The MedGap Project:  
A NEW MODEL OF CARE TO REDUCE THE 
RISK OF MEDICATION-RELATED PROBLEMS 
AT THE HOSPITAL-RESIDENTIAL CARE 
INTERFACE 

FUNDED BY: J.O. AND J.R. WICKING TRUST 

Pharmacy Department, Austin Health;  
Aged Care Services, GP Liaison & Pharmacy Department, Northern Health;  
North East Valley Division of General Practice;  
Centre for Medicine Use and Safety, Faculty of Pharmacy and  
Pharmaceutical Sciences, Monash University;  
Victoria, Australia 

MARCH 2010
Principal Investigators:
Mr Rohan Elliott,
Senior Pharmacist (Aged Care), Austin Health;
Clinical Senior Lecturer, Faculty of Pharmacy and Pharmaceutical Sciences, Monash University
Dr Penny Harvey,
Geriatrician, Northern Health

Co-investigators:
Dr Simone Taylor,
Senior Pharmacist (Research and Emergency Medicine), Austin Health
Ms Rhonda Jennings,
Manager, GP Liaison, Northern Health
Dr Mary Belfrage,
(formerly) Clinical Advisor, Aged Care Program, North East Valley Division of General Practice, (currently Medical Director, Victorian Aboriginal Health Service)
A/Prof Jennifer Marriott,
Associate Professor of Pharmacy Practice, Monash University

Project Manager:
Mr Tim Tran,
Senior Pharmacist, Austin Health

Project Officer:
Dr Marion Cincotta,
Research Scientist, Northern Health

Steering Committee:
Investigators & project staff, plus:
Mr Liam Carter,
Deputy Director of Pharmacy, Northern Health
Ms Clare Chiminello,
North East Valley Division of General Practice
Mr Kent Garrett,
Director of Pharmacy, Austin Health
Mr Raj Sivaraj,
Senior Pharmacist, Bundoora Extended Care Centre, Northern Health

Address for correspondence:
Austin Health Pharmacy Department
PO Box 5555, Heidelberg Vic 3084.
Phone: 03 9496 2334  Email: rohan.elliott@austin.org.au
# TABLE OF CONTENTS

**ABBREVIATIONS** .............................................................................................................. 5

1. **EXECUTIVE SUMMARY** ............................................................................................ 7

2. **ACKNOWLEDGEMENTS** ........................................................................................... 17

3. **BACKGROUND** ......................................................................................................... 19

4. **PROJECT OBJECTIVES & OUTLINE** ....................................................................... 23

5. **STAGE 1** ..................................................................................................................... 25

   5.1 **Objectives** ........................................................................................................... 25

   5.2 **Methods** ............................................................................................................. 25

      5.2.1 Setting .................................................................................................................. 25

      5.2.2 Subjects .............................................................................................................. 26

      5.2.3 Discharge procedure ......................................................................................... 26

      5.2.4 Data collection .................................................................................................. 27

      5.2.5 Clinical significance of medication administration errors ................................ 29

      5.2.6 Medical discharge summary audit .................................................................... 30

      5.2.7 Review of unplanned re-presentations to hospital within 7 days of discharge ... 30

      5.2.8 Outcome measures ............................................................................................ 31

   5.3 **Results** .................................................................................................................. 32

      5.3.1 Subjects .............................................................................................................. 32

      5.3.2 Primary endpoint – Medication administration errors ....................................... 34

      5.3.3 Secondary endpoint – Availability of updated medication chart and medications 37

      5.3.4 Secondary endpoint – ‘Workarounds’ used by RCF staff to avoid missed/delayed doses ................................................................................................................. 37

      5.3.5 Secondary endpoint – Locum medical practitioner attendance .......................... 39

      5.3.6 Secondary endpoint – Medical discharge summary audit ................................ 39

      5.3.7 Secondary endpoint – Unplanned re-presentations to hospital ........................... 41

      5.3.8 Transition Care Program discharges .................................................................. 42

6. **STAGE 2** ..................................................................................................................... 43

   6.1 **Objectives** ........................................................................................................... 43

   6.2 **Methods** ............................................................................................................. 43

      6.2.1 Review of evidence and development of strategies to improve continuity of care 43

      6.2.2 Development of an interim residential care medication administration chart ....... 44

      6.2.3 Stakeholder consultation .................................................................................. 44

      6.2.4 Development of standard operating procedures and associated resources ......... 45

      6.2.5 Staff education and notification ....................................................................... 45

      6.2.6 Piloting of new model of care .......................................................................... 46

   6.3 **Results** .................................................................................................................. 46

      6.3.1 Review of evidence and development of strategies to improve continuity of care 46

      6.3.2 Development of an interim residential care medication administration chart ... 49

      6.3.3 Software development ..................................................................................... 51

      6.3.4 Stakeholder consultation .................................................................................. 52

      6.3.5 Development of standard operating procedures and associated resources, and staff education and notification ................................................................. 54

      6.3.6 Piloting of new model of care .......................................................................... 54

7. **STAGE 3** ..................................................................................................................... 55

   7.1 **Objectives** ........................................................................................................... 55

   7.2 **Methods** ............................................................................................................. 55

      7.2.1 Setting .................................................................................................................. 55

      7.2.2 Subjects .............................................................................................................. 56
8. DISCUSSION .......................................................................................... 73
7.3 Results ............................................................................................................ 61
7.3.1 Subjects ........................................................................................................... 61
7.3.2 Primary endpoint – Medication administration errors ........................................ 62
7.3.3 Secondary endpoint – Availability of up-to-date medication chart ...................... 63
7.3.4 Secondary endpoint – Locum medical practitioner attendance ......................... 64
7.3.5 Secondary endpoint – Proportion of RCF long-term medication charts written or up-dated by patients’ own GP ................................................................. 65
7.3.6 Secondary endpoint – Interim residential care medication administration chart audit ................................................................. 66
7.3.7 Secondary endpoint – Unplanned re-presentations to hospital ......................... 67
7.3.8 Secondary endpoint - Stakeholder satisfaction with the IRCMAC ....................... 67
7.3.9 Secondary endpoint - Cost analysis ................................................................. 70
7.3.10 Transition Care Program discharges ............................................................. 70
7.3.11 Control audit: The Northern Hospital ......................................................... 71
8.1 Problems identified during Stage 1 (pre-intervention) ........................................ 73
8.1.1 Medication administration errors .................................................................. 73
8.1.2 Use of potentially unsafe ‘workarounds’ ......................................................... 74
8.1.3 Use of locum medical services ...................................................................... 74
8.1.4 Accuracy of medical discharge summaries .................................................... 75
8.1.5 Transition Care Program discharges ............................................................. 75
8.2 Impact of the new model of care (post-intervention) ............................................ 76
8.2.1 Medication administration errors .................................................................. 76
8.2.2 Use of locum medical services ...................................................................... 76
8.2.3 Accuracy of hospital-provided interim medication administration charts .......... 77
8.2.4 Health professionals’ satisfaction with the interim medication administration chart ........................................................................................................... 78
8.2.5 Cost analysis .................................................................................................. 79
8.3 Study limitations ............................................................................................ 79
8.4 Australian Pharmaceutical Advisory Council guidelines for continuity of medication management ................................................................. 82
8.5 Arrangements for medication supply on discharge ............................................. 83
8.6 Provision of an IRCMAC from non-inpatient ward areas .................................... 85
8.7 Generalisability and implementation of the IRCMAC at other hospitals ............. 85
8.8 Conclusion ....................................................................................................... 87
9. RECOMMENDATIONS .................................................................................. 89
10. REFERENCES ............................................................................................. 93
11. APPENDICES ............................................................................................. 95
11.1 Appendix A – Classification of clinical significance of missed & delayed doses .. 97
11.2 Appendix B – Interim Residential Care Medication Administration Chart ....... 99
11.3 Appendix C - Themes arising from stakeholder consultation workshops .......... 103
11.4 Appendix D – Sample policy and standard operating procedure for residential care facilities .................................................................................................................................................................................. 105
11.5 Appendix E – RCF flow chart and “frequently asked questions” ..................... 107
11.6 Appendix F – Standard operating procedure for hospital pharmacists .......... 109
11.7 Appendix G – Emergency Department Interim Residential Care Medication Administration Chart .................................................................................................................................................................................. 111

ABBREVIATIONS

AH: Austin Health

BECC: Bundoora Extended Care Centre

ED: Emergency Department

GP: General Practitioner

IRCMAC: Interim Residential Care Medication Administration Chart

NH: Northern Health

PBS: Pharmaceutical Benefits Scheme

RCF: Residential Care Facility

TCP: Transition Care Program
1. EXECUTIVE SUMMARY

Background

Almost 9% of hospital discharges involving patients aged 65 years and over are to residential care facilities (RCFs), and medication-related problems frequently arise during this handover of care. General practitioners or locum medical practitioners are often called at short notice to write medication administration charts, often without access to timely and accurate discharge medication information. Community pharmacists often need to supply or pack medications at short notice. Consequently medication delays and errors are common.

These problems lead to disruptions in continuity of care and, sometimes, adverse patient outcomes including suboptimal disease or symptom control and unplanned hospital readmissions. They also result in inefficient use of the healthcare workforce, and create unnecessary pressure and stress for all healthcare workers involved in the handover of care.

Objectives

The primary objective of this project was to develop and evaluate a new model of care that would enhance continuity of medication management for people discharged from hospital to residential care by:

a) Improving communication regarding discharge medications to RCFs, general practitioners (GPs), and community pharmacies;

b) Providing RCFs with an interim medication administration chart at the time of discharge to facilitate timely medication administration;

c) Reviewing processes for medication supply and packing to facilitate timely access to new and changed medicines.

A secondary objective was to reduce pressure on the residential care workforce by reducing the need for urgent medical attendance at RCFs for the sole purpose of writing or updating the RCF’s medication administration chart on the day of hospital discharge.
Methods

The project was undertaken in three stages:

- Stage 1 involved evaluation of the gaps in continuity of medication management at two acute care and two subacute care hospitals across two major public health services;
- Stage 2 involved stakeholder consultation and development of a new model of care;
- Stage 3 involved implementation and evaluation of the new model of care at three hospitals, with the fourth hospital used as a control site (usual care).

To quantify gaps in care in Stage 1, and evaluate the impact of the new model of care in Stage 3, an evaluation of discharges to RCFs from the participating hospitals was conducted. Data were collected from hospital records and structured telephone interviews with RCF staff approximately 24 hours after discharge. The primary endpoint was: proportion of patients experiencing a medication administration error, defined as a missed dose, significantly delayed dose (more than 50% of prescribed dose-interval), or wrong drug/dose. Secondary endpoints included: the proportion of patients who did not have an up-to-date medication administration chart or medications packed in the RCF’s preferred format available at the time the first dose of medication was due to be administered at the RCF, the proportion of patients who required locum medical practitioner attendance at the RCF, and the accuracy of discharge medication information provided by the hospitals.

Stakeholder consultation involved:

- A project advisory committee comprising representatives from all stakeholder groups involved, or with an interest, in the transition of patients from hospital to residential care;
- Meetings and/or written communications with key organisations such as the Aged Care Accreditation and Standards Agency, the Australian Nurses Federation, the Nurses Board of Victoria, and the Victorian Department of Health;
- Multidisciplinary stakeholder workshops involving RCF staff, GPs, hospital doctors, and community and hospital pharmacists.

Software modules to enable automatic population of the interim medication administration chart with the medications prescribed on discharge (via integration with the hospitals’
medication dispensing software) were developed. Policies and procedures for hospitals and RCFs were developed to support the implementation and uptake of the interim medication chart.

Surveys of RCF staff, GPs and hospital pharmacists were conducted to gauge their satisfaction with the new model of care.

Results

Stage 1 – baseline data collection

The baseline study involved 202 discharges from Austin Health (AH) and 168 from Northern Health (NH). At the time that the first dose of medication was due to be given at the RCF, 57% (NH) - 60% (AH) of patients did not have an updated medication administration chart available, and 30% (NH) - 38% (AH) did not have medications available in the format usually used at the RCF. Medication administration errors occurred in 17% (NH) - 21% (AH) of patients. The majority (89%) of errors were missed doses, most commonly involving analgesic, anti-infective, cardiovascular and gastrointestinal medications.

To enable administration of medications in the absence of an updated medication administration chart or suitably packaged medications, RCF staff used potentially unsafe or inefficient ‘workarounds’ in 54% of cases (e.g. used a copy of the hospital inpatient medication chart or discharge prescription to record administration, or obtained phone orders from the patient’s general practitioner), and/or called upon locum medical practitioners to write or update the RCF medication chart. Locums attended RCFs within 24 hours of hospital discharge in 33% (AH) - 40% (NH) of cases.

Changes to patients’ regularly scheduled medications were made in hospital for 98% of patients, but only 51% of changes were communicated in patients’ medical discharge summaries. Thirty three (9%) patients had an unplanned readmission to hospital within 7 days of discharge, and for 2 (0.5%) patients a medication administration error may have been a contributing factor.
Stage 2 – Development of the new model of care

Review of Stage 1 data indicated that lack of an up-to-date medication administration chart at the RCF was the main factor contributing to both medication administration errors and use of ‘workarounds’ by RCF staff. Overall, 83% of medication administration errors occurred when an up-to-date medication chart was not available. Having a resident’s new or changed medications available at the RCF in original packaging instead of re-packed in the RCF’s preferred format was less frequently associated with a delay in medication administration, provided an up-to-date medication chart was available. It was therefore decided that the new model of care to be developed and evaluated in this project would be based around a hospital-provided interim residential care medication administration chart (IRCMAC), with no change to the way medications were supplied by the hospitals. The purpose of the IRCMAC was to:

a) provide an accurate list of discharge medications,
b) provide information about the time of the last dose for each medication,
c) enable the medications to be safely and legally administered and recorded as soon as a patient arrives at the RCF,
d) provide information about medication changes to supplement data provided in medical discharge summaries.

To ensure sustainability and maximise patient safety, the new model of care was designed to:

- have the minimum possible impact on the workload of hospital staff
- not involve an additional step of manual transcription of discharge medication lists
- ensure that the IRCMAC was produced only after review and reconciliation of the discharge prescription(s) by a hospital pharmacist, to minimise risk of discrepancies between the IRCMAC and intended discharge medications.

Three software modules were developed that could be linked or integrated with the hospital pharmacy dispensing programs used at the participating health services, to enable electronic generation of the IRCMAC as part of the discharge process. The format of the IRCMAC was based on existing medication charts used by RCFs, and the National Inpatient Medication Chart, adapted for electronic production by a pharmacist. The chart was designed to last for 7 days, to provide enough time for the patient’s usual GP to attend the RCF to review the
patient and write a long-term RCF medication chart. Sections for communicating medication changes and medications ceased in hospital were included.

In addition to the IRCMAC, other minor changes were made to the hospital pharmacists’ discharge procedures in order to standardise and streamline their processes.

Stage 3 – Evaluation

The post-intervention study involved 226 discharges from two hospitals within Austin Health and 33 from one subacute hospital within Northern Health. The control group included 114 discharges from one acute care hospital within Northern Health.

For discharges from the intervention hospitals, the proportion of patients without an up-to-date medication administration chart at the time the first dose of medication was due to be given at the RCF fell from 60% to 3% for Austin Health discharges, and from 60% to 4% for Northern Health intervention site discharges. Medication administration errors fell from 20% to 2% for Austin Health discharges, and from 11% to 0% for Northern Health intervention site discharges. Locum medical practitioner attendances dropped from 33% to 11% for Austin Health discharges and from 37% to 21% at the Northern Health intervention site. At the control hospital the incidence of medication administration errors (17%) and locum attendances (39%) did not change significantly compared with Stage 1.

Surveys of RCF staff and GPs indicated very high levels of satisfaction with the IRCMAC: 98% of GPs were comfortable with the interim chart being used at the RCF for up to 7 days; 89% thought it reduced the urgency for them to attend the RCF; 95% thought that the “change status” and “medications ceased” information provided on the IRCMACs was helpful; and 98% agreed that it should be standard practice for all patients discharged from hospital to a RCF. Seventy-nine percent of RCF staff thought the IRCMAC improved patient transfers.

Most hospital pharmacists (78%) reported that preparing the IRCMAC increased their workload (by an average of 9 minutes per discharge including pharmacy technician’s time), however all agreed that it is important for patients to be discharged to RCFs with an up-to-date medication administration chart.
Conclusions

Lack of an updated medication chart at RCFs is a barrier to continuity of care, a cause of unnecessary workload, frustration and stress for RCF staff, and a source of unnecessary use of locum medical services.

An electronically generated IRCMAC, linked to the discharge medication dispensing process, is an effective tool for streamlining handover of medication management and reducing medication errors. Although a formal cost-benefit analysis was not undertaken, the provision of a hospital-provided IRCMAC also has potential for considerable cost-savings as a result of reduced locum medical practitioner attendance at RCFs to write medication charts (at least $126 per attendance, compared with approximately $5 to produce a hospital-generated interim medication administration chart).

RECOMMENDATIONS

Based on the findings of this project, we make the following recommendations to hospitals, governments and professional organisations:

Recommendation 1

All patients discharged from hospital to a residential care facility should be provided with a 7-day interim residential care medication administration chart.

Rationale: An interim residential care medication administration chart enables medications to be safely administered and recorded as soon as a patient arrives at the residential care facility and reduces the need for urgent medical practitioner attendance for the sole purpose of writing a medication chart.
Recommendation 2

The process used to produce the interim residential care medication administration chart should ensure that the chart is consistent with the intended discharge medications (usually the final reconciled discharge prescription(s)).

**Rationale:** Discrepancies commonly occur between discharge prescriptions and other sources of discharge medication information. The discharge prescription, provided it has been reviewed and reconciled against the patient’s pre-admission medication list and current inpatient medication chart (usually by a hospital pharmacist), is usually the most reliable discharge medication list. Discrepancies between the interim residential care medication administration chart and discharge prescriptions could lead to medication errors and adverse patient outcomes. To minimise risk of discrepancies, the interim residential care medication administration chart should not be produced until the discharge prescription(s) have been reviewed and reconciled as described above. Once the interim medication chart is produced it should also be reconciled against the final confirmed discharge prescription(s) before it is provided to the residential care facility.

Recommendation 3

The time that the last dose of each medication was administered in hospital on the day of discharge should be provided on the interim residential care medication administration chart.

**Rationale:** Providing information about the time of the last medication dose facilitates accurate continuity of medication administration at the residential care facility and reduces the need for residential care facility staff to call the hospital and/or obtain copies of hospital inpatient medication charts (which can lead to confusion about what medications the patient needs to receive after discharge from hospital).

Recommendation 4

The interim residential care medication administration chart should be used to communicate information about discharge medications and medication changes made in hospital to residential care staff, general practitioners and community pharmacists (unless hospitals have
an alternative system for reliable and timely provision of medication information to all healthcare team members involved in medication management in residential care). Information provided on the interim medication administration chart should supplement rather than replace information provided in medical discharge summaries.

