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Beacon Digital™

INVATECH HEALTH™

Welcome to Cardiff School of Pharmacy & Pharmaceutical Sciences

Ariennir yn Rhannol gan **Lywodraeth Cymru**
Part Funded by **Welsh Government**

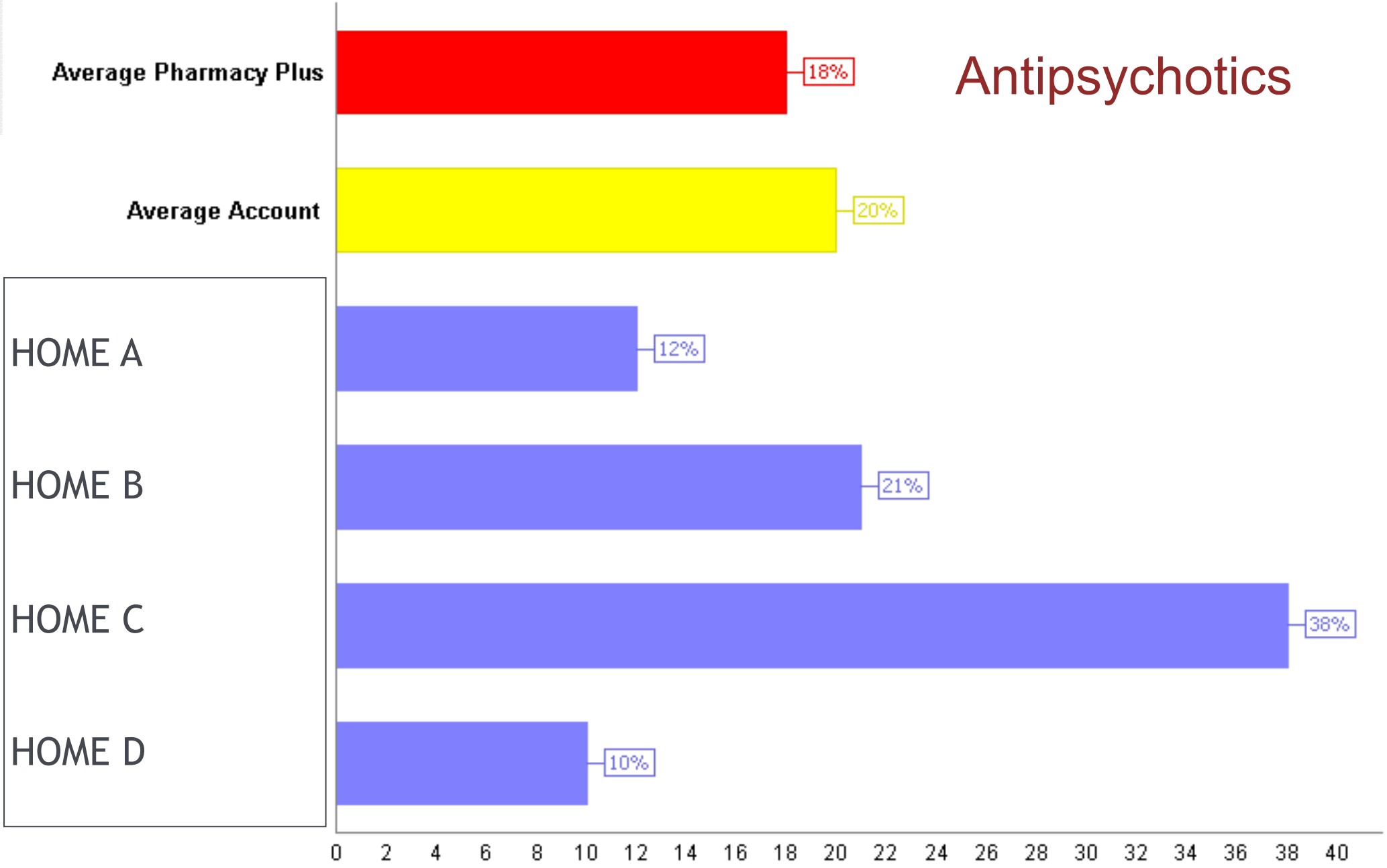




PROF. CLIVE BOWMAN

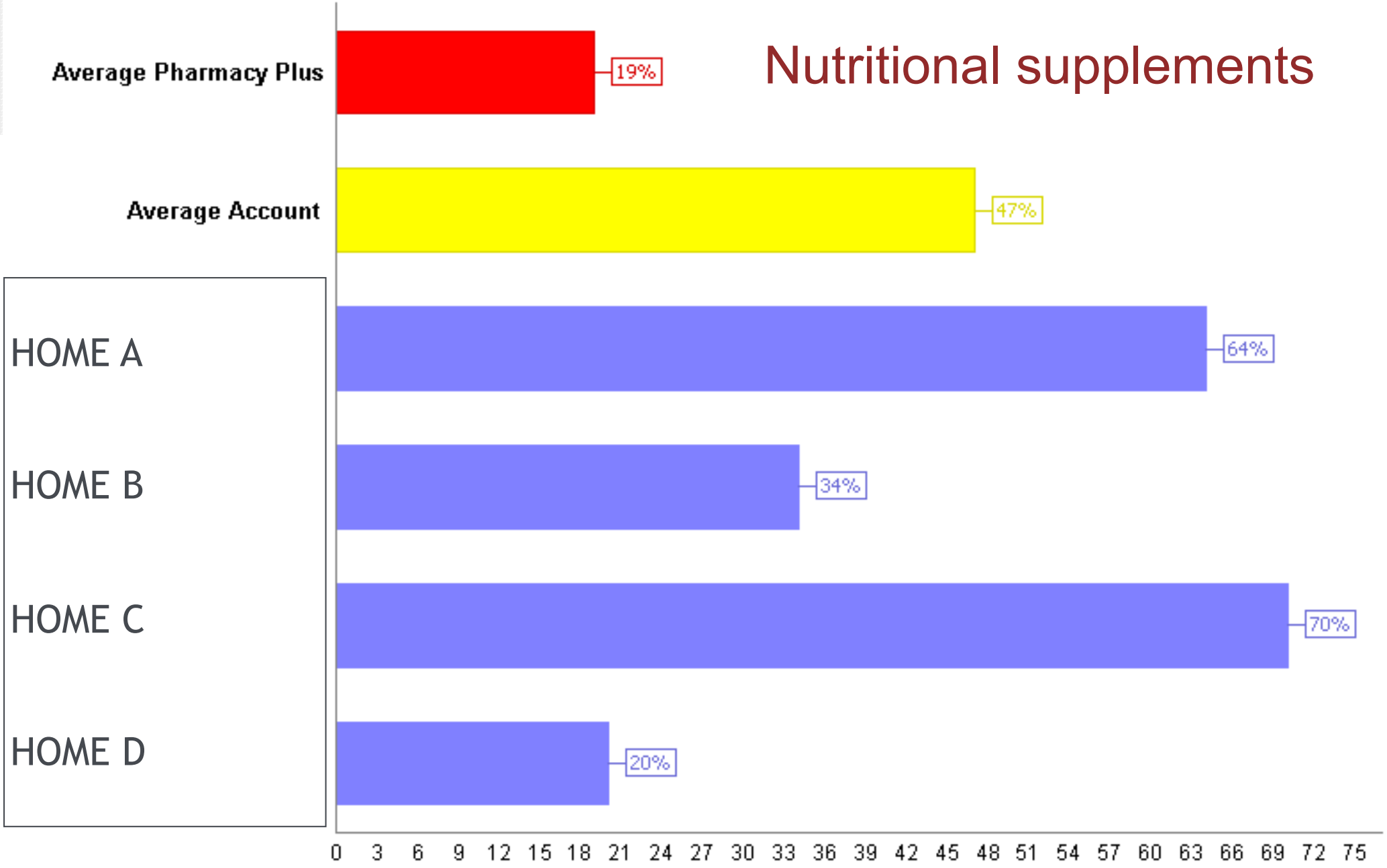
How we got to here!

Antipsychotics



PharmacyPlusOnline

Nutritional supplements



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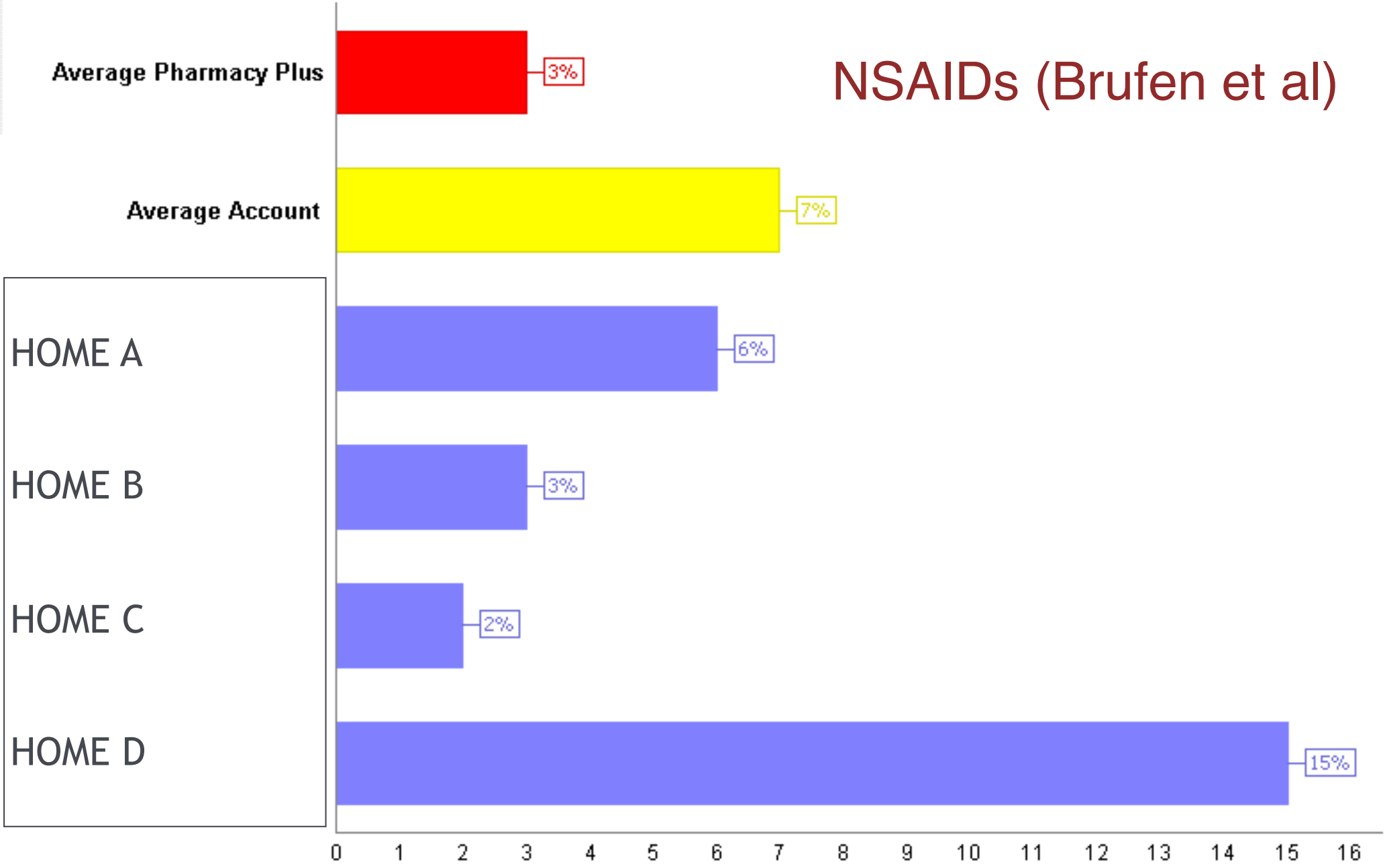
NSAIDs (Brufen et al)



