

## The GRACE-Med study

# General Practice and Residential Aged Care Facility Concordance of medications study

A/PROF MEREDITH MAKEHAM

CENTRE FOR HEALTH SYSTEMS AND SAFETY RESEARCH

AUSTRALIAN INSTITUTE OF HEALTH INNOVATION (AIHI)

HIC Melbourne July 2016



# GRACE-Med study overview

## RESEARCH QUESTION AND AIMS

---

- **EVIDENCE GAP** on the mismatch between medication records at Residential Aged Care Facilities (RACFs) and the GPs' practice software
- What is the **magnitude** of medication discrepancies between GPs' practice clinical information system and residents' medication charts at the RACF?
- What is the **risk to patient safety for RACF residents** associated with these differences?



# GRACE-Med study background

## MEDICATION MANAGEMENT IN THE GENERAL PRACTICE

---



### GP CLINICAL INFORMATION SYSTEMS

2013-14 BEACH data:

- 96.3% of GPs were producing prescriptions electronically (ePrescribing or printing scripts)
- More than two-thirds (69.9%) reported they used electronic medical records exclusively (ie paperless)
- Only 2.4% of GPs did not use a computer at all for clinical purposes

# GRACE-Med study background

## MEDICATION MANAGEMENT AT THE RACF

---

### RACF USE OF CLINICAL INFORMATION SYSTEMS

- Range of programs, with different versions in use at RACFs
- Variable use of medication management modules eg hybrid of hand written changes faxed to pharmacy, then electronic charts generated, which RACF can view but not alter at the facility



# GRACE-Med study background

DATA OVERVIEW – PROCESS WHEN A MEDICATION FOR A RESIDENT IS CHANGED AT THE FACILITY...



**MEDICINE  
NEW or CHANGE**  
Written by hand on  
RACF chart  
**No electronic  
decision support  
available**  
Limited use of  
laptop or cloud by  
GPs



**PRESCRIPTION**  
Written by hand  
and left at facility  
or



Prescription  
generated  
electronically at  
practice  
**BUT electronic  
decision support uses  
medicines list at the  
practice  
not RACF chart**

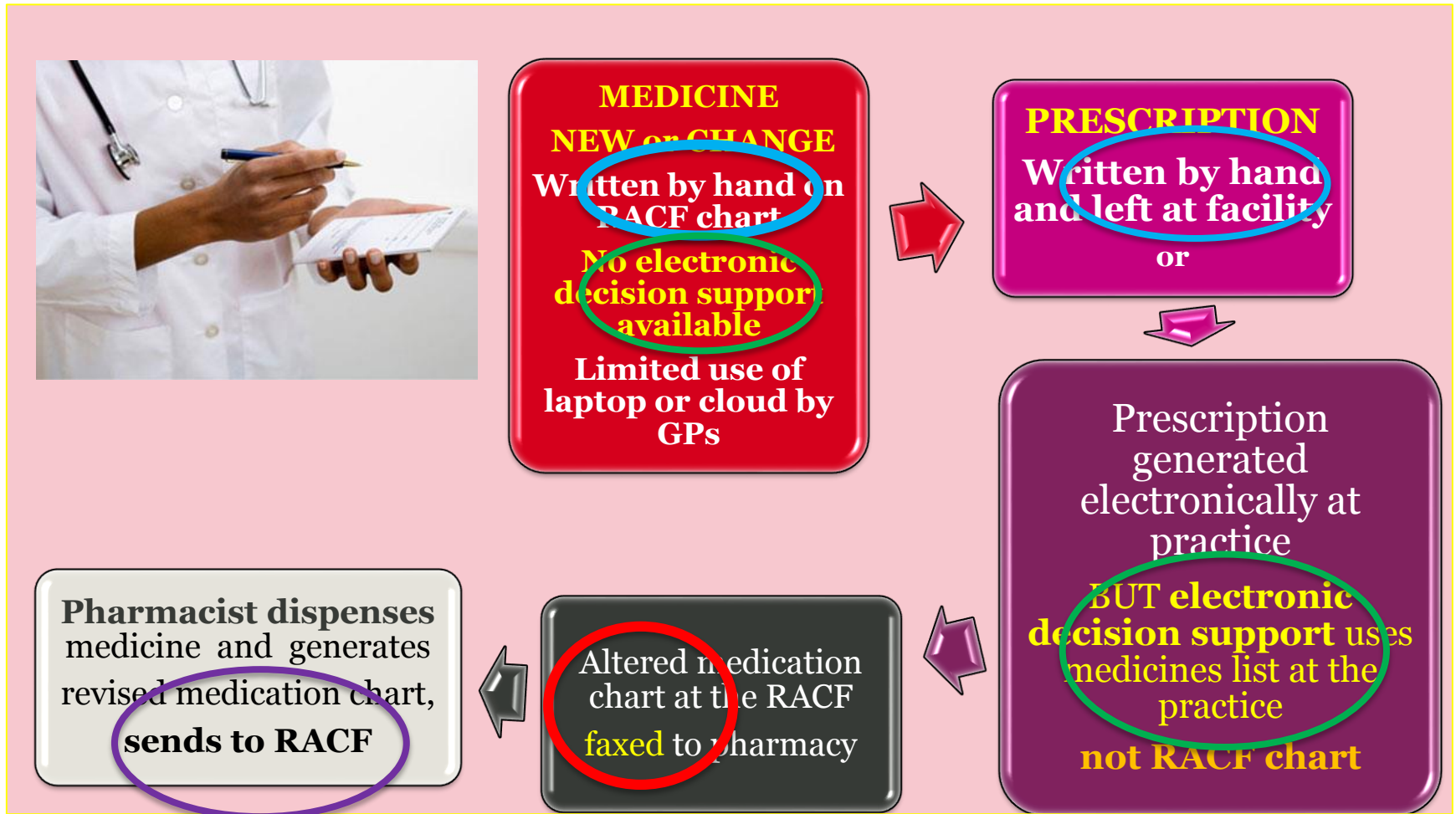


Altered medication  
chart at the RACF  
**faxed** to pharmacy

Pharmacist dispenses  
medicine and generates  
revised medication chart,  
**sends to RACF**

# GRACE-Med study background

DATA OVERVIEW – PROCESS WHEN A MEDICATION FOR A RESIDENT IS CHANGED AT THE FACILITY...



# GRACE-Med study background



## DIGITAL HEALTH DILEMMAS FOR A GP VISITING THE RACF

---

RACF systems designed to support RACF needs in patient care,  
**NOT DESIGNED TO SUPPORT GP WORKFLOW**

- **No prescribing medicine functions** allergy alerts, interactions
- **No ability to generate electronic scripts** in RACF CIS
- **No interoperability** between systems at GP practice and RACF
- **No SMD functions at RACF** – can't send securely point to point such as notes, discharge summaries, referrals
- **No education for GPs** in using RACF CIS
- **No SHS reaching My Health Record** from RACF CIS, GPs are sending from their practice systems using the data held there

# GRACE-Med study methods

## METHODS OVERVIEW

---

- Approx. 1100 **GPs in the PHN region** invited to participate
- GP participants identified their RACF residents
- 10 residents per GP selected randomly, stratified by RACF
- **Medication data extracted**
  - GP's practice CIS
  - RACF chart on the same day
- Discrepancies analysed
- GP feedback was sought on
  - Nature of discrepancies
  - Plans for further action
- RACGP audit activity

