



Automation:

Can We Realise Benefits For Patient  
Safety?

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Isle of Wight

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## Declaration of Interest:

Conflict of interest: nothing to disclose

Reference site for suppliers

# The Isle Of Wight



**Background: 145,000 residents & 2m visitors**

- One CCG
- One provider:
  - Acute
  - Community
  - Ambulance / NHS111/Hub
  - Mental Health
  - ‘One front door’

My life  
a full life



# The Isle Of Wight



21% > 65 years

90% changed in hospital

Average 6-7 medicines per patient

50% not taken as prescribed





# NICE 2016: Medicines optimisation:



- ✓ Assessment
- ✓ Changes
- ✓ Choice
- ✓ Self care
- ✓ Continuity
- ✓ Follow up



# 2016 Carter Report

## 2017 Model Hospital:



- ✓ **Variation**
- ✓ **Collaboration**
- ✓ **Clinical**
- ✓ **Technology**
- ✓ **Continuity**
- ✓ **Efficiency**





## SAFETY:

- **WHO: MEDICATION WITHOUT HARM 2017**
  - >\$40 billion pa                      50% reduction in 5 years
  - *KNOW*
    - *CHECK*
      - *ASK*
- **UK REPORT 2018: 'REDUCING MEDICATION RELATED HARM'**
  - Electronic prescribing & technology
  - 7 day service
  - Transfer of information

# Isle of Wight Vision

- Improve medicines optimisation
- Release clinical time
- Audit trail: patient and pack
- Safe handover
- Integration
- Automate



# Medicines Storage



# Medicines Technology



- Pre 1990: Pharmacy stock control and dispensing
- 2006: Medicine robot in pharmacy, supply
- 2008: Vertical storage carousels
- 2012: EPMA, integrated to Trust patient record
- 2014: Electronic medicine cupboards across Trust\*
- 2015: interface with EPMA
- 2015: Tracking system interface
- 2017: Narcotics automation

\*NHSE Technology Fund

# The Robot



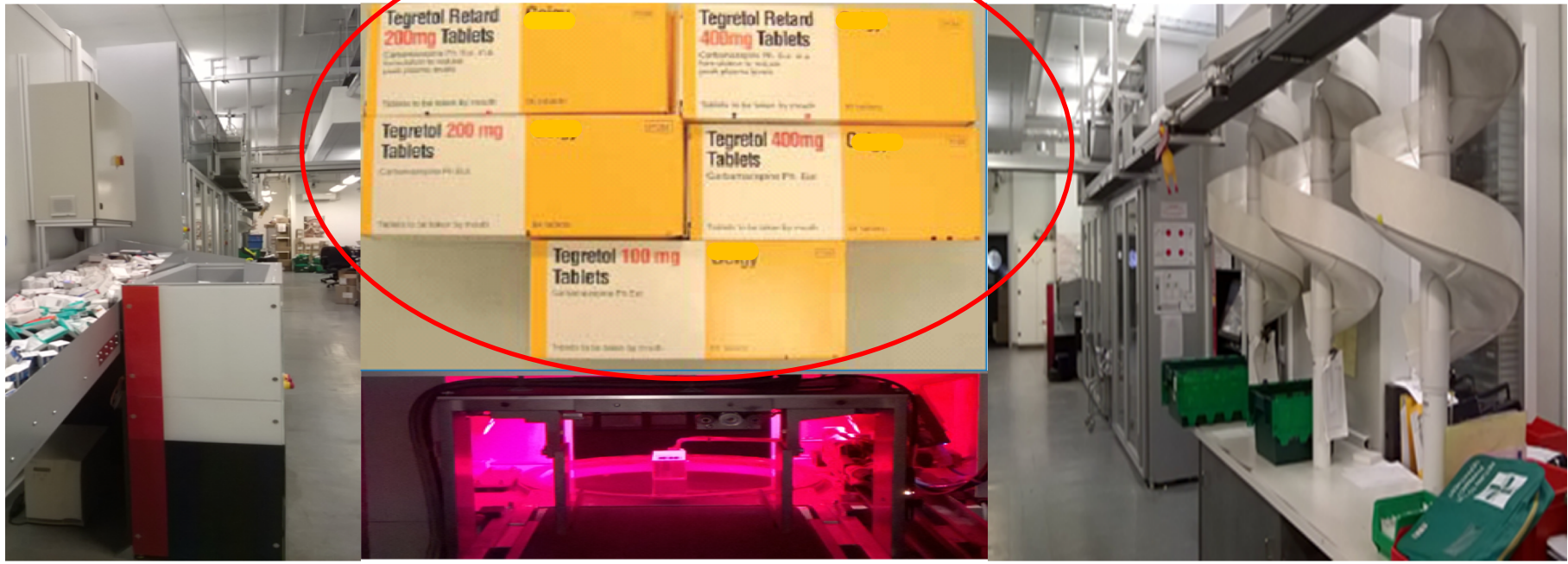
- Sort, put away, manage
- interface with pharmacy system
- Dispensing and stock
- 24 / 7 with OOH collection point
- Release time