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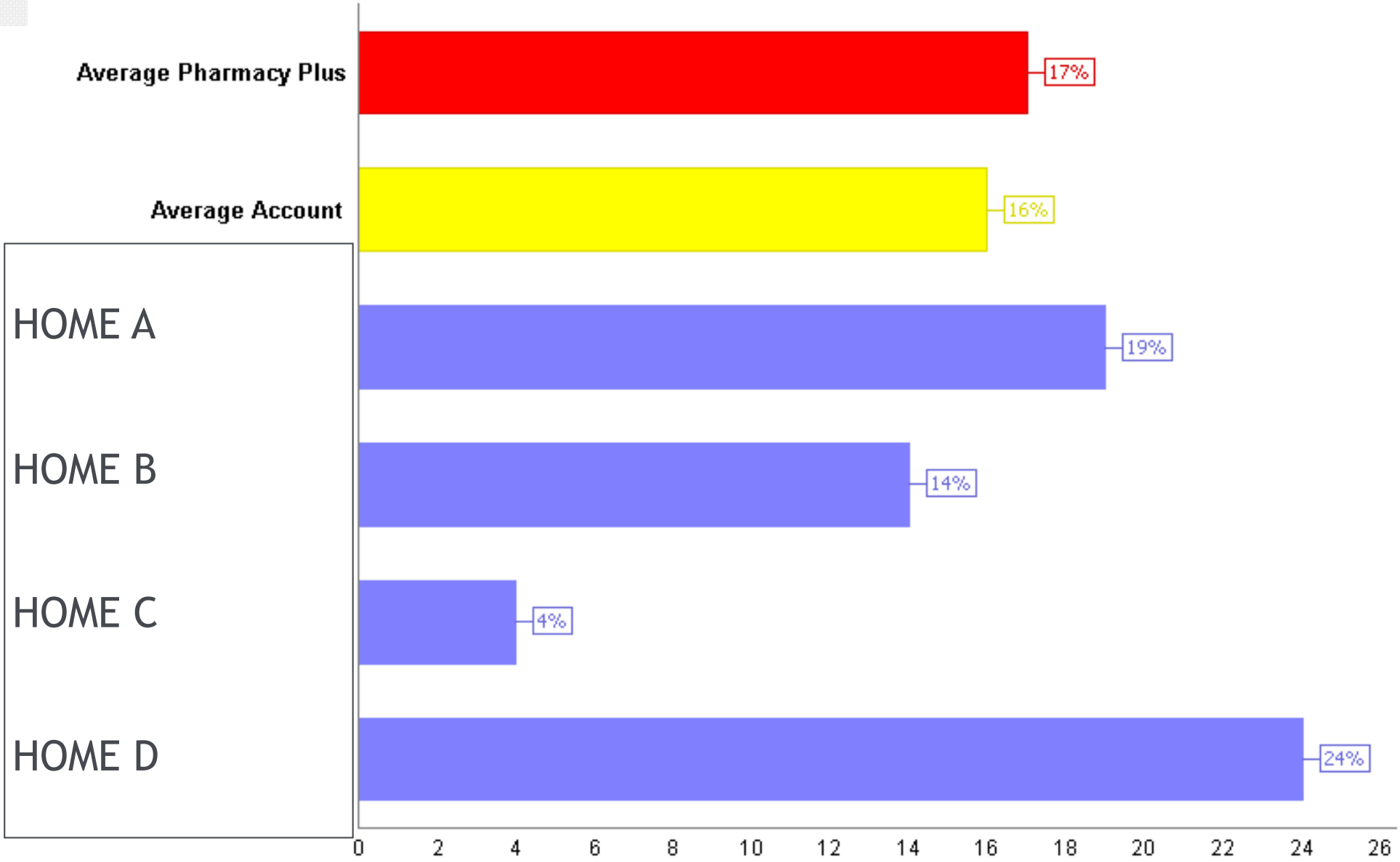
PRN products



Prescribing cultures

- Personalised
  - Low supplemental feeds, low antipsychotics, high analgesia high PRN
- Institutional
  - High supplemental feeds, high antipsychotics, low analgesia & low PRN

Prescribing of antipsychotics in long-term residential care*

Professor Ala Szczepura Dr Deidre Wild Dr Amir J Khan Dr David Owen Dr Tom Palmer
Tariq Muhammad Dr Michael D Clark Professor Clive Bowman

- In 2009, the UK Department of Health commissioned a policy review on antipsychotic use in dementia. The resulting report concluded that usage was unacceptably high and recommended it should be reduced to one third of existing levels over a period of 3 years .
- The UK Royal College of Psychiatrists confirmed that older people could safely be withdrawn from agents like risperidone over a 2–4 week period with no adverse consequences.
- The policy review also stipulated that SGA agents should be prescribed in preference to FGA agents; that the lowest possible effective dose should be prescribed for the shortest period (ideally less than 12 weeks); and that treatment should be reviewed at least monthly with reduction or cessation actively considered at each review.
- These recommendations were incorporated into a National Dementia Strategy (NDS) launched in February 2009.

* In peer review

Table 1 - Care Home and Resident Characteristics

Sample characteristics	Total		Cohort C	
	Baseline (1 Jan 2009)	*Month 48* (31 Dec 2012)	*Baseline* (1 Jan 2009)	*Month 48* (31 Dec 2012)
Number of homes	211	616	166	166
Number of residents	8,357	31,619	6,979	9,006
Resident Demographics				
Women, %	71.9	68.0	71.9	69.1
Age years (mean)	83.7	78.8	83.8	80.1
65–74 years, %	8.9	16.9	8.8	14.4
75–84 years, %	34.8	44.5	34.8	45.5
85 years and over, %	52.5	30.3	52.8	34.0
Care Home Characteristics				
Mean size (number of residents)	39.6	51.3	42.0	54.3
Median size [IQ range]	37 [18]	46 [30]	39 [19]	49 [28]
Type of home (% all homes)				
Residential home, %	47.9	25.8	48.8	48.2
Nursing home, %	39.3	23.5	39.2	34.9
Dual registered* , %	12.8	50.7	12.1	16.9
Medical support (% all homes)				
1 GP practice, %	13.7	11.0	11.5	8.4
2-3 GP practices, %	31.3	29.7	31.9	29.5
4+ GP practices	55.0	59.3	56.6	62.1

* Providing both nursing and residential care.

Note: Cohort C contained homes using PCS at baseline and Month 48

Prescribing of antipsychotics in care homes

Table 2 - Breakdown of Antipsychotic Prescribing Patterns

Prescribing	Total		Cohort C	
	Baseline (1 Jan 2009)	*Month 48* (31 Dec 2012)	*Baseline* (1 Jan 2009)	*Month 48* (31 Dec 2012)
Point-prevalence (PP), %				
All Antipsychotics				
Mean (standard deviation)	18.0 (±12.0)	19.0 (±15.2)	18.3 (±11.9)	18.0 (±12.3)
Median [Inter-quartile range]	15.2 [11.8]	15.4 [14.0]	15.3 [11.4]	15.1 [12.7]
Second-Generation Agents (SGAs)				
All Second-Generation Agents	12.5	14.6	12.8	13.9
Quetiapine	*5.1*	*4.7*	*4.9*	*3.9*
Risperidone	*4.0*	*5.3*	*4.2*	*6.4*
Olanzapine	*2.1*	*3.0*	*2.3*	*2.9*
First-Generation Agents (FGAs)				
All First-Generation Agents	5.9	5.4	5.8	5.2
Halperidol	*2.5*	*3.0*	*2.3*	*2.4*
Daily dosage, %*				
Recommended	98.7	NA	98.6	NA
High	0.3	NA	0.3	NA
Excessive	1.0	NA	1.1	NA
Length of exposure, %**				
Recommended	18.0	12.8	18.2	10.2
Acceptable	12.3	9.7	12.2	6.4
Excessive	69.7	77.6	69.7	83.5

* Percentage of total prescriptions with following daily dosage: 'Recommended' = ≤ Maximum IDD; 'High' = >100% to 200% IDD; 'Excessive' = >200% IDD.

** Percentage of risperidone prescriptions with following LOE: 'Recommended' ≤6 weeks; 'Acceptable' >6 to <12 weeks; 'Excessive' ≥12

Cohort C n = 7000 baseline and at 48m n= 9000

A Technology enabled approach to Medicines Management In Care Homes

A pathfinder project jointly funded by the Welsh Government and Beacon Digital in partnership with the ABMU Health Board and The School of Pharmacy, Cardiff University

Key Facts

Beacon Digital™

Llywodraeth Cymru
Welsh Government

GIG CYMRU NHS WALES
Bwrdd Iechyd Prifysgol Abertawe Bro Morgannwg University Health Board

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- Welsh Technology and Tele-health Fund £450K awarded to implement and evaluate a medicines management solution in 50 care homes in Wales. Fund covers equipment, training, evaluation.
- Beacon Digital provided private match funding. Responsible for delivery of project and establishing an effective system.
- ABMU Health Board are the key partner/ sponsor. Responsible for overseeing the project and understanding the results
- Cardiff University appointed to evaluate baseline situation in medicines management and the effectiveness of the technology.
- Invatech Health responsible for providing an innovative electronic medicines management solution for care homes and pharmacies.

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Cardiff School of
Pharmacy & Pharmaceutical Sciences

Baseline Analysis of Medicines Management in Care Homes

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Delyth James

Mat Smith

Fadya Al-Hamadani
PhD student

MAR Chart Analysis
Waste Analysis

MPharm Students

MAR Chart Analysis

Rita, Joanna & Chiara

Waste Analysis

Jo Kember

Care Home & Pharmacy Interviews

Characteristics of patients in care homes

- Complex medical conditions
- Polypharmacy
- Cognitive impairment
- Multiple sources of interventions

The medication process

The medication process

Prescribing and Ordering

Dispensing and Delivering

Administration

Monitoring and Reporting

The medicines administration process

- Medicines are administered by trained care staff in residential homes and by registered nurses in nursing homes. The level of training appears to be variable.
- Each individual care home adopts its own processes and procedures though most have a drug trolley and conduct a drug round at appropriate intervals through the day.
- There are usually 3-4 drug rounds per day, although residents are most likely to have medicines given at the morning and teatime drug rounds.
- Administered doses of each medicine are recorded on the MAR chart in full. If a dose is not administered for any reason (eg patient asleep, patient refused etc) a code should be recorded on the chart.
- The drug round will generally be conducted by one member of staff, and can take from 30 minutes to 2 hours.

Prescribing and ordering

Dispensing and Delivering

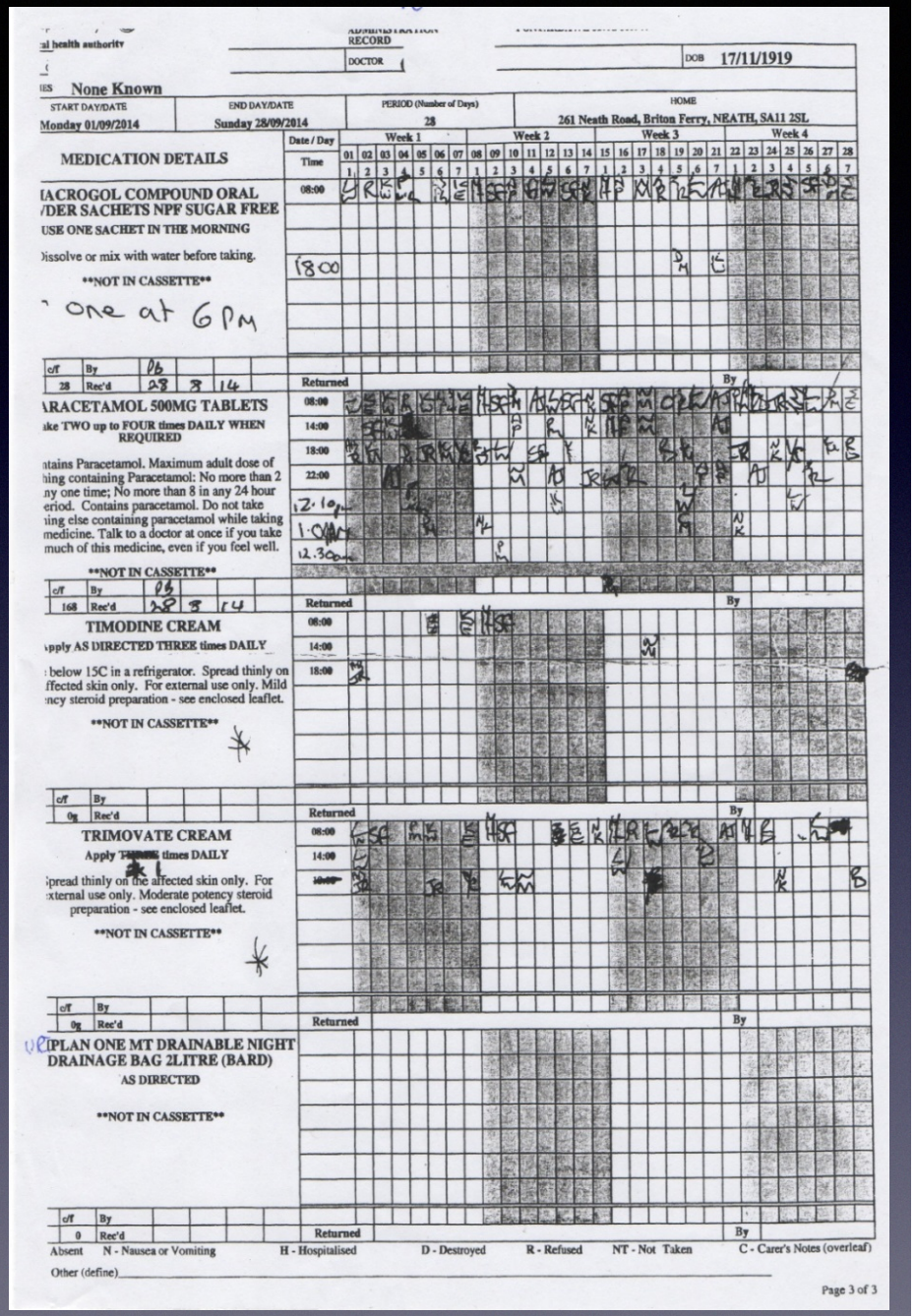
Administration

Monitoring and Reporting

Medicines Administration Record (MAR Chart) Analysis

The MAR chart

- In every social care service where care workers give medicines, they must have a MAR chart to refer to.
- The MAR chart must detail:
  - Prescribed medication
  - Dosage regimen
  - Route of administration
  - Any special instructions
- In general medication should be listed using the generic name to prevent confusion.
- The MAR chart should reflect the name on the medication container.