c





# GRACE-Med study methods

## METHODS – MEDICATION DATA ENTRY

40-58-17-03

**Medications:**

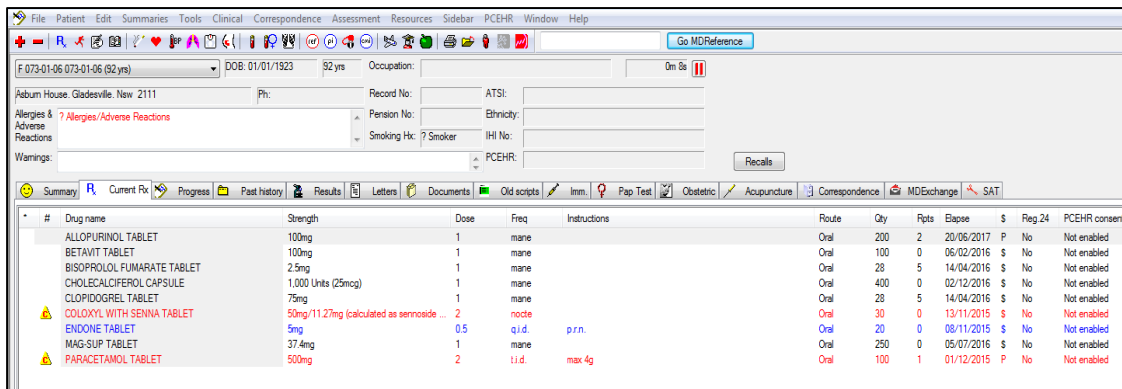
Regular Medication	Time	Medicine Notes
Carvedilol 6.25g	10:00	TO BE COMMENCED immediately <input type="checkbox"/> Not Multi-Dose <input type="checkbox"/> 1/1 Tab. Box
Bipolar 12.5mg	12:00	TO BE COMMENCED immediately <input type="checkbox"/> Not Multi-Dose <input type="checkbox"/> 1/1 Tab. Box
Paro 100g	10:00	TO BE COMMENCED immediately <input type="checkbox"/> Not Multi-Dose <input type="checkbox"/> 1/1 Tab. Box
Nicardipine 30g	10:00	TO BE COMMENCED immediately <input type="checkbox"/> Not Multi-Dose <input type="checkbox"/> 1/1 Tab. Box
Nurofen 200g	10:00	TO BE COMMENCED immediately <input type="checkbox"/> Not Multi-Dose <input type="checkbox"/> 1/1 Tab. Box
Vigora 100g	10:00	TO BE COMMENCED immediately <input type="checkbox"/> Not Multi-Dose <input type="checkbox"/> 1/1 Tab. Box
Hyponat 100g	10:00	TO BE COMMENCED immediately <input type="checkbox"/> Not Multi-Dose <input type="checkbox"/> 1/1 Tab. Box
Vit-B 5	10:00	TO BE COMMENCED immediately <input type="checkbox"/> Not Multi-Dose <input type="checkbox"/> 1/1 Tab. Box
Lisin 10g	10:00	TO BE COMMENCED immediately <input type="checkbox"/> Not Multi-Dose <input type="checkbox"/> 1/1 Tab. Box

Drug Name	Strength	Dosage	Route	Reason	Last script
ALLOPURINOL Tablet (Allopurinol)	100mg	1 mane	Oral		14/01/2016
AMOXICILLIN/CLAVULANIC ACID Tablet (Amoxicillin (as trihydrate)/Clavulanic acid (as the potassium salt))	875mg/ 125mg	1 b.d.	Oral		14/01/2016
ASPIRIN EC Tablet (Aspirin)	100mg	1 mane	Oral		14/01/2016
COLOXYL WITH SENNA Tablet (Docusate sodium/Sennosides)	50mg/11.27mg (calculated as sennoside B 8mg)	2 b.d. p.r.n.	Oral		14/01/2016
ELEUPHRAT Cream (Betamethasone dipropionate)	0.05%	Apply daily	Topical		14/01/2016
FERROGRAD C Tablet (Ferrous sulfate/Ascorbic acid)	325mg/ 500mg	1 mane	Oral		14/01/2016
MACROVIC Sachet	13.125g/ 350.7mg /46.6mg /178.5mg	1 b.d.	Oral		14/01/2016
MONODUR SR Tablet (Isosorbide mononitrate)	120mg	1 mane	Oral		14/01/2016
PANTOPRAZOLE EC Tablet (Pantoprazole (as sodium	40mg	1 b.d.	Oral		14/01/2016

# GRACE-Med study methods

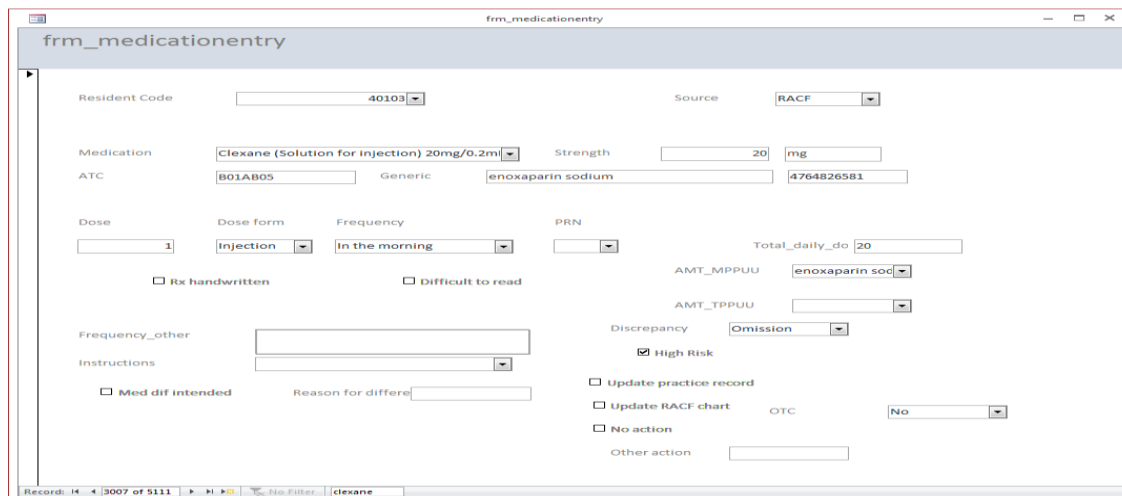
## METHODS – MEDICATION DATA ENTRY

- Data entry into MD software and Access database using AusDI/MIMS/ATC/AMT coding



The screenshot shows a medical software interface with a patient's medication list. The patient's details include: F 073-01-06 073-01-06 (52 yrs), DOB: 01/01/1923, Occupation: 92 yrs, Occupation: On Sa. The medication list is as follows:

#	Drug name	Strength	Dose	Freq	Instructions	Route	Qty	Rpts	Elapse	\$	Reg 24	PCEHR consent
	ALLOPURINOL TABLET	100mg	1	mane		Oral	200	2	20/06/2017	P	No	Not enabled
	BETAWIT TABLET	100mg	1	mane		Oral	100	0	06/02/2016	\$	No	Not enabled
	BISOPROLOL FUMARATE TABLET	2.5mg	1	mane		Oral	28	5	14/04/2016	\$	No	Not enabled
	CHOLECALCIFEROL CAPSULE	1,000 Units (25mcg)	1	mane		Oral	400	0	02/12/2016	\$	No	Not enabled
	CLOPIDOGREL TABLET	75mg	1	mane		Oral	28	5	14/04/2016	\$	No	Not enabled
⚠	COLOXYL WITH SENNA TABLET	50mg/11.27mg (calculated as sennoside ...	2	mane		Oral	30	0	13/11/2015	\$	No	Not enabled
	ENDONE TABLET	5mg	0.5	q.i.d.	p.r.n.	Oral	20	0	08/11/2015	\$	No	Not enabled
	MAG-SUP TABLET	37.4mg	1	mane		Oral	250	0	05/07/2016	\$	No	Not enabled
⚠	PARACETAMOL TABLET	500mg	2	t.i.d.	max 4g	Oral	100	1	01/12/2015	P	No	Not enabled



The screenshot shows the frm\_medicationentry form with the following fields:

- Resident Code: 40103
- Source: RACF
- Medication: Clexane (Solution for injection) 20mg/0.2m
- Strength: 20 mg
- ATC: B01AB05
- Generic: enoxaparin sodium
- 4764826581
- Dose: 1
- Dose form: Injection
- Frequency: in the morning
- PRN: [dropdown]
- Total\_daily\_do: 20
- Rx handwritten
- Difficult to read
- AMT\_MPPUU: enoxaparin soc
- AMT\_TPPUU: [dropdown]
- Discrepancy: Omission
- High Risk
- Update practice record
- Update RACF chart
- OTC: No
- No action
- Other action: [text box]