**Rationale:** Residential care staff, general practitioners and community pharmacists need to have access to accurate discharge medication information as soon as the patient arrives at the residential care facility. Medical discharge summaries are not consistently available on the day of hospital discharge. Even when the medical discharge summary is available on the day of discharge, the medication information provided may be incomplete, and copies are not provided to all members of the healthcare team involved in the handover of medication management.

**Recommendation 5**

The interim residential care medication administration chart should be provided in a standardised format by all hospitals, and processes should be put in place to oversee and fund nation-wide implementation and to manage version control.

**Rationale:** Residential care facilities receive patients from numerous hospitals, so it is important that a standardised interim medication administration chart format is used by all hospitals (similar to the National Inpatient Medication Chart), to minimise the risk of medication administration errors. Uncoordinated implementation, and lack of implementation support, may result in multiple versions of the interim residential care medication administration chart.

**Recommendation 6**

The use of interim residential care medication administration charts, including hospital pharmacist generated charts (not signed by a medical practitioner), should be written into relevant practice guidelines and standards for residential care.

**Rationale:** Residential care staff rely on practice guidelines and standards to guide their professional practice. There is sometimes reluctance to implement new processes if they are
not supported by relevant practice guidelines and standards. The legality of using a medication administration chart that is not written or signed by a medical practitioner should be confirmed for states other than Victoria.

**Recommendation 7**

Further work to improve medication supply and packaging arrangements during the transition from hospital to residential care should be undertaken.

**Rationale:** Problems associated with medication supply and packaging contribute to medication administration errors and use of potentially unsafe and inefficient practices by residential care facility staff, especially in low-level care RCFs and special residential services. They are a source of inefficient work practices for hospital and community pharmacists, RCFs and GPs. They also result in wastage of government-subsidised medications (especially in states that use the Pharmaceutical Benefits Scheme for hospital discharge medications), for example when the community pharmacy contracted to supply medication to the residential care facility outsources medication supply to a unit-dose packaging company that cannot use the hospital-supplied medications.
2. ACKNOWLEDGEMENTS

We would like to acknowledge the valuable contributions made from the following individuals and organisations:

**Advisory Committee Members:**

Ms Christine Sneddon  
Manager, Bluecross Waterdale

Ms Jayne Dohrmann  
Manager, Fronditha Care

Ms Juliette Chapman  
Manager, Aberdeen Aged Care Facility

Ms Mandy Heather  
Manager, Arcare Greenhill

Ms Dimitra Tsucalas  
Community Pharmacist

Dr Rick McClelland  
GP, Northern Division of General Practice

Ms Anne Leversha  
Director of Pharmacy, Latrobe Regional Hospital

Ms Margaret Summers  
Aged Care Branch, Department of Health (Vic.)

Ms Catherine Rokahr  
Quality Use of Medicines, Statewide Quality Branch,  
Department of Health (Vic.)

Mr Stefan Wigg  
Ambulatory & Continuing Care Programs, Department  
of Health (Vic.)

Ms Jenny Dale  
Northern Division of General Practice

Mr Shaheen Evans  
Executive Manager, Villa Maria Aged Care

Ms Meg Storer / Ms Lyn Robb  
Nursing and Discharge Liaison, Austin Health

**Consultations:**

Ms Jill Clutterbuck  
Australian Nursing Federation (Victorian Branch)

Ms Elizabeth Foley  
Australian Nursing Federation

Ms Anastasia Hutchinson  
Northern Clinical Research Centre

Mr John McCormack  
Drugs and Poisons Unit, Department of Health (Vic.)

Ms Kristy Mutsaers  
Nurse Policy Officer, Nurses Board of Victoria

Ms Raelene Thompson  
Aged Care Standards & Accreditation Agency

Ms Francine Tanner  
Clinical Pharmacy Coordinator, Austin Health

Ms Deborah Thorsborne-Palmer  
Medication Safety Officer, Queensland Health

Ms Josie Adams  
Executive Director, Melbourne Medical Deputising Service
Software development

Mr Stephen Cheung  Pharmacy Department, Austin Health
Mr David Kenyon  Information Technology Department, Northern Health
Ms Melissa Mirabile  Software Manager, Manrex Pty Ltd - Webstercare

Data collection and implementation:

Pharmacy staff  Austin Health & Northern Health
Residential care facility staff
Dr Aylin Aslan  Medical Registrar, Aged Care, Austin & Northern Health
Ms Selina Leung  Pharmacy student, Monash University
Mr Xing Xin  Pharmacy student, Monash University

Expert Panel members

Ms Esther Chan  Honorary Research Fellow, Austin Health and Monash University
Ms Mandy Heather  Manager, Arcare Greenhill
Ms Lina Mascaro  Consultant Aged Care Pharmacist, private practice
Dr Rick McClelland  GP, Northern Division of General Practice
Ms Lyn Robb  Nurse Unit Manager, Austin Health
Dr Yana Sunderland  Geriatrician, Northern Health
A/Prof Michael Woodward  Head, Aged & Residential Care Services, Austin Health
3. BACKGROUND

Problems with continuity of care upon patient transfer from hospital to a residential care facility (RCF) are widely recognised. A recent report commissioned by the Aged Care Association Australia entitled “For their sake: can we improve the quality and safety of resident transfers from acute hospitals to residential aged care” highlighted this as a major concern.

Current discharge medication arrangements for patients transferring to a RCF are highly variable, inefficient, and associated with significant patient safety risks. They result in a degree of urgency that community medical, pharmacy and RCF systems are unable to accommodate. An Australia-wide survey of 371 RCF staff found that medication-related problems occurred with around two thirds of transfers from hospital. This survey, along with a survey of 20 RCF managers and their contracted community pharmacies in Melbourne and research conducted in South Australia and Queensland suggest that problems in maintaining continuity of medication management are the result of:

- suboptimal communication between hospital and community healthcare providers;
- absence of an up-to-date medication administration chart for use in the RCF immediately after patient transfer;
- need for urgent general practitioner (GP) attendance to write medication administration orders;
- medication supply and packaging issues.

When a resident arrives at a RCF, a GP is usually required to attend on the day of discharge to write a medication administration chart. The resident’s usual GP may be unable to attend at short notice and a locum medical practitioner may be called. These calls often have low priority and it is common for the locum to attend late at night. Hospital pharmacies usually do not supply medications packaged in dose administration aids, which are commonly used by RCFs, so the RCF’s contracted community pharmacy is often called upon to do this on the day of discharge. Some community pharmacists are reluctant to package medications before the resident has been reviewed by a GP, in case there are changes to the medication regimen. These processes result in major inefficiencies, unnecessary costs, and increased potential for medication delays and errors. There is often a significant time lag before the new medication chart is written and the medications are available in the RCF’s preferred format. Therefore residents may miss medication doses or receive them late, which can adversely affect their
quality of life (e.g. poor pain control) or result in readmission to hospital (e.g. poor seizure control, infection recurrence). Delays in medication administration are particularly problematic when residents return to the RCF for terminal care, when timely availability of analgesics is critical.

In a US study it was reported that adverse drug events as a result of medication omissions or discrepancies occurred in 8.5% of patients transferred from hospital to residential care. In the only Australian published study that has explored medication management after discharge from hospital to residential care, ongoing medication supply problems were noted in 22% of cases eight weeks after discharge.

There is no Australian data on the incidence of missed doses or medication errors in the period immediately after discharge to residential care. However, anecdotal evidence suggests that it is common, and readmissions to hospital as a result of delays in implementing medication changes that were made in hospital have been reported.

Australian studies have also reported that medical discharge summaries for patients transferred to RCFs are often inaccurate or incomplete, thereby compromising the handover of care from hospital to RCF.

Although these problems are widely acknowledged, attempts to develop and evaluate a new model for patient transfer and continuity of care have been limited and fragmented. A barrier to addressing this care-gap may be the state-federal divide, with hospitals managed by the states and RCFs and community pharmacies governed and subsidised federally.

Some hospitals have attempted to improve continuity of medication management using interim medication charts provided by the hospital, with or without medications supplied in a suitable format for the RCF, but there has been limited evaluation in terms of impact on continuity of medication administration, staff satisfaction, workload and sustainability. At Flinders Medical Centre in Adelaide a supported care discharge prescription (SCDP) was trialled, accompanied by a 4 day supply of packaged medication. It was found that the SCDP and medication supply process was beneficial but required refinement. At Barwon Health in Victoria, an interim residential care medication chart was recently introduced. A survey of local RCFs indicated that the chart had been adopted by 52% of RCFs, and those that had used the chart reported that it was very useful. The impact of the chart on medication delays or errors was not evaluated.
A handwritten interim medication administration chart has been used at Northern Health for a number of years. This was initially part of the North West Melbourne Division of General Practice “GP after hours” project for the emergency department, and later part of the Residential Care Intervention Program in the Elderly (RECIPE). Handwritten interim medication charts have also been used at Austin Health and Northern Health for Transition Care Program (TCP) discharges. Use of these handwritten charts however has been limited to selected patients (e.g. palliative care and TCP patients) due to lack of resources to streamline and automate the process and facilitate the necessary systems-change and practice-change to enable use in the broader patient population. Although there has been no formal evaluation of the impact of these interim charts, feedback from RCF staff suggests that delays in the administration of analgesic medications have been reduced and urgent GP/locum callouts for medication orders avoided.
4. PROJECT OBJECTIVES & OUTLINE

The primary objective of the project was to develop and evaluate a new model of care that would enhance continuity of medication management for patients discharged from hospital to residential care facilities (RCFs) by:

a) Improving communication regarding discharge medications to RCFs, general practitioners (GPs), and community pharmacies;

b) Providing RCFs with an interim medication administration chart at the time of discharge to facilitate timely medication administration;

c) Reviewing processes for medication supply and packing to facilitate timely access to new and changed medications.

A secondary objective was to reduce pressure on the residential care workforce by reducing the need for urgent medical attendance at RCFs for the sole purpose of writing or updating the RCFs’ medication administration chart on the day of hospital discharge.

To achieve these objectives, a three-stage process was planned:

- Stage 1 involved a detailed evaluation of the gaps in continuity of medication management, to guide development of processes to address these gaps and improve patient care;

- Stage 2 involved stakeholder consultation and development of a new model of care;

- Stage 3 involved implementation and evaluation of the new model of care.

To ensure sustainability and maximise patient safety, the project goal was to develop solutions that had the minimum possible impact on the workloads of hospital medical and pharmacy staff and did not involve an additional step of manual transcription of discharge medication lists. This meant the solution needed to involve an interim residential care medication administration chart (IRCMAC) that could be electronically generated as part of the hospital discharge process.
Robust evaluation of the new model of care was planned to determine whether it achieved the objectives outlined above and ensure that there were no unintended adverse consequences in terms of patient care or health professionals’ workload and satisfaction with the patient transfer process. This evidence was considered to be important to support the ongoing use of this new model of care within the two health services involved in the project as a best practice model; to support a roll-out of this model to other health services; and to submit a case to state and/or federal government to secure funds for sustained improvements in medication continuity across the hospital-residential care interface.

To ensure that the model was generalisable, the project was conducted across two large health services that use different information technology systems for medication management and clinical information management and discharge patients to more than 100 different RCFs.

*Project organisation and governance*

The project was managed by the principal investigators and project manager, and overseen by a Steering Committee comprising all of the investigators plus additional staff from Austin Health, Northern Health and North East Valley Division of General Practice.

An Advisory Committee was established to provide stakeholder input into the project methodology and development of the new model of care for discharge medication management. This committee included representatives from all stakeholder groups involved in, or with an interest in, transition of patients from hospital to residential care. The Advisory Committee met on three occasions: December 2008 (prior to Stage 1), April 2009 (prior to Stage 2), and August 2009 (prior to Stage 3).

*Ethics approval*

Ethics approval for the project was obtained from the Northern Health, Austin Health and Monash University Human Research Ethics Committees.
5. STAGE 1

5.1 Objectives

The objective of Stage 1 was to evaluate medication management problems that occur in the first 24 hours after discharge from hospital to a residential care facility (RCF), to guide the development of strategies to improve continuity of care.

Specific aims were to:

- Determine the proportion of patients who experience medication administration errors following discharge from hospital to residential care;
- Describe processes used by RCF staff to avoid medication administration errors when they do not have a current medication administration chart and/or medications packed in the format their facility usually uses;
- Determine the proportion of discharged residents who required locum medical practitioner attendance in the first 24 hours after discharge from hospital;
- Assess the accuracy of medication information provided in medical discharge summaries for patients transferred to RCFs; and
- Determine the proportion of residents who are readmitted to hospital as a result of medication administration errors following discharge to residential care.

5.2 Methods

5.2.1 Setting

The study was undertaken at two acute care hospitals and two subacute aged care hospitals within two public health services in metropolitan Melbourne (Table 5.2.1).

Table 5.2.1 Participating hospitals

<table>
<thead>
<tr>
<th></th>
<th>Acute care sites</th>
<th>Subacute aged care sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austin Health</td>
<td>Austin Hospital</td>
<td>Heidelberg Repatriation Hospital</td>
</tr>
<tr>
<td>Northern Health</td>
<td>The Northern Hospital</td>
<td>Bundoora Extended Care Centre</td>
</tr>
</tbody>
</table>
5.2.2 Subjects

Patients were included if they were discharged from an inpatient ward at a participating hospital to a RCF during the study period.\(^a\)

Patients discharged from an Emergency Department (ED) or day procedures unit, or who had no changes to their medication regimen in hospital were excluded. Patients were also excluded if the nurse at the RCF was unable to be contacted or unable to complete the interview by the end of the next business day after discharge from hospital.

Patients discharged to a RCF under the Transition Care Program (TCP) were analysed separately because the discharge processes and access to medical staff for these patients is different to other RCF discharges, and these patients were already receiving a hospital-provided (handwritten) interim medication chart.

5.2.3 Discharge procedure

There was no change to hospital discharge procedures during Stage 1. Usual care was continued (Table 5.2.2).

\(^a\) Austin Hospital and Heidelberg Repatriation Hospital: 19\(^{th}\) January to 18\(^{th}\) April 2009; Bundoora Extended Care Centre: 12\(^{th}\) January to 25\(^{th}\) May; The Northern Hospital: 12\(^{th}\) February to 12\(^{th}\) June
Table 5.2.2 Medication discharge procedures during Stage 1 (usual care)

1. A hospital PBS discharge prescription was hand-written by the treating unit and forwarded to the ward pharmacist.
2. The pharmacist conducted a medication reconciliation to identify any unintended discrepancies between the discharge prescription, the inpatient medication chart and the pre-admission medication list.
3. Discrepancies were discussed with the treating unit and resolved.
4. The ward pharmacist contacted the receiving RCF’s contracted community pharmacy to notify of the impending discharge, and discuss medication supply.
5. Medications were dispensed by the hospital pharmacy department in original packaging (i.e. not re-packed into a dose administration aid), according to each hospital’s existing protocol:
   - **Austin Health** - For patients discharged to a new facility, all medications were dispensed. For patients returning to a RCF, only new and changed medications were dispensed.
   - **Northern Health** – Either the original hospital PBS discharge prescription was sent with the patient to the RCF to be dispensed by the RCF’s contracted community pharmacy (i.e. no medications supplied by the hospital), or (at the discretion of the hospital pharmacist, after discussion with the community pharmacy) some or all medications were dispensed by the hospital pharmacy.
6. The ward pharmacist faxed a copy of the discharge prescription to the community pharmacy. At Austin Health sites only, a typed covering letter summarising medication changes made during hospitalisation was also faxed.
7. The medications, together with a photocopy of the discharge prescription or a medication list printed from the hospital pharmacy dispensing system, were packed in a bag and sent to the RCF with the patient.
8. In some cases a photocopy of the hospital inpatient medication chart was provided to the RCF by the hospital ward clerk or nursing staff (usually on request from the RCF).
9. No medication administration chart was provided by the hospital for use at the RCF, except for TCP discharges or when the receiving RCF provided their own chart and requested the hospital doctor complete it. Except for Austin Health TCP discharges, these handwritten charts were not reconciled with the discharge prescription by a hospital pharmacist to detect potential discrepancies.
10. The treating unit prepared a medical discharge summary that included a section about medication management. This was faxed or emailed to the patient’s GP according to hospital protocols. In some cases the ward clerk also sent a copy to the RCF with the patient, but this varied from ward to ward.

   Note: Medication information provided in medical discharge summaries at Austin Health, including the discharge medication list and changes made to the medication regimen, was typed free-hand by hospital doctors and not reviewed by a pharmacist or reconciled with the hand-written discharge prescription. At Northern Health no medication list was provided in the medical discharge summary and medication changes were typed by hospital doctors.

5.2.4 Data collection

At Austin Health, ward pharmacists identified eligible patients and notified the project officer on the day of discharge. This was supplemented by a daily search of patient administration system to review the discharge address for patients aged 65 years and over. At Northern
Health the main case-finding method was by searching the health service’s patient administration system.

Patients’ demographic data, length of stay, and date and time of discharge were extracted from the patient administration system. Copies of the patients’ pre-admission medication lists and discharge prescriptions were obtained from the medical record to ascertain whether there had been changes to the medication regimen in hospital, and to determine when the first dose of medication was due after discharge from hospital. At Austin Health this data was reviewed prior to contacting the patients’ RCF. At Northern Health, due to delays in scanning information to the electronic medical record, this data was not available to the project officer in the 24 hours after discharge and was therefore not reviewed prior to RCF data collection.

On the day after discharge, between 11am and 3pm (18-28 hours after discharge), a structured telephone interview was conducted with a RCF nurse who was involved with the patient’s transfer. For weekend discharges, interviews were conducted on the following Monday (up to 48 hours after discharge). At Northern Health a modified data collection process was used, in which data was collected up to 72 hours after discharge using a mixture of structured telephone interviews and fax-back questionnaires (data collection form faxed to RCF and completed independently by RCF staff). For Austin Health TCP discharges, a modified data collection process was also used, in which the TCP pharmacist collected the data via face-to-face interviews with the RCF staff.

Data collected for each patient is listed in Table 5.2.3
Table 5.2.3 Data collected during structured telephone interviews with RCF staff

- Whether patient was a new admission or existing resident at the RCF
- Patient’s level of care (low-care, high-care, or ‘supported residential service’*)
- Date and time of arrival at the RCF following discharge from hospital
- Whether a (medical) discharge summary was received with the resident
- Whether a list of discharge medications was received with the resident
- Whether the RCF medication chart had been written or updated to reflect medication changes made in hospital in time for the first dose of medication required to be give at the RCF
- Who wrote or updated the chart (e.g. GP, locum, other), and when did this occur (date and time)
- Whether the new/revised medication regimen was available in the RCF’s usual medication management system/format (dose administration aid or original packaging) in time for the first dose of medication required to be give at the RCF
- What date and time the medications arrived at the RCF in their usual medication management system/format (usually dose administration aids such as blister packs, sachet system)
- Whether any doses of regularly scheduled medications had been missed or delayed since the resident arrived at the RCF (and if so, the names of the medications and length of delay)
- Whether any doses of “as required” (prn) medications had been missed or delayed since the resident arrived at the RCF (and if so, the names of the medications and length of delay)
- How medications were administered and/or recorded if there were no missed/delayed doses reported and the RCF medication chart had not been written or updated and/or if the medications were not available in the preferred medication management system/format prior to the time the first dose was due at the RCF.