Methodology

Ethical approval

Recruitment of care homes

Validation

Allocation

Data collection from MAR charts for all residents over a 28 day period

Data entered into Microsoft Excel® and IBM SPSS®

Data Analysis


Carys Spencer


Nur Musa


Lindsey Heath


Siddhi Patel


Carwyn Whitlock


Shi Wen Chan


Sarah Steel


Thomas Coombe


Benjamin Rock


Roshan Rahim

Error Classification

- Four categories of ‘error’:
  - Administration errors
  - Errors associated with risk
  - Regulatory errors
  - Stock errors
- Issues that could not be categorised from the MAR chart alone

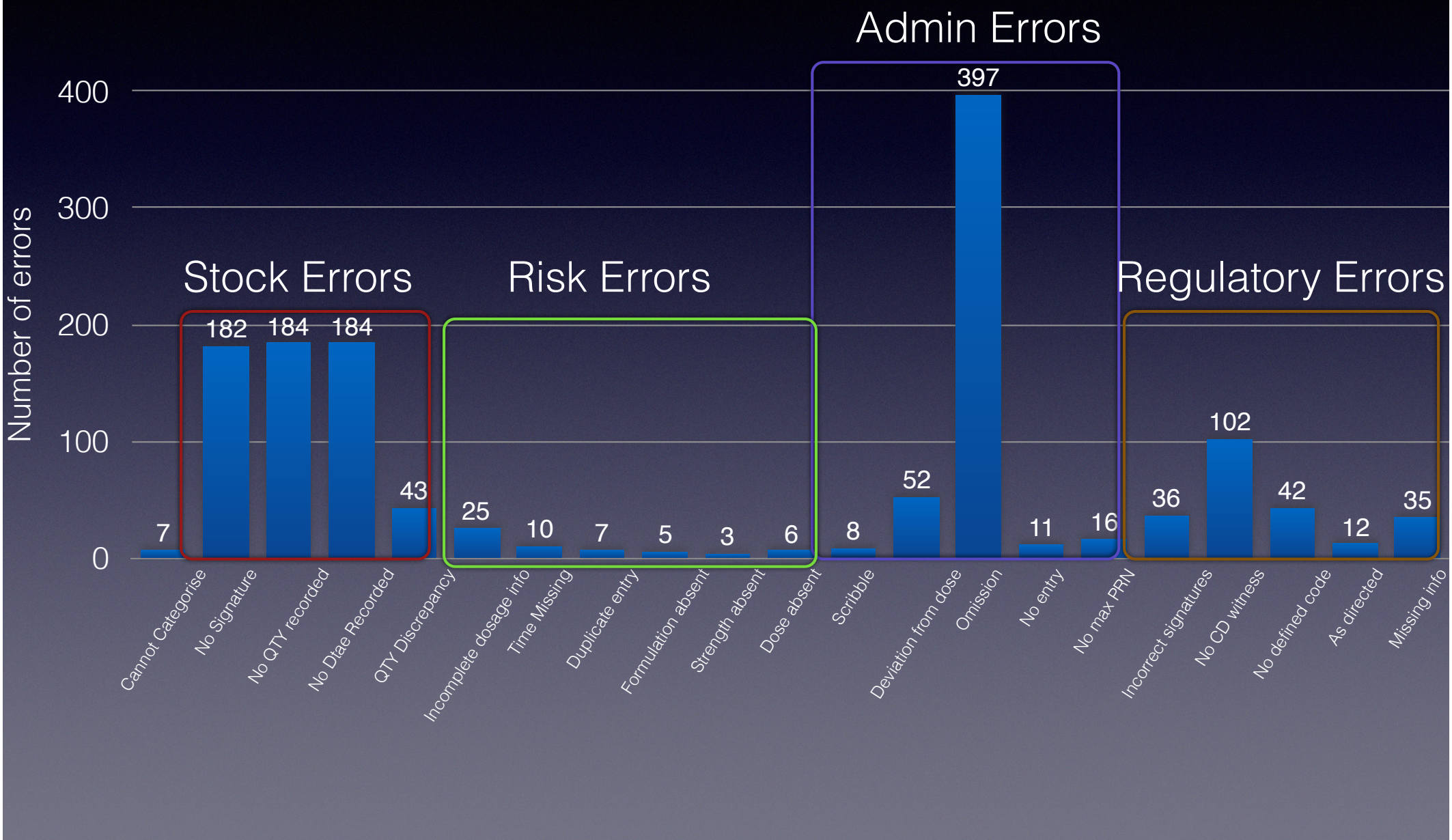
Error Class	Example
Administration Errors	
No entry on chart	No record of administration for a full 28 day cycle
Administration not recorded	No record of discrete administrations
Deviation from prescribed dose	Administration recorded does not correspond to prescribers intentions
Administration crossed out	Unexplained crossing out of an administration
Errors associated with risk	
Dose absent	Prescribed dose absent from MAR chart
Strength absent	Prescribed strength absent from MAR chart
Formulation absent	Prescribed formulation absent from MAR chart
Duplicate entry	The same drug appears on more than one occasion on the MAR chart
Time missing	The scheduling of the administration is absent from the MAR chart
Incomplete dose information	Instructions are not complete e.g. application site for a cream
Regulatory errors	
As directed	Clinical decisions relating to dose should be made by the prescriber
No defined code	An undefined code on the MAR chart to describe an ‘event’
Controlled drug administration	No witness signature for the administration of a controlled drug
Missing signatures	No signature where handwritten amendments are made to the chart
Drug name misspelt	
Max. for when required drugs	Max. daily dose is absent for when required drugs
Information missing	DOB, start date for administrations, allergies etc

Error Class	Example
Stock errors	
Quantity discrepancy	The quantity of drug administered over a 28 day cycle exceeds the apparent stock of the drug in the home
No quantity recorded	Quantity of receipted of stock is not recorded
No date recorded	Date stock receipted not recorded
No signature	Receipted stock not signed for

Care Home Characteristics

Care Home	Number of beds	Average age	Average meds/patient
1	19	89 ± 5	8 ± 4
2	24	75 ± 36	8 ± 4
3	25	88 ± 9	9 ± 3
4	26	86 ± 6	10 ± 4
5	17	88 ± 6	9 ± 5
6	20	88 ± 4	10 ± 4
7	17	86 ± 5	9 ± 4
8	24	87 ± 8	7 ± 5
9	24	86 ± 10	12 ± 5
10	14	79 ± 12	13 ± 4
11	41	64 ± 12	15 ± 6

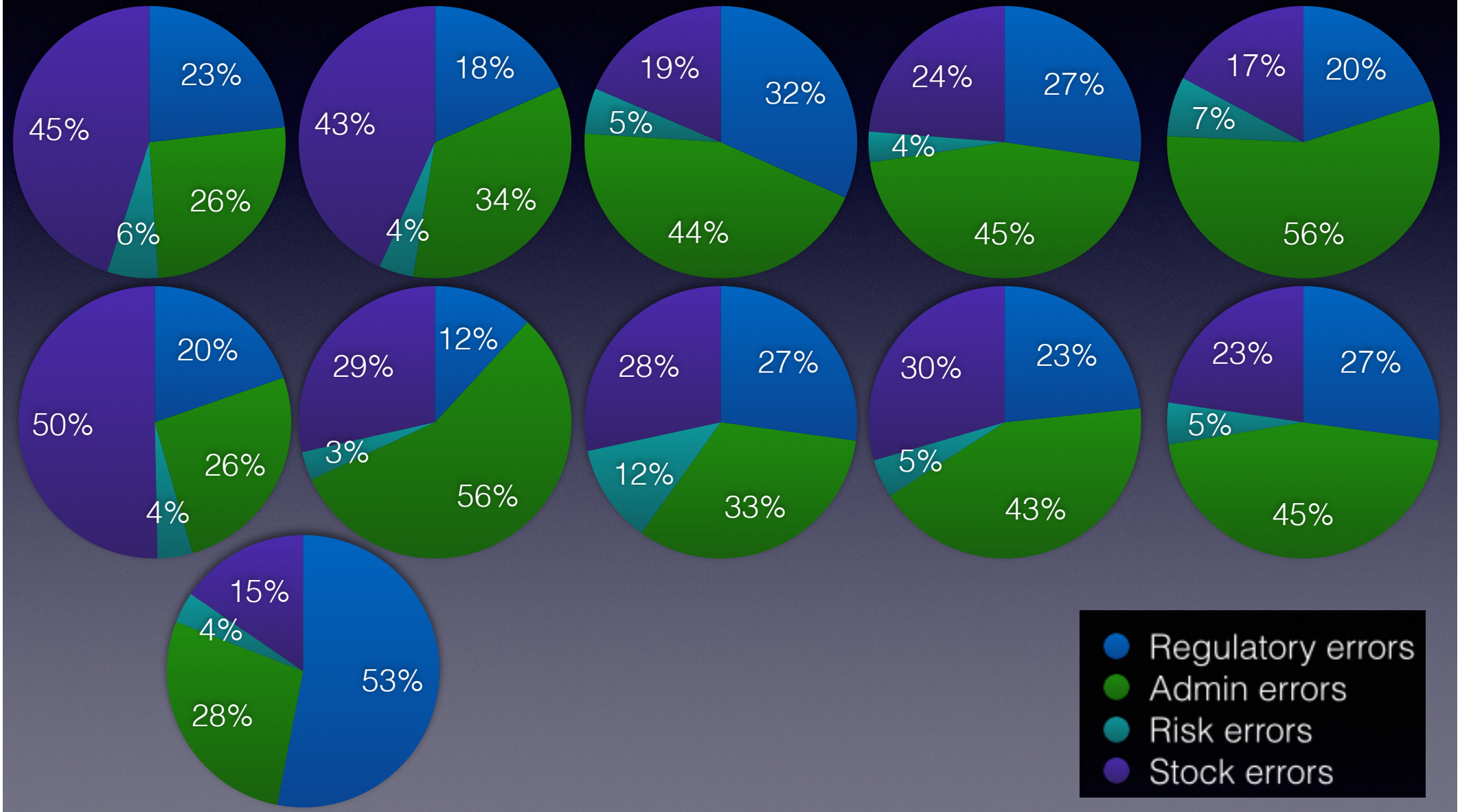
Exemplar - Care Home



Error rate per resident per week

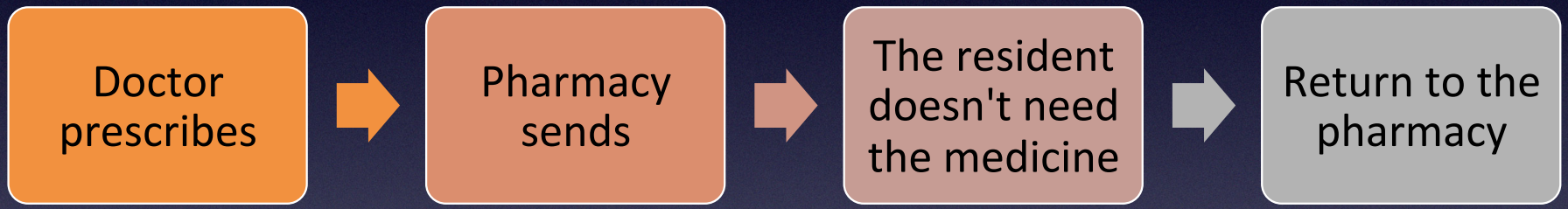
Care Home	Number of errors per resident per week	Number of administration errors per resident per week
1 - residential	24	4
2 - nursing	14	5
3 - nursing	27	7
4 - nursing	18	6
5 - nursing	14	7
6 - nursing	16	4
7 - nursing	16	10
8 - residential	5	1
9 - mixed	9	3
10 - nursing	55	13
11 - nursing	49	6

