receive in HK$</td>
<td>36M</td>
</tr>
<tr>
<td>No. of Items involved in stock receipts</td>
<td>1,600</td>
</tr>
<tr>
<td>No. of Stores for Stock Receipt/ issue</td>
<td>80</td>
</tr>
<tr>
<td>No. of Movement Transactions in these stores</td>
<td>2,400</td>
</tr>
</tbody>
</table>
Quality, Safety and Efficiency in drug distribution/medication use

From manufacturers/distributors

Into pharmacy stores

Out from pharmacy stores

Into dispensing areas

To point of care/patient areas

150 suppliers

41 hospitals

100 pharmacies

80 stores

500 wards

Description of the Major Supply Chain Processes

Each of these processes might be performed by different organizations or by a single entity.
The backend of pharmacy operations in our pharmacy stores serving the hospitals, SOPC & GOPC

- Where do our drugs come from?
- How to optimise the movement of drugs
- What are the logistics in stock receipts?
- What are the processes?
- How to track and trace the Supply Chain?
The Current Practice – drug delivery into stores

External: From Suppliers (>150)

Internal: At Pharmacy stores (>100) in 7 clusters

1. Manual checking of standard information
   - manufacturer
   - country of origin
   - quantity
   - lot no., expiry date, etc.

2. Manual entry of standard information into Pharmacy system

3. Stocking onto the shelves in the Pharmacy stores
Our current pharmacy stores
(too many, too small ...., manual processes)
Drug distribution from pharmacy stores (today’s practice)

- Pharmacy working stores (for drug dispensing to out & in-patients & issue to wards)
- Manual entry of
  - lot no. & expiry date
- No functionality to enable auto track and trace lot no. & expiry information
3 million imported tablets were ineffective

Drug’s expiry date was faked

Ela Lee | photo: Poon Kei

More than 3 million tablets of a pain-killing drug imported by a Hong Kong company were found to have an expired date: one year later than what it should have been.

The Department of Health said there was "no immediate safety or quality concern." However, people should stop using these tablets of naproxen and seek advice from doctors, dentists or pharmacists as appropriate.

A spokesman for the company said: "Doctors said that products with an expired date would not be as effective as they should be." The Department of Health said on Thursday that it had found no evidence of the tablets being used.

People have been arrested and two employees of the company have been fired.

Panelist says misuse of medical supplies

There have been reports of misuse of medical supplies in hospitals.

"The misuse of medical supplies can be a sign of a lack of proper management," a panelist said. "We must take steps to prevent this from happening again."
“Insanity: Continuing to do the same thing and expecting different results.”

- Albert Einstein
The Journey on SCM begun when HA announced in March 2009 – The Key Initiatives

6. Enhance the HA’s Pharmaceutical IT systems to improve controls by moving progressively towards:
   - introducing bar coding
   - automatically check what is received against what was ordered
   - automatically track and trace drugs to the point of issue and
   - prevent dispensing of expired items
1st step – identify the need to Modernise the Supply Chain on Pharmaceutical Products

*IPMOE = In-patient Medication Order Entry
**DDAS= Drug Distribution and Administration System

From manufacturers → into pharmacy stores → into Dispensing area → out from pharmacy stores → to point of care (patients)
Enable track and trace of product movement from suppliers to pharmacy stores through MSCA with provision of:
- Advance Shipping Notice (ASN) from suppliers to pharmacy ERP to verify PO
- Bar coded information on individual product and outer delivery pack from suppliers to verify required information, manufacturer, lot no., expiry dates etc
3rd Step: Finding out the means and How’s to do the project

- Applying the funding from the Government
  - approval obtained from HK Government
  - looking around for suitable solution provider
  - chosen Mobile Supply Chain Application from Oracle
  - Learn about the subject
  - Visited distributors in Hong Kong, China & Japan
  - Survey on vendor readiness & bar code status

Engage a Consultant to review the overall situation and made recommendation on Road Map on SCM for HA – short, medium and long term measures
Supply Chain Modernisation on pharmaceutical products

**System**
- Scope
- Methodology
- Funding

**Process**
- Workflow
  - outbound
  - inbound
  - Internal
  - External
  - management
  - Support services
    - Pharmacy staff
  - vendors
    - HKGS1

**People**
- Which clusters
- Which pharmacies
- Which vendors

**Place**
- Which

**Time**
- Pilots
- Live run
- Roll out
Scope of MSCA

What is Mobile Supply Chain Application?