Record: H 3007 of 5111 | H | No Filter | clexane

# GRACE-Med study methods

## METHODS - GP FEEDBACK REPORT WITH MEDICATION DIFFERENCES

RACF MEDICATION CHART			YOUR PRACTICE RECORD		
Allergies: Elastoplast			Allergies: NKA		
MEDICINE NAME	STRENGTH	DOSAGE	MEDICINE NAME	STRENGTH	DOSAGE
COLOXYL WITH SENNA Tablet (Docusate sodium/Sennosides)	50mg/11.27mg (calculated as sennoside B 8mg)	2 nocte p.r.n.	AVAPRO Tablet (Irbesartan)	300mg	1 daily
EUTROXSIG Tablet (Thyroxine sodium)	50mcg	1 mane	EUTROXSIG Tablet (Thyroxine sodium)	100mcg	1 daily
EUTROXSIG Tablet (Thyroxine sodium)	100mcg	1 mane	EUTROXSIG Tablet (Thyroxine sodium)	50mcg	1 daily
PARACETAMOL Tablet (Paracetamol)	500mg	2 t.i.d. p.r.n.	MIRTAZON Tablet (Mirtazapine)	30mg	2 nocte m.d.u.
SYMBICORT TURBUHALER 200/6 Turbuhaler (Budesonide/Eformoterol fumarate dihydrate)	200mcg- 6mcg/actuation	2 b.d. Rinse mouth after use.	PHOSPHATE SANDOZ Eff' Tablet (Phosphorus (as sodium phosphate monobasic))	500mg	1 t.i.d.
			SPIRACTIN Tablet (Spironolactone)	25mg	1 mane
			SYMBICORT RAPIHALER Inhaler (Budesonide/Eformoterol fumarate dihydrate)	200mcg- 6mcg/actuation	1 b.d.
			VALPAM Tablet (Diazepam)	2mg	0.5 b.d.
			ZYPREXA Tablet (Olanzapine)	2.5mg	1 nocte

# GRACE-Med study methods

## METHODS – MEDICATION DATA ANALYSIS

---

All medication orders at RACF and GP were categorised as:

1. **Omissions** - appeared on the RACF medication chart but was not present on the GP's practice record
2. **Additions** – appeared on the GP's practice record but was not present on the RACF medication chart
3. **Dose differences** - the same medicine appeared in both locations but had a different total daily dose
4. **Matches** - the same medicine appeared in both locations with the same total daily dose

# GRACE-Med study methods

## METHODS – HIGH RISK MEDICATIONS

---

- **High Risk Discrepancies flagged**

Eg Warfarin, aspirin, opioids, diuretics, antibiotics, beta-blockers, methotrexate, insulin, NSAIDS, anti-epileptics...

- Expert review group (GP, pharmacists - literature)

- Higher potential for harm for older people, adverse events

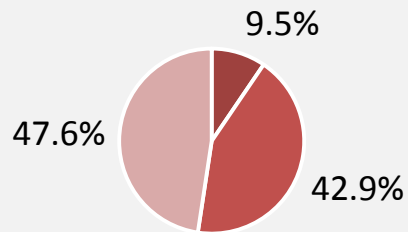


# GRACE-Med results

## GP PARTICIPANT CHARACTERISTICS

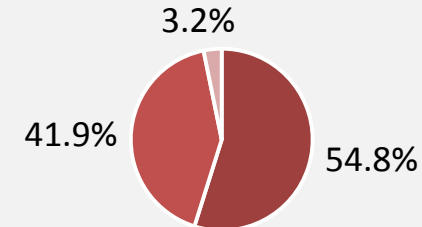
- 31 GPs – 52% male; 48% female
- 21 general practices – 90% eHealth ready

Practice size – solo vs group practices



■ Solo practioners ■ Between 2 - 5 GPs ■ > 5 GPs

GP Practice Software



■ Medical Director ■ Best Practice ■ Practix

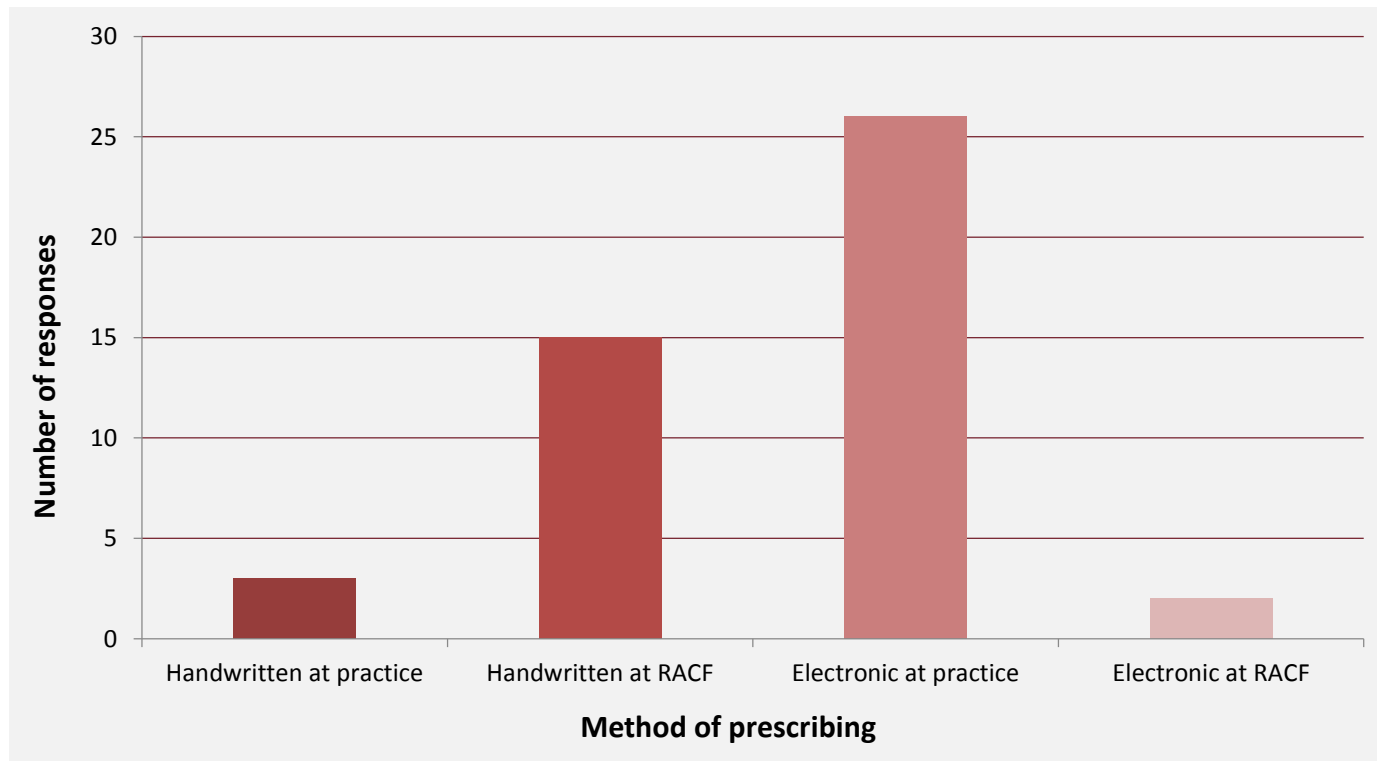
- Average length of time treating nursing home patients – 25 years

# GRACE-Med results

## MEDICATION PRESCRIBING FOR RACF RESIDENTS

---

Most GPs prescribed electronically when they returned to the practice, or left a hand-written script at RACF