* Privately operated RCFs, not subsidised or regulated by Commonwealth Government

5.2.5 Clinical significance of medication administration errors

The clinical significance of missed or delayed doses was determined using a classification system based on the consensus opinion of an expert panel that included nine health professionals with experience in aged care (2 general practitioners, 2 clinical pharmacists, 2 registered nurses, and 3 geriatricians). Medications were classified into 3 groups according to the likelihood and severity of a potential adverse outcome if one or more doses were missed or significantly delayed in the 24 hours following transfer from hospital to residential care (Appendix A). For example, strong analgesics were classified as highly significant due to the high risk for uncontrolled pain if doses were missed or delayed, whereas osteoporosis medications were classified as low significance.
5.2.6 Medical discharge summary audit

To assess communication of medication information via medical discharge summaries one third of participating patients were randomly selected for review.

Changes to medication therapy made during the hospital admission were determined by comparing the pre-admission medication list (obtained from the medication reconciliation form or medication action plan completed on admission to hospital, or a copy of the pre-admission RCF medication chart) to the final discharge prescription (after it had been reviewed and reconciled by the ward pharmacist). The medical discharge summary was then reviewed by a clinical pharmacist (Austin Health) or geriatrician (Northern Health) to identify whether changes were communicated. A medication change was considered to have been communicated if the change and its rationale were mentioned in the discharge summary or the change was mentioned and the rationale could be implied from the summary (e.g. bisphosphonate commenced in a patient admitted to hospital with a bone fracture).

To assess the accuracy of medication lists, the medical discharge summary was compared to the final discharge prescription. Discrepancies on the medical discharge summary were classified as:
- Medication omitted
- Medication strength or dose omitted
- Medication strength or dose different to the discharge prescription
- Medication included on the medical discharge summary but not on the discharge prescription

Accuracy of medication lists was only assessed at Austin Health. At Northern Health medication lists are not usually provided in the medical discharge summary.

5.2.7 Review of unplanned re-presentations to hospital within 7 days of discharge

A search of the patient administration system at both health services was conducted to identify patients who re-presented to either health service within 7 days of discharge. Planned readmissions (e.g. elective surgery, day procedures) were excluded. A medical registrar
reviewed the hospital medical record for each patient and created a case summary of the index admission and the re-presentation.

Case summaries were presented by the medical registrar, both verbally and in writing, to an independent panel consisting of a consultant geriatrician (MW) and a clinical pharmacist (EC). Using tools adapted from previously published studies, panel members independently determined whether a medication-related problem could have contributed to one or more of the medical problems that led to re-presentation, and whether a medication administration error in the 24 hours after discharge, identified via the structured telephone interviews described above, could have contributed to the re-presentation. If a discrepancy between the panel members’ assessment was present, the case was discussed until consensus was reached.

5.2.8 Outcome measures

The primary endpoint for the study was the proportion of patients who were exposed to one or more medication administration errors within the first 24 hours after transfer from hospital to residential care, where ‘medication error’ was defined as a composite of the following:

1. one or more doses of a regularly scheduled medication missed (completely omitted), e.g. 12 hourly Oxycontin® due at 8pm and no dose given until 8am when the next dose was due;

2. administration of one or more regularly scheduled medications delayed by more than 50% of the prescribed dose-interval (i.e. more than 150% of the dose-interval elapsed between the time of the last dose given in hospital and the first dose administered at the RCF), e.g. 12 hourly Oxycontin® due at 8pm and dose given at 3am;

3. administration of one or more “when required” (prn) medications delayed by any length of time when the medication was required by the patient; and

4. one or more medications or medication doses administered not in accordance with the medication regimen prescribed on discharge from hospital, e.g. aspirin administered despite being ceased by hospital medical team.
Secondary endpoints were:

- proportion of patients for whom an updated RCF medication administration chart was not available when the first dose of medication was due to be administered at the RCF;
- proportion of patients for whom medications, dispensed in RCF’s usual medication management system/format, were not available when the first dose was due to be administered at the RCF;
- proportion of patients for whom a ‘workaround’ (see definition below) was used by RCF staff to avoid a delayed or missed dose when either an updated medication chart or suitably packed medications were not available;
- types of ‘workarounds’ used by RCF staff to avoid a delayed or missed dose;
- proportion of patients for whom locum medical practitioner attendance was required within 24 hours of transfer;
- proportion of patients with one or more discrepancies in the medication list provided in their medical discharge summary;
- proportion of medication changes made during hospitalisation communicated in medical discharge summaries;
- number of patients readmitted to hospital within 7 days of discharge to a RCF due to medication administration errors at the RCF.

A ‘workaround’ was defined as any action taken by a RCF staff member that was not their usual practice for medication administration. For example, recording medication administration in a location other than a current medication chart, or administering medications from original packaging when they usually use a dose-administration aid.

5.3. Results

5.3.1 Subjects

Austin Health

Over the 3 month study period, 235 patients met the inclusion criteria (Figure 5.3.1). A telephone interview was not able to be completed for 33 (14%) patients, leaving 202 for inclusion in the study (139 discharged from acute wards and 63 from subacute wards). These patients were transferred to 90 different RCFs.
Figure 5.3.1 – Stage 1 patient recruitment at Austin Health

254 discharges to RCF from inpatient wards (excluding ED / day cases / TCP*)

235 patients met the inclusion criteria

33 patients excluded. Reasons for exclusion:
- Unable to contact RCF** 23
- RCF nurse unable to complete interview 10

202 patients included in the analysis

19 patients did not meet the inclusion criteria:
- No changes to medication 19

Table 5.3.2 summarises the Austin Health study population. The mean age of study patients was 82 years, and the majority were female (59%). They were prescribed a median of 11 medications. Compared to patients discharged from acute wards, subacute patients had a significantly greater length of stay (p < 0.01), and a higher proportion were transferred to a new facility (p < 0.01).

Table 5.3.2 – Patient demographics (Austin Health)

<table>
<thead>
<tr>
<th></th>
<th>Subacute n = 63</th>
<th>Acute n = 139</th>
<th>Total n = 202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) [mean (SD)]</td>
<td>81 (11)</td>
<td>84 (7)</td>
<td>82 (10)</td>
</tr>
<tr>
<td>Female gender [number (%)]</td>
<td>39 (62%)</td>
<td>80 (58%)</td>
<td>119 (59%)</td>
</tr>
<tr>
<td>Length of stay in hospital (days) [median (range)]</td>
<td>40 (8-235)</td>
<td>7 (2-214)</td>
<td>12 (8-235)</td>
</tr>
<tr>
<td>Number of medications prescribed on discharge from hospital [median (range)]*</td>
<td>9 (2-19)</td>
<td>9 (0-23)</td>
<td>9 (0-23)</td>
</tr>
<tr>
<td>Regular</td>
<td>2 (0-6)</td>
<td>1 (0-5)</td>
<td>1 (0-6)</td>
</tr>
<tr>
<td>Total</td>
<td>11 (4-23)</td>
<td>10 (1-25)</td>
<td>11 (1-25)</td>
</tr>
<tr>
<td>New admission to RCF [Number (%)]</td>
<td>44 (70%)</td>
<td>32 (23%)</td>
<td>76 (37%)</td>
</tr>
<tr>
<td>Level of care at RCF [Number (%)]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>35 (56%)</td>
<td>62 (45%)</td>
<td>97 (48%)</td>
</tr>
<tr>
<td>Low</td>
<td>25 (39%)</td>
<td>67 (48%)</td>
<td>92 (45%)</td>
</tr>
<tr>
<td>Supported Residential Service</td>
<td>3 (5%)</td>
<td>10 (7%)</td>
<td>13 (7%)</td>
</tr>
</tbody>
</table>

* Data on number of medications not available for 8 patients from acute wards and 1 patient from subacute wards

* Transition Care Program (TCP) analysed separately (see below)

** RCF nurse involved in the patient’s transfer unable to be contacted by the end of the next business day after discharge
Northern Health

Over the 5 month study period, 168 patients met the inclusion criteria, with 57 discharged from the subacute and 111 discharged from the acute wards (Table 5.3.3). Their median age was 84 years, and the majority were female (64%). Most patients were discharged requiring high level care and this did not differ between acute and subacute settings (p = 0.60). Compared to acute ward discharges, patients from subacute wards had a longer length of stay (p < 0.01) and were more likely to be discharged to a new facility (p < 0.01).

Table 5.3.3 – Patient demographics (Northern Health)

<table>
<thead>
<tr>
<th></th>
<th>Subacute n = 57</th>
<th>Acute n = 111</th>
<th>Total n = 168</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) [mean (SD)]</td>
<td>83 (8)</td>
<td>83 (7)</td>
<td>83 (7)</td>
</tr>
<tr>
<td>Female gender [number (%)]</td>
<td>31 (54%)</td>
<td>77 (69%)</td>
<td>108 (64%)</td>
</tr>
<tr>
<td>Length of stay [median (range)]</td>
<td>41 (5-115)</td>
<td>6 (2-216)</td>
<td>9 (2-216)</td>
</tr>
<tr>
<td>Number of medications prescribed on discharge from hospital [median (range)]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular</td>
<td>9 (3-18)</td>
<td>9 (0-22)</td>
<td>9 (0-22)</td>
</tr>
<tr>
<td>When required (prn)</td>
<td>1 (0-4)</td>
<td>1 (0-6)</td>
<td>1 (0-6)</td>
</tr>
<tr>
<td>Total</td>
<td>10 (3-19)</td>
<td>10 (2-22)</td>
<td>10 (2-22)</td>
</tr>
<tr>
<td>New to facility [number (%)]</td>
<td>40 (70%)</td>
<td>2 (2%)</td>
<td>42 (25%)</td>
</tr>
<tr>
<td>Level of care at RCF [number (%)]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>49 (86%)</td>
<td>100 (90%)</td>
<td>149 (89%)</td>
</tr>
<tr>
<td>Low</td>
<td>8 (14%)</td>
<td>11 (10%)</td>
<td>19 (11%)</td>
</tr>
<tr>
<td>Supported Residential Service</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

5.3.2 Primary endpoint – Medication administration errors

Medication administration errors within 24 hours of discharge from hospital were identified for 41 (20%) patients at Austin Health and 28 (17%) patients at Northern Health (Table 5.3.4).
Table 5.3.4 – Number of patients exposed to one or more medication administration errors

<table>
<thead>
<tr>
<th></th>
<th>Austin Health</th>
<th>Northern Health</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subacute n = 63</td>
<td>Acute n = 139</td>
</tr>
<tr>
<td>Regular medication(s) missed or delayed</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>prn medication(s) delayed</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Regular and prn medication(s) missed or delayed</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Incorrect medication regimen administered</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total [number (%)]</strong></td>
<td>11 (17)</td>
<td>30 (21)</td>
</tr>
</tbody>
</table>

At Austin Health, most errors (34, 83%) involved doses of regularly scheduled medications being missed. Four cases involved prn medications not being given when they were needed (oxycodone in 3 cases and salbutamol in one case). Four errors involved patients receiving incorrect medications or doses, for example when RCF staff reverted back to the resident’s pre-hospital admission medication regimen while waiting for a medical practitioner to write a new medication chart and/or medications to be re-packed by the community pharmacy.

At Northern Health, most errors (26, 93%) involved doses of regularly scheduled medications being missed. Five cases involved prn medications (nine medications involved: oxycodone in five cases, insulin, temazepam, quetiapine and metoclopramide). No cases involved incorrect medication regimen administration.

At both sites there was a trend toward a higher rate of error when patients were transferred from acute wards compared to subacute wards, however this was not statistically significant.

The medications involved in the errors are summarised in Table 5.3.5, grouped by medication class. In total, 81 medications were involved at Austin Health (mean 2 medications/patient exposed to a medication error) and 86 medications at Northern Health (mean 3 medications/patient exposed to a medication error). The most common medication classes involved in errors were cardiovascular, gastrointestinal, anti-infectives and analgesics.
Table 5.3.5 – Medications involved in errors

<table>
<thead>
<tr>
<th>Medication class*</th>
<th>Austin Health Number (%)</th>
<th>Northern Health Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular drugs</td>
<td>15 (19)</td>
<td>10 (12)</td>
</tr>
<tr>
<td>Gastrointestinal drugs</td>
<td>14 (17)</td>
<td>11 (13)</td>
</tr>
<tr>
<td>Anti-infectives</td>
<td>13 (16)</td>
<td>16 (19)</td>
</tr>
<tr>
<td>Analgesics</td>
<td>12 (15)</td>
<td>14 (16)</td>
</tr>
<tr>
<td>Blood and electrolytes</td>
<td>7 (9)</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Neurological drugs</td>
<td>7 (9)</td>
<td>4 (5)</td>
</tr>
<tr>
<td>Eye drugs</td>
<td>5 (6)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Endocrine drugs</td>
<td>3 (4)</td>
<td>11 (13)</td>
</tr>
<tr>
<td>Psychotropic drugs</td>
<td>3 (4)</td>
<td>5 (6)</td>
</tr>
<tr>
<td>Musculoskeletal drugs</td>
<td>1 (1)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Respiratory drugs</td>
<td>1 (1)</td>
<td>4 (5)</td>
</tr>
<tr>
<td>Immunomodulators &amp; antineoplastics</td>
<td>0 (0)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Antidotes &amp; antivenoms</td>
<td>0 (0)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Dermatological drugs</td>
<td>0 (0)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>86</td>
</tr>
</tbody>
</table>

* classified as per the Australian Medicines Handbook

For approximately two-thirds of the medications that were missed or significantly delayed, the clinical significance was classified as moderate or high (Table 5.3.6).

Table 5.3.6 – Clinical significance of missed or delayed doses

<table>
<thead>
<tr>
<th>Clinical significance</th>
<th>Austin Health (n = 75)</th>
<th>Northern Health (n = 86)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High [n (%)]</td>
<td>9 (12)</td>
<td>11 (13)</td>
</tr>
<tr>
<td>Moderate [n (%)]</td>
<td>40 (53)</td>
<td>41 (48)</td>
</tr>
<tr>
<td>Low [n (%)]</td>
<td>26 (35)</td>
<td>34 (39)</td>
</tr>
</tbody>
</table>

Of the 202 patients discharged from Austin Health, 4% had a medication dose missed or significantly delayed that was classified as highly significant, and 14% had doses missed or delayed that were classified as moderately significant. At Northern Health, the corresponding figures were 4% and 12%.
5.3.3 Secondary endpoint – Availability of updated medication chart and medications

At Austin Health, 122 (60%) patients did not have their RCF medication chart written/updated in time for the first dose of medication that was required to be administered at the RCF and 77 (38%) did not have their medications available in the facility’s preferred format. At Northern Health, the corresponding figures were 96 (57%) and 50 (30%) (Table 5.3.7).

Table 5.3.7 – Availability of updated RCF medication chart and medications in preferred format

<table>
<thead>
<tr>
<th></th>
<th>Austin Health</th>
<th></th>
<th>Northern Health</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subacute n = 63</td>
<td>Acute n = 139</td>
<td>Total n = 202</td>
<td>Subacute n = 57</td>
</tr>
<tr>
<td>RCF medication chart</td>
<td>35 (56)</td>
<td>87 (63)</td>
<td>122 (60)</td>
<td>34 (60)</td>
</tr>
<tr>
<td>not written/updated in time for first dose [n (%)]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication(s) not available in RCF’s preferred format in time for first dose [n (%)]</td>
<td>27 (43)</td>
<td>50 (36)</td>
<td>77 (38)</td>
<td>19 (33)</td>
</tr>
</tbody>
</table>

5.3.4 Secondary endpoint – ‘Workarounds’ used by RCF staff to avoid missed/delayed doses
(Austin Health only; data not available from Northern Health)

In the absence of an updated medication chart or medications in their preferred format, RCF staff used numerous ‘workarounds’ in order to document and administer medications. These are summarised on Tables 5.3.8 and 5.3.9. Overall, one or more ‘workarounds’ were used to facilitate medication administration within 24 hours of hospital discharge for 110 (54%) patients.

There were 85 cases where ‘workarounds’ were used if the facility did not have an updated medication chart in time for the first dose that needed to be administered, with about half (49%) of these involving RCF staff documenting medication administration against a list of medications provided by the hospital (e.g. in the margin of a copy of the discharge
prescription or a printed discharge medication list, or on a copy of the hospital inpatient medication chart).

**Table 5.3.8 – ‘Workarounds’ used by RCF staff to document medication administration in the absence on an updated medication chart**

<table>
<thead>
<tr>
<th>Type of ‘workaround’</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documented against a medication list provided by the hospital (e.g. copy of discharge prescription, printed discharge medication list, copy of hospital inpatient medication chart)</td>
<td>43 (50)</td>
</tr>
<tr>
<td>Obtained a telephone order from a doctor</td>
<td>17 (20)</td>
</tr>
<tr>
<td>Administration of medication(s) not documented</td>
<td>4 (5)</td>
</tr>
<tr>
<td>RCF’s community pharmacy provided a medication signing sheet</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Nurse able to initiate medication administration without doctors order (e.g. paracetamol)</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Retrospectively documented after medication chart updated/written</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Documented administration in the residents’ RCF file/progress notes</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Documented against RCF chart used prior to hospital admission (i.e. for medications that were not changed in hospital)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Medication chart transcribed by a RCF nurse</td>
<td>2 (2)</td>
</tr>
<tr>
<td>GP faxed a new/updated medication chart to facility</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Not specified</td>
<td>4 (5)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>85</td>
</tr>
</tbody>
</table>

When RCF staff did not have medications in their preferred format in time for the patient’s next scheduled dose, in the majority of cases they were able to administer the medications from a combination of hospital-supplied medications (in original packs) and existing medications from the facility (90%) (Table 5.3.9). In total, ‘workarounds’ were used in 53 cases.

**Table 5.3.9 – ‘Workarounds’ used by RCF staff to administer medications if medications were not available in the preferred format**

<table>
<thead>
<tr>
<th>Type of ‘workaround’</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse administered from original packaging* and/or used existing packaged medications</td>
<td>48 (90)</td>
</tr>
<tr>
<td>Nurse filled dose administration aid (e.g. Dosett) for personal care assistants to administer</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Not specified</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Patient’s family asked to administer medications</td>
<td>1 (2)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>53</td>
</tr>
</tbody>
</table>

* this was only classified as a ‘workaround’ if original packaging was not the RCF’s usual medication management method
Data on ‘workarounds’ was not available from Northern Health because this question was not consistently collected.