➤ **Clinical Pharmacy**



# The Robot





## Robot: dispensing and stock supply



Conveyers to  
12 drops points



# Vertical Carousels



Scan in and scan out  
Interface pharmacy  
system



# Ward Stock



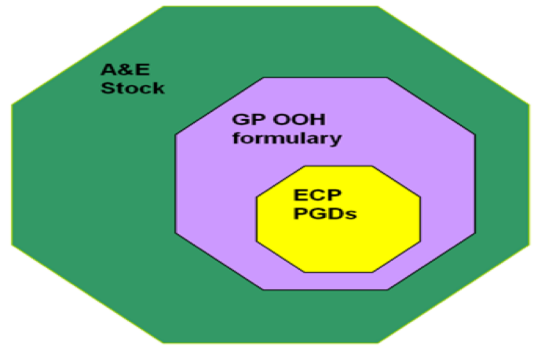


# Electronic medicines cupboards



Quick access, audit trail  
Select by name not appearance

Rationalise stockholding



# Interfaced Process:



## Restock List

Item ID	Description	Control Levels	Page 1
10159-A	ACELYLTYESTER 200mg/1ml, 10ml, IU	20 AMP, 6 AMP	1 PAC
14360-A	ACICV OVR 300mg/20ml, 20ml, IU	10 VIAL, 4 VIAL	1 PAC
11182-A	CLARTHROMYCIN 500mg, IU	25 PACK, 10 PAC	15 PAC
12430-A	CYCLIZHE 50mg/1ml, 1ml, IU	20 AMP, 5 AMP	3 PAC
21610-A	DEXTROSEL (Drypowder)	18 TUBE, 11 TUB	2 PAC
29683-A	DIKTRIDE ENERGY PACK (Change) TABLET	2 PACK, 3 PAC	1 PAC
13544-A	DIGOXIN 500mg/2ml, 2ml, IU	10 AMP, 5 AMP	1 PAC
11640-A	DIPROBASE CREAM	6 TUBE, 3 TUB	3 TUBE
13657-A	ENDOPAZON 40mg/0.4ml, 0.4ml, SYRINGE	60 EAC, 28 EAC	3 PAC
13719-A	FERROUS SULPHATE 300mg TABLET	36 TAB, 17 TAB	1 PAC
14300-A	GENFAMCIB 60mg/2ml, 2ml, IU	30 AMP, 22 AMP	6 PAC
14127-A	IPRATROPIUM BROMIDE 250mg/1ml, 1ml, NEBULE	100 NEED, 33 NEED	3 PAC
14592-A	IPRATROPIUM BROMIDE 500mg/2ml, 2ml, NEBULE	100 NEED, 24 NEED	3 PAC
10398-A	METFORMIN 400mg TABLET	42 TAB, 21 TAB	1 PAC
25842-A	MIDPHINE (Change) 10mg/5ml 100ML BOTT	200 ML, 89.5 ML	1 BTL
11820-A	HALORONE 400mg/1ml, 1ml, IU	16 AMP, 3 AMP	1 PAC
15957-A	PARACETAMOL 1g/100ml, 100ml, INF	40 VIAL, 7 VIAL	3 PAC
12012-A	PARACETAMOL 250mg/5ml, 500ml, BOTT	1050 ML, 36 ML	1 BTL
22483-A	PHOSPHATE ENEMA	4 ENMA, 2 ENMA	2 ENMA
23784-A	POTASSIUM CHLORIDE 0.15% B, 1000ML BOTT	15 BTL, 5 BTL	10 BTL
11934-A	RAMPROL 5mg CAPSULE	36 CAP, 23 CAP	1 PAC
02447-A	SEMPHA 15mg/10ml, 300ML SYRUP	800 ML, 200 ML	2 BTL
03636-A	SODIUM CHLORIDE 0.9% 1000ML BOTT	50 BTL, 25 BTL	20 BTL



Issued from:	St. Mary's Hospital Pharmacy	Issued to:	MAAU (012123)
Order Number:	03498.31175	Issued:	7-Nov-2014 at 8:40
Page 1 of 3	Produced by: Mrs Patricia Burfield (NHS Trust)	Page 1 of 3	Produced by: Mrs Patricia Burfield (NHS Trust)
<b>Picking List &amp; Statement of Charges</b>			
ROBOTISED	NONPNE SULPHATE 2 mg in 1ML Oral Liquid	1 x 100 ml Pack	00.84
ROBOT TEXT	DIPROBASE Cream	3 x 60 g Pack	03.34
ROBOTINSI	IPRATROPIUM BROMIDE 250 micrograms in 1ML NEBULES	3 x 20 x 1ml, Unit-Dose Vial Pack	08.90
ROBOTINSI	IPRATROPIUM BROMIDE 500 micrograms in 2ML NEBULES	3 x 20 x 2ml, Unit-Dose Vial Pack	07.20
ROBOTINSI	CLARITHROMYCIN 500 mg Injection	15 x 1 x 500mg Vial Pack	020.80
ROBOTINSI	CYCLIZHE 50 mg in 1ml Injection	2 x 6 x 1ml, Ampoule Pack	031.14
ROBOTINSI	DIGOXIN 500 micrograms in 2ml Injection	1 x 6 x 2ml, Ampoule Pack	03.76
ROBOTINSI	GENFAMCIB 60 mg in 2ml Injection	6 x 6 x 2ml, Ampoule Pack	041.26
ROBOTINT	DEXYPROSEL (Formerly Hyostop)	2 x 3 x 25g Pack	09.20
ROBOTINSI	DIKTRIDE ENERGY PACK (Change) Tablets	1 x 47 g Pack	06.91
ROBOTISORAL	FERROUS SULPHATE 200 mg Tablets	1 x 26 Tablet Pack	01.15
ROBOTISORAL	METFORMIN 400 mg Tablets	1 x 21 Tablet Pack	00.45
ROBOTISORAL	RAMPROL 5 mg Capsules	1 x 20 Capsule Pack	06.37
ROBOTIWD	PHOSPHATE Enema	2 x 1 x Single Dose Pack	01.49
ROBOTINSI	ACETYLTYESTER 200 mg in 1ML Injection	1 x 10 x 10ml, Ampoule Pack	03.08
ROBOTINSI	CLARITHROMYCIN 500 mg in 0.4ml, Pre-filled Syringe Pack	3 x 10 x 0.4ml, Pre-filled Syringe Pack	030.08
ROBOTINSI	PARACETAMOL 1 g in 100ml, Injection Ampoule	3 x 10 x 100ml Vial Pack	020.35
ROBOTINSI	WATER FOR INJECTION (0.9%) Plastic Ampoule	2 x 20 Ampoule Pack	03.70
ROBOTISRT	PARACETAMOL 250 mg in 5ml, Suspension	1 x 800 ml, Pack	04.00
ROBOTISRT	SODIUM CHLORIDE 0.9% in 100ml, Syrup	1 x 600 ml, Pack	02.76




A Accumulated Restocking Items  
 C Safety/Check Restock Configuration Item  
 D Expanding Error Detected

# Integration:



RT - Chart Administrations [Mrs Gillian Honeywell]

TEST Caution: Patient with similar name on Ward

Insultant: JW Child & Family Ward: APLEY Patient Assessment: 

Hospital No: IW324042 National No: 012 345 6789 Date of Birth: 04-Feb-1954 Height: 160 cm Weight: 70.000 kg BSA: 1.73 sq m

Drugs: PENICILLINS

Administration Period: 31-Oct-2014 03:00 - 01-Nov-2014 02:59

Admin. Medications: [As required (PRN) Medications]

Sched	Date/Time	Drug Name	Dose	mL	Route	W	Admin. Date	Time	Non-admin. Reason
	14:03	STOP FOOD FROM MIDNIGHT	1 unit		Oral				
		TEAROFFEEWATER (Opish Semi-Skimmi)	1 unit		Oral				
Oct-2014	18:00	OXYGEN (Target Sats 88-92%) ADULT USE (< 1 Dose(s))			Inhaled				
		PARACETAMOL 600 mg Caplets	1000 mg		Oral				
	22:00	OXYGEN (Target Sats 88-92%) ADULT USE (< 1 Dose(s))			Inhaled				
		PARACETAMOL 600 mg Caplets	1000 mg		Oral				

Start Cancel Select Patient(s) STL Dates Admin. Chart Resupply Orders Order Inquiry Discontinue Order Close Help

Patient drug chart appears on cupboard



Main Menu: Add New Patient

Global Patient List  
Welcome, Molly Lee

Alkin, Jennifer PLID: 256378 MRN: 789654	Admit: 02/02/11 DOB: 12/06/56	Rm#: 1001-A PLType: INP Area: MEDSURG
Barok, Jason PLID: 908654 MRN: 564378	Admit: 02/02/11 DOB: 03/18/63	Rm#: 1002-A PLType: INP Area: MEDSURG
Cosa, Blake PLID: 234964 MRN: 875302	Admit: 02/07/11 DOB: 09/21/70	Rm#: 1005-A PLType: INP Area: MEDSURG
Dulek, Mila PLID: 905723 MRN: 705673	Admit: 02/07/11 DOB: 06/06/50	Rm#: 1005-A PLType: INP Area: MEDSURG
Firan, Ellen PLID: 564326 MRN: 789543	Admit: 01/29/11 DOB: 02/26/75	Rm#: 1004-A PLType: INP Area: MEDSURG

Sort by Room

Select a patient from the name or use the scroll

Global List Local List Partial Dose List

01:28:42 PM 02/09/11

The Global List contains patients from other nursing units. In addition, it may contain discharged patients so waste or returns can be done if needed.