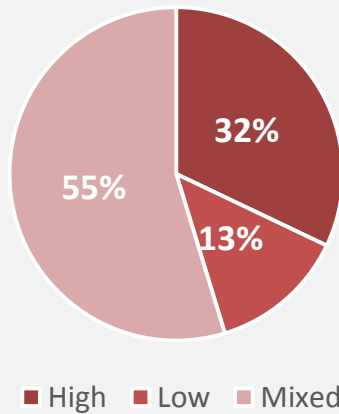


# GRACE-Med results

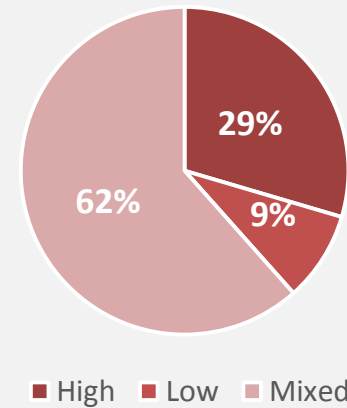
## RESIDENT CHARACTERISTICS

203 residents from 53 RACFs

RACFs by level of care



Residents by level of care

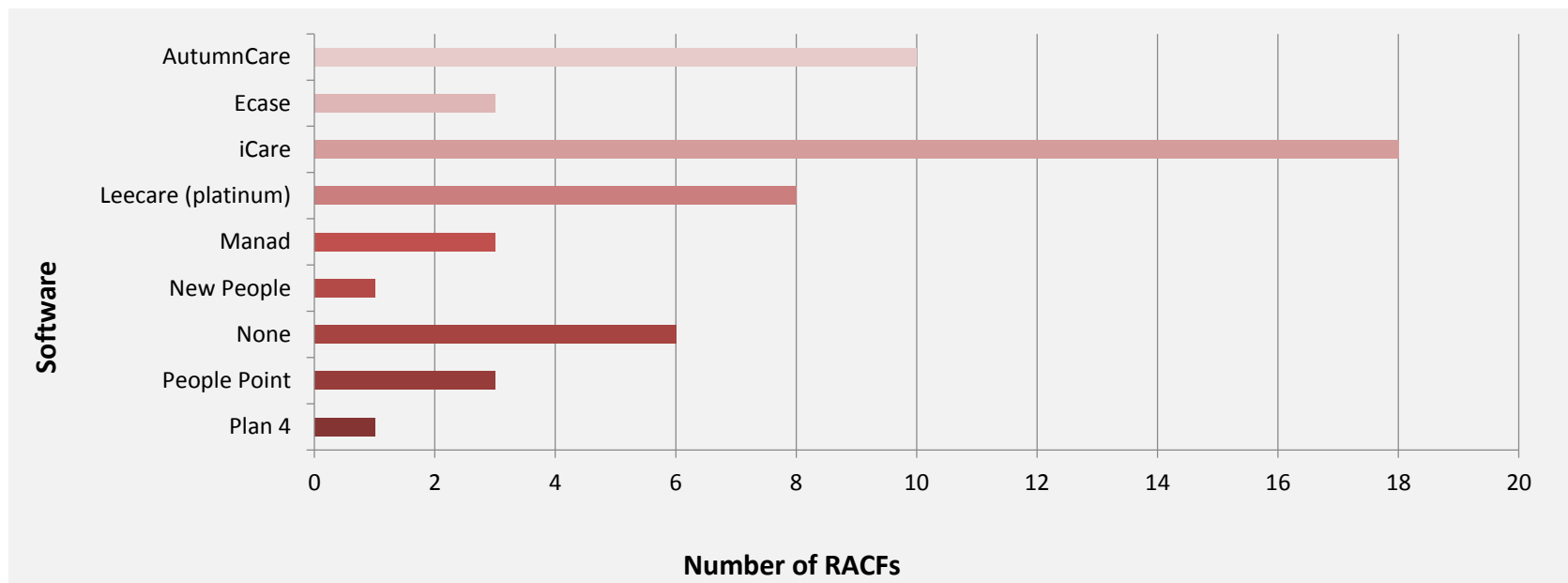




# GRACE-Med results

## CLINICAL INFORMATION SYSTEMS AT THE RACF

Range of programs, with different versions in use at RACFs (eg MyHR capability)



RACF systems in use **don't support** a GP altering medication at the RACF with electronic decision support

# GRACE-Med results

## DATA OVERVIEW

---

## 5091 medication orders

- 385 different medicines
- At RACF, ranged from 1 to 38 (average 12.9)
- At GP, ranged from 1 to 33 (average 12.2)