5.3.5 Secondary endpoint – Locum medical practitioner attendance

Of the 370 patients across Austin and Northern Health, locum medical practitioners attended within the first 24 hours of patients’ arrival at RCFs in 134 (36%) cases (Table 5.3.10). There was a higher proportion of locum visits when patients were discharged from acute wards when compared to subacute wards (difference in proportions 12.9%, 95% CI 2.2-23.6%, p=0.02).

Table 5.3.10 Locum medical practitioner attendances at RCFs within 24 hours of hospital discharge

<table>
<thead>
<tr>
<th></th>
<th>Austin Health</th>
<th></th>
<th>Northern Health</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subacute n = 63</td>
<td>Acute n = 139</td>
<td>Total n = 202</td>
<td>Subacute n = 57</td>
</tr>
<tr>
<td>Number of patients with locum medical practitioner attendance [n (%)]</td>
<td>12 (19)</td>
<td>54 (39)</td>
<td>66 (33)</td>
<td>21 (37)</td>
</tr>
</tbody>
</table>

5.3.6 Secondary endpoint – Medical discharge summary audit

Accuracy of discharge medication lists (Austin Health only)

Of the 71 randomly selected medical discharge summaries audited (approximately one third of total study population), 59 (83%) included a list of medications. Of these, 47 (80%) contained one or more discrepancies when compared with the pharmacist-reconciled discharge prescription. (Table 5.3.11). The median number of medication discrepancies per patient was 2 (range 0-16) with the median number of regular medication discrepancies per patient being 1 (range 0-15).

Twenty two (31%) of the medical discharge summaries were prepared or finalised by a doctor that was different to the doctor who wrote the discharge prescription.
Table 5.3.11 – Accuracy of discharge medication lists in the medical discharge summary

<table>
<thead>
<tr>
<th></th>
<th>Austin (n = 59)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical discharge summaries with a medication list discrepancy [n (%)]</td>
<td>47 (80)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Regular medications</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of regular medications omitted per patient [median (range)]</td>
<td>0* (0-4)</td>
</tr>
<tr>
<td>Number of regular medications with strength / dose omitted per patient [median (range)]</td>
<td>0* (0-10)</td>
</tr>
<tr>
<td>Number of regular medications with strength / dose discrepancies per patient [median (range)]</td>
<td>0* (0-3)</td>
</tr>
<tr>
<td>Number of regular medications added to discharge summary but not ordered on discharge prescription per patient [median (range)]</td>
<td>0* (0-7)</td>
</tr>
<tr>
<td>Total number of regular medications with a discrepancy per patient [median (range)]</td>
<td>1 (0-15)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>prn medications</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of prn medications omitted per patient [median (range)]</td>
<td>0* (0-2)</td>
</tr>
<tr>
<td>Number of prn medications with strength / dose omitted per patient [median (range)]</td>
<td>0* (0-6)</td>
</tr>
<tr>
<td>Number of prn medications with strength / dose discrepancies per patient [median (range)]</td>
<td>0* (0-3)</td>
</tr>
<tr>
<td>Number of prn medications added to discharge summary but not ordered on discharge prescription per patient [median (range)]</td>
<td>0* (0-3)</td>
</tr>
<tr>
<td>Total number of prn medications with a discrepancy per patient [median (range)]</td>
<td>0* (0-8)</td>
</tr>
<tr>
<td>Total number of medications with a discrepancy per patient [median (range)]</td>
<td>2 (0-16)</td>
</tr>
</tbody>
</table>

* Data highly skewed, hence median values = 0

**Communication of Medication Changes**

Of the 132 medical discharge summaries audited at Austin Health and Northern Health, 130 (98%) patients had one or more changes made to their regularly scheduled (non-prn) medications. There were in total 712 changes made to regularly scheduled medications with 363 (51%) communicated on the medical discharge summary. There were 234 changes made to prn medications with 57 (24%) communicated in the medical discharge summary (Table 5.3.12).
Table 5.3.12 – Communication of medication changes

<table>
<thead>
<tr>
<th></th>
<th>Austin (n = 71)</th>
<th>Northern (n = 61)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical discharge summaries with changes made to regular medications [n (%)]</td>
<td>69 (97)</td>
<td>61 (100)</td>
</tr>
<tr>
<td>Number of changes made to regular medications [n]</td>
<td>392</td>
<td>320</td>
</tr>
<tr>
<td>Number of changes made to regular medications per patient [median (range)]</td>
<td>5 (0-21)</td>
<td>5 (1-15)</td>
</tr>
<tr>
<td>Number of changes communicated on the medical discharge summary [n (%)]</td>
<td>197 (50)</td>
<td>166 (52)</td>
</tr>
<tr>
<td>Discharge summaries with changes made to prn medications [n (%)]</td>
<td>52 (73)</td>
<td>37 (61)</td>
</tr>
<tr>
<td>Number of changes made to prn medications [n]</td>
<td>150</td>
<td>84</td>
</tr>
<tr>
<td>Number of changes made to prn medications per patient [median (range)]</td>
<td>2 (0-8)</td>
<td>1 (0-6)</td>
</tr>
<tr>
<td>Number of changes communicated on the medical discharge summary [n (%)]</td>
<td>36 (24)</td>
<td>21 (25)</td>
</tr>
</tbody>
</table>

5.3.7 Secondary endpoint – Unplanned re-presentations to hospital

Thirty-three (9%) patients re-presented to either health service within 7 days of discharge from hospital (Table 5.3.13).

Table 5.3.13 – Re-presentations within 7 days of discharge

<table>
<thead>
<tr>
<th></th>
<th>Austin Health (n = 202)</th>
<th>Northern Health (n = 168)</th>
<th>Total (n = 370)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients [n (%)]</td>
<td>17 (8)</td>
<td>16 (10)</td>
<td>33 (9)</td>
</tr>
</tbody>
</table>

Among the Austin Health re-presentations, there were 9 (53%) patients who had one or more medication administration errors during the first 24 hours after discharge to the RCF, however when reviewed by the expert panel none of these errors were deemed contributory to the re-presentation. Among Northern Health re-presentations, there were 6 (37.5%) patients who had a medication administration error, and two were considered to have contributed to the re-presentation.

The first case involved an 82 year old male from high level care with an index admission diagnosis of recurrent tonic-clonic seizures associated with pneumonia. His usual antiepileptic
dose was increased in hospital and pneumonia treated. After returning to the RCF there was a dose delay of the antiepileptic medication of 14 hours. He was readmitted 6 days after discharge with further seizures and no other exacerbating factors identified. The second case involved a 78 year old female from high level care with an index admission diagnosis of fractured right femoral shaft requiring internal fixation. After returning to the RCF, opioids were delayed for 12 hours and paracetamol was delayed for 18 hours. She was readmitted 7 days after discharge with ongoing pain in the right hip.

5.3.8 Transition Care Program discharges

At Austin Health, 30 patients were discharged to a single RCF under the Transition Care Program during Stage 1 of the study. Four (13%) of these had a medication administration error. At Northern Health, 17 (13 from BECC) patients were discharged to two RCFs under the Transition Care Program, and 3 (18%) had a medication administration error (2 (15%) at BECC).
6. STAGE 2

6.1 Objectives

The objective of Stage 2 was to develop and pilot a new hospital discharge process that would enhance the continuity of medication management for people discharged to residential care and meet the needs of all stakeholders.

Specific aims were to:

- Review the data from Stage 1 and from other sources, to guide development of a new model of care;
- Develop a new model of care that is able to be implemented and sustained throughout a large and diverse health service without major impact on the hospital workforce;
- Develop a process for electronically generating an interim residential care medication administration chart at the point of discharge that is accurate and clear;
- Consult with all stakeholders involved in the hospital-RCF transfer process to ensure the new model of care is acceptable to them and meets their needs;
- Develop standard operating procedures and associated resources for hospital and RCF staff to facilitate uptake of the new model;
- Pilot and refine the new model of care prior to implementation and evaluation;
- Notify and educate stakeholders about the new model of care.

6.2 Methods

The methodology for Stage 2 involved several steps:

6.2.1 Review of evidence and development of strategies to improve continuity of care

A detailed analysis and review of data from Stage 1 was conducted to identify factors that most often contributed to medication administration errors. These findings were reviewed together with findings from previous work conducted by the project team and by others (as discussed in the Background section).
Potential methods for improving medication management at the hospital-RCF interface were explored, considering all aspects of the medication transfer process including prescribing, supply and administration as well as transfer of medication information. Options were presented to the project Advisory Committee before being further developed.

6.2.2 Development of an interim residential care medication administration chart

Australian hospitals that had previously developed and/or implemented an interim medication administration chart were contacted to obtain copies. Software options for electronic generation of an interim medication administration chart were explored. A new interim residential care medication administration chart (IRCMAC) was developed, along with software modules to enable electronic generation at the two participating health services.

6.2.3 Stakeholder consultation

Consultation with key professional and regulatory bodies (see Results section for details) was undertaken to ensure that the proposed new model of care would meet all legal and professional requirements.

Three stakeholder workshops were then conducted to seek input from all health professional groups involved in the hospital-RCF transfer process. All RCFs that had received a patient from one of the participating hospitals during Stage 1 were invited in writing to send up to three staff members, including registered nurses, patient care assistants and/or managers. GPs in the area were invited via a mail-out through the Northern Division of General Practice. Community pharmacists known to service RCFs in the area were invited in writing. Hospital pharmacists, nurses and doctors were invited verbally.

At each workshop the results from Stage 1 were presented, and the proposed new model of care was discussed. A sample copy of an electronically generated IRCMAC was provided. Participants were invited to identify potential problems with the new model, highlight any barriers to successful implementation and make additional suggestions for improving the discharge process.
6.2.4 Development of standard operating procedures and associated resources

A sample policy and standard operating procedures for RCFs was developed, with input from the Advisory Committee and relevant professional and regulatory bodies, modelled on the sample medication management policies and procedures included in the Australian Pharmaceutical Advisory Council’s (APAC) Guidelines for Medication Management in Residential Aged Care Facilities 3rd edition 2002. A simple flow-chart to guide RCF staff in how to use the chart was also developed, along with a “frequently asked questions” document to address issues that commonly arose during the stakeholder consultation process.

Standard operating procedures for hospital pharmacy staff were developed.

6.2.5 Staff education and notification

All RCFs that had received a patient from a participating hospital in Stage 1 were sent a package that included a covering letter outlining the project and the new hospital medication discharge process, the sample policy and standard operating procedures document, and a sample interim medication chart. A face-to-face inservice education session was offered.

GPs and community pharmacists known to service RCFs in the area, and the medical deputising services commonly used in the area, were provided with the same information package. The GP Liaison units at the two health services were provided with information via face-to-face meetings and in hard copy.

A short article was placed in the newsletters of the two Divisions of General Practice in the area, and information was placed on the web site of the North East Valley Division of General Practice.

Hospital staff, including pharmacists, nursing staff, ward clerks and doctors, were informed and educated about the new processes via face-to-face meetings and/or one-to-one detailing.
6.2.6 Piloting of new model of care

The new processes were piloted over a period of approximately 2 weeks at the Austin Hospital and Bundoora Extended Care Centre. RCFs who received a discharge with an interim medication chart were contacted to obtain feedback. Modifications were made to the new discharge process and the interim medication chart to address issues that were identified prior to full implementation.

6.3 Results

6.3.1 Review of evidence and development of strategies to improve continuity of care

Analysis of data from Stage 1, and evidence from previous surveys and consultations, indicated that the new model of care needed to address the following key issues:

a) Medication administration errors in the 24 hours following discharge from hospital, and

b) Poor communication to RCFs and GPs regarding medication changes made in hospital.

a) Medication administration errors

Review of Stage 1 data indicated that the lack of an up-to-date medication administration chart at the RCF when the first dose of medication was due to be given was the main factor that contributed to medication administration errors and use of potentially unsafe ‘workarounds’ by RCF staff.

As illustrated by Figure 6.3.1, below, the incidence of medication administration errors was 26% for patients who did not have an up-dated medication chart available at the time the first dose of medication was due to be given, compared with 8% for patients with an up-dated medication chart. Overall, 83% of medication administration errors occurred when an up-to-date medication chart was not available.

Having a resident’s new or changed medications available at the RCF in original packaging instead of re-packed in the RCF’s preferred format was less frequently associated with a medication administration error, provided an up-to-date medication chart was available. In
most cases RCFs, regardless of level of care, were able to access a Registered Nurse or other medication-endorsed nurse to administer medications from original packaging while waiting for the community pharmacy to deliver re-packed medications.

The lowest incidence of medication administration errors occurred when both an up-dated medication chart and medications in the RCF’s preferred format were available (3%), whilst the highest incidence was when neither was available (43%).

Figure 6.3.1 – Medication administration errors following discharge to a RCF

Figure 6.3.1 also suggests that when an up-dated medication chart was available it was more likely (p < 0.01) that medications in the RCFs’ preferred format would also be available. This may be because, as discussed earlier (in the Background section), some community pharmacists have reported reluctance to re-pack and deliver medications before a medication
chart is written because of concerns that there will be a change to the medication regimen when the chart is written, leading to a need to re-pack and deliver the medications again.

Based on this review, the project team, in consultation with the Advisory Committee decided that the new model of care should focus on ensuring that an up-to-date medication chart is available when the patient arrives at the RCF, and that this chart should be provided by the hospital.

It was decided that there would be no change made to the way medications are supplied, for the following reasons:

a) medication supply and packing issues seemed to be the primary cause of a relatively small proportion of medication errors,

b) resource implications for hospitals to change medication supply arrangements (e.g. packing medications into a dose-administration aid) would be likely to be large and potentially unsustainable within current staffing levels,

c) it would be difficult to get more than 100 RCFs and their contracted community pharmacies to agree on a single method for medication packing on discharge from hospital,

d) if changes to the systems for medication supply and provision of up-to-date medication charts were introduced concurrently, it would be impossible to determine the extent to which each of the changes had an impact.

b) Communication of discharge medication information

Review of Stage 1 data highlighted a range of problems with communication of discharge medication information. Medical discharge summaries were not provided to the RCF in all cases. When medical discharge summaries were provided, they were often inaccurate or incomplete.

When medication lists were provided in medical discharge summaries, these were inconsistent with the pharmacist-reviewed and reconciled discharge prescriptions in 80% of cases. The most common discrepancies were omission of medications and medication strength/dose-discrepancies.
Changes to patients’ medication regimens in hospital were communicated in the medical discharge summaries in approximately 50% of cases.

Based on this review, and published recommendations,\textsuperscript{16-17} the project team in consultation with the Advisory Committee decided that the new model of care should ensure that an accurate medication list is provided to the RCF, GP and community pharmacy for all discharges, and that changes made to patients’ medications should be clearly communicated. It was decided that the most reliable way of ensuring this would be to link it to the interim medication administration chart.

6.3.2 Development of an interim residential care medication administration chart

It was decided to develop an interim residential care medication administration chart (IRCMAC) that could deliver the following primary and secondary outcomes:

Primary outcomes:

\begin{itemize}
  \item Enable medications to be safely and legally administered and recorded as soon as a patient arrives at the RCF, thereby reducing the need for inefficient and potentially unsafe ‘workarounds’ and urgent GP/locum call-outs,
  \item Provide an accurate list of discharge medications, thereby reducing the need for RCF staff and GPs to review and reconcile multiple, often conflicting, medication lists and/or call the hospital to seek clarification.
\end{itemize}

Secondary outcomes:

\begin{itemize}
  \item Provide information about the time of last dose for each medication, thereby facilitating safe and timely administration of medications at the RCF, and reducing the need for RCF staff to call the hospital to seek clarification and/or ask for a copy of the inpatient medication chart,
  \item Provide information about medication changes to supplement data provided in medical discharge summaries, thereby reducing the risk of medication errors and reducing the need for RCF staff or GPs to call the hospital to seek clarification.
\end{itemize}

To ensure sustainability and maximise patient safety the goal was to develop a medication chart solution that:
a) had the minimum possible impact on hospital medical and pharmacy staff workloads,
b) did not involve an additional step of manual transcription of discharge medication lists, and
c) ensured that the chart was produced only after pharmacist review and reconciliation of discharge prescription, to ensure there were no discrepancies between these two documents.

It was decided that the most efficient, safe and reliable method for achieving this would be to have the interim chart generated electronically by the pharmacy department via software that was linked with the pharmacy services’ medication management software. This would avoid the need for additional transcription of medication data and ensure that the IRCMAC and discharge medications were concordant. Having the pharmacist create the chart would also ensure that the chart was provided with the medications (i.e. in the same bag), and would facilitate the inclusion of the time of last dose for each medication because the pharmacist could add this on the ward when doing a final check of the inpatient medication chart before handing over the medications.

Interim medication administration charts developed by Queensland Health, North West Melbourne Division of General Practice, Northern Health, Flinders Medical Centre and Barwon Health were reviewed, along with the National Inpatient Medication Chart (www.safetyandquality.sa.gov.au/Default.aspx?tabid=92; accessed 18/1/10) and long-term care medication administration charts used by RCFs (e.g. Compact Business Systems™ Drug Therapy Chart and Registered Nurse/Carer labels (www.compact.com.au/aged_care.htm; accessed 18/1/10). A new interim residential care medication administration chart was then developed, with the format based primarily on the National Inpatient Medication Chart, a Queensland Health ‘Home Medication Administration Chart’, and the medication charts commonly used by RCFs, adapted for electronic production by a hospital pharmacist (Appendix B).

The chart was designed to last for 7 days, to provide enough time for the patient’s usual GP to attend the RCF to review the patient and write a long-term RCF medication chart.
Sections for indicating the change status of each prescribed medication, and a list of medications ceased in hospital, were included on the chart to address the deficiencies in information transfer described above.

More details about how the IRCMAC was produced and used are provided in Stage 3, section 7.2.3.

6.3.3 Software development

The Austin Health IRCMAC software was developed in-house, within the Merlin dispensing system (a Pharmhos product). It extracted medications that had been entered into Merlin by the pharmacist or pharmacy technician and populated them automatically into the IRCMAC template that was created in Microsoft Word. Prn medications were automatically separated from regular medications in the IRCMAC by detecting any words in the directions that would indicate they were to be given “when required”. Once the IRCMAC was populated in Microsoft Word, the pharmacists were required to manually complete the adverse drug reactions, ‘change status’ and ‘medications ceased’ sections.

The Northern Health IRCMAC software was developed in-house using an established internally developed database package called Healthpower. Healthpower was developed using the development language PowerBuilder 11.5 and runs on Microsoft SQL server 2005 database structure. The Healthpower software extracted patient demographic and episodic information from the hospital patient master index database (iPM – an iSoft product) and combined that information with the dispensed medication information extracted from the iPharmacy database (also an iSoft product) during the discharge medication dispensing process. The authorising pharmacist had to ‘confirm’ the final information, and indicate whether the medication was ‘regular’, ‘prn’ or both, and select its ‘change status’ (i.e. new, unchanged, dose increase of dose decrease) via radio buttons, then add medications ceased, before printing the IRCMAC.