Frequency of error by category



Waste

Waste - the medicines route



Methodology

Visited 7x Care Homes

Counted stock in the care home on a single day

Analysed returns book at end of month

Compared stock to that needed according to MARs

Overstock + Returned Stock = Waste

Results - returned medicines

Care Home	Number of residents	Value of waste from returns book	Average value of return per resident
3	25	£336.96	£13.48
4	29	£41.26	£1.42
10 (a)	16	£609.89	£38.12
10 (b)	26	£792.53	£30.48
11	43	£231.48	£5.38
14 (a)	16	£319.60	£19.98
16	36	£1299.32	£36.09
Total	**191**	**£3631.04**	**£19.01**

Results - overstock of medicines

Care Home	Number of residents	Value of waste from overstock	Average value of overstock per resident
3	25	£451.25	£18.05
4	29	£130.68	£4.51
6	27	£746.41	£27.64
8	24	£304.25	£12.68
10 (a)	16	£708.57	£44.29
10 (b)	26	£774.05	£29.77
17	7	£4.74	£0.68
Total	**154**	**£3119.95**	**£20.25**

Overall value of waste = £19.01 returned + £20.25 overstocked
= £39.26 per resident per month

Summary

- Medication administration records were analysed from 11 care homes
- 23 distinct error types in four categories
- Administration error rate ranged from 1 - 13 errors per resident per week
- Medicines waste was assessed in 7 care homes
- The average cost of waste medicines was £39.26 per resident per month

INVATECH HEALTH

PROMOTING PATIENT SAFETY

DESIGNING PROACTIVE CARE SYSTEM IN

TARIQ MUHAMMAD
CEO, INVATECH HEALTH

An Age Old Problem

INVATECH HEALTH

Numerous reports of problems

- CHUMS reported on errors in care homes
- 70% of Care Homes residents have errors
- 37% of errors are caused by pharmacists
- 39% of errors are caused by GPs
- 22% of errors during administration

- 1 in 15 hospital admissions due to errors
- £1bn cost of hospital stays due to errors
- £100m drug waste
- High on the government agenda
- Care is high profile in the public eye
- Regulatory compliance & consequences

Common Issues

- Overuse of antipsychotics
- Stock not provided on discharge
- Delay in communication
- Delay in issuing Rx from GP
- Overuse of Agency staff
- Too Much stock
- Ran out of stock
- Storage issues
- Staff give stopped medicines
- Staff given at wrong time
- Staff give wrong dose
- Missing entries on MARs

The Causes

INVATECH HEALTH

- Poor Systems
  - Paper based prescriptions
  - Paper based recording of drug administrations
  - Manual checking of medicines administrations – no safety nets
- Poor Transfer of information
  - Doctors changes do not get followed through at the care home and can be delayed at the Pharmacy
  - Hospital discharge information slow to get updated by GPs
- Lack of Information
  - Confirmation that drugs were actually given
  - When were they given?
  - Consolidated information

Design Journey and Principles

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Start with Pharmacy & move away from PMR concept

1

New Data Structure
What a patient is on
Capture every change
Hold stock levels
Hold orders

2

Build Logic & Flow
Check every Rx against current therapy
Logic engine to validate

✓

Clinical Safety
Prescribing interventions
Over stock, Missing Rx
Dose validations
Proactive Support

Re-think Dispensing Flow

3

Barcode Manufacturer
Use the barcode to identify item, then print the label

4

Unique Barcode on label
Every item to reference single pack to recall full audit

✓

Dispensing Safety
Right drug which can be fully tracked to source

Care Home is extension of Pharmacy

5

Barcodes ensure efficient process
Booking in, administrations, returns etc

6

All data Go to 1
Every action recorded is now visible to the pharmacy to improve the pharmacy service

✓

Patient Safety Success
Closed loop system with end to end audit

Overview of Process with InvaLife

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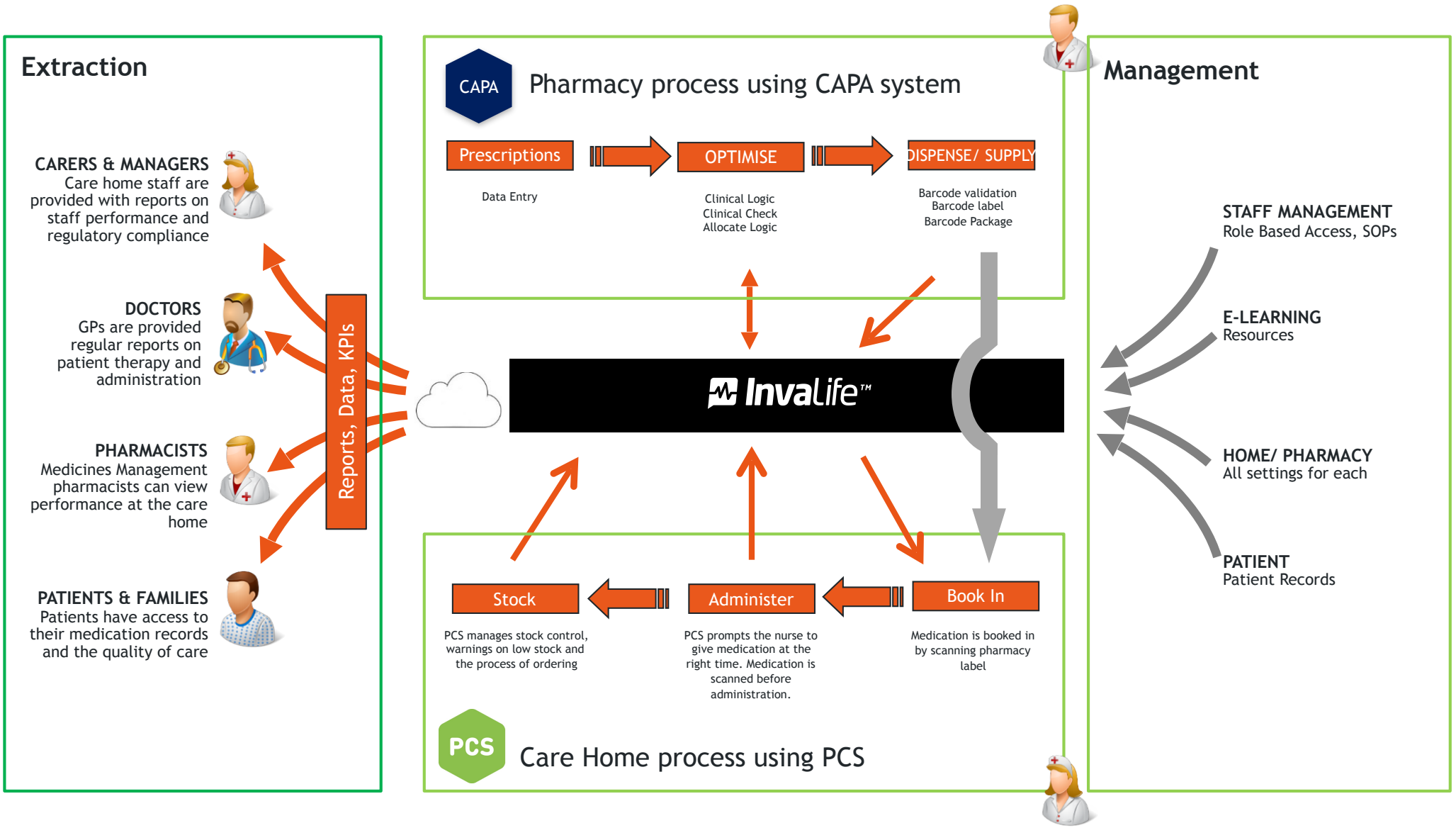


Think Fit for Purpose

INVATECH HEALTH

Device Features

- Fit for purpose hand held PCS device
- iPhone style touch screen
- No exposed parts
- Integrated barcode scanner
- IP54 rating (protected against dust/ water)
- Coating that can be disinfected

Software Features

- Data management by the pharmacy
- Visual patient verification
- Administration Process using barcodes
- Manage clinical readings (pulse, BP, INR)
- Clinical warnings (e.g. allergy)
- Manage Hospital residents
- Manage Homely remedies

Ingredients to Success

INVATECH HEALTH

What we have been able to do

- Put pharmacy at the heart of the process/ connect with residents
- Create data structures to capture everything
- Create new processes to ensure safety from dispensing to administration
- Evidence new levels of accountability/ audit
- View unseen data to inform us of problems and modify system design
- Present information to influence decision making, behaviours and patient care

What remains a challenge

- Attitudes to new concepts and new thinking
- Leadership in change management
- Sustained Funding mechanisms
- Ongoing research & evidence based outcomes

Post-implementation evaluation of the PCS system

Methodology

- Electronic medicines administration records were analysed for a 28 day cycle (August 2015)
- Four phases to the analysis:
    1. Errors analysed using categories as per baseline
    2. System interventions - ‘near misses’
    3. Pharmacist activity
    4. Waste

Part 1: eMAR analysis

- 21 of the 23 errors identified in the baseline analysis were eradicated with the PCS system

Regulatory

No defined code
Controlled drug administration – signature
Missing signatures
Drugs misspelt
No maximum when required (PRN) dose
Information missing from MAR chart

Administration
No entry on chart for 28 days cycle

Deviation from prescribed dose
Deviation from PRN protocol
Scribble

Risk
Dose absent
Strength absent
Formulation absent
Duplicate entry
Missing time
Incomplete dose information

Stock
Quantity discrepancy
No date recorded
No quantity recorded
No signature

Part 1: eMAR analysis

	Number of meds with ‘as directed’ instructions	
Care Home	Pre-implementation	Post implementation
1	25	6
4	5	12
5	40	63
8	6	16

Part 1: eMAR analysis

	Number of omitted administrations	
Care Home	Pre-implementation	Post implementation
1	193	0
4	308	0
5	1317	158
8	81	10

Part 2: System Interventions - ‘Near Misses

- 12 care homes analysed over a 28 day cycle (August 2015)

Intervention	Description
Wrong patient	An attempt to give one resident’s medicines to a different resident.
Medication not found	An attempt to administer a medicine to a resident that has been discontinued by the prescriber or a medicines barcode is scanned and is not recognised.
Medication attempted too early	An attempt to administer a medicine more than 2 hours earlier than scheduled, or the medicine has already been administered and is not due.
Ingredient check failed	An attempt to administer two or medicines containing paracetamol at the same time
Interval check failed	An attempt to administer further doses of paracetamol containing medicines before a 4 hour gap has elapsed.

Part 2: System Interventions - ‘Near Misses’

Intervention	Number of interventions
Wrong patient	87
Medication not found	629
Medication attempted too early	1073
Ingredient check failed	1
Interval check failed	664
Total	**2454**

Part 2: System interventions

Care Home	No. of Residents	No. of admins	Interventions	Interventions per resident
16	34	10142	95	2.8
1	20	5179	273	13.7
22	37	14912	213	5.8
4	29	11704	410	14.1
14b	11	2124	114	10.4
14a	16	6134	95	5.9
5	54	15335	468	8.7
17	7	1282	53	7.6
12	16	6406	231	14.4
9a	26	11473	204	7.8
19	16	3797	110	6.9
8	30	9101	188	6.3
Average per care home	**25**	**8132**	**204.5**	**8.7 per month**

Part 3: Pharmacist Interventions

- Pharmacist interventions analysed for 12 care homes over a 28 day cycle (August 2015)

Intervention	Description
Prescription queries	Checks related to the legal / regulatory requirements of prescriptions
Prescription accuracy checks	Prescriptions that do not match the care home's medication administration records are flagged to the pharmacist for checking.
Clinical medication review	The system compares the care home's medication administration record with the details of the prescription and checks for drug-drug interactions and for items that are clinically similar.
Dispensing accuracy checks	For dispensed items where the manufacturer's barcode cannot be used for validation or the quantity of the dispensed item requires further validation the system flags for further checks.