Main Menu: Add New Patient

Local Patient List  
Welcome, Molly Lee

Alkin, Jennifer PLID: 256378 MRN: 789654	Admit: 02/02/11 DOB: 12/06/56	Rm#: 1001-A PLType: INP
Barok, Jason PLID: 908654 MRN: 564378	Admit: 02/02/11 DOB: 03/18/63	Rm#: 1002-A PLType: INP
Cosa, Blake PLID: 234964 MRN: 875302	Admit: 02/07/11 DOB: 09/21/70	
Dulek, Mila PLID: 905723 MRN: 705673	Admit: 02/07/11 DOB: 06/06/50	
Firan, Ellen PLID: 564326 MRN: 789543	Admit: 01/29/11 DOB: 02/26/75	
Green, Lucia PLID: 765387 MRN: 865342	Admit: 02/01/11 DOB: 01/30/60	Rm#: 1003-A PLType: INP
Horvath, Paul PLID: 245622 MRN: 476937		Rm#: 1006-A

Sort by Room

Select a patient from the name or use the scroll

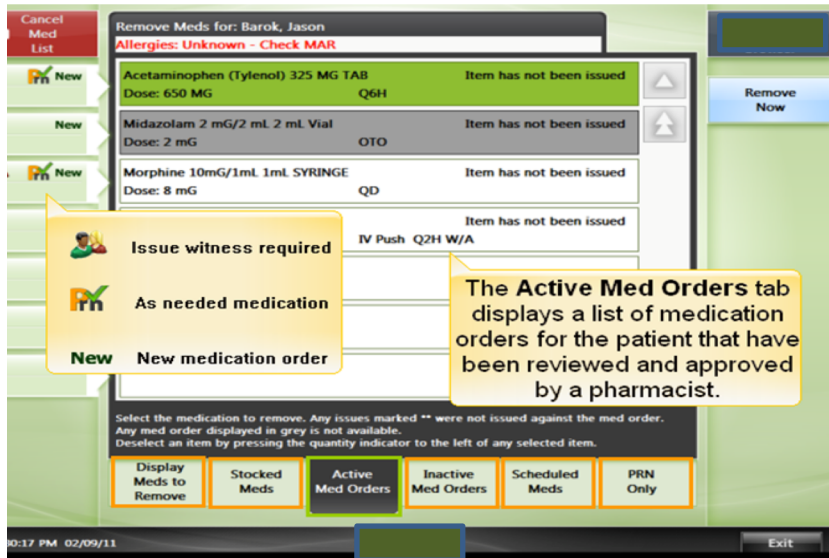
Global List Local List Partial Dose List

01:28:40 PM 02/09/11

Notice that you can see the name, ID, medical record number and date of birth for each patient.

The Local List contains all patients in cabinet's specific area.

# Integration:



Remove Meds for: Barok, Jason  
Allergies: Unknown - Check MAR

New	Acetaminophen (Tylenol) 325 MG TAB Dose: 650 MG QGH	Item has not been issued
New	Midazolam 2 mg/2 mL 2 mL Vial Dose: 2 mg OTO	Item has not been issued
New	Morphine 10mg/1mL 1mL SYRINGE Dose: 8 mg QD	Item has not been issued
	IV Push Q2H W/A	Item has not been issued

**Issue witness required**

**As needed medication**

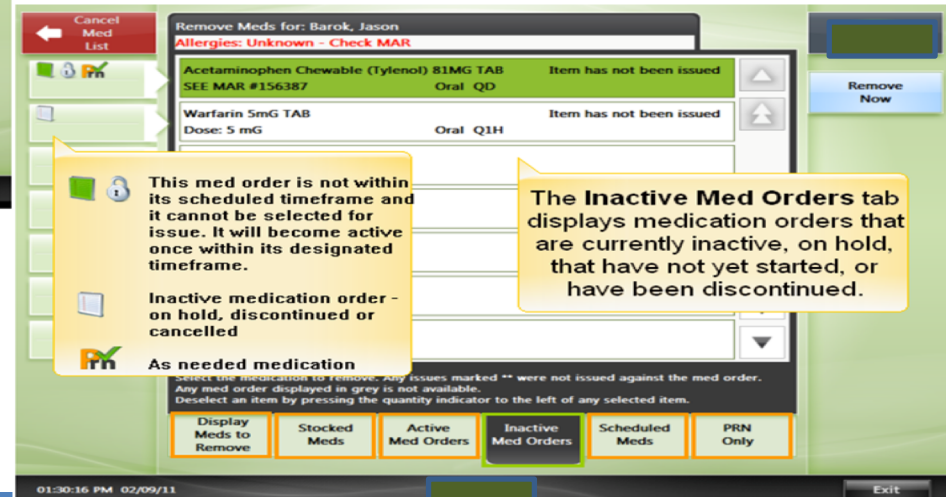
**New** New medication order

Select the medication to remove. Any issues marked \*\* were not issued against the med order. Any med order displayed in grey is not available. Deselect an item by pressing the quantity indicator to the left of any selected item.