The IRCMAC was also incorporated into Webstercare software (a Manrex-Webstercare product), which is a program designed primarily for creating ‘Webster paks’, a type of dose administration aid. According to Manrex-Webstercare, the Webstercare program can be interfaced with most pharmacy dispensing software programs. An interface with Merlin was
developed by Manrex-Webstercare and Austin Health as part of this project. Webstercare produced the IRCMAC by linking with the pharmacy dispensing system to extract dispensed medication and patient data. For medication products that were recognised by Webstercare, they were automatically linked, however unfamiliar products were required to be manually linked or added to Webstercare the first time they were dispensed. The pharmacist was then required to select each medication’s ‘change status’ via check boxes/radio buttons. Medications that were ceased in hospital were then typed manually into the ‘Medications ceased’ section. Following extensive testing and exploration of alternative solutions, it was decided that this system was not the best solution for the participating hospitals, and it was not used for the project. It was decided that a better-integrated and more streamlined process would have less impact on hospital pharmacy staff workload and would save them from having to learn and use an additional software application. However Webstercare may be an option for some hospitals.

6.3.4 Stakeholder consultation

Consultation with key professional and regulatory bodies

The following government and professional bodies were consulted:

- Australian Nursing Federation (ANF)
- The Victorian Department of Health – Drugs and Poisons Unit
- The Victorian Department of Health – Aged Care Branch
- The Victorian Department of Health – Ambulatory & Continuing Care Programs Branch
- The Victorian Department of Health – Quality Use of Medicines Program
- Nurses Board of Victoria (NBV)
- Aged Care Standards & Accreditation Agency (ACSAA)

One of the key issues that needed to be addressed was whether a pharmacist-generated interim medication administration chart would enable RCF staff to administer and record medications in a way that would meet all legal, professional and accreditation standards.

Consultation with the Drugs & Poisons Unit, Department of Health, confirmed that because the IRCMAC is not a prescription there is no legal requirement for it to be signed by a
medical practitioner. “The legal authority to administer medications is on the dispensed medication, with the chart being a means to record the transaction” (Drugs and Poisons Unit, Department of Health, Victoria).

Consultation with the Australian Nurses Federation confirmed that a pharmacist-generated interim medication administration chart would meet the guidelines for medication administration in residential care, provided it is accompanied by a copy of the corresponding discharge prescription that has been signed by a medical practitioner.

Consultation with the Aged Care Standards & Accreditation Agency confirmed that a pharmacist-generated interim medication administration chart would meet their criteria for a safe and legal medication administration system in residential care.

Stakeholder workshops

In total 57 individuals attended the 3 stakeholder workshops, representing the following professions:

- RCF staff (directors of nursing, care coordinators, division 1 & 2 nurses, personal care assistants) (n = 34)
- General practitioners (n = 6)
- Community pharmacists (n = 4)
- Hospital pharmacists (n = 6)*
- Hospital doctors (n = 3)
- Hospital RCF liaison nurse (n = 1)
- Divisions of General Practice Staff (n = 3)

* In addition to stakeholder workshops, there was extensive consultation with hospital pharmacists at the participating health services via regular staff meetings.

Themes that arose during stakeholder consultations, and strategies to address them, are summarised in Appendix C.
6.3.5 Development of standard operating procedures and associated resources, and staff education and notification

A sample policy and standard operating procedures (Appendix D), and a flow-chart and “frequently asked questions” to support use of the IRCMAC by RCF staff (Appendix E), were developed as outlined in section 6.2.4 above.

Information packs containing copies of these documents and a sample IRCMAC were sent to RCFs, GPs, community pharmacies, and medical deputising services as described in section 6.2.4. This information was also posted on the North East Valley Division of General Practice website.

Standard operating procedures for hospital pharmacy staff were developed (Appendix F), and extensive education provided regarding preparation of the IRCMAC and the new discharge procedure. Other hospital staff (nurses, ward clerks and medical staff) were informed of the new procedures as outlined in section 6.2.5 above.

6.3.6 Piloting of new model of care

The new processes were piloted with approximately 10 discharges and amendments made accordingly, before full implementation and evaluation.
7. STAGE 3

7.1 Objectives

The objective of Stage 3 was to evaluate the impact of the new model of care, based around a hospital pharmacy generated interim residential care medication administration chart (IRCMAC), on continuity of medication management for patients transferred from hospital to residential care facilities (RCFs).

Specific aims were to determine the impact of the new model of care on:

- proportion of patients who experience one or more medication administration errors in the first 24 hours after discharge from hospital to a RCF;
- proportion of patients with an up-to-date medication administration chart at the time the first dose of medication is due to be given at the RCF;
- proportion of patients who require locum medical practitioner attendance in the first 24 hours after discharge from hospital;
- proportion of patients whose RCF long-term care medication chart was written or updated by their regular general practitioner;
- provision of discharge medication information to RCFs and GPs;
- hospital re-presentations within 7 days of discharge to a RCF;
- RCF staff, GP and hospital pharmacists’ satisfaction with discharge medication processes and use of a hospital-provided IRCMAC; and
- cost of care (cost of delivering the new model of care, and cost saving associated with the reduced locum medical practitioner attendances at RCFs).

7.2 Methods

7.2.1 Setting

The study was undertaken at the same health services as Stage 1. The new model of care was implemented at one acute care hospital and two subacute aged care hospitals. A second acute
care hospital was used as a concurrent control, with no change to discharge medication management procedures (Table 7.2.1).

Table 7.2.1 - Participating hospitals

<table>
<thead>
<tr>
<th>Intervention sites</th>
<th>Control site</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Austin Health</strong></td>
<td></td>
</tr>
<tr>
<td>Austin Hospital</td>
<td>-</td>
</tr>
<tr>
<td>Heidelberg Repatriation Hospital</td>
<td>-</td>
</tr>
<tr>
<td><strong>Northern Health</strong></td>
<td></td>
</tr>
<tr>
<td>Bundoora Extended Care Centre (BECC)</td>
<td>The Northern Hospital</td>
</tr>
</tbody>
</table>

7.2.2 Subjects

Subjects were patients discharged from an inpatient ward at a participating hospital to a RCF during the study period\(^b\) and who met the inclusion criteria as described in Stage 1 (see section 5.2.2). Patients discharged from Ward 10 at the Heidelberg Repatriation Hospital were excluded because this ward did not exist at the time of the baseline (Stage 1) study.

7.2.3 Discharge procedure / New model of care

The new model of care involved a number of changes to the hospital discharge medication procedure that existed at the time of Stage 1 (described earlier, in Table 5.2.2).

The main change was provision of an IRMAC. As described in Stage 2, the IRMAC was generated electronically by the hospital pharmacy department via software linked with the pharmacy services’ medication dispensing software, ensuring that the IRMAC and discharge medications were concordant. This occurred after the discharge prescription had been reconciled with the patient’s current inpatient medication chart and pre-admission medication list, and any discrepancies discussed with the treating unit and resolved.

The hospital pharmacist also added the following information to the IRMAC:
- the change status for each medication, i.e. whether the medication was new, unchanged, or had a dose-change (with date and reason for change if known to the pharmacist),
- a list of medications ceased (with the date and reason, if known to the pharmacist),
- time of last dose given in hospital for each medication, and

\(^b\) Austin Hospital, Heidelberg Repatriation Hospital and The Northern Hospital: 9\(^{th}\) September to 27\(^{th}\) November 2009; Bundoora Extended Care Centre: 8\(^{th}\) October to 24\(^{th}\) December 2009.
- other comments/information (e.g. explanation that some pre-admission medications were not prescribed in hospital and/or on discharge but were not intended to be discontinued, for example complementary medicines not on the hospital formulary and infrequently used *prn* medicines).

The IRCMAC was checked and signed by the hospital pharmacist, and a photocopy of the discharge prescription (signed by the hospital medical practitioner) was attached with a staple.

The IRCMAC and photocopy of the discharge prescription were then placed in a transparent red plastic sleeve along with the instructions for using the IRCMAC and “frequently asked questions” (Appendix E). The red sleeve was placed in a clear plastic bag along with the discharge medications that were supplied as outlined in Table 5.2.2 (there was no change to the way in which medications were supplied).

A second change to the discharge procedure was that the hospital pharmacist telephoned the RCF prior to discharge to notify them that an IRCMAC would be provided (previously RCFs were only called by the pharmacist in cases where the identity of the RCF’s contracted community pharmacy was not known or if there were specific medication issues or queries that required discussion). This call was in addition to any calls made by other hospital staff.

A third change (applicable at Austin Health sites only) was that instead of telephoning the community pharmacy and preparing a typed fax-letter summarising medication changes made during hospitalisation (steps 4 and 6 in Table 5.2.2), the hospital pharmacist was given the option to just fax a copy of the IRCMAC and discharge prescription to the community pharmacy, along with a pre-printed fax cover-sheet outlining the hospital’s medication supply and IRCMAC policy (although a telephone call could still be made if there was a need to discuss medication issues in more detail). This change was designed to streamline the discharge process for the pharmacists and partially compensate for the extra time it would take to prepare the IRCMAC.

### 7.2.4 Data collection

Eligible patients were identified and their demographic and medication data obtained using the same methods as described in Stage 1 (Section 5.2.4). A revised data collection form for
the structured telephone interview with RCF staff was developed. The interview was conducted the day after discharge (or within 48-72 hours of discharge for Friday and Saturday discharges) as described in Stage 1 (Section 5.2.4).

Data collected for each patient was the same as listed in Table 5.2.3, with additional items regarding provision of the IRCMAC (Table 7.2.2).

Table 7.2.2- Additional data collected at Day 1 structured telephone interview with RCF staff in Stage 3

- Whether the IRCMAC was received by the RCF
- Whether the IRCMAC was used to record medication administration for the resident and if not why
- Whether (and how) the provision of a hospital-provided interim administration chart improved the medication transfer process

In addition, a second structured telephone interview was performed on day 8 for patients who had not had their RCF medication chart updated by a medical practitioner at the time of the initial interview. Data collected in the day 8 interview are listed in Table 7.2.3.

Table 7.2.3 – Day 8 data collection

- Whether the RCF medication chart had been written or updated
- Who wrote or updated the chart (e.g. GP, locum, other), and when did this occur (date)

7.2.5 Clinical significance of missed or delayed medication doses
The clinical significance of medications that were missed or delayed was determined as described in section 5.2.5.

7.2.6 Interim residential care medication administration chart audit
(Austin Health only)

Interim residential care medication administration charts (IRCMACs) produced for one third of participating patients from Austin Health were randomly selected for review of both the accuracy of the medication lists and communication of medication changes. The IRCMACs were retrieved retrospectively (as Microsoft Word documents) from the hospital server where they were automatically saved, and consequently the audit could not take account of any
hand-written information that might have added by pharmacists after the IRCMAC was printed. IRCMACs from BECC were not audited as they were not able to be retrieved.

To assess the accuracy of the IRCMAC medication list, it was compared to the final pharmacist reviewed and reconciled discharge prescription. The classification of discrepancies was as outlined in Section 5.2.6 (medical discharge summary audit).

Changes to medication therapy were determined as outlined in Section 5.2.6. A medication change was considered to have been communicated if the pharmacist documented it in the “Change status” column or the “Medications ceased” section of the IRCMAC.

7.2.7 Review of unplanned re-presentations to hospital within 7 days of discharge

Unplanned re-presentations to hospital within 7 days of discharge were identified as described previously in section 5.2.7. The re-presentation rate for Stage 3 (post-intervention) was compared with Stage 1 (pre-intervention). Medical records for patients who re-presented were not reviewed to determine causality.

7.2.8 Residential care staff satisfaction with the IRCMAC

RCF staff satisfaction was determined via the telephone interview described in section 7.2.4 and Table 7.2.2.

7.2.9 General practitioner satisfaction with the IRCMAC

A short survey was mailed to the GP’s of patients who had been provided with the IRCMAC during the last 4 weeks of data collection at Austin Health, and during the 11 weeks of data collection at BECC. A pre-addressed reply-paid envelope was enclosed with the survey. There was no follow-up of non-responders.

For patients returning to a RCF, their GPs were identified via the hospital patient administration system. For patients who were discharged to a new RCF, the survey was sent to the RCF, addressed to the GP who would be responsible for that patient’s care when allocated (because often patients change GPs on admission to a RCF).
7.2.10 Hospital pharmacist satisfaction with IRCMAC

Hospital pharmacists involved with the implementation of the IRCMAC were asked to fill out a brief survey about the new process, and return this to the project officer via internal mail.

7.2.11 Cost of care provision

Hospital pharmacists and technicians documented the length of time taken (in minutes) to produce the IRCMAC prospectively for a sample of patients towards the end of the data collection period. The cost associated with this additional workload was calculated based on the salary plus 20% on-costs for a Grade 1, Year 6 Hospital Pharmacist and a Grade 2 Hospital Pharmacy Technician, according to relevant Victorian employment awards and agreements (these are the ‘average’ employment levels of ward pharmacists / technicians at Austin Health). Cost of consumables was calculated based on their purchase price (paper, printer cartridges and red plastic sleeves).

Cost-savings associated with reduced locum medical attendance in Stage 3 compared with Stage 1 were calculated based on the Medicare Benefits Schedule (November 2009), assuming that patients were seen before 11pm (Item 1 plus Item 10990). This would be a conservative cost estimate because the costs are higher when the consultation occurs after 11pm, which is often the case for attendances for the primary purpose of writing medication charts.

7.2.12 Outcome measures

The primary endpoint for Stage 3 was the change in proportion of patients who were exposed to one or more medication administration errors during the first 24 hours after transfer from hospital to residential care, where ‘medication administration error’ was defined as described earlier, in section 5.2.8.
Secondary endpoints were:

- change in proportion of patients for whom an up-to-date medication administration chart was not available when the first dose of medication was due to be administered at the RCF;
- change in proportion of patients for whom locum medical practitioner attendance was required within 24 hours of transfer;
- change in proportion of patients who had their RCF medication chart written or updated by their usual GP following discharge from hospital;
- change in proportion of patients who re-presented to hospital within 7 days of discharge;
- accuracy of medication information provided in the IRCMAC;
- proportion of medication changes made during hospitalisation communicated in the IRCMAC;
- time taken by hospital pharmacy staff to produce the IRCMAC;
- change in cost of care (in terms of cost of delivering the new model of care and use of locum medical services); and
- RCF staff, GP and hospital pharmacist satisfaction with the IRCMAC.

7.3 Results

7.3.1 Subjects

*Austin Health*

Over the 3 month study period, 259 patients met the inclusion criteria and a completed telephone interview was performed for 226 patients (Figure 7.3.1). These patients were transferred to 91 different RCFs.
The demographics for Stage 3 patients did not differ from Stage 1. However, more patients in Stage 3 were discharged to high-level care compared with Stage 1 (56% vs. 48%, p = 0.12).

**Bundoora Extended Care Centre (BECC)**

Over the 11 week study period, 33 eligible patients had a completed phone interview, with no differences in demographic details compared with Stage 1.

7.3.2 Primary endpoint – Medication administration errors

At Austin Health, the percentage of patients who received a medication administration error declined from 20% at Stage 1 to 2% at Stage 3 (difference in proportion 18%, 95% CI 12-24%, p < 0.01). All five errors occurring during Stage 3 were regular medications being missed or delayed (Table 7.3.2). In one of these cases the RCF did not receive an IRCMAC.

At BECC, the percentage of patients who received a medication administration error was reduced from 11% in Stage 1 to 0% in Stage 3 (difference in proportion 11%, 95% CI 0-22%, p = 0.12).
Table 7.3.2 – Number of patients exposed to one or more medication errors

<table>
<thead>
<tr>
<th></th>
<th>Austin Health</th>
<th>BECC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stage 1 (pre-</td>
<td>Stage 3 (post-</td>
</tr>
<tr>
<td></td>
<td>intervention)</td>
<td>intervention)</td>
</tr>
<tr>
<td>n = 202</td>
<td>n = 226</td>
<td>n = 57</td>
</tr>
<tr>
<td>Regular medication(s) missed/delayed</td>
<td>33 5 4 0</td>
<td>prn medication(s) delayed</td>
</tr>
<tr>
<td>Incorrect medication regimen administered</td>
<td>4 0 0 0</td>
<td></td>
</tr>
<tr>
<td>Total [Number (%)]</td>
<td>41 (20)</td>
<td>5 (2)</td>
</tr>
</tbody>
</table>

The medications involved in the errors are summarised in Table 7.3.3, grouped by medication class.

Table 7.3.3 – Medications involved in errors

<table>
<thead>
<tr>
<th>Medication class*</th>
<th>Number of errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-infectives</td>
<td>4</td>
</tr>
<tr>
<td>Cardiovascular drugs</td>
<td>2</td>
</tr>
<tr>
<td>Neurological drugs</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
</tr>
</tbody>
</table>

* classified as per the Australian Medicines Handbook

Of the 8 medications that were missed, 2 were classified as highly significant, 5 as moderate and 1 as low significance.

7.3.3 Secondary endpoint – Availability of up-to-date medication chart

The number of patients who did not have an up-to-date medication administration chart (either an updated RCF long-term medication chart or an IRCMAC) in time for the first dose of regularly scheduled medication that needed to be given at the RCF decreased from 60% to 4% (p < 0.01) for Austin Health discharges and from 60% to 3% (p < 0.01) for BECC discharges.
Compared to Stage 1 at Austin Health, there was a higher proportion of patients who did not have their RCF long-term medication chart updated within approximately 24 hours of discharge from hospital (77% cf. 60%, p < 0.01). At BECC, the proportion of patients who did not have an updated RCF long-term medication chart was similar in Stages 1 and 3 (60% cf. 64% respectively, p = 0.88).

At Austin Health, of the 175 Stage 3 patients who did not have their RCF long-term medication chart updated in time for the first medication dose, 147 (84%) received and used the IRCMAC, 20 (11%) received but did not use the IRCMAC, and 8 (5%) did not receive the IRCMAC from the hospital. The total number of patients for whom a ‘workaround’ was used by RCF staff because of lack of access to an updated medication chart was reduced from 85 (42%) in Stage 1 to 28 (12%) in Stage 3 (p < 0.01).

At BECC, of the 21 patients who did not have their RCF long-term medication chart updated in time for the first medication dose, 16 (76%) received and used the IRCMAC, 4 (18%) received but did not use the IRCMAC and 1 (5%) did not receive the IRCMAC.

7.3.4 Secondary endpoint – Locum medical practitioner attendance

Locum medical practitioner attendances at RCFs within 24 hours of discharge dropped from 33% to 11% at Austin Health (difference of proportion 22%, 95% CI 14-30%, p < 0.01) and from 37% to 21% at BECC (difference of proportion 16%, 95% CI -5-37%, p = 0.12) following implementation of the IRCMAC (Table 7.3.5).