Part 3: Pharmacist interventions

Care Home	No. of Residents	Items dispensed	Pharmacist Interventions	Prescription Queries	Prescription accuracy	Clinical Medication review	Dispensing accuracy check	Average no of interventions per \ item
16	34	253	164	2	37	25	100	0.6
1	20	149	128	3	58	13	54	0.9
22	37	365	278	9	66	25	178	0.8
4	29	250	215	7	47	59	102	0.9
14b	11	56	44	4	7	0	33	0.8
14a	16	121	66	4	8	2	52	0.5
5	54	431	316	24	95	16	181	0.7
17	7	31	17	1	2	0	14	0.5
12	16	219	214	4	26	38	146	1.0
9a	26	208	324	4	130	86	104	1.6
19	16	99	99	16	23	9	51	1.0
8	30	219	131	7	19	1	104	0.6
Average per care home	**25**	**200.1**	**166.3**	**7.1**	**43.2**	**22.8**	**93.3**	**0.8**

Part 4: Waste

Methodology

3x Care Homes

Analysed returns book at end of month

Stock counts extracted from PCS system 24th Aug 2015 - 10 care homes

Compared stock to that needed according to MARs

Overstock + Returned Stock = Waste

Results - returned medicines

Care Home	Number of residents	Value of waste from returns book	Average value of return per resident
4	29	£318.89	£11.00
14 (a)	16	£141.60	£8.85
22	36	£231.66	£6.44
Total	**81**	**£692.15**	**£8.55**

Results - overstock of medicines

Care Home	Number of residents	Value of waste from overstock	Average value of overstock per resident
1	20	£159.41	£7.97
4	29	£369.41	£12.74
8	24	£222.14	£9.26
10 (a)	16	£455.70	£28.48
10 (b)	26	£1462.1	£56.23
14 (b)	11	£17.96	£1.63
16	36	£333.86	£9.27
17	7	£10.06	£1.44
19	16	£70.93	£4.43
22	36	£376	£10.44
Total	**221**	**£3477.57**	**£15.74**

Comparison of waste pre- & post-implementation

Care Home	Pre-implementation	Post-implementation	Difference (%)
Average return value per resident per month	£19.01	£8.55	-55%
Average value of overstock per resident per month	£20.25	£15.74	-22%

Summary

- Post-implementation the PCS system had eradicated 21 out of the 23 types of error identified in the baseline analysis.
- The remaining errors were
    - (i) “no administration recorded” (where the medicine was either administered and not recorded OR the administration was omitted altogether) this error type was significantly reduced by at least 88%
    - (ii) “as directed” dosage instructions, an issue directly related to the prescribing instructions for the medicine and which cannot be influenced by the system or care home staff.
- The system made a number of interventions that prevented further potential administration errors, a unique feature of the electronic system that cannot be replicated by the traditional paper based Medicines Administration Record system
- Unlike paper based systems, the electronic system enabled pharmacists to intervene in a proactive and consistent manner to support the care homes in ensuring medicines administration were safe and effective for the patients, that administration records were correct and to flag new medicines or new dosages.

The experience of care homes and pharmacies

Methods

- Interviewed care home & pharmacy staff pre- and post- implementation
- One to One telephone interviews, using a semi-structured survey to yield a mixture of qualitative and quantitative data.
  - Originally intended to survey a larger number of care home staff via an online questionnaire, but response rate was low primarily due to access to computers at work

Survey Design – Care Homes

- **Part 1** captured background information about the care home and the interviewee
- **Part 2** 5-point Likert scale to rate the extent to which issues were considered as barriers to the safe and efficient administration of medicines in care homes
  - Issues relating to the MAR chart
  - Issues relating to communication
  - Issues relating to ***prn*** (as required) medication
  - Issues relating to processes
  - Issues relating to workload and time
  - Issues relating to the care home
- **Part 3** respondents were asked to rate their perceived level of confidence in the medicines administration process at the time of the survey (on a scale from 1 to 10)

Survey Design – Pharmacies

- **Part 1** captured background information about the pharmacy
- **Part 2** relating to the provision of medicines support to care homes by the pharmacy at the time of the survey (i.e. before and after PCS)
- **Part 3** 5-point Likert scale to rate the extent to which issues were considered as barriers to the safe and efficient administration of medicines in care homes
  - Issues relating to the MAR chart
  - Issues relating to communication
  - Issues relating to ***prn*** (as required) medication
  - Issues relating to processes
  - Issues relating to workload and time
  - Issues relating to the care home
- **Part 4** respondents were asked to rate their perceived level of confidence in the medicines administration process at the time of the survey (on a scale from 1 to 10)

Care Homes

Results – pre-implementation Care Homes

- Sixteen interviews were conducted – 12 care home managers, 2 care home owner, 2 deputy managers
- Range of qualifications:
  - 6x registered general nursing qualification
  - Most held a national vocational qualification (NVQ) level 4 or above
- Interviewees had worked in the sector from 3 – 37 years (median 14.5 years)
- Fourteen interviewees were involved in all aspects of the day-to-day administration of medicines; two were involved with overseeing and auditing the process

Main barriers to the safe and efficient administration of medicines

- Issues were deemed a major barrier if eight or more responders rated the issue as a 4 or 5 on the likert scale:

1) ***Issues relating to the MAR chart***
   - Potential for missing records (i.e. no signatures or reason for missed doses) (9/16 responders)
   - Too much paperwork (8/16 responders).

2) ***Issues relating to when required (prn) medications***
   - Insufficient room on MAR chart to write the time the medicine was given (11/16 responders)
   - Having to record the time when the ***prn*** medication was given (8/16 responders)

3) ***Other medicines management issues***
   - The efficiency of the method of auditing (8/16 responders)

The median confidence rating for the current paper process for administering medicines was 7 (range 3 to 9).

Results - Main barriers to the safe and efficient administration of medicines

- The other areas rated highly (7/16 rating as a 4 or 5 for all) were:
  - The need to record reasons for non-administration
  - The need to witness changes made to the MAR chart
  - Changes not carried over from one month to the next
  - Knowing the time interval between dosages (e.g. products containing paracetamol)
  - Impact of time spent doing medicines administration on other areas of care.

Results – post-implementation Care Homes

- Fourteen interviews were conducted – 7 interviewees had been interviewed prior to implementation
- Range of qualifications:
  - 1x registered general nursing qualification
  - NVQ level 3 or above for all remaining interviewees
- Interviewees had worked in the sector from 4 – 37 years (median 16 years)
- All interviewees were involved in all aspects of the day-to-day administration of medicines

Results - Main barriers to the safe and efficient administration of medicines

A substantial shift was seen in respondents' rating

Pre-existing issues were mostly no longer perceived to be a barrier to the safe and efficient administration of medicines

Further scrutiny of the seven care homes which took part in the before and after survey found favourable changes in their ratings for most aspects of medicines administration

Only one care home rated some of the barriers higher than pre-implementation

The median confidence rating for the electronic PCS system was 8 (range 3 to 9, same as pre-implementation) indicating an upward shift in confidence by a factor of 1.

Results – New issues raised

- A number of new issues were raised none of which were rated as major barriers:
  - Opening boxes can be slower than administering from MDS blisters.
  - Stock levels don't always tally after booking in medicines
  - Not being able to look at the entire MAR chart as need to switch between different screens
  - Not being able to give the medicine when the command pops up as the incorrect time
  - Unable to see which two individuals have signed for the medicine to be changed
  - The GP is not being linked up to the process by the new system
  - Problems with scanning or faxing the pharmacy
  - Certain days when PCS trained pharmacy staff are not present.

Results – qualitative data: patient safety

- *"Good patient safety and efficiency. Can't get drugs they shouldn't have and flags up missed doses" (CH15).*

- *"Much safer and easier to use. We can see what the pharmacy is doing so don't have to phone up to check what's happening with medication that we have ordered" (CH 16).*

- *"Reduces the errors by about 99%. The system helps staff and guides them through the process and is very user friendly. The managers can monitor what the staff are doing from their computer without having to search through the MAR charts. I would recommend the system to anybody" (CH16).*

- *"There's little room for error with the new system. Main reason I like it is patient safety" (CH24).*

- *"Very little chance error. No paperwork. No need to decipher signatures messy paper MAR charts. Stock levels much better. We are only ordering what we need. Very little waste. Some duplication is still possible - we had Paracetamol and Paracetamol sachets. The main problems we have had are related more to the fact that we have had to change pharmacies rather than problems directly linked to the device" (CH26).*

Summary

- The care homes involved in this trial welcomed the new system recognising its many benefits on the day-to-day administration of medicines and improvement on patient safety.
- All but one care home wanted to continue with the new PCS system
- Some minor ‘glitches’ were experienced but most of these were during the initial implementation phase in each home
- However, for the system to be more readily accepted, the main issues to address include:
  - Further training of pharmacy staff when implementing the system in order for the care home to have confidence in them and provide a further source of support
  - Consider extending the period during which Beacon-Digital provides help-line support.
  - Enhance the synchronisation of the PCS unit where possible to speed up the process
  - Improve facility for printing a paper MAR chart
  - Fix some of the IT issues which allow for ‘timing’ errors to occur for variable dosing.
  - Provide further input to assess stock level in the care home so that the benefits of stock control can be optimised.

Pharmacies

Results – pre-implementation Pharmacies

- Seven interviews were conducted – 6 pharmacy managers, 1 dispenser
- Interviewees had been involved in medicines management to care homes from 2 months to 25 years (median 4 years).
- The total number of care homes for which medicines management was provided ranged from 1 to 8 (median 1.5)
- The number of care homes using the new system ranged from 1 to 6 (median 1).
- All seven pharmacies were involved in the full range of medicines management activities to provide support to care homes.

Results - Main barriers to the safe and efficient administration of medicines

- Issues were deemed a major barrier if eight or more responders rated the issue as a 4 or 5:

1) *Issues relating to the MAR chart*
   - *Pharmacy records do not match the care home MAR chart record*
   - *Pharmacy does not have access to how medicines are being taken by residents*

2) *Issues relating to communication*
   - *No mechanism for providing feedback between the pharmacy and care home on patient's medication*
   - *Poor communication between community pharmacy and GP*
   - *Lack of access to patient medication records at the GP surgery*

3) I*ssues relating to processes*
   - *Difficulty identifying residents in need of a medication review g) Ensuring optimal stock control at the care home*
   - *There is potential for over-supply of medicines*

- Respondents' ratings of their level of confidence in the current paper system ranged from 3 to 8 (median = 7).

Results - Main barriers to the safe and efficient administration of medicines

- The other areas rated highly (3/7 rating as a 4 or 5 for all) were
  - Changes to resident's medicines are not communicated to the pharmacy
  - Over-ordering of prn medication
  - Having to chase up monthly prescriptions
  - Current system results in too much waste

When asked to rate the **difficulty** of the current process of supplying medicines to care homes, this ranged from 4 to 8 (median = 5). Further comments in support of these ratings were:

- *"Time taken to pop tablets and check MDS" (PH3).*
- *"The process is easy but time consuming. Reminder cards on racks are frequently lost" (PH5).*
- *"Two full time members of staff have to be set aside for it, need good background knowledge about the care home. It needs good relationship building in order to make the process easier. Staff have to be able problem solve" (PH7).*
- *"The staff are stable both in pharmacy and home so this makes the process fairly efficient. Manual handling quite demanding - heavy. Open to error" (PH10).*

Results – post-implementation Pharmacies

- Ten interviews were conducted – four were included in both pre- and post- implementation phases
- The number of care homes for which medicines management was provided using the new system ranged from 1 to 4 (median 1).
- All ten pharmacies were involved in the full range of medicines management activities to provide support to care homes.

Results – compared to pre-implementation

Issues were deemed an improvement if five or more rated the issue as a 1 or 2 (i.e. Agree or Strongly agree when combined).

Issues relating to the medication administration record

- Pharmacy access to information about how medicines are being taken by residents at care home is now available) (n=6/9 responders)
- Accuracy of medication administration records entries is improved (n=6/9).

Issues relating to communication

- The pharmacy can now potentially provide feedback regarding how medicines are being used at care homes (6/10 responders)
- The pharmacy can now query prescriptions with GPs knowing the details of the resident's records at the care home (6/10 responders)

Issues relating to 'when required' or 'prn' medicines

- You can now see how prn medicines are being used and actually taken (9/10)
- PRNs can now potentially be ordered only when needed (9/10 responders; 4 rated strongly agree)
- You can manage PRN medication more appropriately (5/10)

Results – compared to pre-implementation

Issues relating to processes

- The system makes it easier to audit who has carried out medicine related activities at the home and the pharmacy (7/10)
- The system reduces the chances of over stock at the home (7/10)
- The system allows optimum stock control at the home (7/10)

Issues relating to the care home

- The new system evidences who has made changes to medication at the home or the pharmacy (7/10)
- The new system provides a consistent way for making changes to medication records (6/10)

- The median confidence rating for the electronic PCS process for administering medicines was 6.75 (range 1 to 8). This compares to a median rating of 7 (range 3 to 9) in the pre implementation sample.

