

In search of the Value of Automation

On dealing with the challenges in operationalising the solutions brought in automating the hospital pharmacy

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Patrick van Oirschot, MSc
March 22-23, 2017

Your team of today



Etienne Cousein
Hospital Pharmacist &
Vice-Chief Medical Officer

His passion: make people work together

Nothing to declare.



Patrick van Oirschot
Owner GPP Support

His passion: giving shape to the future together by
constructing bridges

*No relevant financial relationships with
manufacturers or providers to declare*

Connect!



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We would like to know:

1. Can you identify and quantify all costs and benefits of automation solutions that are relevant in your in the medication distribution process?
2. Do you know how to engage and persuade all stakeholders in an automation Implementation project?
3. Do you have a better view of the levers and tools available to implement a new medication distribution process?

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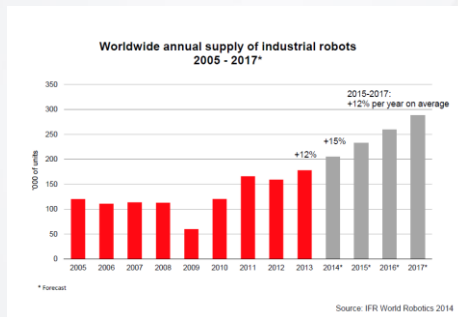


... 1. Introduction ...

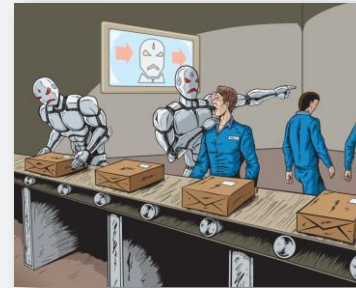
- In our vision we see a future ... today ... in which people and machines are changing healthcare as we know it. Healthcare is becoming more seamless across the health ecosystem.
- We see robots being patients housekeepers and companion avatars streamlining the patient intake process.
- Does this sound frightening to you? Do you think machines are going to replace people? Or do you believe, as we do that it's all about allowing people to work more efficiently, and where they are needed most.

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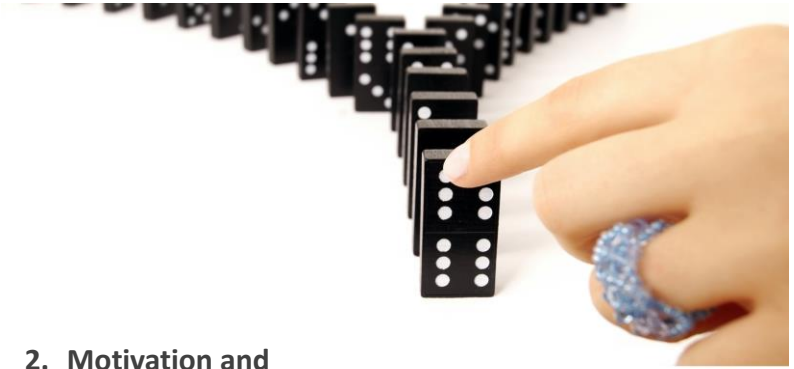
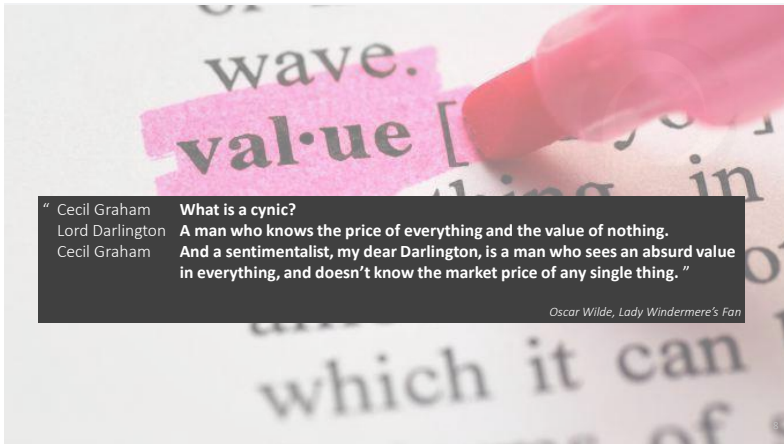
1. Introduction



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2. Motivation and drivers to automate

What motivates us?



