Hôpitaux Universitaires de Genève

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IT to optimize the medication process at the hospital

Agenda

13h45  HUG presentation
14h00  Theoretical introduction & movies
       « IT to optimize the medication process at the hospital »
15h00  Visit in 2 groups (30’ per visit)
       - Robotized logistics
       - IT management of production
16h00  Discussion of use case
16h45  Debriefing and conclusion
17h00  End
Geneva university hospitals (HUG)

- 1 out of 5 swiss university hospitals
- Consortium of public hospitals in Geneva county
- 1 central pharmacy
Medical activities

1800 beds

- 26% Soins de réadaptation
- 15% Soins d'urgence
- 1% Soins pédiatrique

Finances

- Expenditures
  - 2% Charges non monétaires
  - 11% Matériel médical d'exploitation
  - 11% Autres charges monétaires
- Incomes
  - 45% Produits
  - 41% Intérêts monétaires de financement
  - 5% Produits exceptionnels

Budget ≈ CHF 1,75 milliards

Annual report HUG 2014
Human resources

- The larger employer in Geneva county

<table>
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<tr>
<th>Group professional</th>
<th>Total</th>
<th>Part de formeuse</th>
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<td>Médecins</td>
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<td>Personnel de services sociaux</td>
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<td>Personnel des services logistiques</td>
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<td>2.0</td>
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<tr>
<td>Personnel administratif</td>
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<td>12.8</td>
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HUG

Annual report HUG 2014

Pharmacy strategic priorities

- Optimize safety, efficiency and traceability of the **physical circuit** of drugs

- Optimize the **information flow** during prescription, dispensing, preparation and administration of drugs
Medication process organisation

- Existing models
  - Global distribution
    The pharmacy delivers packages of drugs and nurses dispense individual treatments from the ward stock
  - Nominal or individual distribution
    Drug dispensing is performed at the pharmacy, for each patient, based on a prescription

The medication process

- Prescription
- Cytos
- TPN
- MP
- Administration to patients
- End-product analysis
- Production
- Raw-materials analysis
- Production stock
- Dispensation
- Ward stock
- Pharmacy stock
- Industry stock
- Production stock
Safety problems?

An obsolete organisation?

Avoidable ADE: 6.5% of admissions

39% Prescription

11% Ward stock

38% Administration to patients

Bates DW, JAMA 1995;274:29
The addition of two errors

Commission error **AND** Control failure

- **Selection error** \( P_{sel} \)
- **Check failure** \( P_{chk} \)

\[ P_{err} = P_{sel} \cdot P_{chk} \]

Distribution errors

(Real life)

- **Error rate = 1 %**

- **56%** Counting
- **24%** Omission
- **20%** Selection

Gschwind L, Carrez L, François O, HUG, 2006-11
Dispensing errors (experimental)

- Error rate = 3%
- Selection error: 74%
- Repartition error: 20%
- Counting error: 6%


Limited performance of controls

- Introduction of errors during unit dose dispensing
- Detection ability during human-performed control:
  - Pharmacists: 87.7%
  - Nurses: 82.1%

Facchinetti NJ, Med Care 1999;37:39-43

Efficacy ≈ 85%
(known value in the industry)

Do not be too confident with the double-checks!
How to improve the safety?

- Implement strategies to
  - Increase the reliability of controls
  - Reduce the frequency of errors

IT can help!