Time taken to complete medicines management

	Median time taken in minutes/month to complete care home related medicines management	
	Pre-implementation	Post-implementation
Ordering monthly prescriptions	45 (30 – 240)	11 (2 – 60)
Chasing up monthly prescriptions	65 (30 – 120)	30 (10 – 300)
Reconciliation of PMR / MAR chart	180 (60 – 500)	38 (5 mins – 2 days)
Gathering information about newly prescribed / discontinued medicines	60 (15 – 300)	30 (0 – 60)
Chasing missing prescriptions	60 (10 – 300)	60 (20 – 180)
Ordering / supply of interim prescriptions	120 (30 – 1200)	35 (10 – 1200)

Benefits

- Pharmacy staff saw clear benefits of using the system.
- *"Good points are: Time saving, access to medical records and to stock records. Ability to undertake dose changes in the system in the pharmacy on notification by the GP is good, but feel very strongly that the care home staff shouldn't be doing it but the GPs when at the home don't know how to nor are they interested in doing it, whereas they would have willing made an alteration on a paper MAR chart" (PH10).*
- *"In theory I think the system is fantastic, the 'visibility' of all the records so both sides can 'see what is going on' is good. The fact that it 'locks out' errors is really good" (PH11).*
- *"I think the new system is better for the patient and probably, once they've got used to it, for the care home" (PH7).*

Reflections – old systems vs new

- For those, who preferred the new system, reasons provided were:
- *"New system is better. Quicker, but you have to have someone willing to really engage with it, and it's difficult for other staff to 'dip in' when needed. It takes up less room in some ways. Original pack dispensing is best. It allows the pharmacy to 'see in to' the care home system which is really useful. In a negative way however having lots of baskets in the dispensary when doing the dispensing can cause a space problem. Also I am unhappy that the care home staff can gain access in to the system to change doses. I think only the GP or pharmacist should be able to do this" (PH10).*
- *"Yes A lot better you can find things at a click of the button. Don't have to trawl through lots of paperwork. Much quicker dispensing too" (PH12).*
- *"Yes new way more efficient" (PH1).*

Reflections – old systems vs new

- Those who were undecided explained why:

- *"This is a step in the right direction but there are practical problems which stand in the way. It's much better than re-blistering. Most of our problems come from lack of training, and not knowing what the system can do, so we don't fully understand it" (PH7).*

- *"The idea of the new system is good but the old system was easier, because of all the problems we are having it is taking a lot of time and stress to cope with it" (PH11).*

- For those who preferred the old system, some of the reasons for this were:

- *"Old way is much better. Although using original packs is good, and eMAR is potentially good. However, this system is unsafe, not thought out properly, the support from Invatech is not enough and we don't get proper advice from them on why something has gone wrong and when they are going to rectify it" (PH2).*

- *"At the moment the old system because of the stress levels with this new system, but I can see there are benefits for the care home. It may get better but I am dreading Christmas. Lack of training is probably why this is an issue" (PH6).*

Summary

- The majority of pharmacies involved in this trial welcomed the new system and recognised the potential time saved on the day-to-day dispensing of medicines to care homes.
- Overwhelming feedback was the desire for more training on how to implement and get the most out of the system.
- The introduction of the PCS requires a different way of working which needs some careful planning for the system to be a success.
- This was a highlighter problem with the introduction and running of the system as it inhibits the system being used to its full capacity as well as putting unreasonable pressure on the pharmacy team.
- The 'inefficient' way in which scripts were inputted into the system was another strong concern.
- The fact that the 2-D scanner, which was introduced in Wales to input prescriptions on to the PMR, does not support the PCS system may be a barrier to its wider implementation.
- Further training is also needed once the system is embedded so that use of the facilities are maximised and to ensure that pharmacy can provide optimal support for the care home and to do so with confidence.

INVATECH HEALTH

Next steps

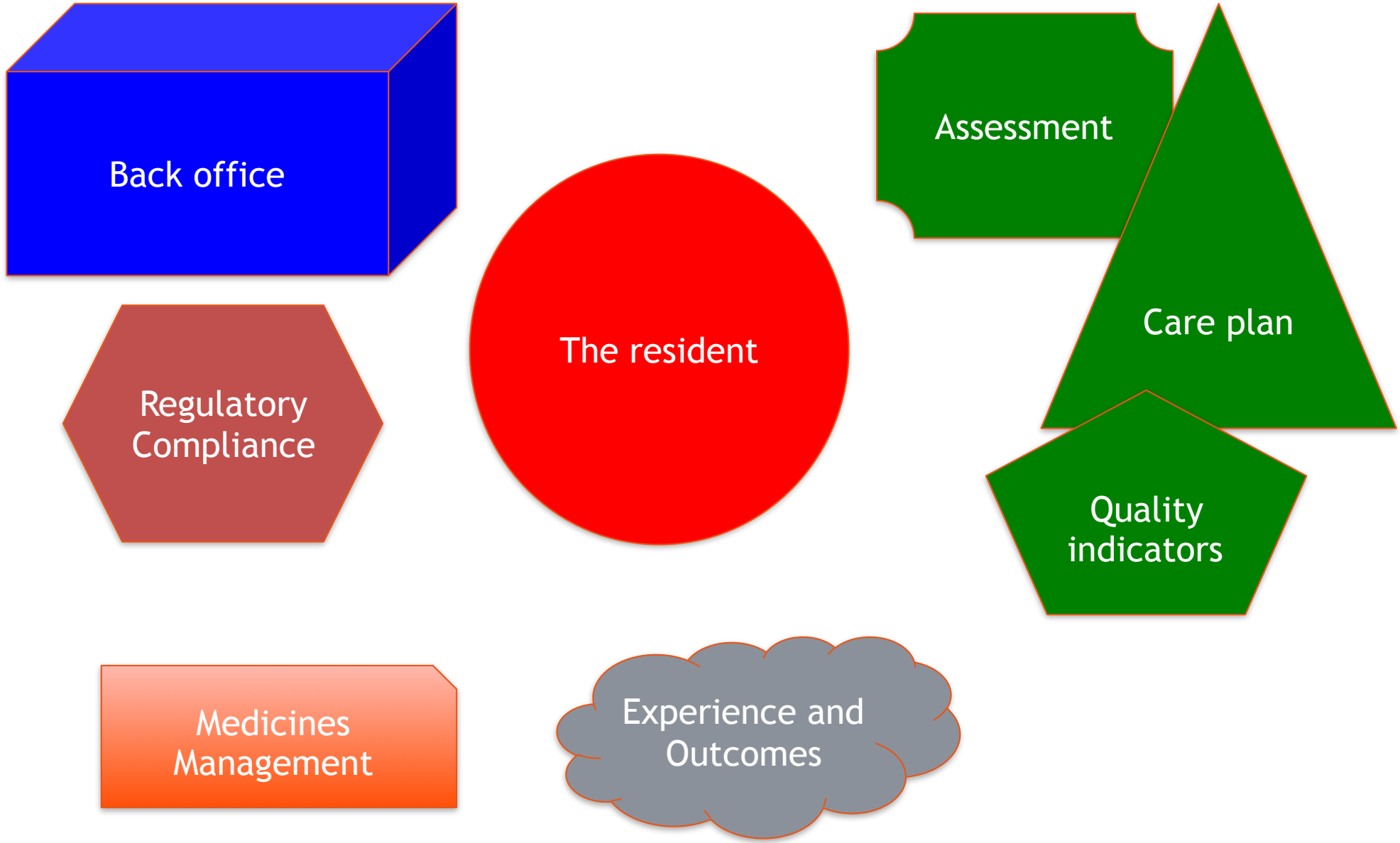
The rise of the SNFs ?

INVATECH HEALTH

- 23,000 care home beds in Wales
- Unsustainable hospitals
- Prudent Healthcare

Information and tech in care homes

INVATECH HEALTH



Manager 90 day Dashboard

Individual Care Home Performance

INVATECH HEALTH

SAMPLE HOME	TOTAL ADMINS	TOTAL PATIENTS	AVE ITEMS/ PATIENT	ITEMS ACTIVE	THERAPY LENGTH (DAYS)
	157.772K	127	14.08	1788	235

AS DIRECTED ITEMS	INTERVENTIONS	NOT GIVEN PERCENT	MISSING PERCENT	ADMIN DELAY (HRS)	% ASY
532	2.76% 0.00% 1.77% 5.00%	21.7% 0% 22.7% 100%	0.89% 0.00% 0.75% 2.00%	1.23 0.00 1.25 3.00	15.9% 0% 32.3% 100%

BARCODE PERCENTAGE	TOTAL INTERVENTIONS	SANG COUNT	TOTAL MISSINGS	% NUTR	% SED
64.4% 0% 32.1% 100%	2796	1534	1180	12.3% 0% 49.6% 100%	10% 0% 14.2% 100%

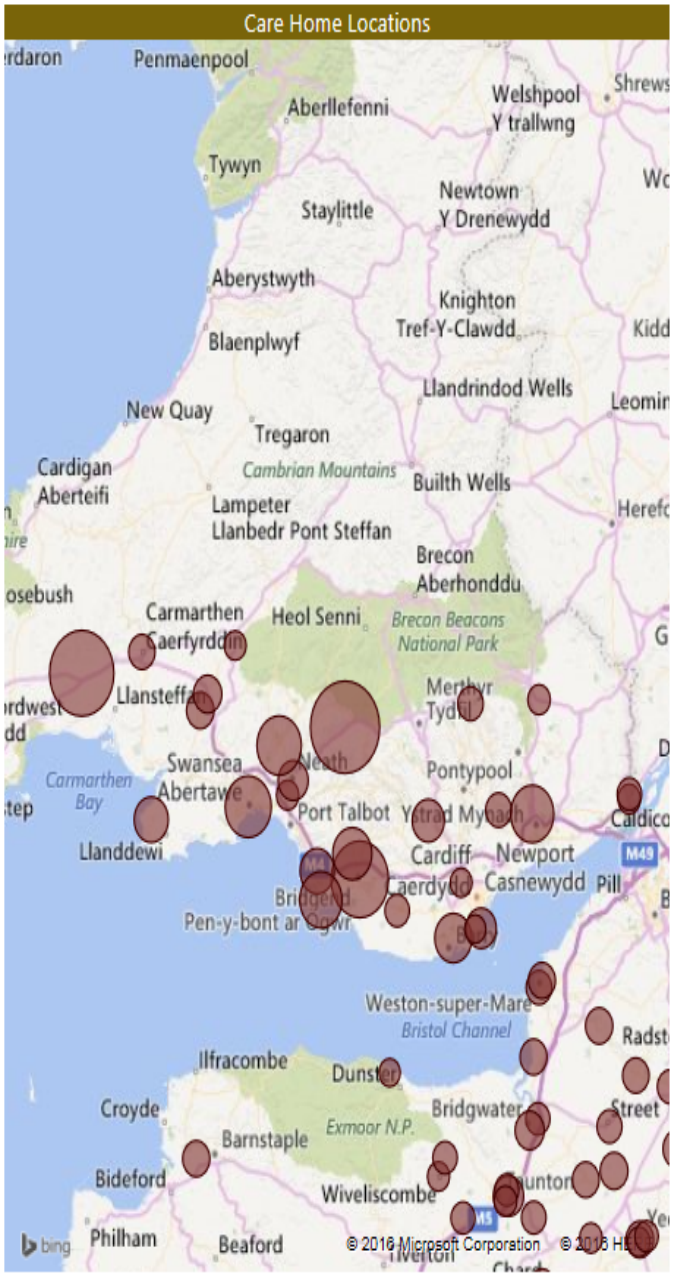
AVE POT AND PT TIME				HOSPITAL VISITS	AVE HOSPITAL STAY	% ANTIBIOTIC
1.18 Average of POT TIME	1.00 Average of PATIENT TIME	2.18 Average of TOTAL ADMIN TI..	20.64 TOTAL HRS/ DAY	5	2.65 0.00 4.45 10.00	14% 0% 13.4% 100%