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Why automate?

SAFETY FIRST

Patient Safety

- Reduce medication errors
- Secure bedside scanning

Cost Control

- Reduce inventory, returns & spillage
- Reduce repair work

Process control

- Reduce manual labour, Accuracy
- Create lean process

Floor space

- Optimise use of "A-location"
- Condensed use of space

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Incentives for a new organisation

New prescription process



New building



New funding process



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Key objectives and expectations

- To centralize medication dispensing, in order to
 - Facilitate the control of operations
 - Restrain manpower needs
- To focus staffs on their core job
 - Nurses
 - 0.55 FTE dedicated to pharmaceutical products every 80 beds
 - Pharmacists
 - Pharmacy technicians

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Key objectives and expectations

- No de-blistering
 - No data on drug stability
 - Cross contamination hazard
- One solution fits all drug forms
- 24/7 solution
 - To handle the morning medical round main flow
 - To have a safe solution for off duty hours

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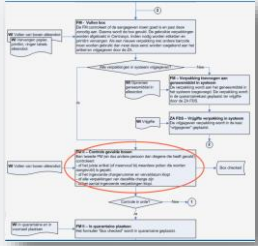
The overall approach: Flexibility inside a safety frame

Secure: the Right medication



Optimize:
The Best medication

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FMEA

Severity

Chance

Detection

Risk priority number

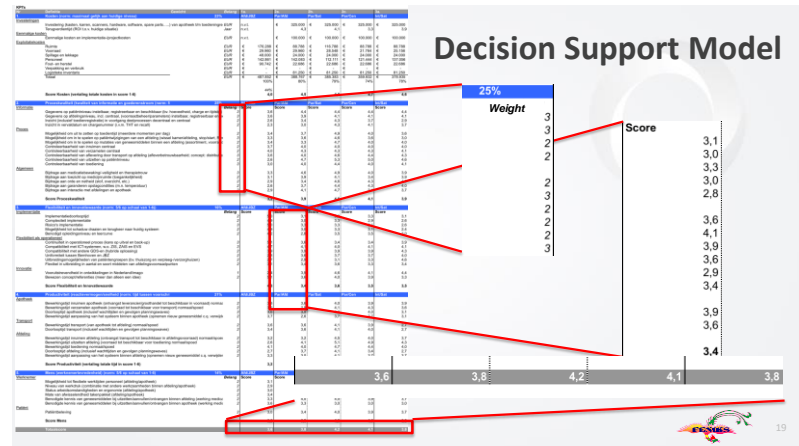
#	Funktionsbereich	Situations	Charakteristika	Maßnahmen	Wartungszug
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3. What to automate

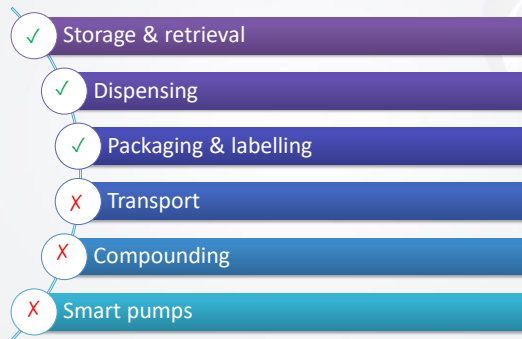


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4. Overview of categories in automation



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Purchase strategy

- Stock management automation
 - Carrousel (whole packages)
- Automated Cabinets
- Automated Medication Dispensing System
- Warehouse Management Software

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Vertical carrousel

- Ensure bulk distribution for ward stocks
- Ensure monthly delivery for some long stay beds
- « Besides » dispensing for unit dose delivery
 - Drug forms not handled by the robot (bottles, ...)
 - Labelled with patient name, room number, dosage, ...

