Transforming the Healthcare Supply Chain on pharmaceutical products

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Provide answers to some questions on the SCM project

• Why do we need to transform the Healthcare Supply Chain on pharmaceutical products?
• What were the problems in the system?
• How did we do it?
• What challenges did we encounter?
• What was the outcome?
Health Care System in Hong Kong

Dual-track Healthcare System

- Public sector - the cornerstone of the healthcare system
- Private sector – Personalised services for those willing and may afford higher fees
Hospital Authority – Provider of Secondary and Tertiary Medical Services

Public and Private Shares of Hospital Bed-days

- 90% Public hospitals
- 10% Private hospitals

Sources: Hospital Authority Statistical Reports and private hospital statistics from Department of Health
Hospital Authority
Hong Kong (HAHK)

• A statutory body established on 1 December 1990

• Manages all public hospitals spread over 7 clusters in HK
  = 41 public hospitals (total 27,900 hospital beds)
  with 47 specialist & 74 general clinics

• Total 63,000 staff
  with 5,475 Doctors & 20,522 Nurses & 5,834 Allied Health

• 2013/14 Government Funding: ~ USD 5.69B (HKD44.4B)
Some of our hospitals in Hospital Authority Hong Kong (HAHK)
Two Levels of Operational Control for Pharmaceutical Services

• At Head Office level:
  – Chief Pharmacist’s Office
  – Central steering functions
    • set policy & directions
    • establish professional standards
    • develop and implement & support systems
    • monitor progress on all pharmaceutical issues

• At Hospital Cluster level:
  – Hospital Pharmacies Cluster Chiefs
    • Control & perform decentralised operations at local pharmacies including purchasing, clinical activities
Out - Patients waiting to be served at different pharmacies at our hospitals
Magnitude of our **daily** business transactions in all HA pharmacies in 2013

<table>
<thead>
<tr>
<th>Transaction types</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Dispensed Items</td>
<td>215,000</td>
</tr>
<tr>
<td>No. of 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>Dollar value of Stock items received in HK$</td>
<td>36M</td>
</tr>
<tr>
<td>No. of stock items involved in stock receipts</td>
<td>1,600</td>
</tr>
<tr>
<td>No. of Pharmacy Stores for Stock Receipt/issue</td>
<td>80</td>
</tr>
<tr>
<td>No. of Stock Movements in these stores</td>
<td>2,400</td>
</tr>
</tbody>
</table>
Ever wonder what is the backend of in our pharmacy stores serving the hospitals, SOPC & GOPC?

- Where do our drugs come from?
- How to control and monitor the movement of drugs
- What are the logistics in stock receipts?
- What are the processes?
- How to track and trace the Supply Chain?
The ordering and delivery processes in our HA pharmacies

External: From Suppliers (>200)

Internal: At Pharmacy stores (>100) in 7 clusters
The overall situation about our pharmacy stores (too many, too small ...... manual processes.....) before 2009
The importance and significance of 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

42 hospitals

100 pharmacies

80 Stores

500 wards

Description of the Major Supply Chain Processes

Industry -> Logistic provider -> Healthcare facility

Production

- Raw material intake
- Quality and inspection
- Packaging

Manufacturing/Preparation

- Management of suppliers and vendors
- Inventory and storage management

Shipping

- Loading and unloading
- Tracking and tracing

Receiving

- Inspection of incoming materials
- Storage

Healthcare Delivery

- Medication administration
- Patient care

- Description of the Major Supply Chain Processes
  Each of these processes might be performed by different organizations or by a single entity.
“Insanity: Continuing to do the same thing and expecting different results.”

- Albert Einstein
2009 - Catalysts for change.

Drug’s expiry date was extended.

3 million imported tablets were ineffective.
The Journey on Supply Chain Modernisation Project began 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
Turning threats into opportunity
How did we do this?
What are the Challenges in SCM Project: fighting the unknowns!

- People - pharmacy users, vendors, IT, managers, administrators
- System & Processes
- Standards
- Hardware & scanners
- Scope of project
- Our gaps
- Our support
- Time
- Effectiveness
- Physical space
- Supply Chain Modernisation Project
Leadership & Project Governance

• Central level
  - User Resource Group (URG)
    - Chaired by Cluster Service Director at Headoffice level
    - members from project team & clusters representatives
    - define project plan & monitor progress
    - allocate resources, prioritise issues & make decision on direction
    - deal with concerns from system vendor and users

• Cluster level
  - 7 Cluster Implementation Project Resource Groups (CIPRG)
    - each Chaired by Cluster Chief Executives
    - members from hospital administrators, finance and pharmacy
    - meet quarterly to report & monitor progress of implementation
Understand the need to transform/ modernise the Supply Chain process on Pharmaceutical Products

From manufacturers → into pharmacy stores → into Dispensing area

out from pharmacy stores → to point of care (patients)
Identify the scope to be covered in the Supply Chain Modernisation project on Pharmaceutical Products

*IPMOE = In-patient Medication Order Entry
**DDAS = Drug Distribution and Administration System
Defining what we want to do in SCM?