- Making use of mobile devices to support the Supply Chain Process from Goods receipt to Goods issue as much as possible
- Use wireless connection, scanners, bar codes, data transmission
- Minimize manual data entry
- Improve accuracy & efficiency of data capture
- Not RFID but bar codes
### The process flow in MSCA

#### External: From Suppliers
- Advanced Shipping Notice (ASN)
- Entire shipment with bar coded SSCC on each logistic unit

#### Internal: At Pharmacy stores

<table>
<thead>
<tr>
<th>Before goods arrive</th>
<th>1. Prior validation of manufacturer, country of origin, quantity, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Online provision of lot no, expiry date</td>
</tr>
<tr>
<td>When goods arrive</td>
<td>3. Scan outer pack bar code label to verify Purchase Order (PO)</td>
</tr>
<tr>
<td></td>
<td>4. PO details displayed in scanner for inspection</td>
</tr>
<tr>
<td></td>
<td>5. Confirm receipt &amp; instant update into system</td>
</tr>
<tr>
<td>Stock into stores</td>
<td>6. Pack-unpack containers to separate items</td>
</tr>
<tr>
<td></td>
<td>7. Scan GTIN with lot no. expiry date and confirm qty</td>
</tr>
<tr>
<td></td>
<td>8. Stock to pre-defined location in stores</td>
</tr>
<tr>
<td>Drug distribution</td>
<td>9. Enable lot-control with track-and-trace functionality</td>
</tr>
</tbody>
</table>
4th step: Defining our action plans

**External**

HKGS1:
- Technical guidelines
- Industry standards on ASN, SSCC, GTIN, GLN

Pharmaceutical vendors:
- System interface to HA
- GTIN on smallest order unit
- Bar code readiness to include GTIN, Qty, BN, Expiry date
- Shipper case & logistic units
- Testing and preparation

**Internal**

Hospital side:
- Management buy in
- Support services
- Pharmacies

Engagement & support:
- Implementing MSCA
- Renovating stores & facilities
- Adding manpower
- Supporting training
Vendor Engagement

- No less than 5 vendor briefings, 20 meetings, training workshops, testing, emails, etc…
  - Clarifications on project objectives, process, technical requirement, time frame…..
  - Frequently Ask Questions
- Mock ups on bar code labels,
- EDI testing
- End to End testing with mock up products
- On site testing at pilot sites
What is the status of bar code on different levels of pharmaceutical products?
Examples of problems encountered on bar codes

Difficulties to identify the correct bar code to scan

Some bar codes are not in black and white

AI (241) which is a customer Part Number and cannot be used as an item identifier

Not a GTIN bar code, only a supplier Item bar code
The HA requirement on GTIN and bar codes on the different levels of pack

<table>
<thead>
<tr>
<th>Packaging Hierarchy</th>
<th>Example</th>
<th>Identification Key</th>
<th>Example</th>
<th>Bar code</th>
<th>Bar Code Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Packaging</td>
<td><img src="image1.png" alt="Example Image" /></td>
<td>No</td>
<td>NA</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Ordering base unit</td>
<td><img src="image2.png" alt="Example Image" /></td>
<td>GTIN</td>
<td>GTIN A: 489-1668-00002-2</td>
<td>Optional</td>
<td>GS1-128, GS1 Data Bar, GS1 Data Matrix, EAN/UPC.</td>
</tr>
<tr>
<td>Multi Pack</td>
<td><img src="image3.png" alt="Example Image" /></td>
<td>No</td>
<td>NA</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Case</td>
<td><img src="image4.png" alt="Example Image" /></td>
<td>Optional</td>
<td>GTIN B: 489-1668-00001-5</td>
<td>✓</td>
<td>GS1-128, GS1 Data Matrix</td>
</tr>
<tr>
<td>Logistic Unit</td>
<td><img src="image5.png" alt="Example Image" /></td>
<td>SSCC</td>
<td>SSCC: 1-489-1668-000000001-2</td>
<td>✓</td>
<td>GS1-128</td>
</tr>
</tbody>
</table>
The symbol including its Quiet Zones, should be at an edge to avoid damage.
**GS1 Identifiers in Healthcare**