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Vertical carrousel



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Unit dose

- Packaged by the robot
- Most of the drugs are overwrapped
- If supplier delivers bulk : rewapp
- Tablets, capsule, bags, eye drops, ...
- Blind double check

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Boxstation



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Centre hospitalier de Valenciennes - Service de pharmacie - Pôle Production - secteur D.H.E.N. Automate - Fiche de conditionnement

CONDITIONNEMENT PHIALBOX PILLBOX CHARGEMENT MANUEL

Date	Spécialité	Dosage	Quant conditionnée exprimée en prise*

* NB : les spécialités conditionnées en prise de 2 comprimés sont à exprimer en prise

NUMERO DE PHIALBOX ou de PILLBOX :

COLLER ICI L'ETIQUETTE PRODUIT
VÉRIFIER NOM + LOT+ DATE DE PÉREMPTION

Incident éventuel :

Initiales du prénom et du nom du préparateur et signature

CONTROLE PHIALBOX PILLBOX CHARGEMENT MANUEL

Action correctrice :	Initiales du prénom et du nom du préparateur ou du pharmacien	<input type="text"/>
Incident éventuel :	et signature	<input type="text"/>

W:\Pharmacie\Tous Communi\Pharm_TF6400 de production\Fiche de conditionnement (1).doc

26

Therapies production

- One bag by dose to be administered, bound by a ring
- Sorted by administration time
 - Evening morning noon
- Number of rings for 24 h depends on each bag thickness

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Unit dose dispensing system



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Therapy ring



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Automated Cabinets

- New/modified orders are taken in charge by the robot up to 5 pm, delivered around 6:30 pm
- In case of prescription modification to be applied before 6:30 pm:
 - Nurses go to the AC
- AC displays the prescription

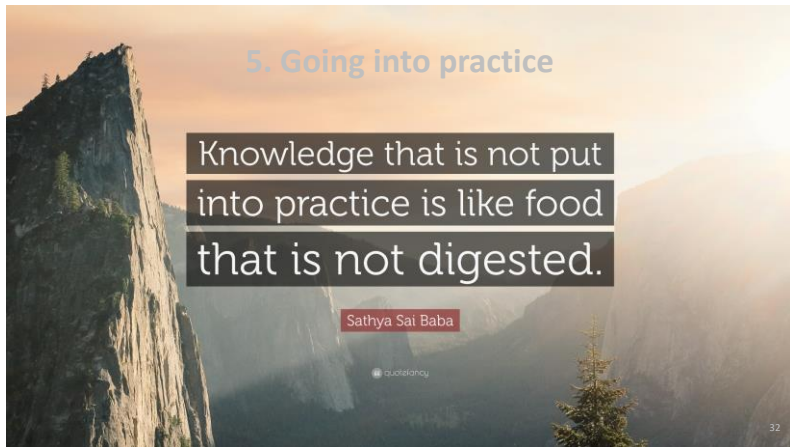
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Automated Cabinets

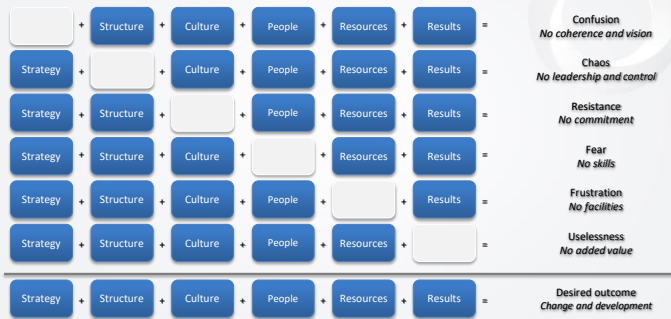


- Medication access after identification of
 - Nurse (Bio-ID)
 - Patient
 - Product
- Secured opening
- Real time connexion to the pharmacy WMS