Display Meds to Remove | Stocked Meds | **Active Med Orders** | Inactive Med Orders | Scheduled Meds | PRN Only

10:17 PM 02/09/11

- Allergies
- Scheduled
- If required
- On hold
- Approved



Remove Meds for: Barok, Jason  
Allergies: Unknown - Check MAR

	Acetaminophen Chewable (Tylenol) 81MG TAB SEE MAR #156387 Oral QD	Item has not been issued
	Warfarin 5mg TAB Dose: 5 mg Oral Q1H	Item has not been issued

**This med order is not within its scheduled timeframe and it cannot be selected for issue. It will become active once within its designated timeframe.**

**Inactive medication order - on hold, discontinued or cancelled**

**As needed medication**

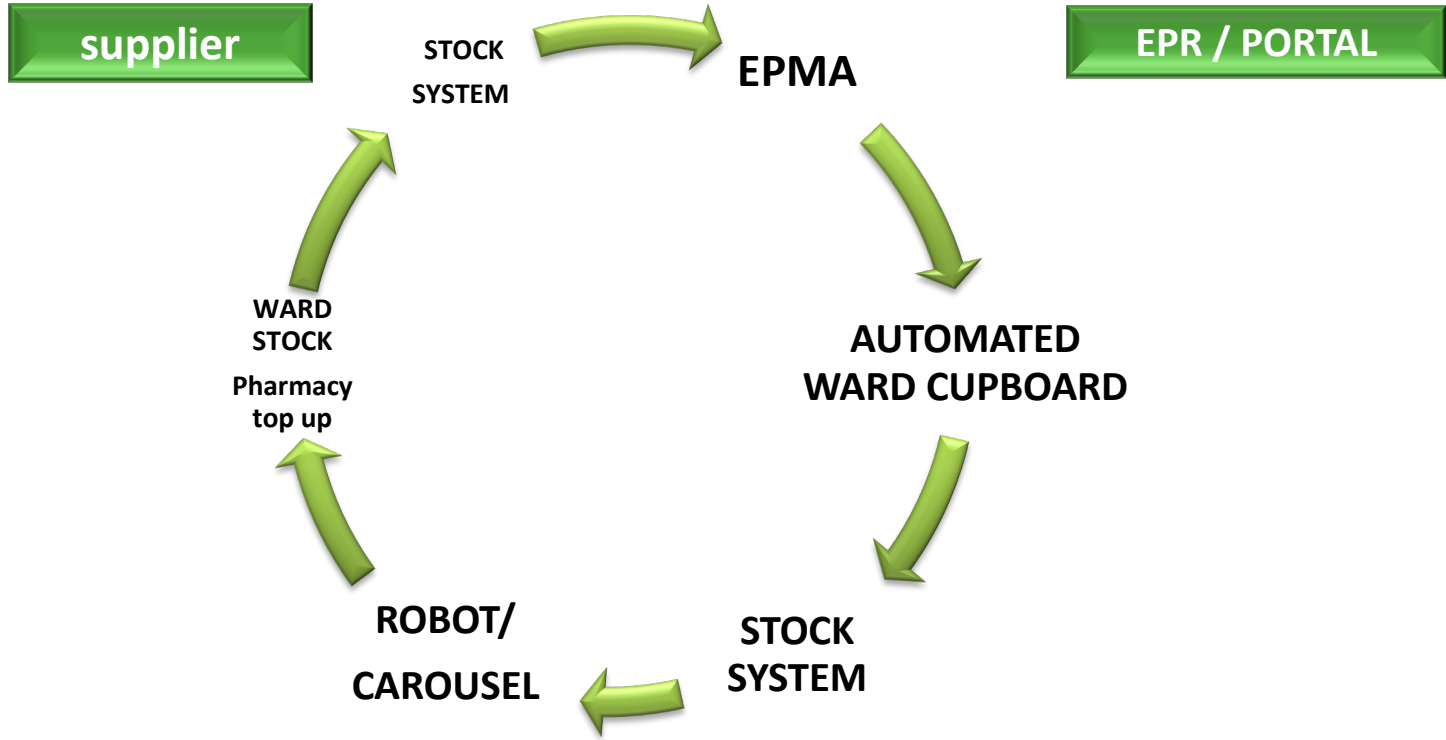
Select the medication to remove. Any issues marked \*\* were not issued against the med order. Any med order displayed in grey is not available. Deselect an item by pressing the quantity indicator to the left of any selected item.

Display Meds to Remove | Stocked Meds | Active Med Orders | **Inactive Med Orders** | Scheduled Meds | PRN Only