<table>
<thead>
<tr>
<th>GS1 Key</th>
<th>Represented Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTIN (Global Trade Item Number)</td>
<td>Identification of Healthcare Product</td>
</tr>
<tr>
<td>GLN (Global Location Number)</td>
<td>Identification of Location &amp; Legal Entity</td>
</tr>
<tr>
<td>GSRN (Global Service Relation Number)</td>
<td>Identification of Patient &amp; Care Giver</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application Identifier</th>
<th>Represented Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ai(01)</td>
<td>Global Trade Item Number</td>
</tr>
<tr>
<td>Ai(10)</td>
<td>Batch Number</td>
</tr>
<tr>
<td>Ai(17)</td>
<td>Expiration Date</td>
</tr>
<tr>
<td>Ai(21)</td>
<td>Serial Number</td>
</tr>
</tbody>
</table>

* GS1 keys & Application Identifiers are recognised by ISO.

**Data Structure of a GTIN**

- **GTIN-13**

- **GS1 PREFIX**
  To identify territory of the GS1 organization issuing the number. In Hong Kong, the GS1 Prefix assigned to GS1 HK is 489.

- **GS1 COMPANY NUMBER**
  To identify the member company assigned by the local GS1 organization.

- **ITEM REFERENCE**
  To identify the unique product and service assigned by the member company.

- **CHECK DIGIT**
  Calculated by modulo-10 formula to serve as an accuracy check on the entire number by scanning devices.

**Batch Level Identification & Expiration Control**

- For batch control or expiry date control, which are common to healthcare items, people may prefer encoding batch number and expiration date in barcode.

- GS1 System provides data structure standard for them as well:
  - Batch number – Alphanumeric data format with variable length up to 20 characters
  - Expiration date – Numeric data format (YYMMDD) with fixed length of 8 digits

<table>
<thead>
<tr>
<th>(91)</th>
<th>(01)</th>
<th>(17)</th>
<th>(10)</th>
<th>(ABC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0413</td>
<td>2354</td>
<td>67890</td>
<td>123</td>
<td></td>
</tr>
</tbody>
</table>

Expiration date & batch no. must be used with GTIN and application identifier (AI) in a barcode.
Cat A – EDI Gateway (EDI PO, PO Response, PO Change, ASN, Invoice)

Programming and Integration is needed ERP Capable Suppliers
Problem on Expiration date format

Expiration date on printed label is DDMMYY which does not match ERP expiration date format “YYMMDD”
Tendering of Hardware & printers & labels
Hospitals side

- ERP System
  - Early engagement
  - Data preparation
  - Data cleansing
  - Data conversion
- MSCA / SCM
  - Hospitals Stores Facilities
- Manpower
- Training
Stores in Queen Elizabeth Hospital
Ultimate conditions of our pharmacy stores
The Challenges encountered

- Entire SCM process is voluntary for vendors
- No credit, no penalty (yet)
- Depends on the vendors readiness & willingness & ability
- First batch involving 13 vendors (out of 150+)
- Pharmacy users’ acceptance to adopt new processes
- Increase in manpower with skills and knowledge on SCM
- Installation of wi fi in our pharmacy stores, modernise the environment, increase space and layout….
- Choice of hardware,
- Training of staff, vendors….
- …………. 
**Full scale SCM – external dependencies**

Tracking from manufacturers/suppliers into pharmacy stores

| Phase I | - Persuading vendors to comply with requirement on system support, GTIN, Bar codes  
|         | - Provide support e.g. education, training, defining requirement  
|         | - No mandates |
| Phase I/II | - Increasing the no. of vendors to comply with requirement on system support, GTIN, Bar codes |
| Phase II | - Built into procurement requirement  
|         | - Mandatory requirement for vendors  
|         | - Increasing vendors compliance with full requirement |
### Full scale SCM – internal dependencies

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>Tracking from manufacturers/suppliers into pharmacy stores - only possible for vendors which are ready - only for goods receipt process</td>
</tr>
<tr>
<td>Stage II</td>
<td>Tracking from pharmacy stores to issue areas - only possible for vendors who are ready on the level 2 bar codes availabilities - only possible for selected areas of the stores</td>
</tr>
</tbody>
</table>
*IPMOE = In-patient Medication Order Entry
**DDAS= Drug Distribution and Administration System
- Electronic prescribing by clinicians
- Vetting & dispensing with workflow reengineering at Pharmacies
- Drug administration by nurses using BCMA

Track and Trace to the point of care

IPMOE */ DDAS**
The Journey is long & tough

Insanity :

Continuing to believe that if we insist and persist, we can make the difference, some day ....

- S C Chiang