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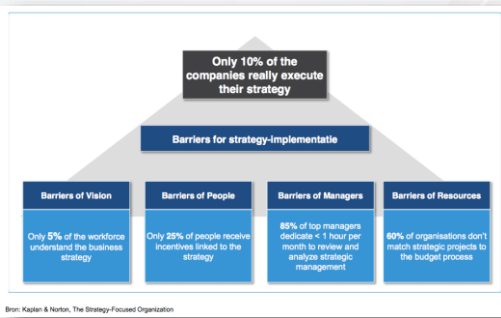


Change management challenges



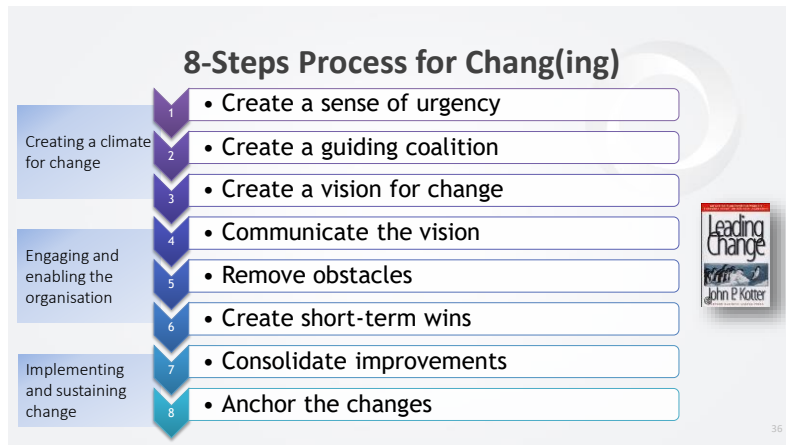
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Barriers in implementation of strategic Projects

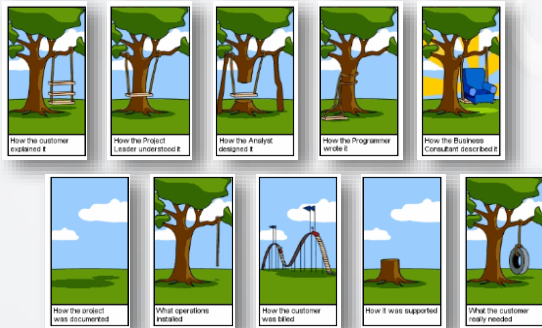


From Kaplan & Norton, The Strategy-Focused Organization

35



Project management errors



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Lessons learned in leadership

Momentum

Strong team

Sufficient support
board and
doctors?

Sufficient priority
IT department

No project plan, no
phasing ... No
celebrations of
successes!

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Considerations How to get the most out of my project?

Project scope

1. Changing insights
2. User biased influence of professionals (quality creep)
3. Dynamics in the context of project
4. Insufficient project support

Setback in Project planning &

5. Blind spots of project planning
6. Parkinson's law

Exceeding Budget

7. Delay decision-making
8. Price inflation by suppliers



Lessons learned in project management

Soft
inter



AR

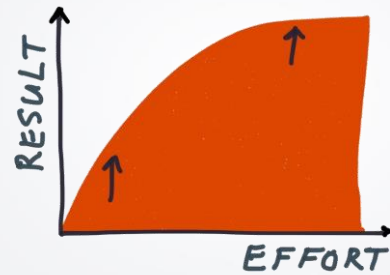
Experience

MRSA >
Inspection

Long
project

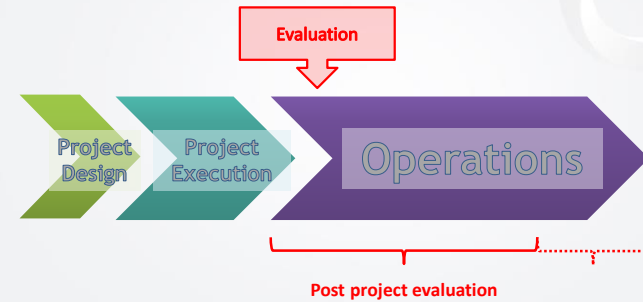


*"I understand!
The question is how much money can I save?"*



42

Post project evaluation
Have we captured the value of the BC?