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

External: From Suppliers

Internal: At Pharmacy stores

Drug Delivery

Order & Product Information (ASN)

Drug Receiving

Scanning of bar coded information on outer pack for checking, verification & tracking
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
  - Learnt about the subject
  - Visited distributors in Hong Kong, China & Japan
  - Surveyed on vendor readiness & bar code status
  - Engaged 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 – areas of concerns

- System
  - Scope
  - Methodology
  - Funding

- Process
  - Workflow
  - outbound
  - inbound

- People
  - Internal management
  - Support services
  - Pharmacy staff
  - External vendors
  - HKGS1

- Place
  - Which clusters
  - Which pharmacies
  - Which vendors

- Time
  - Pilots
  - Live run
  - Roll out
The IT system: Using MSCA in ERP (Oracle)
(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
Understand the Industry Standards provided by GS1

**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>Al(01)</td>
<td>Global Trade Item Number</td>
</tr>
<tr>
<td>Al(10)</td>
<td>Batch Number</td>
</tr>
<tr>
<td>Al(17)</td>
<td>Expiration Date</td>
</tr>
<tr>
<td>Al(21)</td>
<td>Serial Number</td>
</tr>
</tbody>
</table>

* GS1 keys & Application Identifiers are recognised by ISO.

**Data Structure of a GTIN**

- **GTIN-13**

**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 6 digits
What is required on the product to enable track and trace

there should be bar coded information on GTIN, Batch, Expiry Date and QTY at the primary packing
Is it feasible to have Bar-code track-and-trace all the way?

Target areas for direct-from-supplier bar-coding:

- Item identity, batch no., expiry date
- Item identity, batch no., expiry date
- Item identity, batch no., expiry date
- Item identity, batch no., expiry date
Legislation in Hong Kong on pharmaceutical products

• Pharmaceutical Product registration requirement by HKSAR
  – no legislative requirement on bar code on drug package
• Pharmaceutical industry not mandate to have the bar code printed
• Generally, the sales and marketing people are not concerned with this need
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
What is the Gap and how big is it?

Findings:
- GTIN not a compulsory requirement
- Some bar codes are not GTINs
- EDI not a compulsory requirement
- Most EDI vendors do not have bar coded info on primary packaging
- Some have bar coded info but not EDI vendors
- Bar coded info contain GTIN only, no batch no., no expiry dates
Is it feasible to have Bar-code track-and-trace all the way?

Target areas for direct-from-supplier bar-coding:
- item identity, batch no., expiry date
- item identity, batch no., expiry date
- item identity, batch no., expiry date

stop at the logistic units!
The process flow in Mobile Supply Chain Application

External: From Suppliers

- Advanced Shipping Notice (ASN)

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>
The electronic information exchange in MSCA process

The Key elements of Despatch Advice (ASN):
- SSCC (Serial number for Logistics unit)
- GTIN (a universal bar code number)
- Batch/ Lot number
- Expiration Date
- and other elements...

*The Despatch Advice (ASN) should be sent 24 hours before the Physical Goods Delivery.*
Preparing for the Challenges

Support services

Pharmacy staff

System

Process

People

Place

Time

Scope

Methodology

Funding

Workflow

outbound

inbound

Internal

management

Support services

Pharmacy staff

External

vendors

HKGS1

Which clusters

Which pharmacies

Which vendors

Pilots

Live run

Roll out

Infrastructure

Leadership

Technology

Resources
### Defining our action with stakeholders

<table>
<thead>
<tr>
<th>External</th>
<th>Internal</th>
</tr>
</thead>
</table>
| **HKGS1:**  
- Technical guidelines  
- Industry standards on ASN, SSCC, GTIN, GLN | **Hospital side:**  
- Management buy in  
- Support services  
- Pharmacies  

**Pharmaceutical vendors:**  
- System interface to HA  
- GTIN on smallest order unit  
- Bar code readiness to include GTIN, Qty, BN, Expiry date  
- Bar coded Labels for shipper case & logistic units  
- Testing and preparation | **Engagement & support:**  
- Implementing MSCA  
- Renovating stores & facilities  
- Adding manpower  
- Supporting user training |
Vendor Engagement started in 2010

- No less than 6 mega vendor briefings, 25+ 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 messages testing
- End to End testing with mock up products
- On site testing at pilot sites
- With HKGS1 assistance and support
Importance of GTIN in SCM