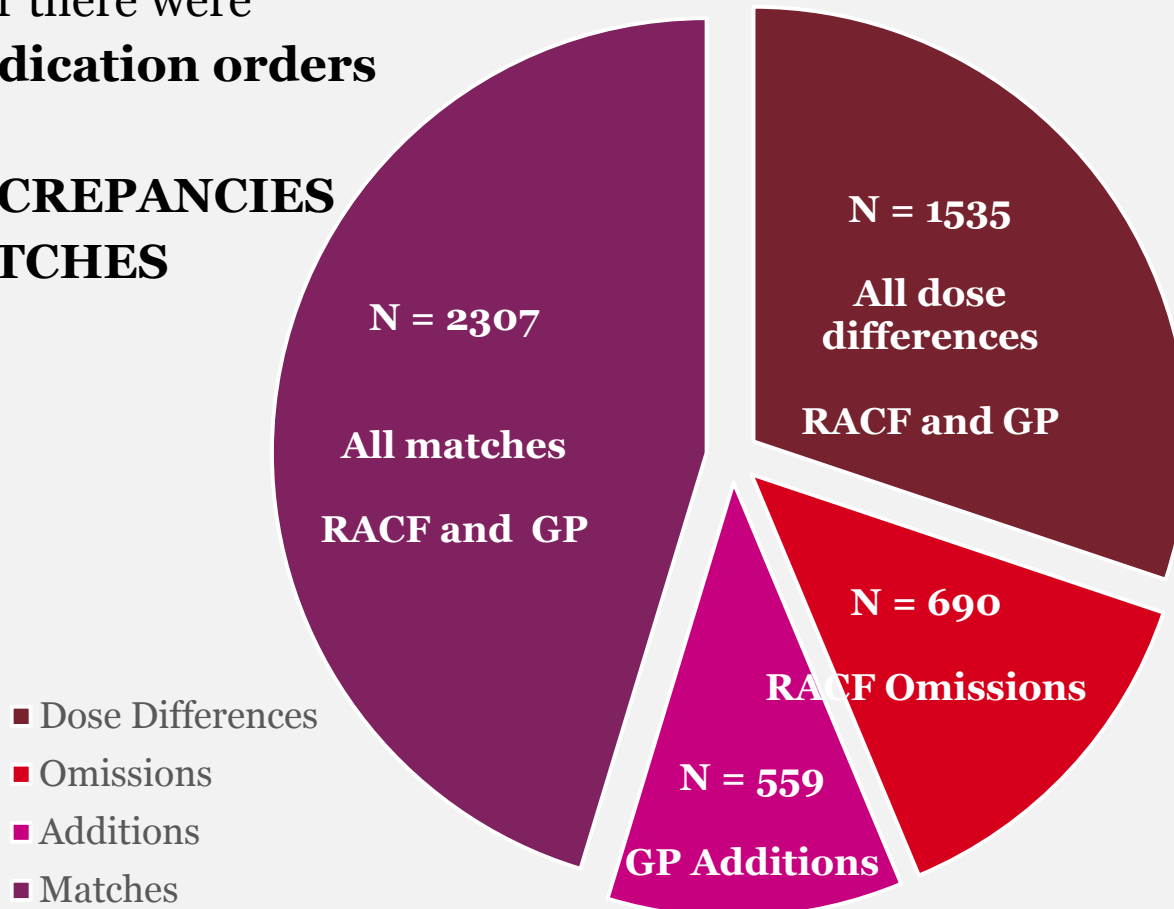


# GRACE-Med results

## ALL MEDICATION ORDER DISCREPANCIES AND MATCHES

Altogether there were  
**5091 medication orders**

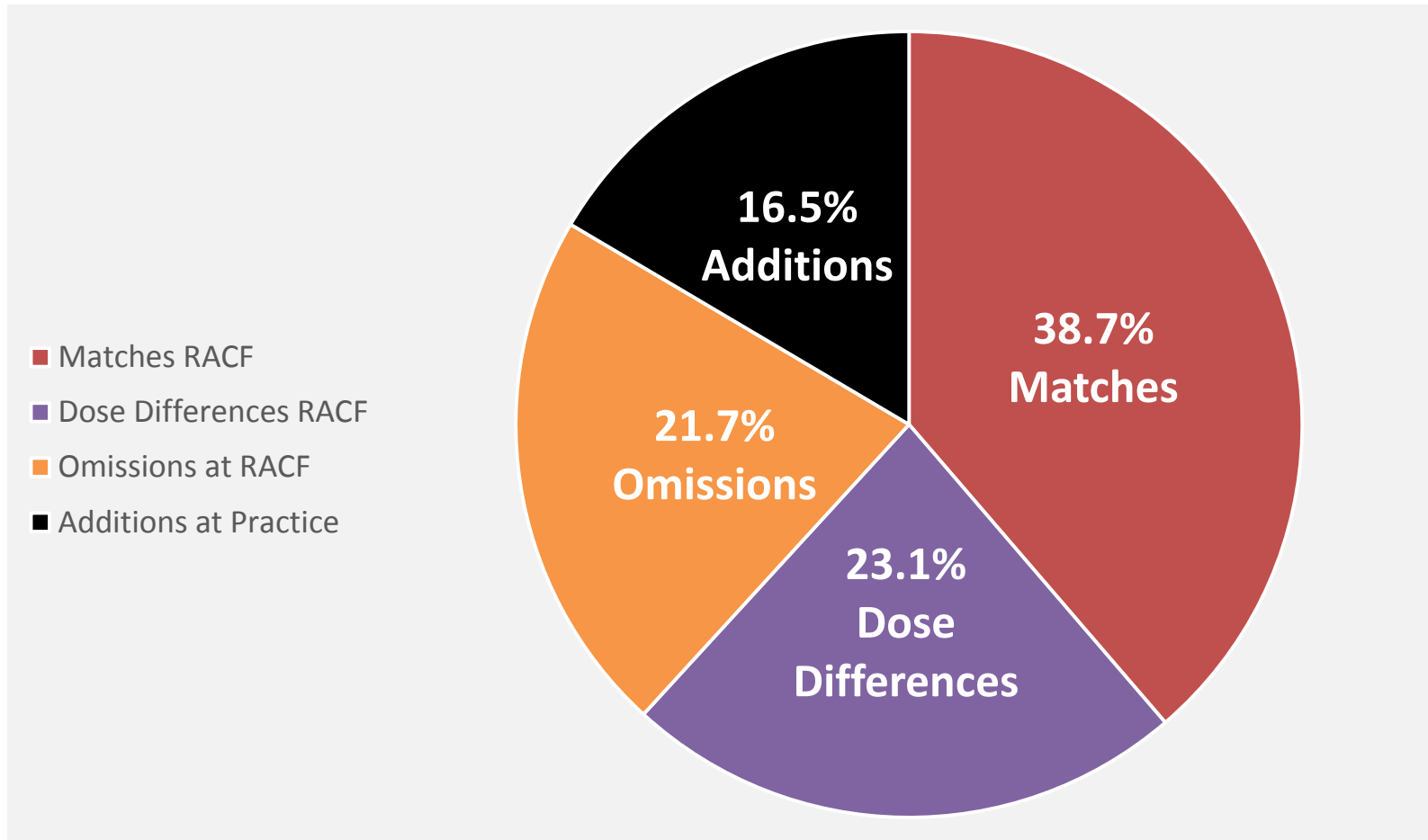
**55% DISCREPANCIES**  
**45% MATCHES**



# GRACE-Med results

AVERAGE % OF DISCREPANCIES PER RESIDENT

---



# GRACE-Med results

## PERFECT MATCHES AND ABSOLUTE MISMATCHES

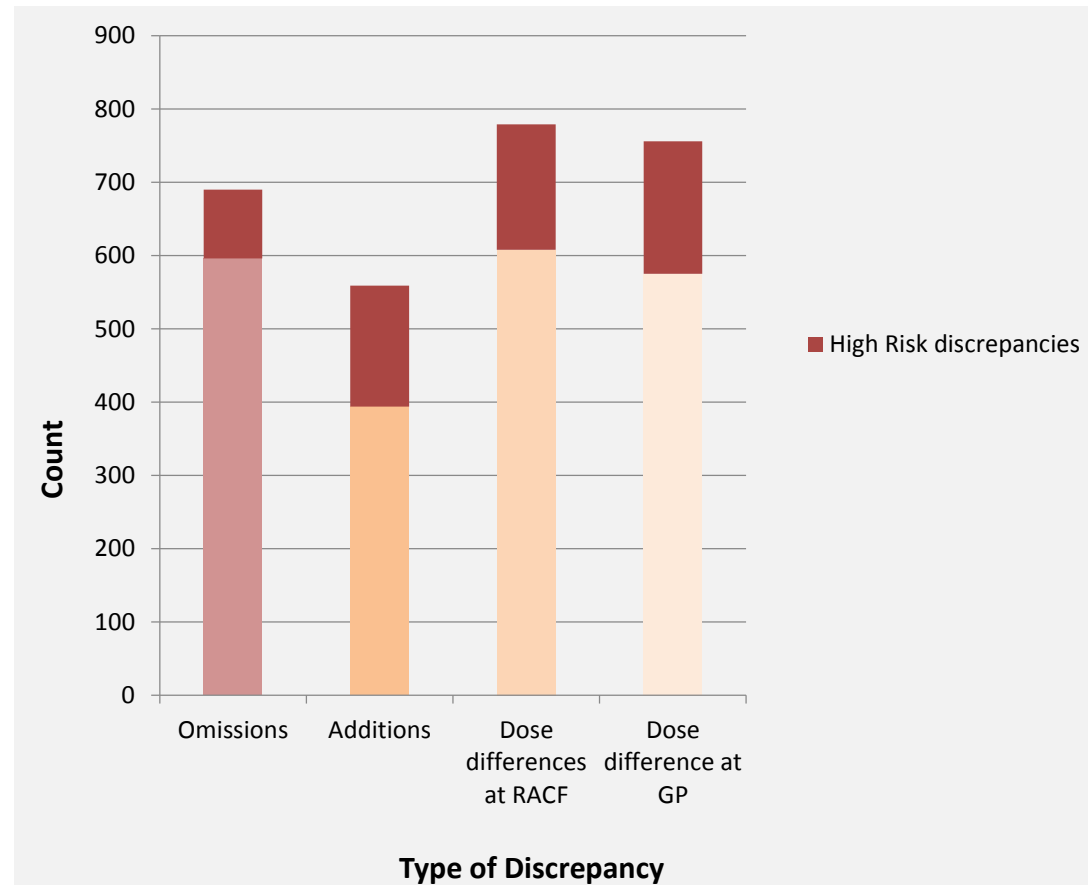
---

- 6 (3%) of 203 residents were **perfectly matched** between their RACF medication chart and their GP's practice record
- 14 (7%) had **no matched medication orders** between the RACF chart and GP practice record

# GRACE-Med results

## HIGH RISK MEDICINES WITHIN DISCREPANCIES

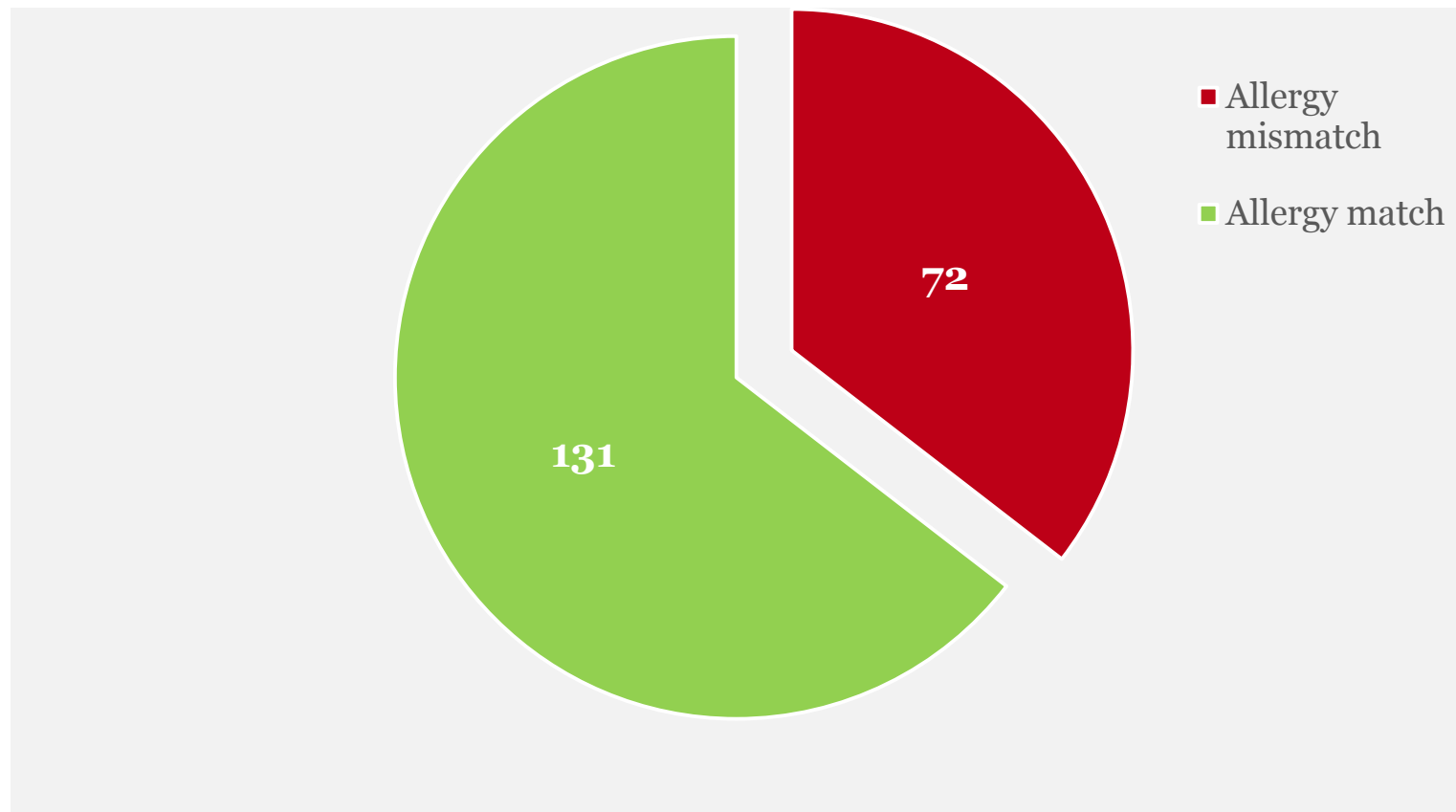
- **140 (69.0%) residents experienced some form of high risk discrepancy**
- 78 unique medications (classified by ATC code Level 5) were categorised as **high risk**
- Of the total set of 2784 discrepancies, 611 (21.2%) were noted to involve **high risk** medications