01:30:16 PM 02/09/11



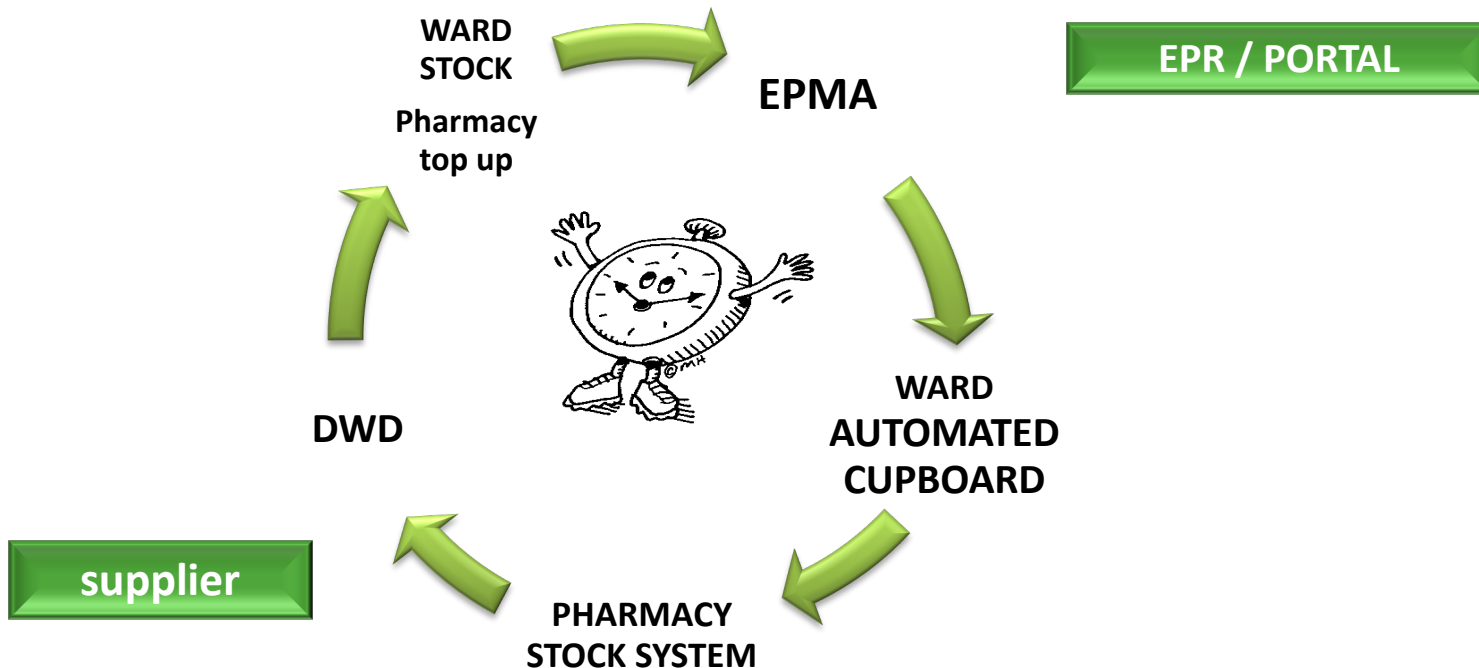
# Interface Map: current



**EPR / PORTAL**



# Interface Map: Model Hospital



# Safety Benefits



Before



After



# Benefits: Staff



4.74 FTE nursing time: administering 4,380 doses per day. 5.3%\* down to 1% missed doses (0.12 per 100,000 bed days)



1.38 FTE Pharmacy time: ward based: 66% ward dispensed, 80% TTOs, >80% clinical time



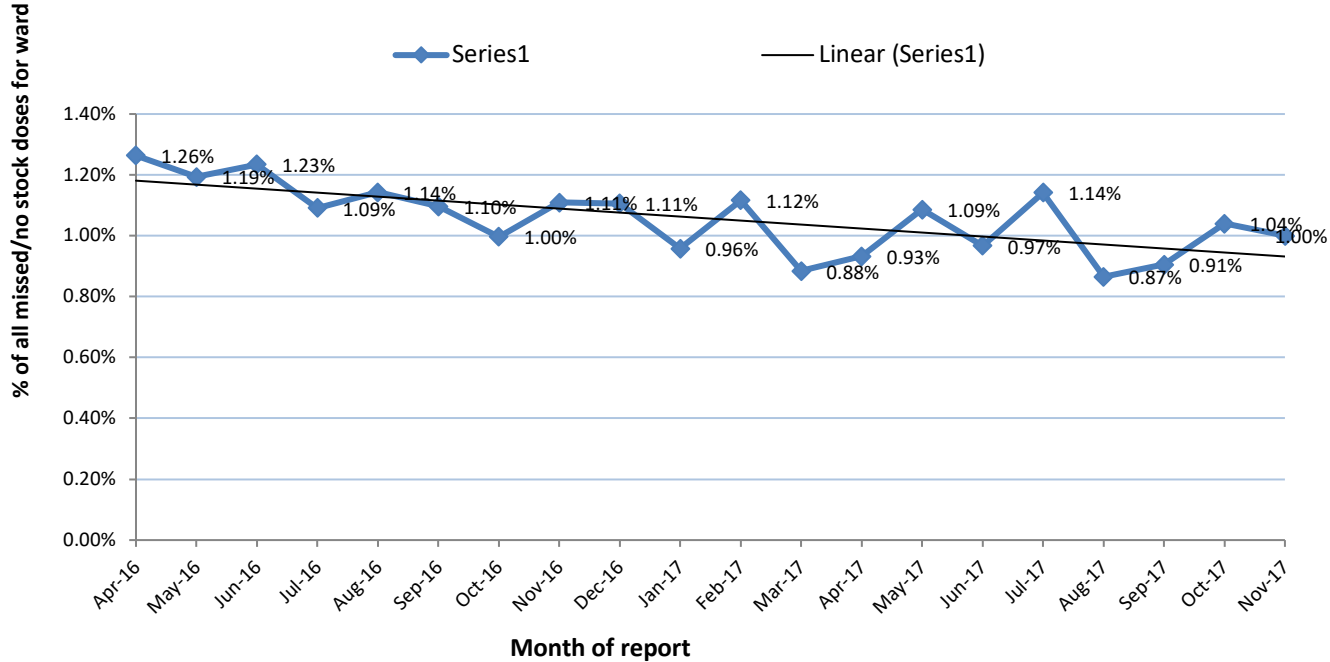
Doctor time: ~50% TTOs by pharmacist, >20% admissions, EPMA

\*Hough, Nicholls 2012

# Benefits: Safer Care:



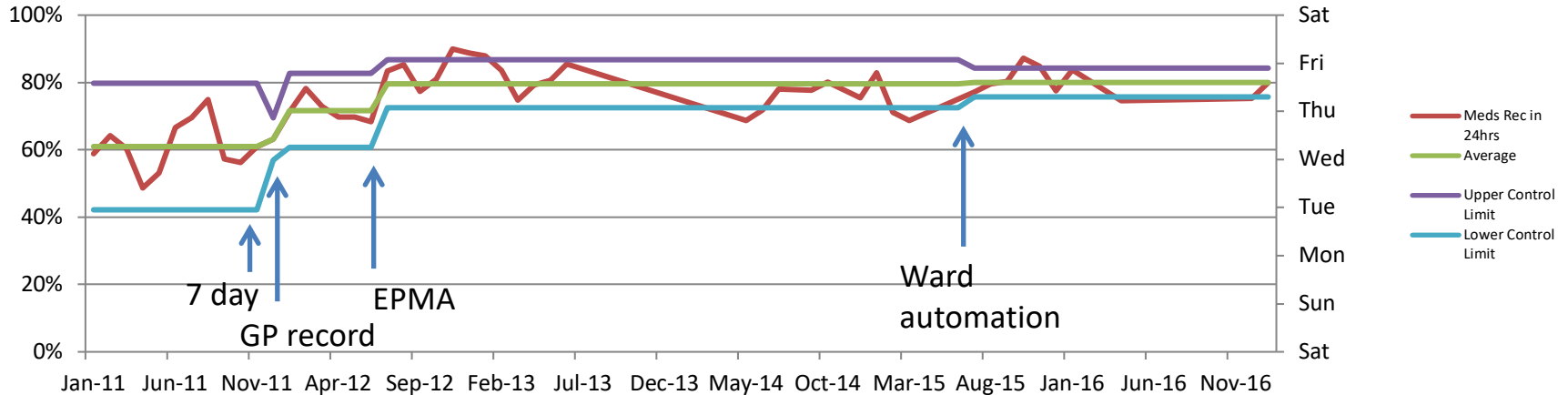
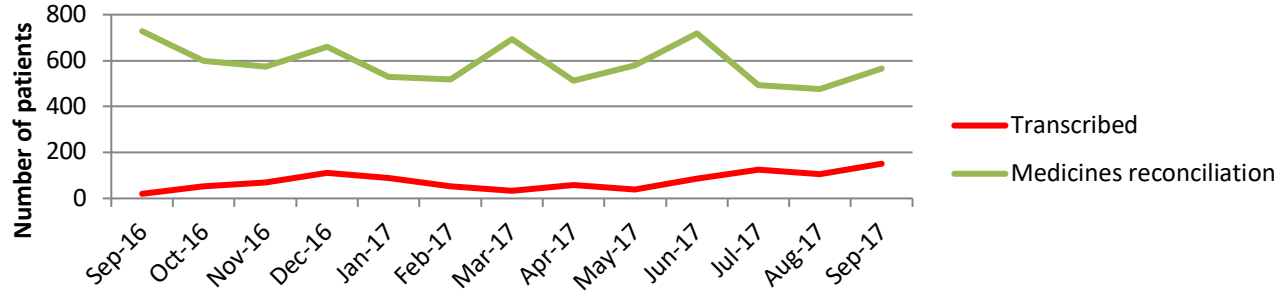
Avoidable missed and no stock doses as % of prescribed for Trustwide