Table 7.3.5 – Locum medical practitioner attendances at RCFs within 24 hours of hospital discharge

<table>
<thead>
<tr>
<th></th>
<th>Austin Health</th>
<th>BECC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stage 1 (pre-intervention)</td>
<td>Stage 3 (pre-intervention)</td>
</tr>
<tr>
<td>Locum medical practitioner attendances [n (%)]</td>
<td>n = 202</td>
<td>n = 226</td>
</tr>
<tr>
<td></td>
<td>66 (33)</td>
<td>25 (11)</td>
</tr>
</tbody>
</table>
The provision of an IRCMAC did not defer or delay locum medical attendance. Day 8 telephone interviews for patients who had not had their RCF long-term medication chart updated at the time of the first telephone interview identified only 1 patient from Austin Health and 1 from BECC whose RCF medication chart was subsequently written/updated by a locum medical practitioner (i.e. total number of charts written by a locum medical practitioner within 7 days of discharge was 26 (12%) and 8 (24%) respectively)

At the time of the day 8 telephone interview for Austin Health discharges, 198 (88%) of patients had their RCF long-term medication chart written/updated. Of the remaining 28 (12%) patients, 8 (3.5%) did not need their chart written/updated (e.g. the only change made in hospital was addition of a short course of antibiotics that could be completed using the IRCMAC), and in 17 (7.5%) cases we could not establish whether the chart had been written/updated (e.g. patient had been readmitted to hospital or was deceased). Therefore there were only 2 (1%) patients who required a new/updated RCF long-term medication chart and did not have one by day 8.

For BECC discharges, by the day 8 telephone interview 32 (97%) of patients had their RCF long-term medication chart written/updated. The single patient who did not have their RCF chart written/updated by day 8 did not require one.

7.3.5 Secondary endpoint – Proportion of RCF long-term medication charts written or updated by patients’ own GP

Of the 200 patients discharged from Austin Health during Stage 3 who needed an RCF long-term medication chart to be written or updated, 165 (83%) had their chart written or updated by their usual GP within 1 week of discharge. Because there was no day 8 telephone interview conducted during Stage 1 a direct comparison cannot be made, however based on the day 1 telephone interviews in Stage 1 we know that 33% of RCF long-term medication charts were written by a locum medical practitioner which means, at best, 67% of RCF charts were written by the patients’ usual GP.

For BECC discharges in Stage 3, of the 32 patients who needed an RCF long-term medication chart written or updated, this was done by their usual GP in 21 (66%) cases. In Stage 1, at the day 1 telephone interview 39% RCF long-term medication charts were written by a locum
medical practitioner which means, at best, 61% of RCF medication charts were written by the patients’ usual GP.

7.3.6 Secondary endpoint – Interim residential care medication administration chart audit  
(Austin Health only)

Accuracy of IRCMAC medication lists  
There were 877 items (765 regular and 112 prn) prescribed for the 76 patients whose IRCMAC was randomly selected for review. When compared to the pharmacist-reconciled discharge prescription, there were 16 discrepancies identified for 16 (21%) patients. Of these discrepancies, 7 were omission of a nutritional supplement (e.g. Arginaid®, Sustagen®) that was ordered on the discharge prescription but not available for supply by the hospital’s Pharmacy Department. A further 2 discrepancies were complementary medicines that were not on the hospital formulary (contrary to the hospital IRCMAC protocol these discrepancies between the discharge prescription and IRCMAC were not explained in the ‘Comments’ section of the IRCMAC). Of the remaining 7 discrepancies, 1 involved a regular medication being omitted, 2 involved prn medications being omitted, 1 involved a medication that was prescribed for both regular and prn use being charted only in the prn section, and 1 involved a regular medication added to the IRCMAC but not appearing on the discharge prescription. Excluding nutritional supplements, the medication discrepancy-rate between the discharge prescription and the IRCMAC was 9/877 (1.0%).

Communication of medication changes  
All patients had one or more changes made to their regularly scheduled medications in hospital. There were, in total, 453 changes made to regularly scheduled medications, with 254 (56%) communicated on the saved version of the IRCMAC. This was similar to Stage 1 where 50% changes were communicated on the medical discharge summary (refer to section 5.3.6). There were 137 changes made to prn medications with 46 (34%) communicated on the IRCMAC. This was an improvement compared to Stage 1 where 24% of prn medication changes were communicated on the medical discharge summary.
7.3.7 Secondary endpoint – Unplanned re-presentations to hospital

Compared to Stage 1, there was no significant difference in the rate of unplanned re-presentations at Austin Health or BECC (p = 0.84 and 0.69 respectively). The re-presentation rate at Northern Hospital was also unchanged compared with Stage 1 (Table 7.3.8).

Table 7.3.8 – Re-presentations within 7 days of discharge

<table>
<thead>
<tr>
<th></th>
<th>Austin Health</th>
<th>BECC</th>
<th>Northern Hospital – Stage 3 (n = 114)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1 (pre-intervention)</td>
<td>Stage 3 (post-intervention)</td>
<td>Stage 1 (pre-intervention)</td>
<td>Stage 3 (post-intervention)</td>
</tr>
<tr>
<td>n = 202</td>
<td>n = 226</td>
<td>n = 57</td>
<td>n = 33</td>
</tr>
<tr>
<td>Number of patients [n (%)]</td>
<td>17 (8)</td>
<td>21 (9)</td>
<td>3 (5)</td>
</tr>
</tbody>
</table>

7.3.8 Secondary endpoint - Stakeholder satisfaction with the IRCMAC

**RCF staff**

For Austin Health and BECC discharges respectively, 189 (84%) and 15 (45%) of RCF nurses thought that the IRCMAC improved the patient transfer process from hospital. Some comments provided are shown in Table 7.3.9 categorised by theme.

Table 7.3.9 – Examples of comments from RCF nurses about the IRCMAC

<table>
<thead>
<tr>
<th>Theme</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Reduction in need for urgent medical practitioner attendance | “Avoided us needing to call locum”  
“Beautiful, perfect, gives time to organise doctor”  
“So good. Saves getting locum, saves getting a phone order”  
“Very good, can’t get doctor always. Could accept patients (from hospital) later now. Normally only before 1pm” |
| Clarity of information                               | “Brilliant, able to read, very easy to read”  
“More legible, easier for the doctor. Really good” |
| Usefulness of information                            | “Change status alerted nurse of new medications”  
“Did not need to check when last dose was given” |
| Reduction in medication administration errors        | “Wouldn’t have been able to administer medications (without it)”  
“...Usually can not administer from script so this allowed for signing” |
| Lack of familiarity with IRCMAC (RCF staff who received but didn’t use the IRCMAC) | “…. didn’t realise it could be used til the day after”  
“Unfamiliar with the chart though fantastic idea”  
“Would have been helpful if staff familiar” |
**General Practitioners**

Surveys were sent to 84 GPs caring for residents discharged from Austin Health and 33 GPs from BECC. Four surveys from Austin Health were returned as the GP was no longer managing the resident’s care; 35 surveys from Austin Health and 9 from BECC were completed, giving response rates of 44% and 27% respectively. The results of these surveys are shown in Table 7.3.10.

**Table 7.3.10 – General Practitioner Questionnaire**

<table>
<thead>
<tr>
<th>Survey question</th>
<th>Austin Health</th>
<th>BECC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the provision of an Interim Medication Administration Chart reduce the urgency for you to attend the RCF to review this patient after discharge from hospital? [n (%)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>31 (89)</td>
<td>8 (89)</td>
</tr>
<tr>
<td>No</td>
<td>2 (5.5)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Not sure</td>
<td>2(5.5)</td>
<td>1 (11)</td>
</tr>
<tr>
<td>Were you comfortable with a hospital-provided Interim Medication Administration Chart being used at the residential care facility (for up to 7 days) until you or another GP were able to review the patient and write the long-term residential care medication chart? [n (%)]</td>
<td>35 (100)</td>
<td>8 (89)</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Not sure</td>
<td>0 (0)</td>
<td>1 (11)</td>
</tr>
<tr>
<td>Was the “Change status” or “Medications ceased” section on the interim chart helpful for informing you about medication changes made in hospital? [n (%)]</td>
<td>34 (97)</td>
<td>8 (89)</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Did not see the interim chart provided for this patient</td>
<td>1 (3)</td>
<td>1 (11)</td>
</tr>
<tr>
<td>Do you think provision of an Interim Medication Administration Chart should be standard practice for all patients discharged from hospital to a residential care facility? [n (%)]</td>
<td>35 (100)</td>
<td>8 (89)</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Not sure</td>
<td>0 (0)</td>
<td>1 (11)</td>
</tr>
</tbody>
</table>
Table 7.3.10 (continued) – General Practitioner Questionnaire

Comments:

• The typed nature of these charts helps a lot – some hand written discharge medication lists in the past have been illegible.
• Less stress on staff chasing the GP’s or locum service to write the medication chart.
• (I) think this is the best idea ever.
• This is a great help in arranging an easy move from hospital to residential care facility and helps take the pressure of the first few days – thank you.
• Interim medication administration chart is very useful. Would be useful if done for every patient discharged to residential facilities on a regular basis.

Hospital pharmacists

At Austin Health 25 surveys were distributed to hospital pharmacists who had been involved with the implementation of the IRCMAC, and 20 were returned giving a response rate of 80%. At BECC, 3 surveys were distributed with a 100% response rate. The results of the surveys are shown in Table 7.3.11.

Table 7.3.11 – Hospital Pharmacist Questionnaire

<table>
<thead>
<tr>
<th>Survey question</th>
<th>Austin Health</th>
<th>BECC</th>
</tr>
</thead>
<tbody>
<tr>
<td>How has the new process impacted on the time it takes to process a discharge for patients going to a RCF? [n (%)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longer</td>
<td>15 (75)</td>
<td>3 (100)</td>
</tr>
<tr>
<td>Shorter</td>
<td>3 (15)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>About the same</td>
<td>2 (10)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Do you think it is important for patients to be sent to RCFs with an interim medication administration chart? [n (%)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, very important</td>
<td>18 (90)</td>
<td>1 (33)</td>
</tr>
<tr>
<td>Yes, somewhat important</td>
<td>2 (10)</td>
<td>2 (66)</td>
</tr>
<tr>
<td>No</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Unsure</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Do you use a pharmacy technician to assist with preparation of the chart? [n (%)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>15 (75)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>No</td>
<td>5 (25)</td>
<td>3 (100)</td>
</tr>
</tbody>
</table>

Comments:

• Great project & improved communication on discharge.
• … Quite a simple process to complete and can be done quite quickly and efficiently once we get used to doing them.
7.3.9 Secondary endpoint - Cost analysis

At Austin Health, pharmacists and technicians documented the length of time required to produce the IRCMAC for 55 discharges. On average, it took 8.6 minutes to produce the IRCMAC per patient (pharmacist 7.3 minutes plus pharmacy technician 1.3 minutes). The hourly wage for a grade 1 year 6 pharmacist (including on-costs) was $32.33 and for a grade 2 technician was $21.75 (including on-costs). Therefore the cost to produce the IRCMAC per patient was $3.93 for the pharmacist’s time and $0.47 for the technician’s time, with an overall staff cost of $4.40. Taking into consideration the cost of consumables, the approximate cost to the hospital to produce the IRCMAC was $5.00 per patient.

The cost to Medicare for a locum medical practitioner attendance at an RCF (conservatively assuming that all locum attendances were before 11pm) was $126. With a 22% absolute reduction in locum attendances (based on Austin Health data, which included both acute and subacute discharges), the average cost saving due to reduced locum attendances was $27.72 per patient discharged from hospital to a RCF.

Considering only the cost to produce the IRCMAC and the cost-avoidance associated with fewer locum attendances, the overall saving to the healthcare system per patient discharged to a RCF was approximately $22.72. This does not consider additional cost savings associated with fewer medication errors and adverse medication events, and efficiency gains for GPs and RCF staff.

7.3.10 Transition Care Program discharges

At Austin Health in Stage 3, 28 patients were discharged to a single RCF under the Transition Care Program. One (4%) patient received a medication administration error at the RCF. This compares with 13% in Stage 1, however this difference was not statistically significant (p = 0.45). At BECC in Stage 3, 13 patients were discharged to two RCFs under the Transition Care Program. One (8%) patient received a medication administration error. This compares with 2 (15%) in Stage 1, however this difference was not statistically significant (p = 0.96).
7.3.11 Control audit: The Northern Hospital

114 eligible patients were discharged from The Northern Hospital and had a telephone interview completed within 72 hours of discharge during the study period. Of these, 19 (17%) had a medication administration error upon transfer; this was not significantly different to the Stage 1 audit (20% cf. 17%, p = 0.683). Locum medication practitioner attendance at the RCFs within the first 24 hours was also not significantly different compared to Stage 1 (39% cf. 40%, p = 0.986).
8. DISCUSSION

Medication-related problems during the transition from hospital to residential care are well known to hospitals, residential care facilities (RCFs), general practitioners (GPs), locum medical services and community pharmacists.1-3 This is, however, the first study to have quantified these problems and formally evaluated the impact of strategies to address them. With four hospitals across two major health services included in the project, we believe that our findings are generalisable to other hospitals.

8.1 Problems identified during Stage 1 (pre-intervention)

8.1.1 Medication administration errors

Approximately 1 in 5 patients experienced a medication administration error in the first 24 hours after transfer to a RCF. This figure is likely to be an underestimate of the true error-rate given the reliance on retrospective self-reporting by RCF staff.

The majority of the medication administration errors were a result of one or more doses of regular medications being missed. In a small number of cases, patients received a wrong medication or dose. For example in one case, a RCF reverted to the resident’s pre-hospitalisation medication chart and medication pack (dose administration aid) which did not reflect changes made in hospital; therefore the patient received gabapentin at an increased dose (dose was reduced in hospital from three times a day to once daily) and received aspirin that had been ceased during hospital admission. This type of error has great potential for adverse outcomes. For example, in a recently published report a scenario similar to this one led to a patient being readmitted to hospital with recurrent seizures after his hospital-amended anti-epileptic medication regimen was not implemented at the RCF, due to lack of an updated medication chart and re-packed medications.7

Two medication administration errors in our study may have contributed to readmission to hospital. Outcomes associated with the other medication administration error cases were not able to be determined, however many had potential to cause an adverse outcome. More than 12% of the medications that were missed or significantly delayed were rated as highly
significant, and approximately 50% as moderately significant. Only about one third of missed or delayed doses were rated as low significance.

8.1.2 Use of potentially unsafe ‘workarounds’

In order for RCF staff to administer medications to their residents, they require: i) an updated medication chart that reflects changes made in hospital and ii) medications in a format that can be used by the RCF. It was found that 60% of residents did not have an updated RCF medication chart in time for the next scheduled dose of medication. This resulted in RCF staff having to use ‘workarounds’ in at least half of transfers, where they were required to practice outside of recommended industry standards and guidelines to ensure patients did not miss medication doses. Some of these workarounds may be associated with an increased risk of medication errors and adverse outcomes. For example, using a copy of a hospital inpatient medication chart, may result in errors because this chart is often different to the discharge medication list. Other ‘workarounds’ result in inefficient use of RCF staff and GPs time, for example obtaining telephone orders from the GP.

Patients’ medications were not available in the RCF’s preferred format (usually re-packed into a dose-administration aid) in approximately one third of cases. In the absence of this, RCF staff were able to administer the required medications from original packaging supplied by the hospital if a Division 1 Registered Nurse or Medication Endorsed Division 2 (Enrolled) Nurse was available. In some cases, however, these nurses were not available and the RCF staff (personal care assistants) were not able to administer the medications.

8.1.3 Use of locum medical services

Locum medical practitioners were called to the RCF within the first 24 hours in more than one in three patient transfers. Although the primary purpose for the locum medical practitioner call out was not collected, it was clear that many calls were made because of the need for a new or updated RCF medication chart when the resident’s regular GP was unable to attend at short notice. Use of locums to write up the long-term care RCF medication chart poses a quality and safety risk, as this task should ideally be performed by the patient’s regular GP who would have a better understanding of their patient’s medical and medication history. The locum medical practitioner call out rate was higher when a patient was
discharged from an acute ward compared to a subacute ward. This is probably because the length of stay is higher for patients discharged from subacute wards, allowing for better discharge planning and preparation, and earlier notification to the RCF of patient discharges.

8.1.4 Accuracy of medical discharge summaries

The audit of the medical discharge summaries found that communication of medication information to community healthcare providers by the hospital was poor. When medication lists were provided on the discharge summary, 80% were found to have a discrepancy between the medical discharge summary and the discharge prescription. This can make it difficult for RCF staff and GPs to determine what medications the resident should be taking after discharge from hospital, since they are often provided with the medical discharge summary, the discharge prescription and in some circumstances a copy of the inpatient medication chart. Inconsistency between these three sources of medication information create confusion and the need for the RCF or GP to liaise with the hospital to determine the intended discharge medication regimen. In addition to these discrepancies, only approximately 50% of regular and 25% of prn medication changes were communicated in the medical discharge summary. Because of this lack of communication, RCF staff and GPs are often unsure of whether changes made in hospital (e.g. cessation of a medication) were intentional or oversights, which may result in the GP reverting to the resident’s previous medication regimen.

8.1.5 Transition Care Program discharges

When patients were discharged under the Transition Care Program, there were fewer errors (between 13-18%). This is to be expected because unlike patients discharged to other RCFs, these patients received a (handwritten) interim medication chart and had access to hospital doctors and (in the Austin Health program) pharmacists at the RCF.
8.2 Impact of the new model of care (post-intervention)

8.2.1 Medication administration errors

The implementation of the interim residential care medication administration chart (IRCMAC) resulted in a reduction in medication administration errors at both sites (from 20% to 2% at Austin Health and 11% to 0% at BECC). This is likely to be a result of RCF staff having access to an up-to-date medication administration chart for almost 100% of discharged patients. Error rates remained stable at the control site, where no IRCMAC was provided.

There was also a reduction in error rates for patients discharged under the Transition Care Program during Stage 3, despite the fact that these patients were already receiving an interim medication chart at the time of the Stage 1 study. This reduction may have been a result of improved legibility and accuracy of interim medication charts (by generating them electronically and integrating their preparation into the discharge prescription review and dispensing processes). Although consistent with other findings in the trial, this finding could also be a random error due to the small number of subjects and errors in the TCP cohort.

Following introduction of the IRCMAC there was an increase in the proportion of patients who did not have their RCF long-term medication chart written or updated at the time the first medication dose required to be given at the RCF. This is most likely a result of the staff having access to and using the IRCMAC thereby reducing the need for a doctor to visit the facility urgently to write the long-term RCF chart.