• GTIN is a compulsory requirement for EDI PO
• It is inevitably that some items would not carry a valid GTIN because
  – Free Goods, Sample Goods, Donated Goods, Clinical Trial Goods and duplicate item code created for special program...
  – Due to System limitation, one GTIN cannot be assigned to multiple item codes
  – GTIN may not be available when new items are introduced into HA
GTIN Allocation

different GTIN
Locations - Types of GLN

A Universal Unique Number to Identify

Legal Locations

Physical Locations

Functional Locations

Company

Subsidiary

Warehouse

Store

Accounting Dept

Purchasing Dept
Standards provided by GS1

The symbol including its Quiet Zones, should be at the edge to avoid damage.
# The Data String for Bar Code

<table>
<thead>
<tr>
<th>Application Identifier</th>
<th>Meanings</th>
<th>Example</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>(02)</td>
<td>The data follows (02) is the GTIN of [<strong>ordering base unit</strong>]</td>
<td>(02)04891668000022</td>
<td>Must be 14 digit no.</td>
</tr>
<tr>
<td>(17)</td>
<td>The data follows (17) is the expiration date</td>
<td>(17)110106</td>
<td>YYMMDD Format</td>
</tr>
<tr>
<td>(37)</td>
<td>The data follows (37) is the count of trade item</td>
<td>(37)12345678</td>
<td>Up to 8 digit no.</td>
</tr>
<tr>
<td>(10)</td>
<td>The data follows (10) is batch/Lot no.</td>
<td>(10) ABCDEFGH</td>
<td>Up to 20 alphanumeric</td>
</tr>
</tbody>
</table>

= (02)04891668000022(17)110106(37)12345678(10)ABCDEFGH
for vendors with no in house IT system ability

Cat A – EDI Gateway (EDI PO, PO Response, PO Change, ASN, Invoice)

Programming and Integration is needed ERP Capable Suppliers
Tendering of Hardware & printers & labels
Hospitals side – engagement with local management & pharmacy

- ERP System
  - Early engagement
  - Data preparation
  - Data cleansing
  - Data conversion
- MSCA / SCM
  - Hospitals Stores Facilities
- Manpower
- Training
How did we do it?
Defining the scope of the Supply Chain Modernisation Project
How did we do it?
Defining time frame for SCM implementation

by phase & batch approach:

Phase I
- Track from distributors into the main stores
- Applicable to all pharmacy stores in all hospitals
- Involve 2 batches of vendors on all their products

Phase II
- Track from pharmacy stores to the dispensing stores
- Pilot in two hospitals PWH and QEH on Dangerous Drugs
## SCM Project implementation: by batch & phase approach

### Batch I
(live run in June 2013)
- 13+1 vendors
- = about 70% of order lines
- About 38% of item sources

### Batch II
(live run in April 2014)
- + 13 vendors
- = about 16% more order lines
- About 13% item sources

<table>
<thead>
<tr>
<th>Vendor Name</th>
<th>Vendor Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAXTER HEALTHCARD LTD</td>
<td>EUROPHARM LABORATOIRES CO. LTD.</td>
</tr>
<tr>
<td>DKSH H.K. LTD</td>
<td>HK MEDICAL SUPPLIES LTD</td>
</tr>
<tr>
<td>FERRING PHARMACEUTICALS LTD</td>
<td>JOHNSON &amp; JOHNSON (HK) LTD</td>
</tr>
<tr>
<td>FRESENIUS MEDICAL CARE HK LTD</td>
<td>MEDI PHARMA LTD</td>
</tr>
<tr>
<td>GAM BRO HK LTD</td>
<td>MEKIM LTD</td>
</tr>
<tr>
<td>HIND WING CO LTD</td>
<td>PRIMAL CHEMICAL CO LTD</td>
</tr>
<tr>
<td>JACOBSON MEDICAL HK LTD</td>
<td>STAR MEDICAL SUPPLIES LTD</td>
</tr>
<tr>
<td>JEAN-MARIE PHARMACAL CO LTD</td>
<td>SYNCO (HK) LTD</td>
</tr>
<tr>
<td>KERRFLEX SUPPLY CHAIN SOLUTIONS LTD</td>
<td>THE INTERNATIONAL MEDICAL CO. LTD.</td>
</tr>
<tr>
<td>LF ASIA (HONG KONG) LIMITED- HEALTHCARE DIV</td>
<td>TRENTON-BOMA LIMITED</td>
</tr>
<tr>
<td>LF ASIA (HONG KONG) LIMITED- UNIVERSAL DIV</td>
<td></td>
</tr>
<tr>
<td>LUEN CHEONG HONG LTD</td>
<td>UNITED ITALIAN CORPORATION (HK) LTD.</td>
</tr>
<tr>
<td>U S SUMMIT CO LTD</td>
<td>VICKMANS LAB LTD</td>
</tr>
<tr>
<td>ZUELLIG PHARMA LTD</td>
<td>Y.C. WOO &amp; CO. LTD</td>
</tr>
</tbody>
</table>
SMART Achievement