# Benefits: Safer Care:



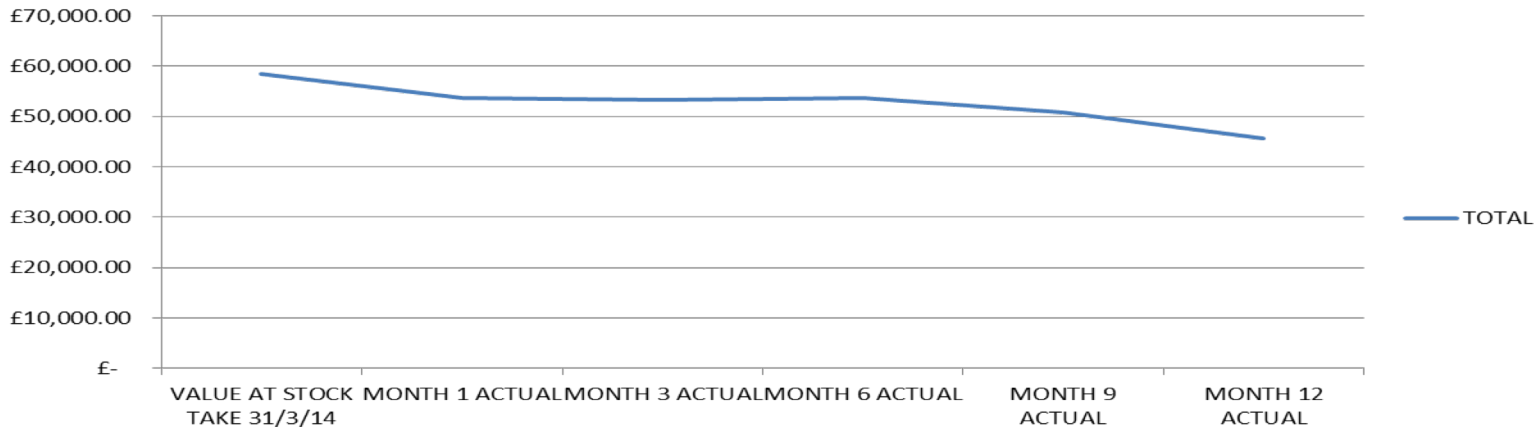
## Transcribing and medicines reconciliation 2016-17



# Benefits: Finance



**TOTAL STOCK VALUE**

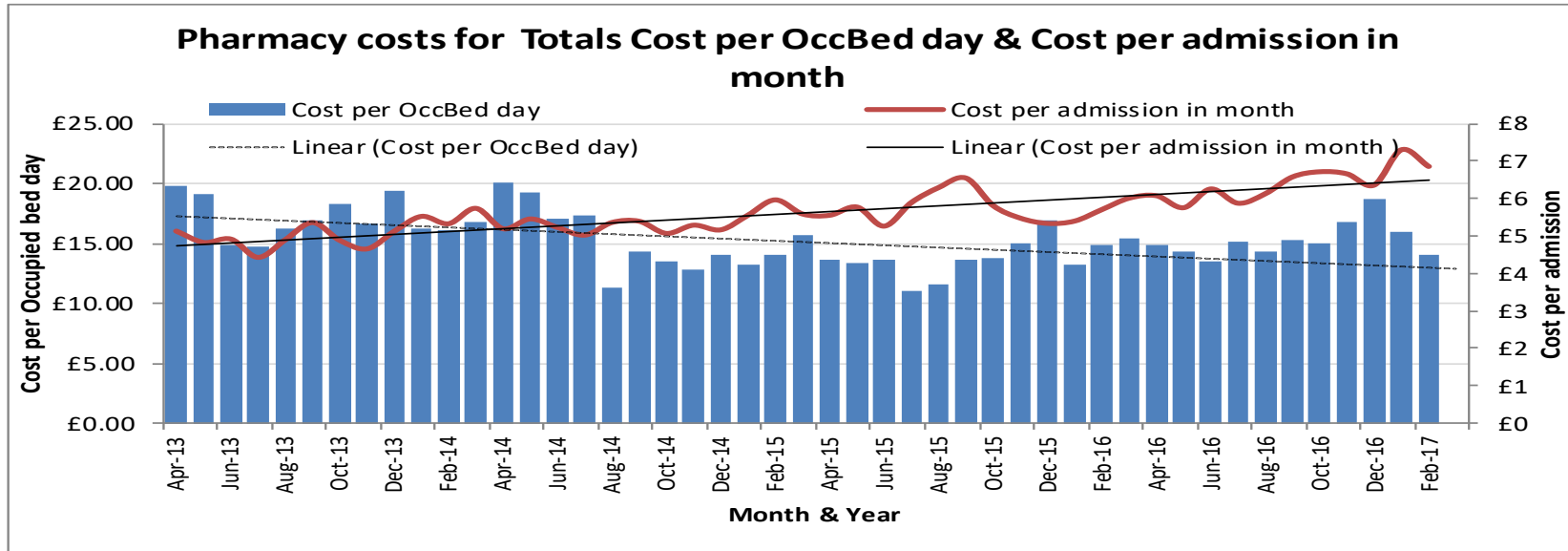


**8% reduction**  
**JUST IN TIME TOP UP:**  
**38 increase to 95**

# Benefits: Finance



## Reduced cost per Occupied Bed Day



Replace what is used, not what is missing

# Risks:



## Human Factors

- 'Computer is always right'
  - Drop down menu
    - Selection ≠ actual

## Technology

- Network and power dependent
  - Inter-operability

## System and Process

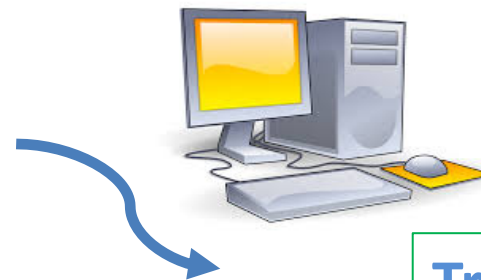
- Change management
  - Enabler, not solution



# 2018: Transfer of Care



Assessment  
on admission



Transfer of  
Care

Discharge  
MUR



#MedicinesMo

# Conclusion:

## Safety

- Right drug, right place, right time, right patient

## Human Factor

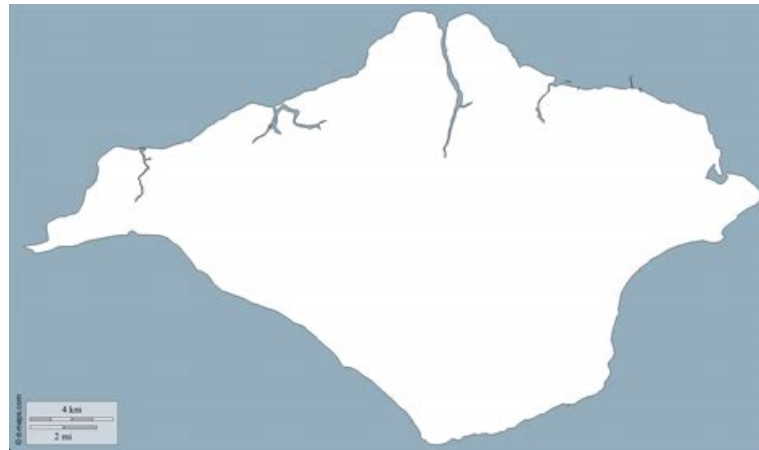
- Take the robot out of the human
- Change management