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6. Results & Case Studies

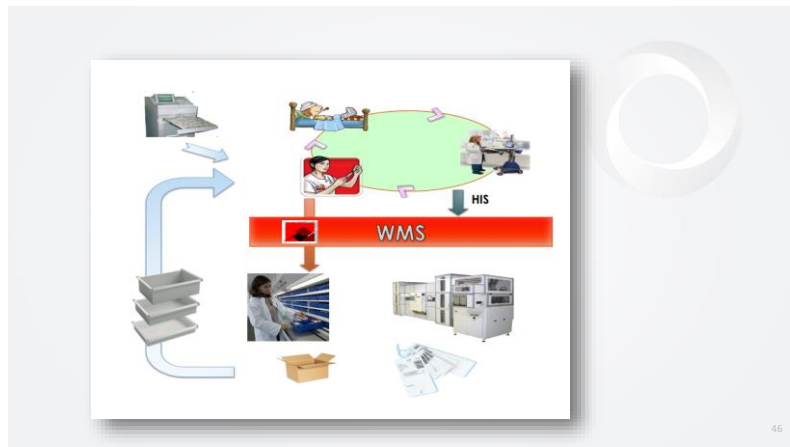


Roll out

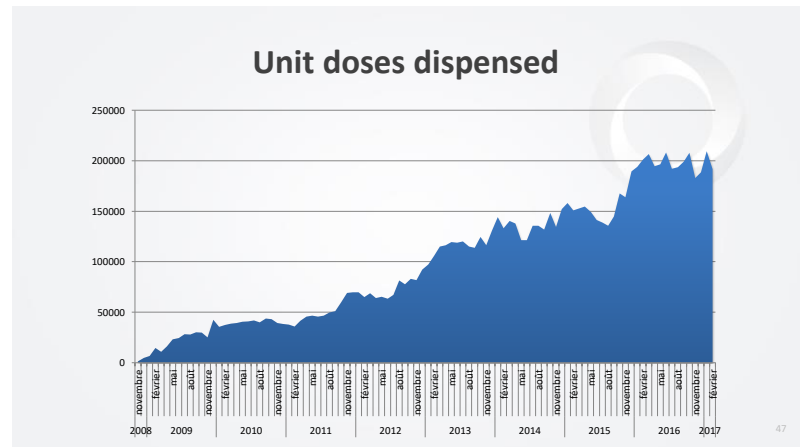


- July 2008: WMS and carrousel
- September 2008: AMDC
- January 2009: first unit doses
- May 2011: Electronic record and CPOE
- January 2017
 - 637 beds under automated dispensing system
 - 581 daily unit dose delivery
 - 56 weekly unit dose delivery
 - 23 AMDC stand alone (ICU)

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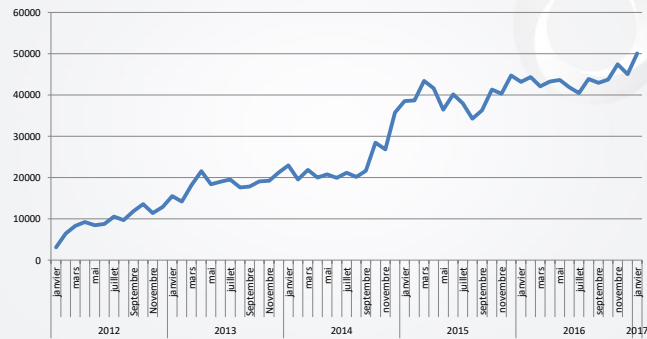


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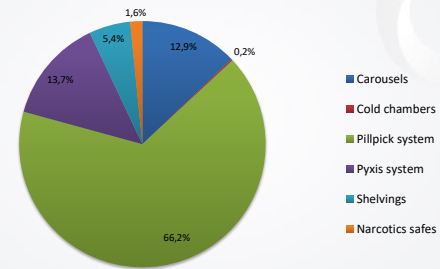
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Order lines checked by the pharmacists