# GRACE-Med results

## ALLERGIES

35.5% of residents had an allergy mismatch



# GRACE-Med results

## MEDICATION CONCORDANCE SCORE



No. of matched medication orders on the  
RACF chart

---

All medication orders on RACF chart +  
Additions on the GP record

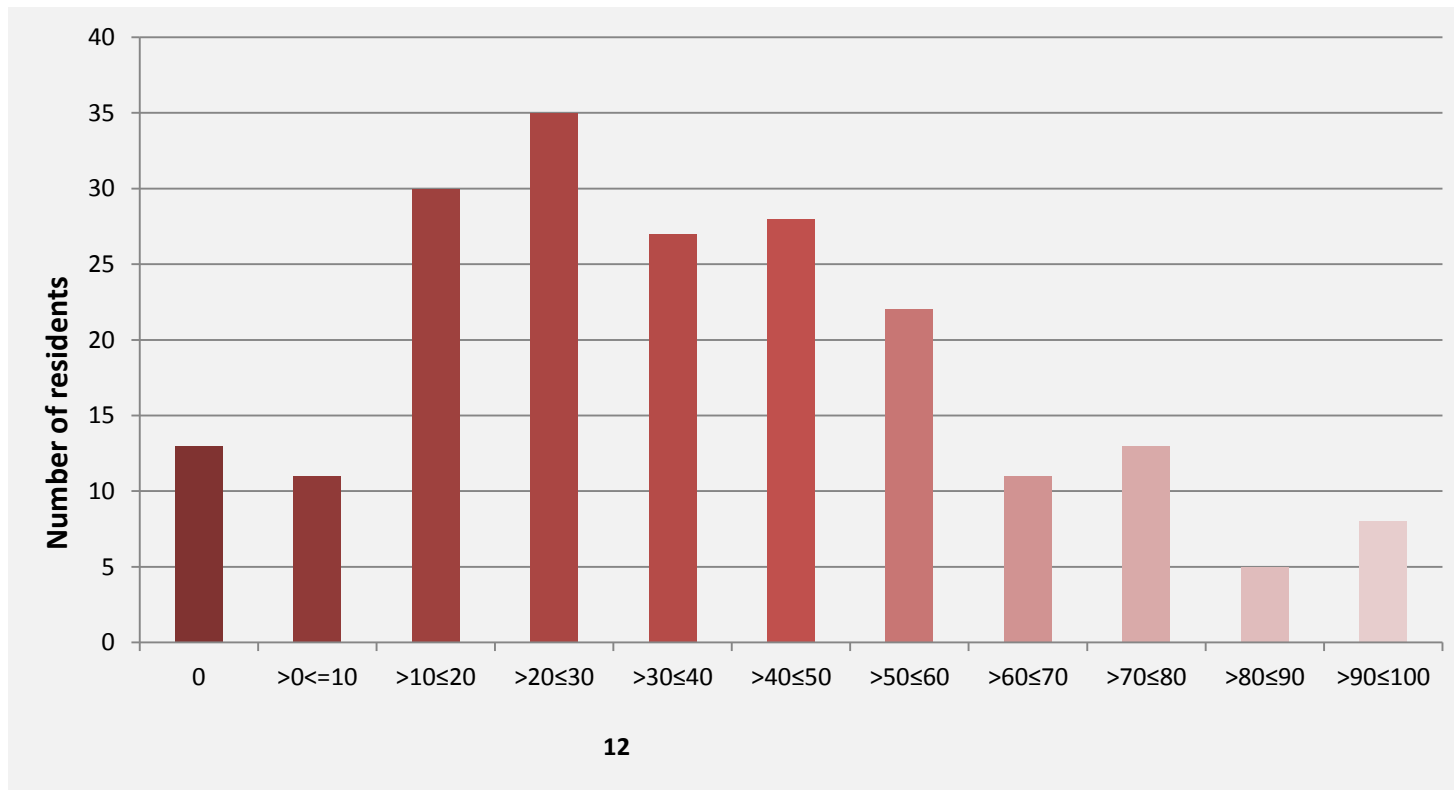
x 100



# GRACE-Med results

## MEDICATION CONCORDANCE

- This score represented how ‘well matched’ a resident was, and ranged from 0 (no match) to 100 (perfect match).
- Average of **38.7** (SD 25.2) and median of 35.7 (IQR 35.36).