History of IT at the hospital...
Potential interests of IT

- To improve
  - The safety
    by reducing the rate of errors and improving the reliability of controls
  - The traceability
    by facilitating the registration of logs
  - The efficiency
    by increasing the working performance
  - The communication
    by connecting the different steps of the processes

Many questions before to start

- Positive impacts ?
- New risks ?
- Return on investment ?
- System selection ?
- Commercial or homemade ?
- Interoperability ?
- User's training strategy ?
- Acceptability ?
Electronic systems to catch errors

Industry stock

Pharmacy stock

Ward stock

Dispensation

Production stock

End-product analysis

Production

Raw-materials analysis

Prescription

Cytos

TPN

MP

Production

Administration to patients

Electronic systems to avoid errors

Industry stock

EDI

Pharmacy stock

Ward stock

Dispensation

Production stock

End-product analysis

Production

Raw-materials analysis

CPOE / CDSS

Cytos

TPN

Production

EPR

Administration to patients
Robotisation of drug distribution

- **1200 drugs, 45’000 packages** in the robot
- **30’000 lines** distributed in a month
- **55%** of the total activity

Safety

- **≈ 4500 avoided errors/yr**
  - Selection 0%
  - Conveyor 0.27%
  - Manual finalisation 0%
Robotisation of drug distribution

Efficiency

- 2 FTE

ROI ≈ 4.5 years

François O, HUG, 2013

Automation of drug dispensing

Safety

- Experimental

Du Pasquier C, Riberdy L, HUG, 2003
Automation of drug dispensing

Efficiency

Lines asked in emergency mode

% 20
15
10
5
0

Before (manual) Pilot with ADS After (manual)

Surgical ward, 28 beds
François O et al, HUG, 2013

Administration to patients

Bedside scanning

- Cytostatics

Physician
Nurse
Drug

Database
Patient

STOP
Administration to patients

Safety

- Benefit of bedside scanning
  - Wrong drug - 75%
  - Wrong dose - 62%
  - Wrong patient - 93%
  - Wrong administration time - 87%

  Globally - 80%

The medication process

Final perspective

- Robotized distribution
- Automated dispensing system
- EDI
- Central pharmacy stock
- Ward stock
- Logistic information system
- CPOE
- Clinical information system
- Bedside scanning
- Distribution with scanning
- Industry stock

Johnson, J Healthcare Inf Manag 2002;16:1
Computer-assisted production management

- **Objectives**
  - To support any type of preparation by IT
  - Batches
  - Cytostatics
  - TPN
  - Other individualized prescriptions
  - To implement in-process electronic controls during the most critical steps
  - To link individualized preparation to their prescription and their administration

Production management

**Automation**

- **Nutrition** (Baxa)
- **Cytostatics** (PharmaHelp)
- **CIVAS** (Smartfiller)
Production management
In-process control - Gravimetry

- Cytostatics (Cato, Cypro)

Batch production

Prerequisite to successful IT implementation

- Electronic management of processes (CPOE, stocks, …)
- Technical infrastructure (hard-, soft-)
- Actors identification (caregivers, patients, drugs)
- Acceptability (patients, caregivers)
- Adaptation to processes
- Project leadership
- Financing
Actors identification

**Patient**

**Caregiver**

**Drug**

Drug identification

- Reconditioned by the pharmacy
- Identified by the industry
Drug identification

- Hierarchy

Unit dose
Secondary package
Hospital package
Box
Pallet

= international standard

GS1 codification of pharmaceuticals at HUG

- Product ID (cytostatics)

GTIN - cytos  EXP (date and time)  Serial
01 07613167000009 7003 1103161400 21 cyt-11198499
GS1 codification of pharmaceuticals at HUG

- Product ID (batch production)

GTIN: 01 17613167001249
EXP date: 17 120831
Batch: 10 PDS-11289663

How to progress?

- Determine an institutional strategy and an implementation schedule, taking into account:
  - the local organisation
  - the local culture
  - the expected return on investment
- Involve the different partners
- Re-think the process organisation (re-engineering)
- Manage each projet independently, without loosing the global vision
Conclusion

- The medication process at the hospital is complex and involves many different professionals
- A clever organisation contributes to improve the safety, the efficiency, the communication and the traceability
- IT takes more and more importance in the process improvement approaches: their implementation is necessary but is a challenge
- Each hospital must determine a strategy, based on the local context

For more information...

See the movie (12’) of the pharmacy

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