Clinical Summary for Groups

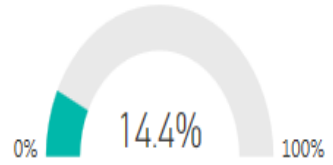
TOTAL PATIENTS	TOTAL ITEMS	AVE ITEMS/ PT	TOTAL STAFF
3595	27,147	7.6	1486

X | Y | Z

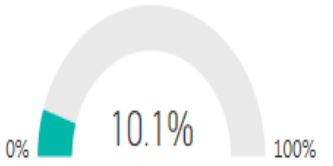
Antipsychotic map



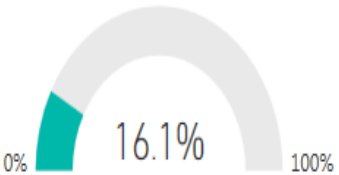
ANTIBIOTIC PERCENT



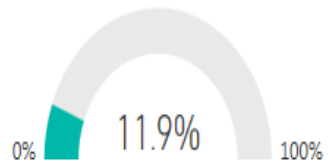
SEDATIVE PERCENT



ANTIPSYCHOTIC PERCENT



NUTRITION PERCENT



ALIAS HOME	Count of PatientName	AVE ITEMS/ PATIENT 2	% ASY	% SED	% ANTIBIOTIC	% NUTR
Tr (105269)	1	6.00	100.0 %			
Pe (105389)	10	5.40	90.0 %			
Be (105360)	42	5.14	76.2 %	11.9 %	9.5 %	
St (105471)	58	9.71	58.6 %	12.1 %	10.3 %	15.5 %
He (105274)	15	7.73	53.3 %	13.3 %		
Mi (105273)	4	7.00	50.0 %	75.0 %		25.0 %
Cl (105362)	36	9.03	47.2 %	36.1 %	19.4 %	8.3 %
Pi (105349)	11	10.00	45.5 %	27.3 %		
El (105339)	39	5.97	43.6 %	5.1 %	7.7 %	5.1 %
Fo (105319)	28	10.43	39.3 %	10.7 %	39.3 %	14.3 %
Ne (105401)	20	7.25	35.0 %	10.0 %	5.0 %	5.0 %
Ty (105392)	20	8.65	35.0 %	15.0 %	5.0 %	10.0 %
Th (105478)	21	5.00	33.3 %			4.8 %
Bu (105316)	24	7.58	29.2 %	16.7 %	16.7 %	4.2 %
Ll (105317)	31	7.10	29.0 %	35.5 %	12.9 %	3.2 %
Pe (105381)	50	7.46	28.0 %	10.0 %	26.0 %	16.0 %
La (1010)	127	9.39	27.6 %	12.6 %	11.0 %	44.1 %
Wi (105363)	19	7.37	26.3 %	36.8 %		15.8 %
Ab (105492)	20	7.60	25.0 %	15.0 %	10.0 %	10.0 %
Ma (105484)	56	7.09	25.0 %	8.9 %	10.7 %	25.0 %
Po (105378)	52	8.54	25.0 %	19.2 %	32.7 %	21.2 %
Ca (105485)	44	7.68	22.7 %	4.5 %	4.5 %	15.9 %
Th (105380)	22	7.50	22.7 %	13.6 %		9.1 %
Th (105343)	54	7.17	22.2 %	3.7 %	31.5 %	3.7 %
Ta (105338)	41	7.05	22.0 %	17.1 %	7.3 %	14.6 %
Fo (105468)	32	6.91	21.9 %	12.5 %	18.8 %	6.3 %
Mo (105342)	51	7.71	21.6 %	3.9 %	23.5 %	11.8 %
Hu (105356)	28	7.18	21.4 %	3.6 %	21.4 %	3.6 %
To (105341)	14	7.71	21.4 %		14.3 %	
Th (105406)	24	7.21	20.8 %	20.8 %	4.2 %	50.0 %
Th (105452)	15	9.00	20.0 %	26.7 %	26.7 %	20.0 %
Ca (105432)	36	6.69	19.4 %		11.1 %	
Th (105364)	31	6.16	19.4 %	3.2 %	6.5 %	
Total	**3595**	**7.55**	**16.1 %**	**10.1 %**	**14.4 %**	**11.9 %**

TOTAL PATIENTS	TOTAL ITEMS	AVE ITEMS/ PT
1830	14,251	7.8

Average Items Summary

X Y Z

ESTABLISHED

Established

ALIAS HOME

- Ab
- As
- Be
- Br
- Bu
- Ca
- Cl

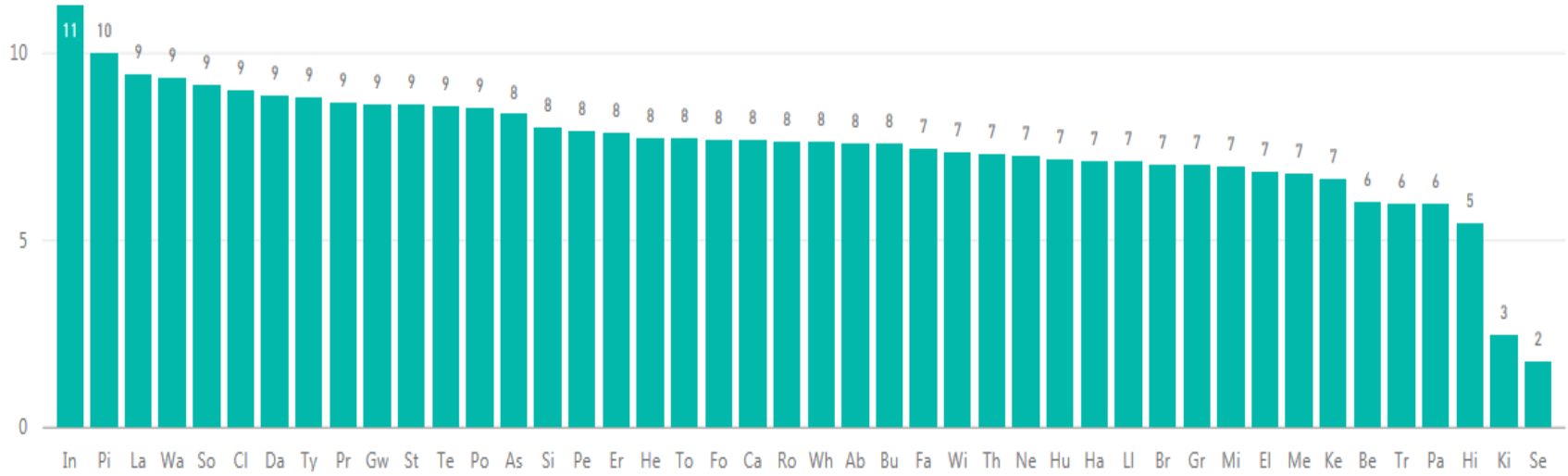
PATIENT

- AB (1269)
- AB (2203)
- AB (2400)
- AB (2458)
- AB (2758)
- AB (288)
- AB (3094)
- AB (3264)

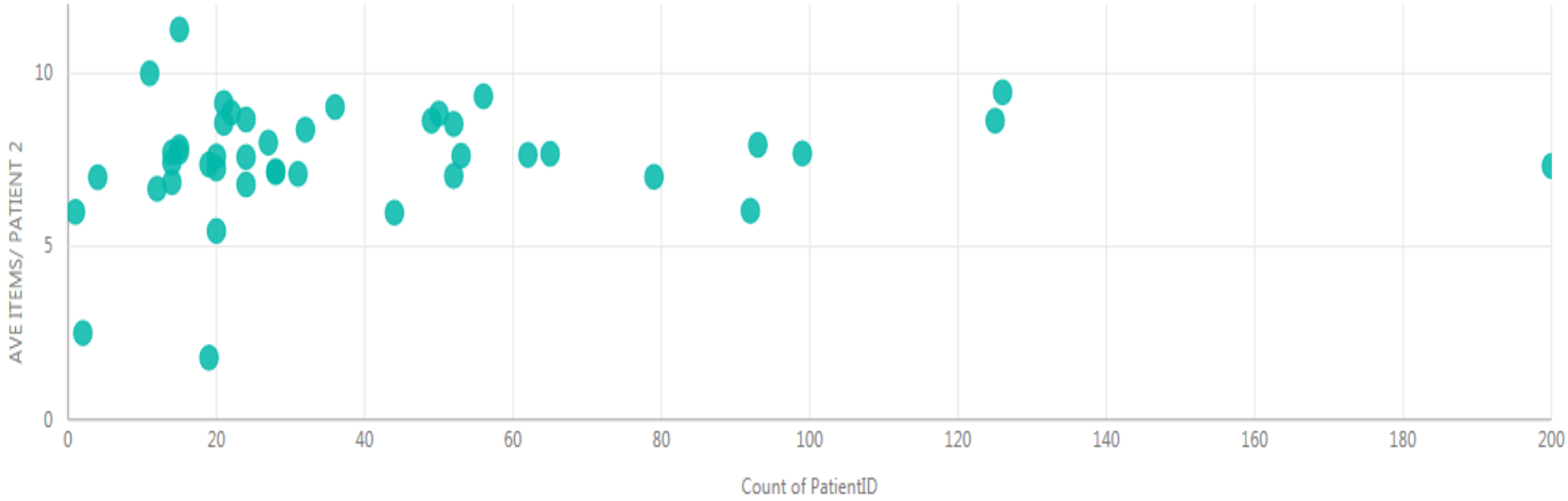
WEEK

1 2 3 43 44
45 46 47 48 49
50 51 52 53

AVERAGE ITEMS PER HOME



AVERAGE ITEMS PER HOME BY NUMBER OF PATIENTS



Antipsychotic Summary

TOTAL PATIENTS	TOTAL ITEMS
11	17

X Y Z

ESTABLISHED

Established

ALIAS HOME

- Ab
- Al
- As
- Be
- Br
- Bu
- Ca

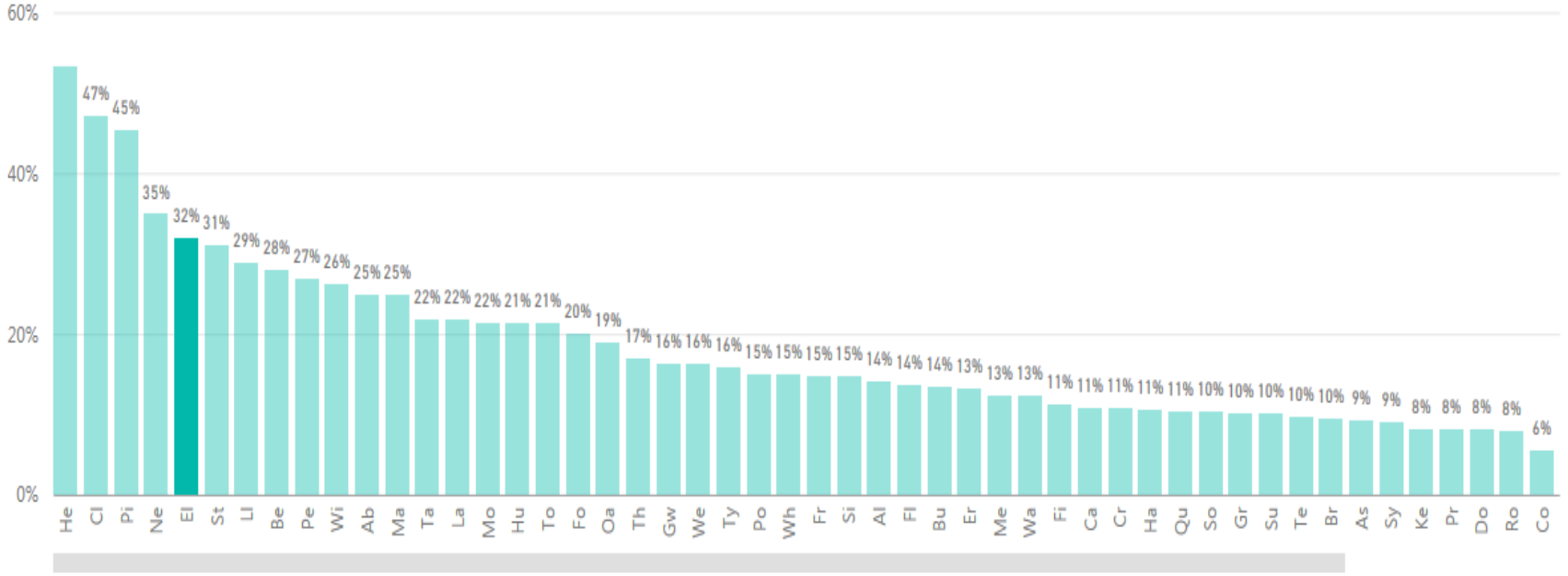
PATIENT

- AA (3796)
- AB (1269)
- AB (1307)
- AB (1308)
- AB (1333)
- AB (2203)
- AB (2227)
- AB (2400)