# GRACE-Med results

## LIST OF FACTORS THAT WE STUDIED

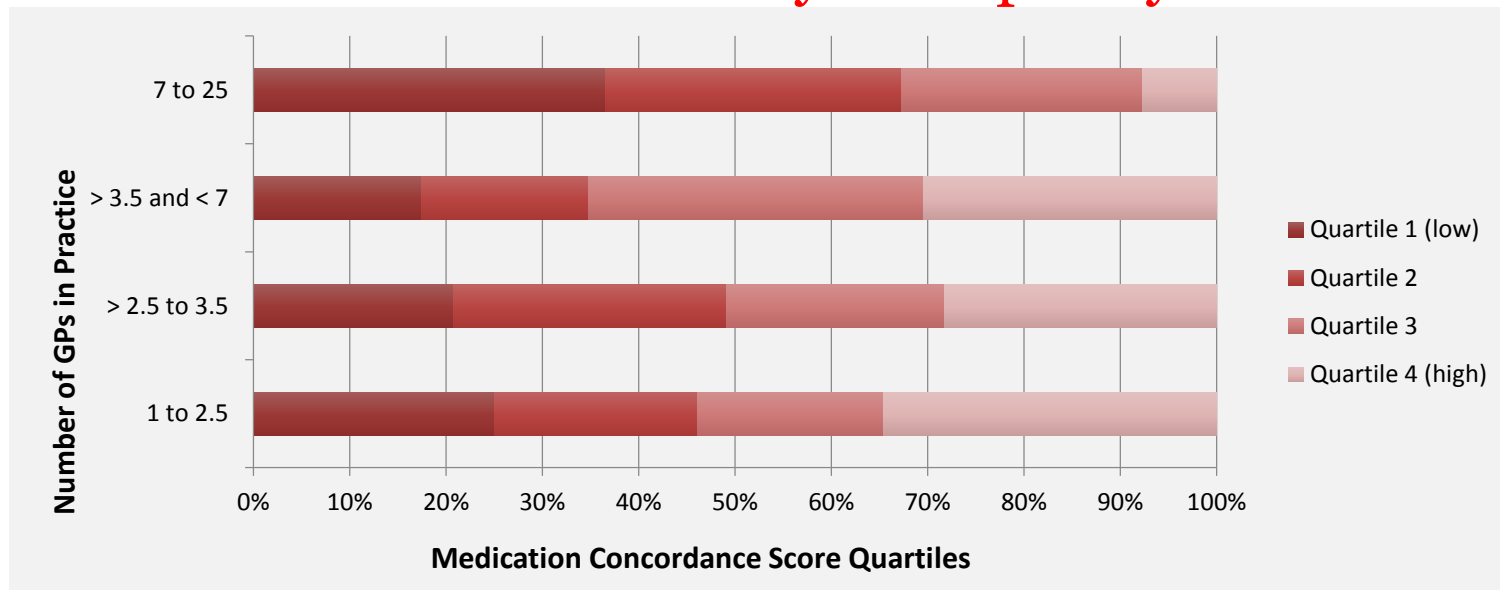
---

- We grouped the residents into four quartiles according to their **medication concordance scores**.
- We looked at the following factors to see if there was **any association** with:
  - Total number of medication orders at the RACF
  - **Proportion of High Risk discrepancies per resident**
  - **Age of residents**
  - Gender of RACF resident
  - Difference in allergies recorded by GP and RACF
  - Number of beds at the resident's RACF
  - **Level of care provided at the RACF**
  - **Number of FTE GPs at the resident's GP practice**
  - Number of half day sessions worked by GPs
  - Type of software used by resident's GP practices

# GRACE-Med results

## CHARACTERISTICS ASSOCIATED WITH POORER MEDICATION CONCORDANCE SCORES

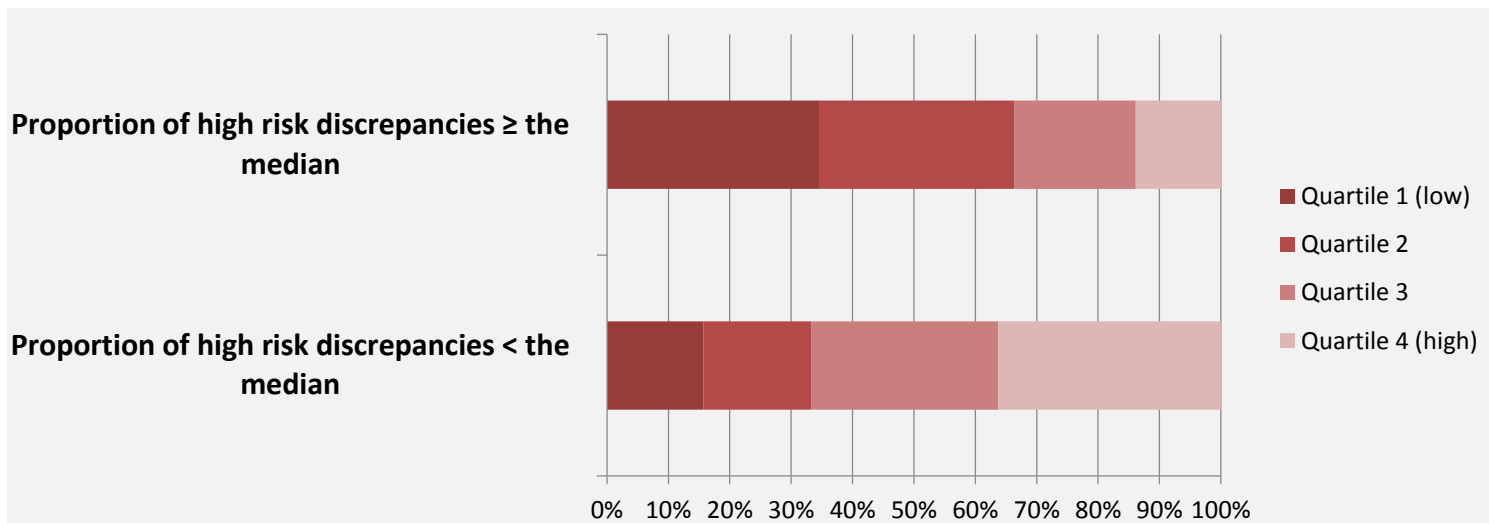
- Having a GP working in a larger practice group (7 or more FTE doctors) raised the odds of having a medication concordance score lower than the median (OR 2.3, 95% CI 1.1-4.7)
- This means residents with GPs in a practice of 7 or more were more likely to be poorly matched



# GRACE-Med results

## CHARACTERISTICS ASSOCIATED WITH POORER MEDICATION CONCORDANCE SCORES

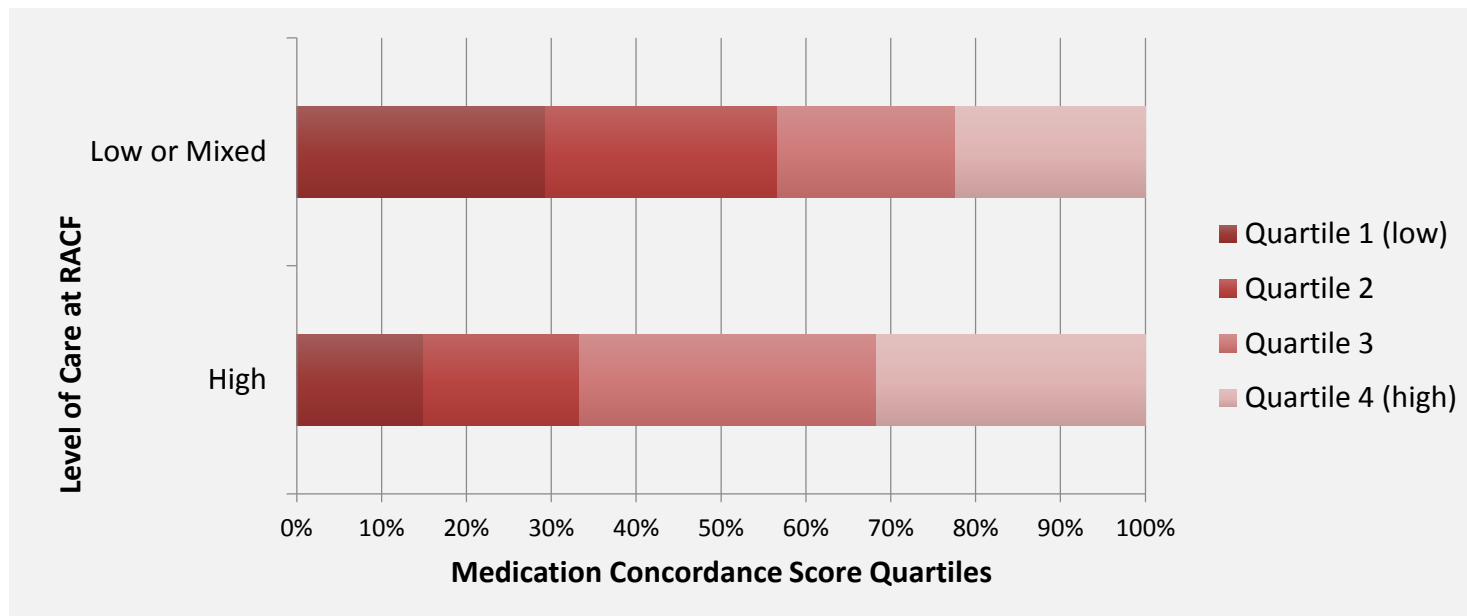
- Having a **greater proportion of high risk discrepancies** raised the odds of having a medication concordance score lower than the median (OR 3.3, 95% CI 1.8-6.1)
- This means residents with a greater % of high risk discrepancies were **more likely to be poorly matched**