8.2.2 Use of locum medical services

There was a 16-21% absolute reduction in the rate of locum medical practitioner call outs within the first 24 hours of discharge following implementation of the IRCMAC. This suggests that the majority of locum call outs during Stage 1 were solely or predominantly to provide an updated medication chart for the RCF. Despite having an IRCMAC, some RCFs still called a locum medical practitioner within the first 24 hours of arrival at the RCF. There are various explanations for this including: some RCFs had policies which required all new admissions to be reviewed/admitted by a medical practitioner; some RCFs had a policy which states that all medication administration charts used at the RCF must be written by a medical
practitioner; some locum call outs were due to RCF staff being unfamiliar with the IRCMAC; concerns about the requirements of the Aged Care Standards & Accreditation. Almost 1 in 5 RCFs received an IRCMAC but did not use it. It was apparent, however, that towards the end of Stage 3, RCFs were becoming familiar with the chart and were more willing to use it. Therefore it is possible that over time the locum attendance rate may decrease further than was observed in this study.

To ensure that locum attendances would not simply be delayed by the 7 days that were covered by the IRCMAC, we repeated the telephone interview on Day 8 post-discharge. The results showed that almost 100% of patients had their RCF long-term medication chart written at the time of the Day 8 call with most being written by the patient’s regular GP and only 2 by a locum medical practitioner. Ensuring the medication chart is written by the patient’s regular GP is likely to improve medication safety as it provides the GP an opportunity to review the patient and any medication changes made in hospital rather than have this task completed by someone who is not familiar with the patient.

8.2.3 Accuracy of hospital-provided interim medication administration charts

The audit of the accuracy of IRCMACs showed that 79% were identical to the discharge prescription. Excluding nutritional supplements, which were not supplied by the pharmacy department, this figure increased to 88%. At the medication level, this equated to a 1.0% discrepancy rate. A limitation of the IRCMAC audit was that the IRCMACs were retrieved retrospectively from the hospital database, so handwritten annotations or changes could not be identified. Also, the source of discharge prescriptions for the audit was the scanned copies saved in the pharmacy department after the prescription was processed; in some cases the scanned copy may not include last minute changes to the prescription. It is possible that these factors might have accounted for some of the medication discrepancies identified. Nevertheless, the overall error rate is very low and likely to be far better than what could be achieved with a handwritten interim medication chart.

When comparing the IRCMAC with the medication list that was provided in medical discharge summaries in Stage 1, there was a 59% absolute increase in accuracy, as only 20% of medical discharge summaries had a medication list that was identical to the discharge prescription in Stage 1. The reason for this difference is that the IRCMAC was linked to the
hospital dispensing system and produced after pharmacist review and reconciliation of the discharge prescription(s), whereas the list provided on the medical discharge summaries was hand typed by a doctor (not necessarily the same doctor who wrote the prescription) and not reviewed or reconciled by the pharmacist. A recent study indicated that pharmacist review of the medical discharge summary before patient discharge resulted in a 45% reduction in medication discrepancies compared to if the discharge summary was not reviewed by the pharmacist.\textsuperscript{18}

The communication of medication changes on the IRCMAC by the hospital pharmacist was only slightly better than the medical discharge summary, with 56% of changes to regular medications communicated compared with 50% in the medical discharge summaries. However the proportion of changes identified as having been communicated on the IRCMAC is probably an under-estimate, because some pharmacists were known to have completed the ‘Change status’ and ‘Medications ceased’ sections by hand after printing the chart. Because the IRCMAC did not replace the medical discharge summary, and therefore the RCF received both sources of information, the combined percentage of changes that were communicated via the two sources is likely to have been increased compared with Stage 1.

8.2.4 Health professionals’ satisfaction with the interim medication administration chart

There was very positive feedback from RCF staff, GPs and hospital pharmacists about the IRCMAC. Recurring themes were: the amount of time saved by RCF staff and GPs in organising an updated/new RCF medication chart; time saved by RCF staff in calling up hospitals with medication related queries (e.g. to find out when the last dose of medication was given); and the improved legibility of the IRCMAC compared with other handwritten charts and sources of medication information. A few comments by RCF staff suggested that they were unfamiliar with the chart or that the RCF had yet to adopt the change in their policies and procedures. This highlights the need for education and training of RCF staff to raise awareness and increase confidence that the IRCMAC is accepted by professional bodies and organisations, which will improve the uptake of the chart.

The GP survey revealed that 89% thought provision of the IRCMAC reduced the urgency for them to attend the RCF. By providing the IRCMAC, RCF staff were able to use the chart for up to 7 days which allowed the GP to schedule a review of the resident within the week.
Almost 100% of GPs who responded to the survey were comfortable with RCF staff using the IRCMAC and thought that provision of the IRCMAC should be standard practice for all patients discharged to a RCF. Most GPs reported that communication of medication changes on the IRCMAC was useful.

Hospital pharmacists found that the new process increased their workload, however they acknowledged that it was important in order to ensure continuity of medication management.

**8.2.5 Cost analysis**

Provision of an IRCMAC for all patients discharged to a RCF is estimated to result in a cost saving of at least $22.72 per patient discharged to a RCF (based on the cost to hospitals for producing the IRCMAC for all patients and a conservative estimate of the saving to Medicare associated with reduced locum attendances at RCFs). Data published by the Australian Institute of Health and Welfare in 2008 indicated that between 2001-2002, 76,179 patients were discharged nationally from hospital (both public and private) to a RCF after spending at least 1 night in hospital. Using these figures, the potential cost saving net nationally if an IRCMAC was provided for all patients is at least $1.7 million (at least $2.1 million saving by Medicare, at a cost of approximately $380,000 to hospitals).

This is a conservative estimate of the cost-benefit. It does not consider potential cost-savings associated with reduced adverse outcomes that would be expected to flow from a reduction in medication administration errors. It also does not consider other efficiency gains likely to be derived within the RCF, GP and community pharmacy workforces. Telephone interviews and satisfaction surveys suggested that the IRCMAC resulted in considerable (but unquantified) time savings for RCF staff and GPs, allowing them to spend more time on clinical tasks. It may also result in reduced need for community pharmacists to re-pack medications and/or reduced the need for after-hours services, although this was not formally explored.

**8.3 Study limitations**

There were several limitations with this study. We used a pre- and post-intervention methodology, with pre-intervention (Stage 1) data collected between January and April, and post-intervention (Stage 3) data collected five months later, between September and
December. There is a possibility that factors other than the new model of care contributed to the observed reduction in medication administration errors and locum medical attendances. We are not aware of any changes in the healthcare environment or other external influences that could have impacted on these outcomes over the study period, however it is possible that the extensive stakeholder consultation that was undertaken as part of the project, and presentation of the baseline data to stakeholders, may have contributed to changes in practice that could have reduced errors and locum medical attendances. To assess whether this was the case, we repeated the audit at one non-intervention hospital during Stage 3, at the same time as the post-intervention audit was conducted at the other three hospitals. The error rate remained stable at the non-intervention hospital between Stage 1 and Stage 3 of the project, and the locum attendance rate was unchanged, suggesting that the new model of care was the most likely cause of the observed improvements at the intervention hospitals.

Another limitation with the pre- and post-intervention study design was that there may have been differences between the two groups of subjects due to, for example, seasonal variations. We did not collect data on the reasons for hospital admission, however general patient characteristics such as age, gender and number of medications for the two groups were the same. The only significant difference was that a higher proportion of post-intervention patients at Austin Health were discharged to high level care compared with pre-intervention subjects (56% versus 48%). This could potentially have reduced the error rate in the post-intervention period because of better access to registered nurses at high-care RCFs. However it is unlikely to fully explain the large decrease in errors rates that were observed.

Thirdly, medication administration errors were based on self-reporting by RCF staff. This may have led to under-estimation of error prevalence. To mitigate against this, the structured telephone interview included questions about how errors were avoided if the RCF medication chart had not yet been written or the patient’s medication had not yet been delivered to the RCF in their preferred medication management format in time for the first medication dose that was due to be given after patient arrival at the RCF (i.e. what ‘workarounds’ were used to ensure medications were administered on time). Despite this, there remains a possibility that some medication administration errors were not detected with this data collection method. Due to the large number of RCFs involved in the study (more than 100) and the short notice of discharge in most cases, telephone interview was deemed to be the most feasible method for collecting this data. It is possible that under-estimation of error prevalence was greater for
Northern Health discharges as a result of differences in data collection methodology. For example, the project officer at Northern Health did not have access to the patients’ discharge prescriptions at the time of the telephone interview, and therefore could not enquire about specific medications, such as those that were newly commenced or due to be administered shortly after patient arrival at the RCF. Telephone interviews were not always able be performed at Northern Health, and therefore in some cases the questions were faxed to the RCF staff member who completed and returned the form to the project officer. For a significant number of discharges, the question about ‘workarounds’ was omitted. These differences would have made it more difficult to detect medication administration errors.

Data about medication administration errors was collected from RCFs usually about 24 hours after discharge, to minimise potential for recall bias. Collecting the data this soon after discharge meant that some missed or delayed doses could not be detected. This occurred when once-daily, morning doses had not yet been administered by the time of the telephone interview, but the delay had not yet reached 50% of the prescribed dose-interval. This may have resulted in underestimation of the number of medication administration errors identified, but probably not the number of patients who were exposed to one or more medication errors since patients who missed morning medications usually also missed doses of evening medications.

Some telephone interviews were conducted up to 72 hours after hospital discharge, which may have led to recall bias. In some cases the RCF nurse who was on duty when the patient arrived was not available for interview. To overcome these issues every effort was made to speak to the nurse who was present during the transfer, and if that nurse was unavailable, the interviewee was asked to refer back to the resident’s RCF records and medication charts to answer the questions.

Another limitation was the absence of blinding of both investigators and participants (health professionals), which could have introduced bias into the data collection. However the changes in error rates and locum attendances are supported by the consistently positive feedback that was provided by RCF staff and GPs which indicated that they were strongly of the opinion that the new model of care improved the medication discharge process, avoided medication delays and reduced urgency for medical attendance.
Finally, it is possible that not all eligible discharges from the participating health services were captured, particularly because the health services’ patient administration systems (PAS) did not include a searchable field that could reliably identify patients discharged to residential care. Therefore patients’ discharge addresses as recorded in the PAS had to be relied upon. In some cases, even for RCFs, only a street address is provided (without the name of the RCF) which may lead to patients being overlooked. To overcome this at Austin Health ward pharmacists alerted the project officer whenever they received a discharge prescription for a patient going to a RCF. At Northern Health no reliable alternative case-identification method could be found, so a daily PAS search was used as the primary method. Discharges from the Emergency Departments of both health services were excluded.

8.4 Australian Pharmaceutical Advisory Council guidelines for continuity of medication management

The new model of care for medication management on transfer from hospital to residential care developed in this project makes a substantial contribution toward meeting hospitals’ and RCFs’ responsibilities and needs under the Australian Pharmaceutical Advisory Council (APAC) Guiding Principles for Continuity of Medication Management (Table 8.1).

Table 8.1 - APAC Guiding Principles for Continuity of Medication Management and how they are addressed through the new model of care.

<table>
<thead>
<tr>
<th>Relevant Guiding Principle</th>
<th>How the new model of care contributes to meeting the principle</th>
</tr>
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<tbody>
<tr>
<td>7. Supply of medicines information</td>
<td>The IRCMAC provides a source of discharge medicines information for the patient’s carers (RCF staff) that enables them to safely administer and record the medicines without delay and for up to 7 days, until the patient is reviewed by their GP.</td>
</tr>
<tr>
<td>Before consumers transfer to another health care provider, they and/or their carers will receive sufficient information, in a form they can use and understand, to enable them to safely and effectively use all medicines in accordance with the agreed Medication Action Plan.</td>
<td></td>
</tr>
<tr>
<td>9. Communicating medicines information</td>
<td>The IRCMAC provides an accurate discharge medication list and a record of the times that the last doses were administered in hospital. It also provides a brief summary of</td>
</tr>
<tr>
<td>When a consumer is transferred to another episode of care, the transferring health care provider(s) should supply comprehensive,</td>
<td></td>
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</tbody>
</table>
complete and accurate information to the health care provider(s) responsible for continuing the consumer’s medication management in accordance with their Medication Action Plan. Information about medication changes made in hospital (designed to supplement rather than replace more detailed information about the rationale for medication changes that should be provided in the medical discharge summary).

The APAC guidelines highlight that discrepancies between discharge summaries and discharge prescriptions are common. Discrepancies between the IRCMAC and discharge prescriptions are avoided through a process that links the production of the IRCMAC, to the review and processing of the discharge prescriptions by the hospital pharmacist.

<table>
<thead>
<tr>
<th>4. Accurate medication history</th>
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<tbody>
<tr>
<td>An accurate and complete medication history should be obtained and documented at the time of presentation or admission, or as early as possible in the episode of care.</td>
</tr>
<tr>
<td>Sending an IRCMAC with the patient ensures that the RCF and GP have access to an accurate and complete medication history at the time the patient arrives at the RCF. Providing a copy to the patient’s community pharmacy ensure they also have timely access to this information.</td>
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**8.5 Arrangements for medication supply on discharge**

The APAC Guiding Principles for Continuity of Medication Management (Guiding Principle 8: Ongoing access to medicines) state: “Consumers and/or their carers should receive sufficient supplies of appropriately labelled medicines (with the active ingredient name and brand name displayed) and information about how to obtain further supply of medicines to support their Medication Action Plan.”

Although lack of access to an updated medication administration chart was the main barrier to continuity of medication administration, problems associated with medication supply and packaging also contributed to medication administration errors and use of inefficient and potentially unsafe practices by RCF staff. Lack of availability of medications packed in the RCF’s preferred medication management format (usually a dose administration aid) led to a medication administration error in 6% of patients during Stage 1.

Problems around medication supply and packaging were not addressed in this project, however we believe this needs to occur as a matter of urgency. As well as contributing to medication administration errors, the current arrangements for medication supply are a source
of inefficient work practices for hospital and community pharmacists and RCF staff. They also result in wastage of government-subsidised medications (especially in states that use the Pharmaceutical Benefits Scheme for hospital discharge medications), for example when the community pharmacy contracted to supply medication to the residential care facility outsources medication supply to a unit-dose packaging company that cannot use the hospital-supplied medications.

A variety of medication packing and administration systems (dose administration aids) are used in RCFs, making it difficult for discharging hospitals to provide medications in an individual facility’s preferred format. For this reason, as well as workforce and resourcing considerations, most hospitals do not routinely pack discharge medications into dose administration aids. To provide RCF staff with medications packed in their preferred format, some hospitals outsource discharge medication supply to the RCF’s contracted community pharmacy. However this can lead to delays in some cases, depending on how much notification the community pharmacy is given, what time of day the patient is discharged, how frequently the pharmacy makes deliveries to the RCF, and their distance from the RCF. These delays can contribute to adverse outcomes. Furthermore, there are potentially adverse financial consequences for the hospital or state health department when hospital Pharmaceutical Benefits Scheme (PBS) prescriptions are dispensed in the community. Other hospitals dispense the discharge medications and send them with the patient in original packaging. This ensures the medications are available at the RCF in a timely fashion, but if there are no staff qualified to administer the medications from original packaging then medication administration errors can still occur. This is especially the case for low-level care and Supported Residential Service facilities. In these cases the medications need to be collected from the RCF by the community pharmacy, to be re-packed.

There is no simple solution to overcome these problems. Given the typically short notice of hospital discharge, especially in the acute care setting, it is likely that the most reliable way to ensure medications are available at the RCF packed in a dose administration aid is by having the hospital pack the medications and send them with the patient. However this would require a number of issues to be addressed, such as:

- all RCFs agreeing on a single dose administration aid format for use during the interim period (up to 7 days) while waiting for their own pharmacy to supply medications in their preferred dose administration aid format.
• hospitals acquiring additional resources (manpower, facilities and equipment) for repacking discharge medications into dose administration aids, and
• changes to PBS funding/reimbursement for medications dispensed by hospitals for patients discharged to RCFs, so that hospitals do not face the choice of either dispensing PBS quantities (usually at least 30 days) that may result in medication wastage and extra financial burden on patients, or dispensing only 7 days and not being able to fully recoup costs through the PBS.

8.6 Provision of an IRCMAC from non-inpatient ward areas

The hospital pharmacy-generated IRCMAC developed in this project can only be produced during Pharmacy Department business hours. Although most discharges from inpatient wards occur during these hours there is a need for hospitals to be able to provide an IRCMAC at other times, especially in the Emergency Department (ED) setting where discharges may occur at any time.

Some hospitals (e.g. Northern Health) have piloted the use of handwritten interim medication charts for RCF discharges from the ED. Although the EDs of the participating hospitals were not included in our project, to address this additional need we have recently adapted the pharmacy-generated IRCMAC for the ED setting, as a handwritten interim chart (Appendix G). Unlike the pharmacy-generated IRCMAC (that is designed to include all of the patient’s medications and therefore usually replaces the RCF’s medication chart), the handwritten IRCMAC is designed primarily for situations where there is a need to make minor changes to the patient’s medication regimen (e.g. addition of antibiotics or analgesics). Therefore the chart is designed to be used in addition to the existing RCF medication chart. This chart is currently being piloted in the ED at Austin Health. It could also be useful in outpatient departments, which is another area where minor medication changes are commonly made, and where delays sometimes occur before the patient is able to receive the newly prescribed medication after arrival back at the RCF.

8.7 Generalisability and implementation of the IRCMAC at other hospitals

Preliminary findings from this project have been presented at a range of forums.\textsuperscript{19-22} As a result there has already been strong interest from many hospitals keen to implement the
IRCMAC. At least two major metropolitan healthcare networks in Victoria are planning to begin implementing the pharmacist-generated IRCMAC in the first half of 2010. There has also been interest from other states. There is a very strong desire from the residential care sector and from general practice for the IRCMAC to be implemented at all hospitals.

Given that RCFs receive patients from multiple hospitals, it will be important that a standardised interim medication administration chart format is used by all hospitals, to minimise risk of medication errors. Processes will need to be put in place to oversee and fund implementation of a hospital-provided interim residential care medication administration chart, and manage version control for the chart, in order to ensure consistency across hospitals.

We have developed systems that could enable the pharmacy-generated IRCMAC to be provided by other hospitals, via either the Merlin (Pharmhos), iPharmacy (iSoft)-Healthpower (Northern Health) or Webstercare (Manrex-Webstercare) software packages. Based on our experiences with developing these modules we believe it would be relatively easy for other pharmacy software vendors to incorporate an IRCMAC, using processes similar to the way most pharmacy dispensing systems produce discharge medication lists (e.g. Medilists).

Austin Health plans to make the Merlin IRCMAC module available to other Merlin users at no cost (there are likely to be set-up costs charged by the software vendor). Northern Health is continuing to develop the Healthpower IRCMAC module for use with the iPharmacy application and would be happy to discuss the development process used with other hospitals running the iPharmacy system. The Webstercare software is inexpensive and can be linked to most pharmacy dispensing systems; although it provides a less well-integrated solution it may suit some hospitals.