- **System**
- **Scope**
- **Methodology**
- **Funding**
- **Process**
- **People**
- **Place**
- **Time**
- **Scope**
- **Workflow**
- **Internal**
- **Internal**
- **External**
- **External**
- **Methodology**

HKGS1 management

Outbound inbound

Which clusters

Which pharmacies Which vendors

Funding

Pilots

Live run

Roll out

Live run on June 2012 in two clusters
Dec 2012 in three clusters
June 2013 in two more clusters
The Change - Goods Receipts from batch I vendors using ASN & SSCC
The Gains – a much improved goods receipts process assisted by technology
The Gains - much better & improved storage facilities
Problems encountered
## Requirement for Expiry Date Format

<table>
<thead>
<tr>
<th>e.g.</th>
<th>Expiry Date on Product</th>
<th>Expiry date format in ASN message CCYYMMDD</th>
<th>Barcode Format on Shipper Case YYMMDD</th>
<th>Expiry date printed on Shipper Case label</th>
<th>Expiry date printed on DN/Invoice</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>28-Dec-2013</td>
<td>20131228</td>
<td>131228</td>
<td>28 DEC 2013</td>
<td>28 DEC 2013</td>
</tr>
<tr>
<td>B</td>
<td>Dec-28-2013</td>
<td>20131228</td>
<td>131228</td>
<td>28 DEC 2013</td>
<td>28 DEC 2013</td>
</tr>
<tr>
<td>C</td>
<td>28-12-2013</td>
<td>20131228</td>
<td>131228</td>
<td>28 DEC 2013</td>
<td>28 DEC 2013</td>
</tr>
<tr>
<td>D</td>
<td>12-28-2013</td>
<td>20131228</td>
<td>131228</td>
<td>28 DEC 2013</td>
<td>28 DEC 2013</td>
</tr>
<tr>
<td>E</td>
<td>Dec-2013</td>
<td>20131200</td>
<td>131200</td>
<td>DEC 2013</td>
<td>DEC 2013</td>
</tr>
<tr>
<td>F</td>
<td>122013</td>
<td>20131200</td>
<td>131200</td>
<td>DEC 2013</td>
<td>DEC 2013</td>
</tr>
<tr>
<td>G</td>
<td>201312</td>
<td>20131200</td>
<td>131200</td>
<td>DEC 2013</td>
<td>DEC 2013</td>
</tr>
<tr>
<td>H</td>
<td>12/13</td>
<td>20131200</td>
<td>131200</td>
<td>DEC 2013</td>
<td>DEC 2013</td>
</tr>
</tbody>
</table>
Mismatch Expiry date information on ASN and products

- Expiry date printed on products did not match ASN message -> When no date is specified, HA takes 1st day of month as the ‘used by’ date.
users reported that the lot information printed on product packing did not match with the lot number printed on product
Batch number issues

• Issues were referred to the vendors
• Different batch number assigned due to the different stages of redressing involved
• Need to understand the process and provide explanation for our pharmacy store management users
In stocking up the shelves,
- each batch should be stored in a separate locator
- apply physical separators to separate different batches
- shelf label marked with bar-coded locator information
In reality, not enough space and manpower, mix batches are in the same locator.
Storage Racks

Stores are installed with carton flow racks which facilitate users to fill the newly received goods from the back and pick the goods from the front.

In reality, newly received goods may have earlier expiration.
Some pharmacy stores are still temporary stores
Storage space & facilities

Conclusion: Plenty of room for improvement in our stores
For SCM EDI vendors:

- Bar codes are required on outer cartons, pellets with GTIN, Batch No, Expiry date.
- These information are lost when the goods are removed from cartons and pellets.
Not all store rooms are properly setup
Way Forward

Patient & Medication Safety

Visibility

Traceability

where we want to go via the SCM Project
Way Forward
The Supply Chain Modernisation on Pharmaceutical Products

*IPMOE = In-patient Medication Order Entry
**DDAS= Drug Distribution and Administration System
Track and Trace to the point of care

IPMOE */ DDAS**

- Electronic prescribing by clinicians
- Vetting & dispensing with workflow reengineering at Pharmacies
- Drug administration by nurses using BCMA
What do you see?
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

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tel: 852-39121638
The GS1HK Business Casebooks

HA SCM project included in the GS1HK Business Casebook 2010

HA SCM project included in the GS1HK Business Casebook 2012

HA SCM project included in the GS1HK Business Casebook 2011

HA SCM project included in the GS1HK Business Casebook in 2013