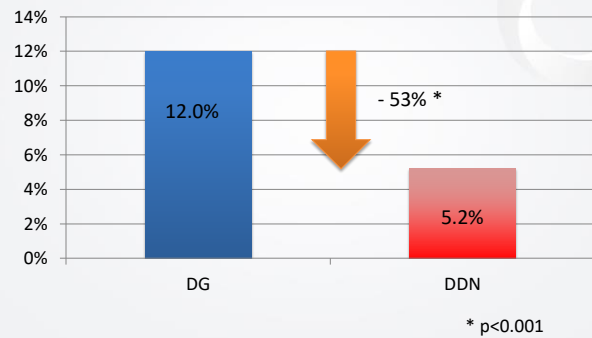
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Systems involved in dose dispensing



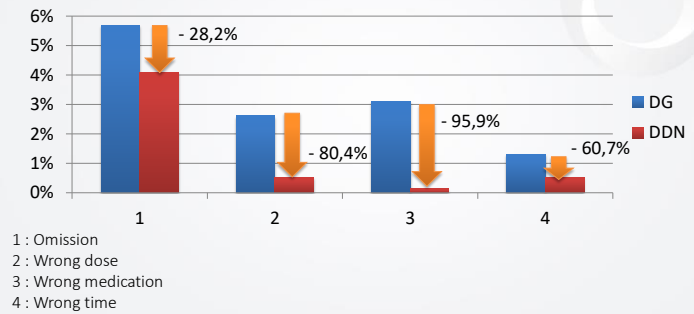
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Medication error rates



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Medication error types



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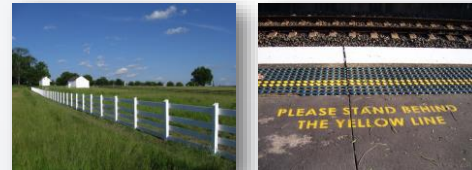
Look at the wider picture



52

A white fence is better than a yellow line

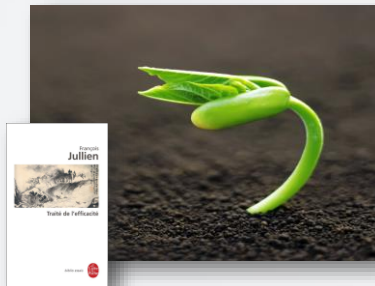
- Cerner / Copilote interface build
- Pharmacist phial-box refill check



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Be efficient ?

The Chinese way



The occidental way



Journal of Evaluation in Clinical Practice
Effect of automated drug distribution systems on medication error rates in a short-stay geriatric unit
 Etienne Cousin PharmD MSc, e.a.

Results A total of 615 opportunities of errors (OEs) were observed among 148 patients treated during the WSS period, and 783 OEs were observed among 166 patients treated during the UDSS period. ME (medication administration error [MAE]) rates were calculated and compared between the two periods. Secondary measures included type of errors, seriousness of errors and risk reduction for the patients. The implementation of an auto-mated drug dispensing system resulted in a **53% reduction in MAEs**. All error types were reduced in the UDSS period compared with the WSS period ($P < 0.001$). Wrong dose and wrong drug errors were reduced by 78.1% (2.4% versus 0.5%, $P = 0.005$) and 93.7% (1.9% versus 0.1%, $P < 0.001$) respectively.

Conclusion An automated UDSS combining dispensing robot and AMDCs could reduce the discrepancies between ordered and administered drugs, thus improving medication safety among the elderly.

53%

Does it work ?

- YES it works !**
- Wrong product
- Wrong dose
- Wrong time of administration
- Wrong frequency administration
- Double medication or dose
- Contraindications and allergies for patient
- Unlabeled patient medical records (PDR)
- Failure update of medication support OFFICE

Errors ↓

Case studies

30%

Complex Automated Medication Systems Reduce Medication Administration Error Rates in an Acute Medical Ward
 B Risør, M Lisby, J Sørensen

Results A total of 265 doses with one or more errors were identified out of 3216 doses administered. The complex automated medication system effectively reduced the overall risk of administration errors in the intervention ward (OR 0.53; 95% CI 0.27-0.90), and the procedural error rate was also significantly reduced (OR 0.44; 95% CI 0.126-0.94). The non-patient specific automated medication system effectively reduced the clinical error rate in the intervention ward (OR 0.38; 95% CI 0.15-0.96).