# GRACE-Med results

## CHARACTERISTICS ASSOCIATED WITH POORER MEDICATION CONCORDANCE SCORES

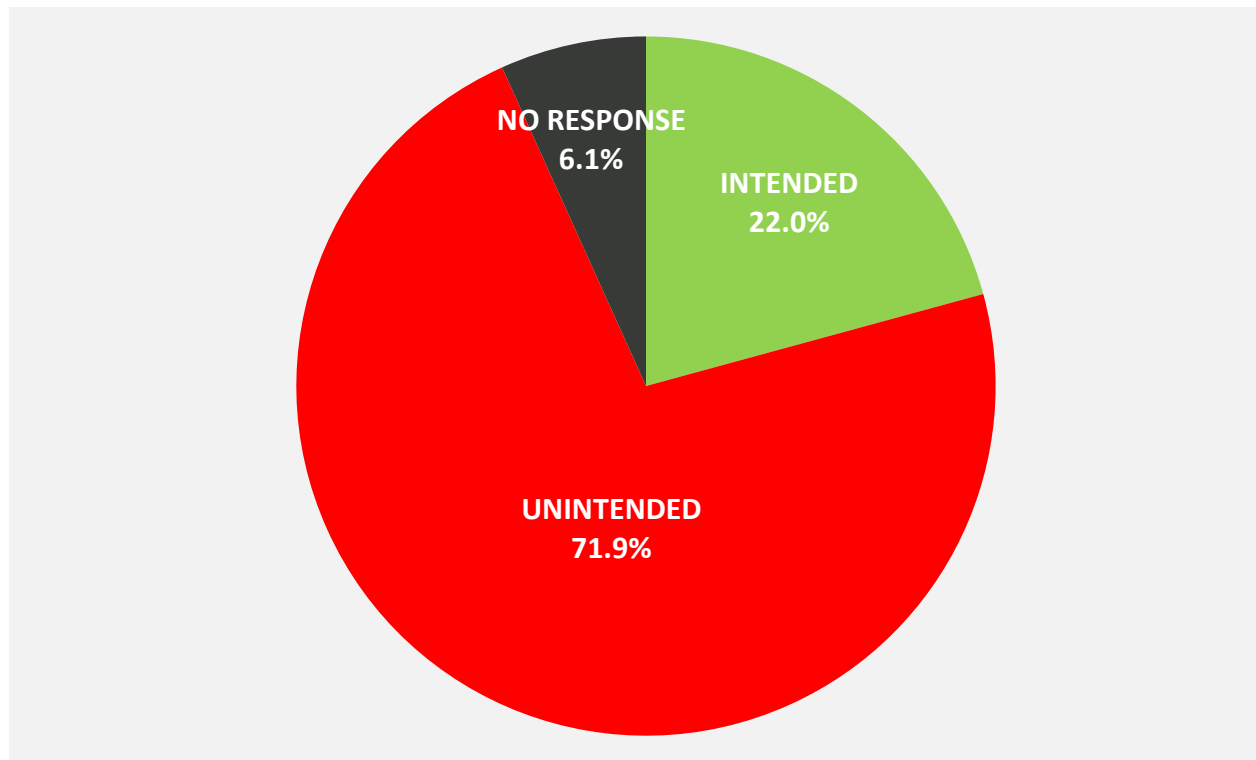
- Residing in a **high care facility** lowered the odds of having a medication concordance score lower than the median (**OR 0.4, 95% CI 0.2-0.9**)
- This means you were **less likely to be poorly matched** if you lived in a high care facility



# GRACE-Med results

## GP REASONS FOR DISCREPANCIES

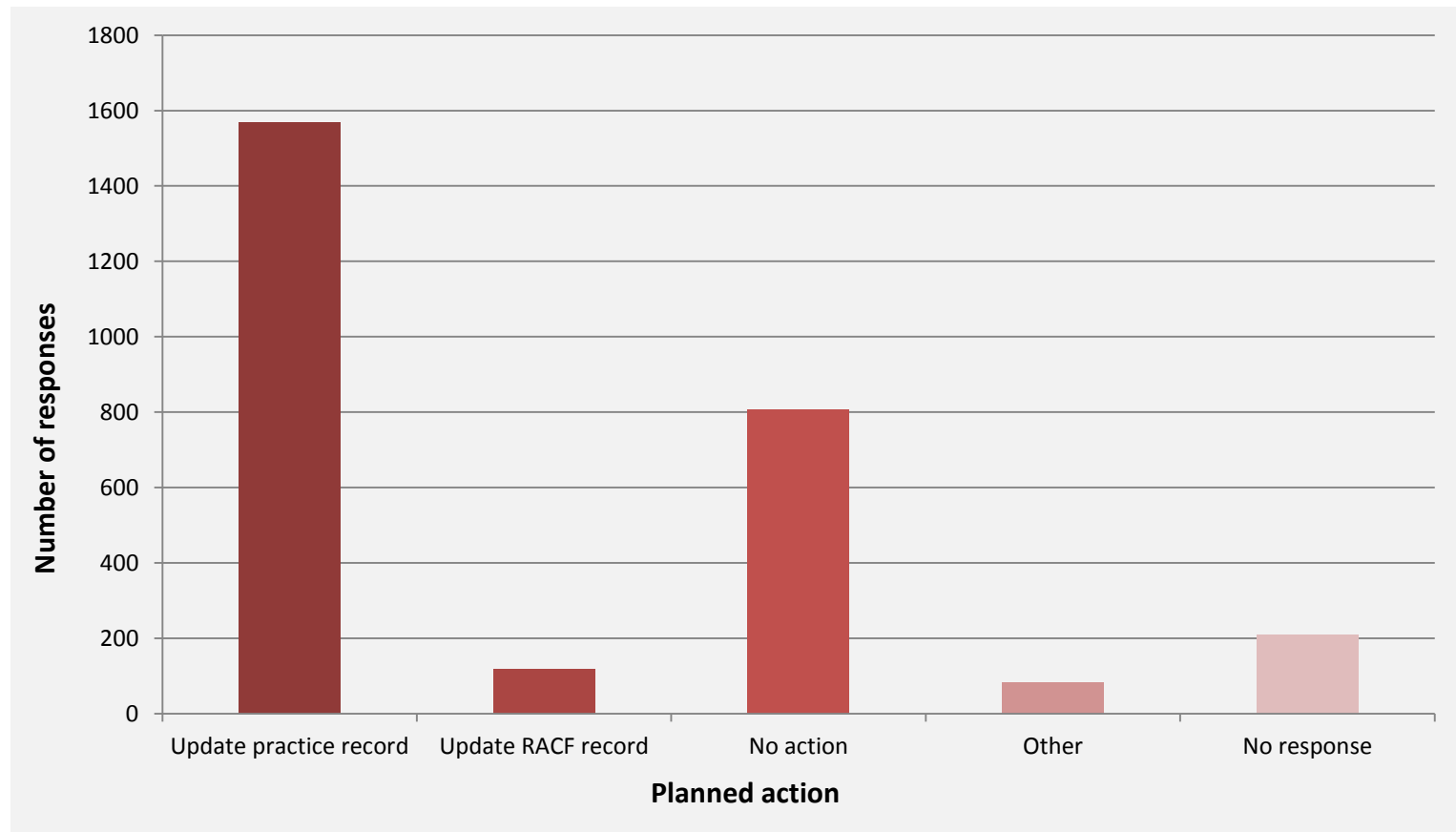
- 72% of discrepancies were **unintentional**



# GRACE-Med results

## GP PLANNED FOLLOW UP ACTIONS – ALL DISCREPANCIES

---



# GRACE-Med results

## GP REASONS FOR DISCREPANCIES

---



- Practice records not updated after a change
  - time pressures, memory
- OTC medications not included in practice records as pharmacy didn't require a script
- Practice software used solely for generating scripts, not considered a source of truth
- RACF charts treated as source of truth
- Convenience of having non-regular 'favourites' in the practice list



# GRACE-Med results

## GP FEEDBACK – RACF DIGITAL HEALTH NEEDS

---

GP feedback indicated a need for:

- Remote access to RACF records from the practice
- Integrated, interoperable software between their practice and the RACF
- Improved support using eHealth tools (such as secure messaging, and education about using My Health Record)

# GRACE-Med Study - summary



## KEY FINDINGS: BASELINE STUDY TO DEFINE THE ISSUE

---

- **Current software** (GP and RACF CIS) **does not support GP workflow** within RACFs for medication management
- There are **significant medication record differences** for the vast majority of people between RACF and GP systems
- These include a **significant proportion of high risk medicines**
- The incorrect medication data is sitting in the system that is being **used to share primary care data** with My Health Record, generate referrals, and generate new prescriptions using inaccurate allergy information and inaccurate interaction checking decision support

**RACF residents are at risk of patient harm**

**Our ability to electronically communicate RACF resident's medicine information accurately is greatly impaired**

# GRACE-Med study

QUESTIONS?

**Associate Professor Meredith Makeham**

[meredith.makeham@mq.edu.au](mailto:meredith.makeham@mq.edu.au)

**Centre for Health Systems and Safety Research**

**Australian Institute of Health Innovation**

Macquarie University