## Finance

- Whole system efficiency
- Actual drug cost



# THANK YOU FOR LISTENING

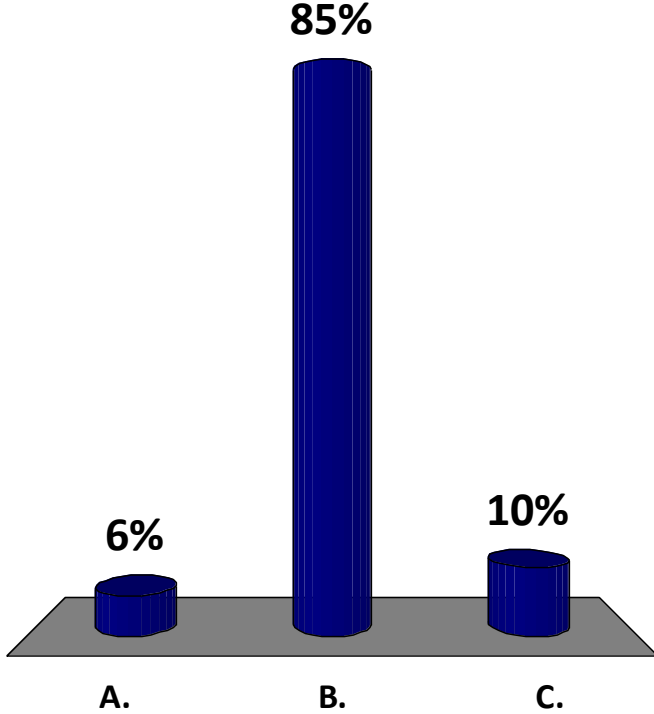


[gillian.honeywell@nhs.net](mailto:gillian.honeywell@nhs.net)

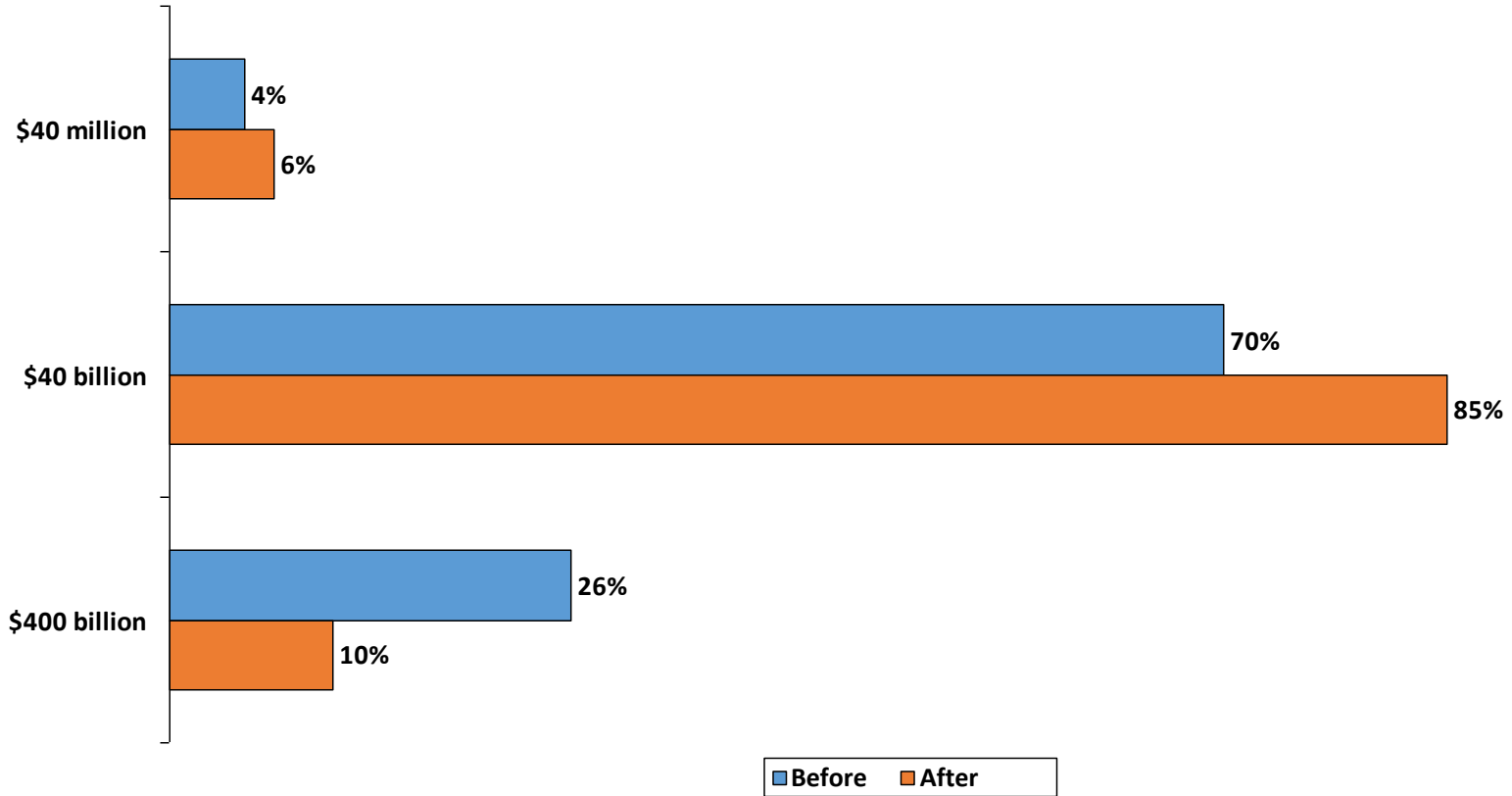
[www.iow.nhs.uk](http://www.iow.nhs.uk)

What is the global cost of medication errors:

- A. \$40 million
- ✓ B. \$40 billion
- C. \$400 billion

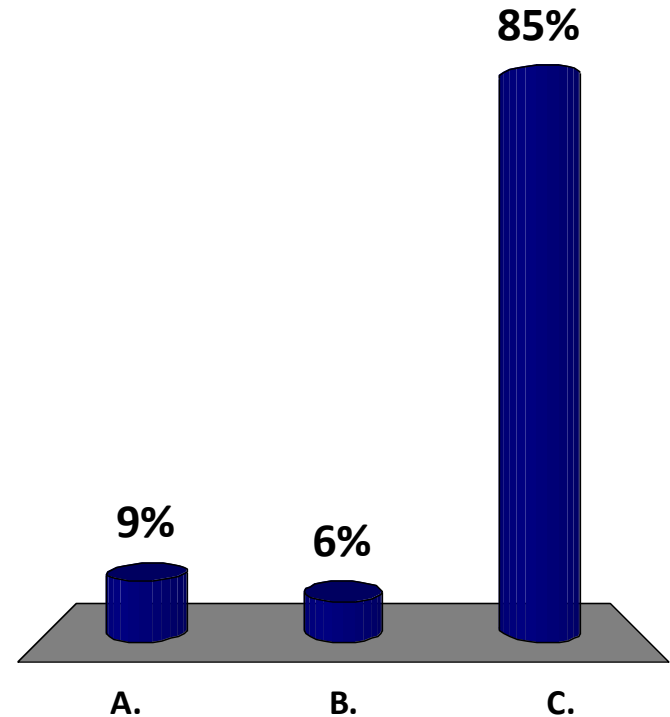


## What is the global cost of medication errors:

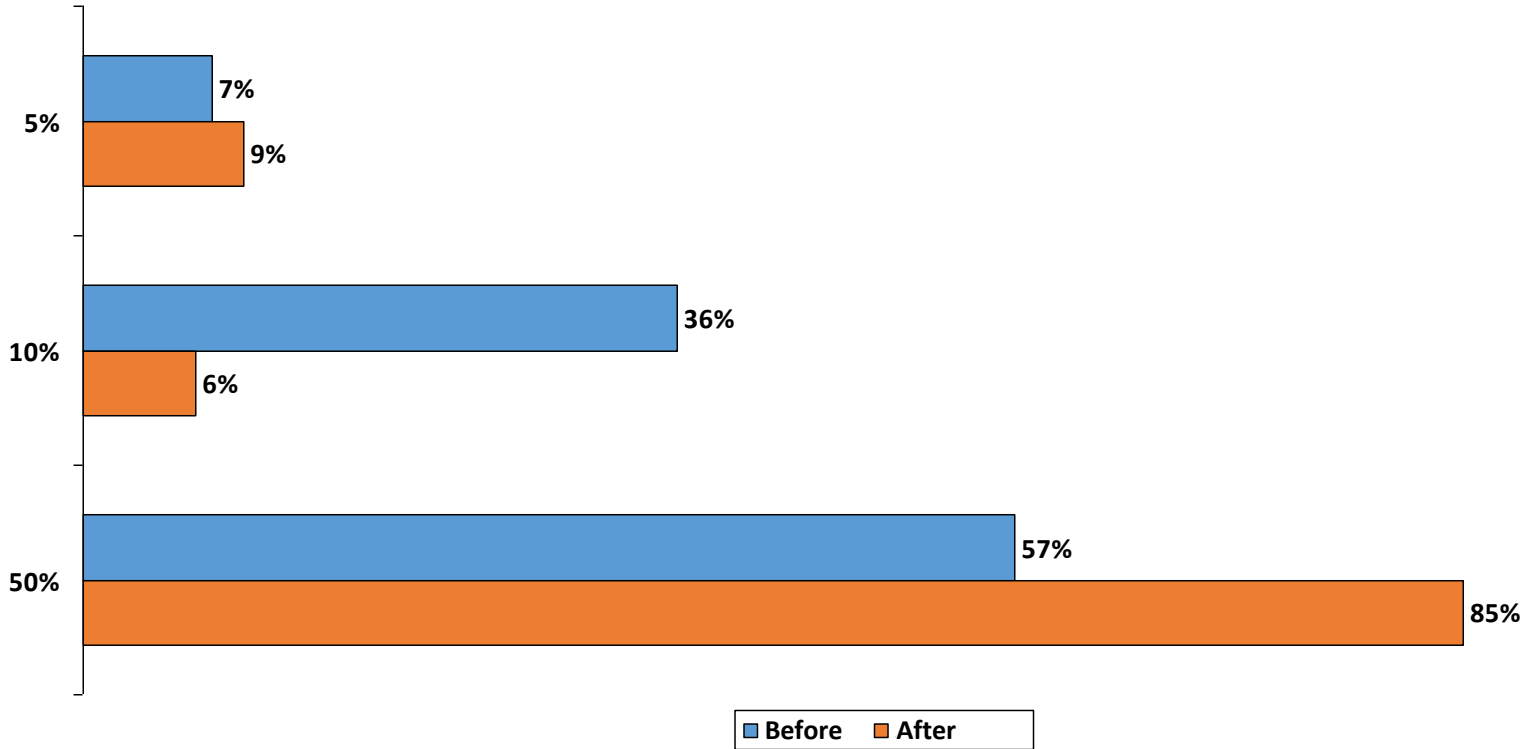


The WHO in the 'Medication Without Harm' challenge aims to reduce avoidable harm globally by what % over the next 5 years:

- A. 5%
- B. 10%
- ✓ C. 50%

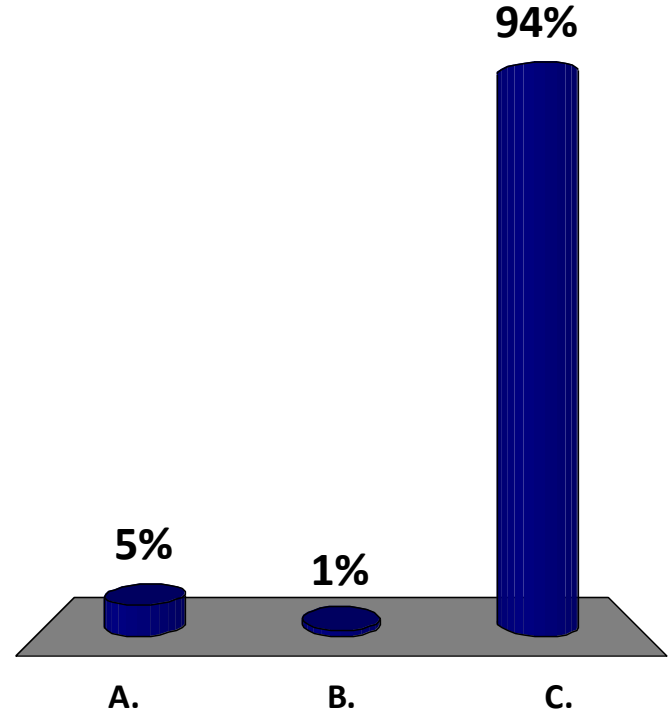


## The WHO in the 'Medication Without Harm' challenge aims to reduce avoidable harm globally by what % over the next 5 years:



Does automation save money in medicines expenditure:

- A. No
- B. Only a one off saving at the beginning
- ✓ C. Yes





## Does automation save money in medicines expenditure:

