Trend of SCM with auto-identification for medical field in Japan
~ from factory to bedside ~

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GS1 Healthcare Conference     London, UK, 29-31 October 2007
The concept of the Hospital IT system in Japan is not only a management material but also integrated management resource, prevent medication errors, application to EBM by the data mining of medical records.

As for this system, it has become to grasp medical practice and medical material, which did not understand on current electronic receipt, billing slips processing system accurately.

In POAS (Point of Act System), it is saved the management information, so-called, “man, money, material, and information.”

We concluded that this system has remarkable investment effect, over four million dollars per year, since it is a hospital management system including logistics management. In addition, the quality of care has been improved dramatically while error rates have been reduced – nearly to zero in some case.
What is POAS?

Real-time Consumption Data Capturing System

- Collects, manages, and uses consumption data at the point of consumption (e.g. Hospital bedside)
  - In the form of When, Where, Who, to Whom, Why, What, How (6W’s, 1H)
- The first application is hospital
  - International Medical Center of Japan (since 2002)
- Current technology is PDA/bar code, but RFID technologies are now in processing
What can POAS do?

By collecting data from wireless PDAs, examination room terminals, and laboratory equipment, POAS can:

• Record medical actions in detail, everywhere
• Assist practicing medical treatment to patients
• Monitor patient symptoms continuously
• Comprehend logistical data by the “minimum unit”
  → In real-time.

Useful for automatic single size item identification

UDI
The effects of making injection action entries (calculated from performance data)

**Issue injection prescription**
- Ward / Outpatient (HIS)
  - 750 orders/day
  - 2,329 drugs/day

**Perform mixed injection**
- Neither cancellations Nor changes 570 orders/day
- IV drip bottle
- Nurse station (HIS)
  - 570 orders/day
  - 1,770 drugs/day

**Action entry**
- About 37 thousand/month
- Bedside (Mobile terminal)
- 1006 Rp/day

**Canceled or changed orders**
- 180 orders/day
  - (318Rp/day)

Changes made to route speed
- 116 orders/day
  - (204 Rp/day)
  - 15%

There is a possibility of misadministration of about 40% if the change of order is not communicated in real-time.
Comparison of the number of times mixed injections were checked and error rate (%)

The number of check actions and the error rate have a slightly negative correlation.

The smaller the number of injections a nurse performs that day, the higher the alarm rate.
Alarm status according to different time segments

Time segments with higher alarm rates become even clearer when seen in 30-minute increments.

Number of errors for different time segments (30-minute increments) and error rates.
Error rates for time elapsed on nurse duty (before and after hand-over time)

Work status of nurses who trigger alarms around the hand-over time.

Before hand-over time
- Error rate
- Nurses right at the beginning of their shift

Hand-over time segment
- Error rate

After hand-over time
- Error rate
- Nurses right before the end of their shift

Day shift
- Seminight shift
- Late night shift

<Number of errors>

<Time elapsed on nurse duty that day (hr)>
Study of alarm status of “First injection/IV drip”

Study regarding the phenomenon where the alarm is more likely to be triggered on the first injection or IV drip on a nurse’s shift.

There was a significant increase in the alarm rates for first injections. P=0.000000000000000000000082397(10^-23)

Alarms on the first injection = 1,527

Alarms on the second injection = 802

The alarm rate for a nurse’s first injection of the day was unusually high.

Number of injections performed by a nurse that day.
Time that injection and IV drips were started and order frequency

Average

- Bead inspection
- Injection
- Cancellation order
- New order / order change
Injection operations from the perspective of medical safety

- Physician
  - Enter prescription
  - Change the prescription if you see these exam results!
  - Cancel - change

- Pharmacy
  - The speed and accuracy at which the changes are reflected is important.

- Ward
  - Mixing
  - Administer drugs

- Digitalization of this section was achieved with the use of POAS.

- An inter-divisional safety system is needed.
- A system is needed that reflects changes and cancellations in the information given to medical staff within a timeframe of 2 seconds.
**Conventional system ID:** Drug code  
**POAS system ID:** Drug code + serial code

**Order**

- **Act1**  
  Task: 5W1H

- **Act2**  
  Task: 5W1H

- **Act3**  
  Task: 5W1H

**Data unit = Invoice (payment) unit**

**Injection prescription**

11/1

- Rp1) 5% glucose 500 ml
- Vitamedin 1A morning

11/2

- Rp1) 5% glucose 500 ml
- Vitamedin 1A morning

11/3

- Rp1) 5% glucose 500 ml
- Vitamedin 1A morning

**Data granularity**

**Order**

- **Act1**  
  Task: 5W1H

- **Act2**  
  Task: 5W1H

- **Act3**  
  Task: 5W1H

**Data unit = People’s actions (changes) single item based**

**Management of the number of items**

**Individual (ID) management**

**Data unit = Invoice (payment) unit**

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Unusually high alarm rates among certain nurses or physicians

Distribution of alarm rates for number of actions taken by each nurse. There were certain nurses with relatively higher alarm rates.
## Cancel data 4/01/2004 – 3/31/2005

<table>
<thead>
<tr>
<th>Type</th>
<th>Cost (Yen)</th>
<th>Number</th>
<th>Rp numbers</th>
<th>The number of injection and shot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normality</td>
<td>1,113,386,619</td>
<td>1,019,229</td>
<td>556,283</td>
<td>336,682</td>
</tr>
<tr>
<td>Cancel Type2</td>
<td>108,535,086</td>
<td>102,127</td>
<td>55,289</td>
<td>35,959</td>
</tr>
</tbody>
</table>

**cost saved: $1M / year**

- **Normality:** After the medicine is mixed, discontinuance (for the abandonment) is contained.
- **Discontinuance:** Medicine that was discontinued before medicine is mixed, and returned.

- this amount if there was no confirmation before mixing the medicine.

### About the unit price
- **Normal:** I calculate by an actual unit price by the inventory.
- **Cancel:** Because drawing is released and it is drawn by other patients after returned goods unsold, a real unit price is uncertain. Therefore, the agreement unit price of a period concerned and the trial.
POAS can improve inventory management.

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Beds</th>
<th>Item number</th>
<th>Area of warehouse (㎡)</th>
<th>Staff N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Stock</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>IMCJ with POAS</td>
<td>925</td>
<td>300</td>
<td>6,800</td>
<td>32</td>
</tr>
<tr>
<td>A w/o POAS</td>
<td>1,205</td>
<td>1,900</td>
<td>20,000</td>
<td>300</td>
</tr>
<tr>
<td>B w/o POAS</td>
<td>1,203</td>
<td>500</td>
<td>8,000</td>
<td>200</td>
</tr>
<tr>
<td>C w/o POAS</td>
<td>1,178</td>
<td>1,000</td>
<td>3,500</td>
<td>65</td>
</tr>
<tr>
<td>D w/o POAS</td>
<td>1,154</td>
<td>1,320</td>
<td>7,700</td>
<td>155</td>
</tr>
<tr>
<td>E w/o POAS</td>
<td>1,150</td>
<td>700</td>
<td>7,000</td>
<td>108</td>
</tr>
<tr>
<td>F w/o POAS</td>
<td>800</td>
<td>600</td>
<td>10,000</td>
<td>300</td>
</tr>
</tbody>
</table>

Inventory was cut to a tenth. A cost reduction of 225.5 million yen was achieved for pharmaceuticals and 241.62 million yen for medical supplies.
POAS can be improved hospital management.

- Prevent medical accidents.
- Thorough inventory management
- Keywords are “real-time entry” and “serialization for single item management.”
- The accurate acquisition of information on bedside actions is crucial.
- Acquire cancellation and change data.
  - Only about 60% can be acquired in conventional systems.
  - POAS gives an overall picture.
  - POAS can save 4 million dollar per year.
- This improves medical safety and management efficiency.
GS1: Product Identification through the Supply Chain

PHYSICAL ITEMS & DATA FLOW

**Automatic granularity exchange**

Granularity of shipping

GTIN / Serial ID  GTIN  SSCC  GTIN  GTIN / Serial ID

RSS / RFID  GS1-128  GS1-128  GS1-128  RSS / RFID

Item data, sales catalog, ship notice, invoice

request for quotation, planning schedule, POS

Electronic Commerce Information Flow
The evolution of hospital information systems

1G: Billing and Lab test: medical affairs and specimen exams
2G: CPOE: ordering
3G: EPR: paperless electronic medical charts

4G: Ubiquitous medical information systems for most dangerous / high costs areas

We need standardized UDI!

Bedside, ER (emergency), (OP) operating room and ICU
*verbal communication *high risk, and high cost
Feasibility study on medical field in Japan

Internet

Track/trace (EPCIS)

Lot No  Product ID  Drug code  ...
100000  A1111  765325
100000  A1112  765325
100000  A1113  765325
100000  A1114  765325

Pharmacy

Order

Audit

Prepare

Injection

Ph  Dr  Ph/Ns  Ns  Patient

Drug ID  Status  Date/time  ...
A1111  患者A  200708172210
A1112  病棟A  200708172210
A1113  藥剤部  200708172210
A1114  藥剤部  200708172210

Product ID  Status  Date/time  ...
A1111  入庫In  200708170900
A1111  倉庫  200708171000
A1111  出庫  200708171500
A1112  入庫  200708170900

RFID tag UHF

RFID tag HF

Supplier

truck

Whole saller

Hospital

 scrim
Thank you for your attention. Any Questions?

➔ Think!

➔ What kind of system do you want, if your son or daughter were a patient?

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