WEEK

1 2 3 43 44
45 46 47 48 49
50 51 52 53

HOMES WITH ANTIPSYCHOTIC PATIENTS PERCENTAGE



PatientName	BNFGroupName	VMPName	RepeatMedStart	THERAPY LENGTH	DosageText
AS (5810)	Antipsychotics	Amisulpride 200mg tablets	05 January 2016	15	Take ONE in the evening
AS (5810)	Antipsychotics	Amisulpride 50mg tablets	05 January 2016	15	Take TWO in the morning and ONE in the evening
KC (873)	Antipsychotics	Aripiprazole 10mg tablets	17 December 2015	34	Take two tablets every morning
AS (5810)	Antipsychotics	Clozapine 100mg tablets	26 June 2015	208	Take TWO tablets at night
AS (5810)	Antipsychotics	Clozapine 25mg tablets	26 June 2015	208	Take TWO tablets at night
RB (6622)	Antipsychotics	Olanzapine 10mg oral lyophilisates sugar free	23 December 2015	28	Take ONE a day
BB (6603)	Antipsychotics	Olanzapine 10mg tablets	04 January 2016	16	Take ONE a day
KC (873)	Antipsychotics	Olanzapine 10mg tablets	17 December 2015	34	Take ONE tablet at night
IL (903)	Antipsychotics	Olanzapine 5mg oral lyophilisates sugar free	27 November 2015	54	Take ONE twice a day
PT (1114)	Antipsychotics	Olanzapine 5mg tablets	04 January 2016	16	Take on in the morning
KC (873)	Antipsychotics	Olanzapine 5mg tablets	17 December 2015	34	Take ONE tablet at night
MT (271)	Antipsychotics	Quetiapine 150mg tablets	23 December 2015	28	Take ONE a day
JG (4300)	Antipsychotics	Risperidone 1mg tablets	05 May 2015	260	Take ONE twice a day
EK (3788)	Antipsychotics	Risperidone 2mg tablets	22 December 2015	29	Take ONE twice a day

Working the data - hypnotics

293 patients analysed of which 44 (15%) received a hypnotic over the three month study period.
Hypnotic prescribed by frequency in table below:

Drug Choice	% Patients receiving a hypnotic over July-September
1st Line: Lorazepam, Zopiclone	56.25%
Non 1st Line: Diazepam, Melatonin, Temazepam	39.58%
Drug to avoid: Nitrazepam	4.17%

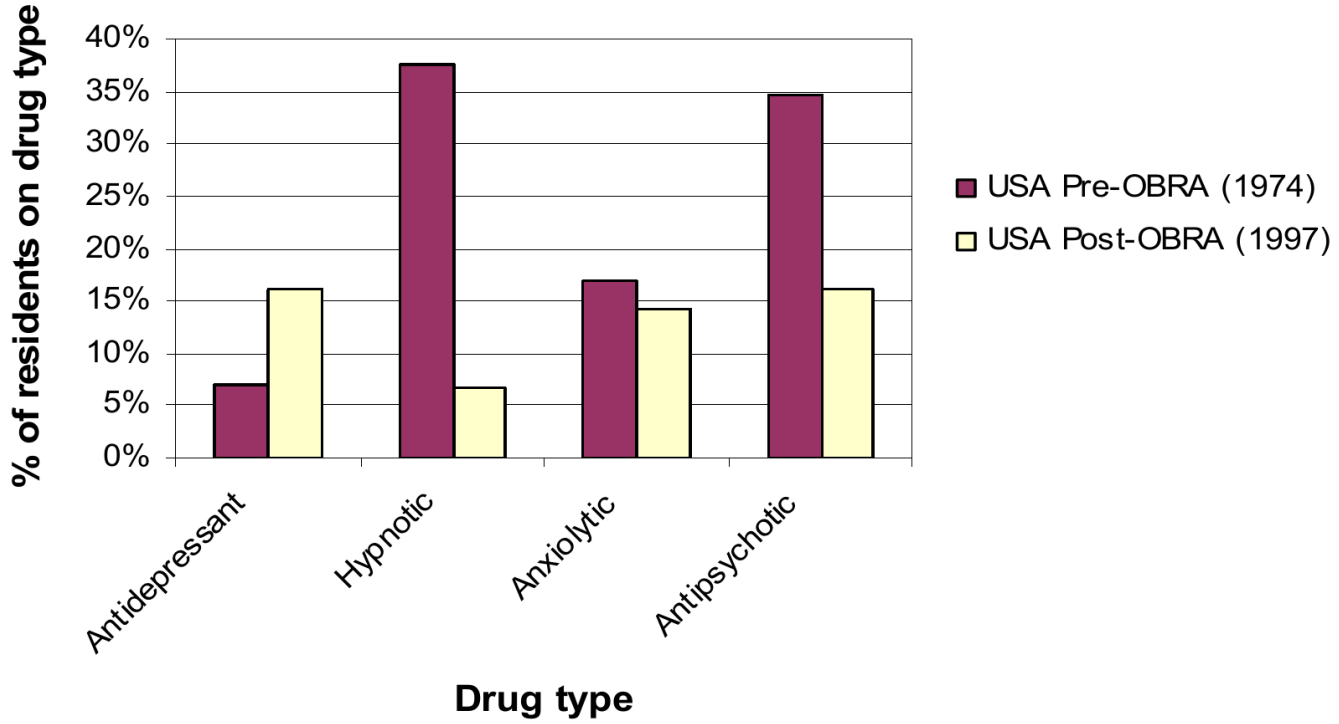
Working the data -hypnotics

Prescribing errors:

Error type	No of errors	% of patients affected by error (total number of patients = 44)
Dose too high i.e. adult dose of 7.5mg prescribed	13	27%
Prescribed for greater than 1 month	33	69%
Drug choice (i.e. not 1st line)	10	21%

US prescribing patterns pre/post OBRA 1987

Causative illness had to be specified to justify prescriptions
Recommendations on dosage levels



Hospital Visit Analysis

TOTAL HOMES	TOTAL PATIENTS	TOTAL OCCASIONS
58	119	126

Absent | Away | Hospital

ESTABLISHED

Established | New

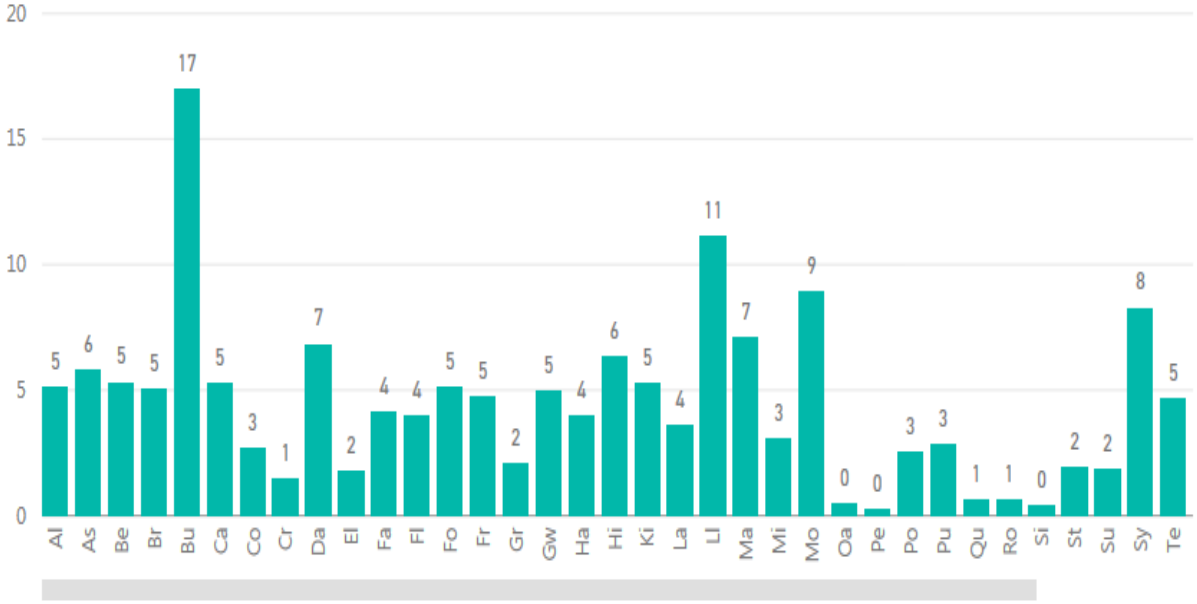
ALIAS HOME

- Al
- As
- Be
- Br
- Bu
- Ca
- Co
- Cr
- Da
- El
- Fa
- Fl
- Fo
- Fr
- Gr
- Gw
- Ha
- Hi

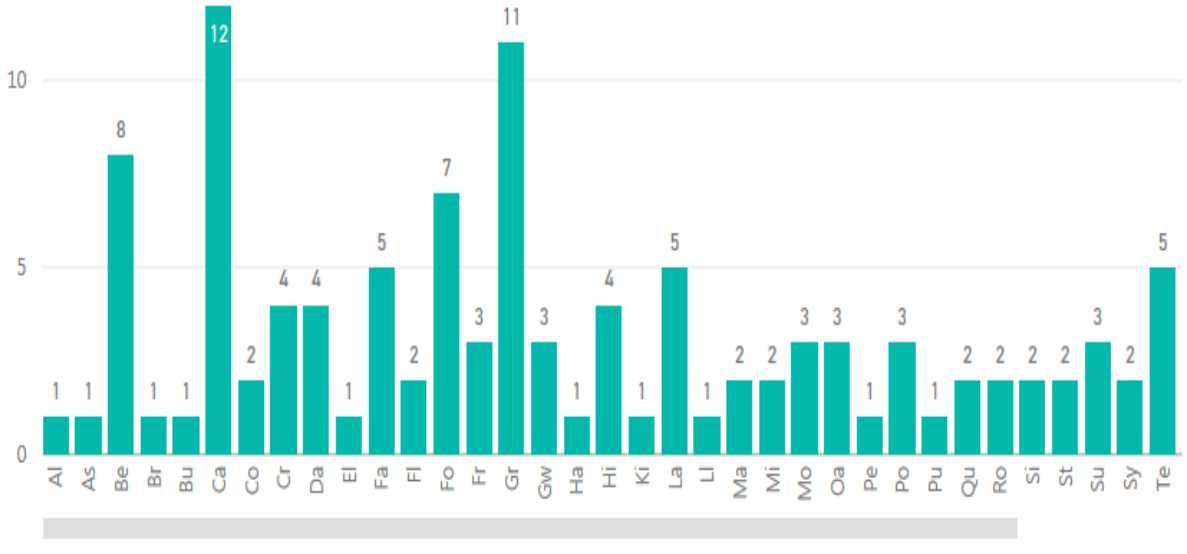
WEEK

1 | 2 | 3 | 4 | 51 | 52 | 53

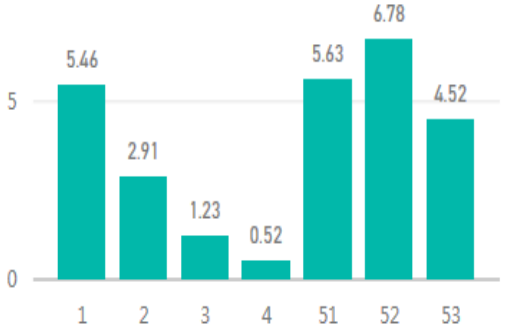
HOSPITAL STAY DURATION BY HOME



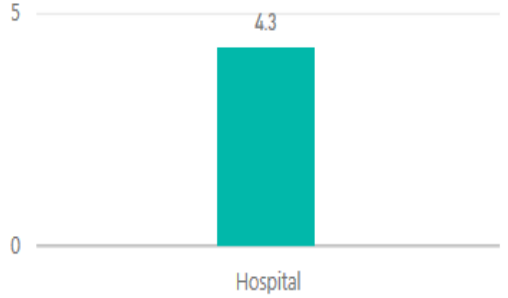
HOSPITAL VISITS BY HOME



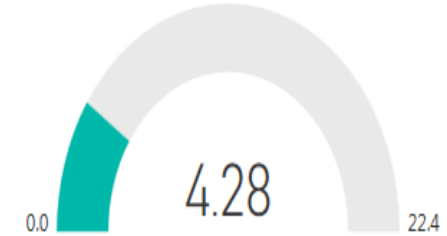
Average of ABSENT DAYS by WEEK



Average of ABSENT DAYS by Description



Average HOSPITAL STAY



Dear Prudence.....

INVATECH HEALTH

The Beacon project
could inform care home medicines management in Wales
Improving care and safety, role of Pharmacist
introducing a means for guidance and controls

School of Pharmacy as an “Observatory” and centre for medicines and care homes research with a range of partners

Some pain but plenty of gain!