Conclusion The implemented automated medication system reduced the error rate in the medication administration and thus improved quality and patient safety.

Concludes BAP Pilot Geire

74%

Medication Administration Error Rates in an Acute Medical Ward
 B Risør, M Lisby, J Sørensen

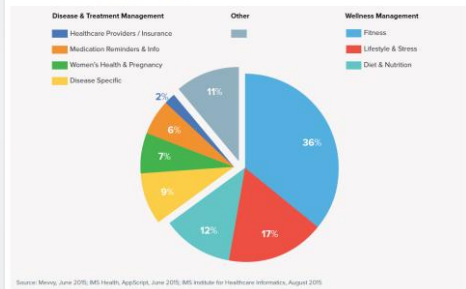
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0.53



Exhibit 2: mHealth Apps by Category 2015



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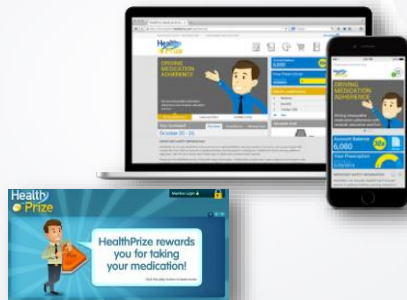
From wearables to ... insideables



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Gaming becoming serious



6.2

We would like to know:

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2. Do you know how to engage and persuade all stakeholders in an automation Implementation project?
3. Do you have a better view of the levers and tools available to implement a new medication distribution process?

6.3

8. Take home messages

1. Always keep the end in mind!
2. Not just focus on automating the process
3. Do mind your stakeholders
 - What do you give them?
 - What do you need?
4. The value of automation
 - ... to create an agile organisation that can adept itself to changes ...



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*"Alice: This is impossible.
The mad Hatter: Only if you believe it is."
Lewis Carroll, Alice in Wonderland*

We would like to recommend

- Risk management and Medication safety
 - Kohli, K. T., Corrigan, J. M., Donaldson, M. S. (1999) To err is human: building a safer health system. Washington, DC: National Academy Press.
 - Reason, James (2000). "Human error: models and management". British Medical Journal 320 (7237): 768–770. doi:10.1136/bmj.320.7237.768
 - Cousien E1, Mareville J, Leroy A, Caillaud A, Labreuche J, Dambre D, Odou P, Bonte JP, Puisieux F, Decaudin B, Coupé P. (2014) Effect of automated drug distribution systems on medication error rates in a short-stay geriatric unit. Journal of Evaluation in Clinical Practice.
- Barcode-Scanning:
 - Poon, E. G., Keohane, C. A., Yoon, C. S., et al. (2010) Effect of bar-code technology on the safety of medication administration. New England Journal of Medicine, 362 (18), 1698–1707.
- Management
 - Goldratt, Eliyahu M. (1984) The Goal. North River Press
 - Molen, Michiel van der (2006) PRINCEZ for the project executive. Great Britain. Office of Government Commerce.
 - Taleb, Nassim Nicholas (2007) he Black Swan: The Impact of the Highly Improbable. Random House.
- Leadership
 - Kotter, J. P. (1996) Leading Change, Boston: Harvard Business School Press.
 - Jullien, François (1997) Traité de l'efficacité. Grasset
- Innovation
 - TEDxMaastricht - Wouter Bos - "Is technology the answer to the rising costs of healthcare?" <http://youtu.be/v65Ulr9TCsc>
- ... Just for fun ...
 - Jonasson, Jonas (2011) The 100-Year-Old Man Who Climbed Out the Window and Disappeared