Another way an IRCMAC could be provided is by integrating it into hospitals’ electronic prescribing modules, as has been done at one Victorian health service (Barwon Health). With the current move toward electronic prescribing (e.g. Cerner Millennium in Victoria), development of electronic prescribing packages should incorporate an IRCMAC that could be auto-populated from the electronic prescription. Like the pharmacy-generated IRCMAC this would negate the possibility of transcription errors. However there would need to be
processes in place to ensure that the IRCMAC corresponds with the final version of the discharge prescription(s), after review and reconciliation by the hospital pharmacist.

8.8 Conclusion

A hospital pharmacy generated, electronically prepared, interim residential care medication administration chart resulted in significantly fewer medication administration errors and locum medical practitioner callouts when patients were transferred from hospital to residential care. As outlined in the ‘Recommendations’ section, below, we recommend a roll-out of this new process to all hospitals and RCFs nationally, in a systematic way.
9. RECOMMENDATIONS

Based on the findings of this project, we make the following recommendations to hospitals, governments and professional organisations:

**Recommendation 1**

All patients discharged from hospital to a residential care facility should be provided with a 7-day interim residential care medication administration chart.

*Rationale*: An interim residential care medication administration chart enables medications to be safely administered and recorded as soon as a patient arrives at the residential care facility and reduces the need for urgent medical practitioner attendance for the sole purpose of writing a medication chart.

**Recommendation 2**

The process used to produce the interim residential care medication administration chart should ensure that the chart is consistent with the intended discharge medications (usually the final reconciled discharge prescription(s)).

*Rationale*: Discrepancies commonly occur between discharge prescriptions and other sources of discharge medication information. The discharge prescription, provided it has been reviewed and reconciled against the patient’s pre-admission medication list and current inpatient medication chart (usually by a hospital pharmacist), is usually the most reliable discharge medication list. Discrepancies between the interim residential care medication administration chart and discharge prescriptions could lead to medication errors and adverse patient outcomes. To minimise risk of discrepancies, the interim residential care medication administration chart should not be produced until the discharge prescription(s) have been reviewed and reconciled as described above. Once the interim medication chart is produced it should also be reconciled against the final confirmed discharge prescription(s) before it is provided to the residential care facility.
Recommendation 3

The time that the last dose of each medication was administered in hospital on the day of discharge should be provided on the interim residential care medication administration chart.

Rationale: Providing information about the time of the last medication dose facilitates accurate continuity of medication administration at the residential care facility and reduces the need for residential care facility staff to call the hospital and/or obtain copies of hospital inpatient medication charts (which can lead to confusion about what medications the patient needs to receive after discharge from hospital).

Recommendation 4

The interim residential care medication administration chart should be used to communicate information about discharge medications and medication changes made in hospital to residential care staff, general practitioners and community pharmacists (unless hospitals have an alternative system for reliable and timely provision of medication information to all healthcare team members involved in medication management in residential care). Information provided on the interim medication administration chart should supplement rather than replace information provided in medical discharge summaries.

Rationale: Residential care staff, general practitioners and community pharmacists need to have access to accurate discharge medication information as soon as the patient arrives at the residential care facility. Medical discharge summaries are not consistently available on the day of hospital discharge. Even when the medical discharge summary is available on the day of discharge, the medication information provided may be incomplete, and copies are not provided to all members of the healthcare team involved in the handover of medication management.

Recommendation 5

The interim residential care medication administration chart should be provided in a standardised format by all hospitals, and processes should be put in place to oversee and fund nation-wide implementation and to manage version control.
Rationale: Residential care facilities receive patients from numerous hospitals, so it is important that a standardised interim medication administration chart format is used by all hospitals (similar to the National Inpatient Medication Chart), to minimise the risk of medication administration errors. Uncoordinated implementation, and lack of implementation support, may result in multiple versions of the interim residential care medication administration chart.

Recommendation 6

The use of interim residential care medication administration charts, including hospital pharmacist generated charts (not signed by a medical practitioner), should be written into relevant practice guidelines and standards for residential care.

Rationale: Residential care staff rely on practice guidelines and standards to guide their professional practice. There is sometimes reluctance to implement new processes if they are not supported by relevant practice guidelines and standards. The legality of using a medication administration chart that is not written or signed by a medical practitioner should be confirmed for states other than Victoria.

Recommendation 7

Further work to improve medication supply and packaging arrangements during the transition from hospital to residential care should be undertaken.

Rationale: Problems associated with medication supply and packaging contribute to medication administration errors and use of potentially unsafe and inefficient practices by residential care facility staff, especially in low-level care RCFs and special residential services. They are a source of inefficient work practices for hospital and community pharmacists, RCFs and GPs. They also result in wastage of government-subsidised medications (especially in states that use the Pharmaceutical Benefits Scheme for hospital discharge medications), for example when the community pharmacy contracted to supply medication to the residential care facility outsources medication supply to a unit-dose packaging company that cannot use the hospital-supplied medications.
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2. McDonald T. For their sake: Can we improve the quality and safety of resident transfers from acute hospitals to residential aged care? Australian Catholic University; 2007.

3. Schiller T. Continuity of care in therapeutics: a pilot study to further implement the APAC guiding principles to achieve continuity in medication management between hospital and residential aged care facilities. University of South Australia; 2006.


5. Spurling L. Implementation of a supported care discharge prescription across the hospital to the residential care interface. Redesigning care program. Flinders Medical Centre and Southern Division of General Practice, South Australia 2005.


9. Crotty M, Rowett D, Spurling L, Giles L, Phillips P. Does the Addition of a Pharmacist Transition Coordinator Improve Evidence-Based Medication Management and Health Outcomes in Older Adults Moving from the Hospital to a Long-Term Care Facility? Results of a Randomized, Controlled Trial. Am J Geriatr Pharmacother 2004; 2: 257-64.


-93-


11. APPENDICES
11.1 Appendix A – Classification of clinical significance of missed and delayed doses

Classification criteria:
The clinical significance of missed or delayed doses is based on the *likelihood* and *potential severity* of an adverse consequence if 1 or more doses is missed or significantly delayed\(^\wedge\) during the first 24 hours after discharge from hospital to residential care, for a typical patient.*

\(^\wedge\) “Missed dose” is defined as medication dose completely omitted; “Delayed dose” is defined as: regularly scheduled medication dose delayed by >50% of the prescribed dose-interval (e.g. 12 hourly medication given more than 6 hours late) or PRN medication dose delayed by any length of time after it was required by the patient.

* “Typical patient” refers to the average patient transferred from hospital to residential care: frail, 84 year old female with multiple comorbidities, prescribed 9 regularly scheduled medications and 1 ‘prn’ medication, transferring to a high-level care facility.

<table>
<thead>
<tr>
<th>Highly significant</th>
<th>Moderate to high likelihood of a high-severity adverse consequence(^#)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderately significant</td>
<td>Moderate to high likelihood of a medium-severity adverse consequence(^#)</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>Low likelihood of a high-severity adverse consequence(^#)</td>
</tr>
<tr>
<td>Low significance</td>
<td>Any likelihood of a low-severity adverse consequence(^#)</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>Low likelihood of a medium-severity adverse consequence(^#)</td>
</tr>
</tbody>
</table>

\(^\#\) “High severity adverse consequence” would include any adverse consequence that could cause major patient discomfort or harm or that may require either medical attendance or readmission to hospital;

“Medium-severity adverse consequence” would include any adverse consequence that could cause mild to moderate patient discomfort or harm or that may require telephone consultation with a medical practitioner;

“Low-severity adverse consequence” would include any situation other than the above.

<table>
<thead>
<tr>
<th>Highly significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong analgesics (e.g. morphine, oxycodone)</td>
</tr>
<tr>
<td>Anticoagulants</td>
</tr>
<tr>
<td>Antiparkinsonian medications</td>
</tr>
<tr>
<td>Bronchodilators (when prescribed for prn use)</td>
</tr>
<tr>
<td>Insulin</td>
</tr>
<tr>
<td>Pyridostigmine (for Myasthenia gravis)</td>
</tr>
</tbody>
</table>
## Moderately significant

<table>
<thead>
<tr>
<th>Medications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milder analgesics (e.g. paracetamol, NSAIDs)</td>
<td>Bronchodilators (when prescribed for regular use)</td>
</tr>
<tr>
<td>Acid suppressing medications / antacids (when prescribed for prn use)</td>
<td>Cardiovascular medications except diuretics and amiodarone**</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>Colchicine</td>
</tr>
<tr>
<td>Antidiarrhoeals</td>
<td>Oral corticosteroids</td>
</tr>
<tr>
<td>Antiemetics</td>
<td>Potent diuretics (e.g. frusemide)</td>
</tr>
<tr>
<td>Anticonvulsants (when prescribed for seizure disorders or BPSD*)</td>
<td>Glaucoma medications</td>
</tr>
<tr>
<td>Antihistamines (when prescribed for prn use)</td>
<td>Sulphonylurea oral hypoglycaemics</td>
</tr>
<tr>
<td>Antipsychotics</td>
<td>Immunosuppressants (for prevention of organ transplant rejection)</td>
</tr>
<tr>
<td>Benzodiazepines (when prescribed for regular use for any indication, or for prn use in BPSD or anxiety disorders)</td>
<td></td>
</tr>
</tbody>
</table>

*BPSD = Behavioural & psychological symptoms of dementia

**Missed doses of amiodarone less significant because of very long half-life

## Low significance

<table>
<thead>
<tr>
<th>Medications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid suppressing medications (when prescribed for regular use)</td>
<td>Thiazide diuretics and indapamide</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>Non-sulphonylurea oral hypoglycaemics (e.g. metformin, rosiglitazone, acarbose, sitagliptin)</td>
</tr>
<tr>
<td>Anticonvulsants (when prescribed for pain syndromes)</td>
<td>Laxatives</td>
</tr>
<tr>
<td>Antidepressants (for any indication)</td>
<td>Lipid-lowering medications</td>
</tr>
<tr>
<td>Antihistamines (when prescribed for regular use)</td>
<td>Lubricant eye drops</td>
</tr>
<tr>
<td>Antiplatelet drugs</td>
<td>Mineral supplements (e.g. potassium, magnesium, etc.)</td>
</tr>
<tr>
<td>Benzodiazepines (when prescribed for prn use for insomnia)</td>
<td>Thyroxyine</td>
</tr>
<tr>
<td>Bisphosphonates, strontium</td>
<td>Topical medications (anti-infectives, analgesics, steroids, etc.)</td>
</tr>
<tr>
<td>Cholinesterase inhibitors &amp; memantine (for dementia)</td>
<td>Urate lowering medications (e.g. allopurinol)</td>
</tr>
<tr>
<td>Immunosuppressants (for auto-immune diseases)</td>
<td>Vitamin supplements (e.g. vitamin D, thiamine)</td>
</tr>
<tr>
<td>Inhaled corticosteroids</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix B – Interim Residential Care Medication Administration Chart

#### Regular Medications

<table>
<thead>
<tr>
<th>Medication</th>
<th>Date Administration Times</th>
<th>Change Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASPIRIN 100mg TABLETS (DBL ASPIRIN)</td>
<td></td>
<td>UNCHANGED</td>
</tr>
<tr>
<td>Take ONE tablet daily.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERINDOPRIL ARGININE 2.5mg TABLETS (COVERSYL)</td>
<td></td>
<td>DOSE DECREASED – hypotension (25/3)</td>
</tr>
<tr>
<td>Take ONE tablet daily.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIMVASTATIN 40mg TABLETS (GENRX SIMVASTATIN)</td>
<td></td>
<td>UNCHANGED</td>
</tr>
<tr>
<td>Take ONE tablet at night.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PARACETAMOL 500mg TABLETS (PARACETAMOL SANDOZ)</td>
<td></td>
<td>DOSE INCREASED</td>
</tr>
<tr>
<td>Take TWO tablets FOUR times a day. (Do not take more than 8 tablets containing PARACETAMOL in 24 hours).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OXYCODONE CR 5mg TABLETS (OXYCONTIN)</td>
<td></td>
<td>NEW – for pain associated with osteoarthritis (25/3)</td>
</tr>
<tr>
<td>Swallow whole ONE tablet TWICE a day.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This chart has been generated by the hospital pharmacy department, based on the discharge prescription (copy attached). The list of medications has been reviewed by the hospital pharmacist and reconciled with the resident's inpatient medication chart and medications prior to admission.

**CHECKED BY:** ……………………….. (Pharmacist)
### Interim Residential Care Medication Administration Chart

This interim medication chart is only to be used until the resident is reviewed by his/her general practitioner (within 7 days of hospital discharge).

<table>
<thead>
<tr>
<th>ALLERGIES &amp; ADVERSE DRUG REACTIONS (ADR)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Nil known</td>
<td>□ Unknown</td>
<td></td>
</tr>
<tr>
<td><strong>Drug (or other)</strong></td>
<td><strong>Reaction &amp; Date (if known)</strong></td>
<td></td>
</tr>
<tr>
<td>Penicillin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**UR:** 123456  
**Family name:** TEST  
**Given name(s):** Andrew smr  
**Address:** 2 Napier Road Studley Road BOX HILL 3128  
**Date of birth:** 21 Mar 1925  
**Date printed:** 31 Mar 2010  
**Doctor:** Unk UNKNOWN

---

#### AS REQUIRED “PRN” MEDICATIONS

<table>
<thead>
<tr>
<th>MEDICATIONS</th>
<th>ADMINISTRATION DETAILS</th>
<th>CHANGE STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DOCUSATE-SENN 50mg-8mg TABLETS (COLOXYL WITH SENNA)</strong></td>
<td>Date</td>
<td>NEW – for constipation associated with opioids</td>
</tr>
<tr>
<td>Take TWO tablets TWICE a day if required for relief of constipation.</td>
<td>Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dose</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sign</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Date</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dose</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sign</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OXYCODONE 5mg CAPSULES (OXYNORM)</th>
<th>Date</th>
<th>NEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swallow whole ONE capsule FOUR times a day if required for strong pain.</td>
<td>Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dose</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sign</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Date</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dose</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sign</td>
<td></td>
</tr>
</tbody>
</table>
Interim Residential Care Medication Administration Chart

This interim medication chart is only to be used until the resident is reviewed by his/her general practitioner (within 7 days of hospital discharge)

ALLERGIES & ADVERSE DRUG REACTIONS (ADR)

☐ Nil known ☐ Unknown

Drug (or other) Reaction & Date (if known)

Penicillin

UR: 123456
Family name: TEST
Given name(s): Andrew smr
Address: 2 Napier Road Studley Road BOX HILL 3128
Date of birth: 21 Mar 1925 Male
Date printed: 31 Mar 2010
Doctor: Unk UNKNOWN

MEDICATIONS CEASED IN HOSPITAL

<table>
<thead>
<tr>
<th>Medication</th>
<th>Date ceased (if known)</th>
<th>Reason (if known)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prazosin</td>
<td>25/3/2010</td>
<td>Hypotension</td>
</tr>
</tbody>
</table>

COMMENTS

REPLACEMENT CHART: This chart replaces the resident’s residential care medication chart(s) until these have been reviewed/updated by the general practitioner

Glucosamine not charted as not stocked in hospital. GP to review whether ongoing treatment required.

Acknowledgements: This chart was developed by Austin Health, Northern Health, North East Valley Division of General Practice and Monash University Centre for Medicine Use & Safety, in consultation with the Aged Care Standards & Accreditation Agency, Australian Nursing Federation, Nurses Board of Victoria, and the Victorian Department of Health (Drugs and Poisons Unit, Aged Care Branch, Ambulatory & Continuing Care Programs Branch, Quality Use of Medicines Program), with financial support from the JO & JR Wicking Trust. The chart design is based on the National Inpatient Medication Chart and an interim aged care medication chart developed by Queensland Health.

Contact details:
Pharmacist named on this chart: 9496 5000 and ask for the pharmacist by name or pager number.
Ward or treating doctor: 9496 5000 and ask for the ward or doctor by name.
Pharmacy Department, Austin Hospital: 9496 5291 (Hours: 0830-1730 Monday-Friday; 0900-1300 Sat-Sun)
Pharmacy Department, Heidelberg Repat.: 9496 4246 (Hours: 0830-1730 Monday-Friday)
Pharmacy Department, Royal Talbot: 9496 7587 (Hours: 0900-1700 Monday-Friday)

Pharmacist Name: ................................................. Contact: ..................

This chart has been generated by the hospital pharmacy department, based on the discharge prescription (copy attached). The list of medications has been reviewed by the hospital pharmacist and reconciled with the resident’s inpatient medication chart and medications prior to admission.

CHECKED BY: ...........................................(Pharmacist)

-101-
### 11.3 Appendix C - Themes arising from stakeholder consultation workshops

<table>
<thead>
<tr>
<th>Theme / Issue</th>
<th>Actions/strategies to address issues raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legality of an interim medication administration chart (IRCMAC) that is not signed by a medical practitioner</td>
<td>Wrote to all RCFs that participated in Stage 1, explaining new process, how we had addressed these issues (including consultation with Drugs &amp; Poisons (Department of Health), ANF, Aged Care Standards &amp; Accreditation Agency), and provided a sample policy &amp; procedure for interim medication management &amp; use of the IRCMAC</td>
</tr>
<tr>
<td>Whether an IRCMAC that is not signed by a medical practitioner meets nursing guidelines &amp; standards</td>
<td>Asked RCFs to table these at their next Medication Advisory Committee meeting, with a view to adopting the interim medication management policy (or an adaptation of it) at the facility</td>
</tr>
<tr>
<td>Some RCFs have existing policies that medication charts must be signed by a doctor</td>
<td>Developed brief instructions and “frequently asked questions” to be provided to RCF with every IRCMAC.</td>
</tr>
<tr>
<td>Accuracy of a hospital-provided IRCMAC</td>
<td>Included brief instructions/information on the IRCMAC - e.g. “The enclosed interim medication chart can be used for up to 7 days or until resident is reviewed by his/her GP. It has been developed in consultation with …………”</td>
</tr>
<tr>
<td>Concerns that IRCMAC may go missing during transit from hospital pharmacy to RCF (existing RCF and hospital transfer envelopes sometimes go missing)</td>
<td>Wrote to GPs servicing RCFs in the region (with similar information to that sent to RCFs)</td>
</tr>
<tr>
<td></td>
<td>Included information in Division of General Practice newsletters and website.</td>
</tr>
<tr>
<td>IRCMAC layout/wording</td>
<td>Enclose IRCMAC in a brightly coloured transparent plastic sleeve</td>
</tr>
<tr>
<td>Need for additional spaces for signing for prn medication administration</td>
<td>Used a separate envelope for PBS script (if this is sent with patient; Northern Health only)</td>
</tr>
<tr>
<td>RNs can now sign for multi-dose administration</td>
<td>Put IRCMAC in the bag of medications if medications supplied</td>
</tr>
<tr>
<td>Dose-times not required to be specified by hospital, but need more specific directions than “daily”</td>
<td>Modified IRCMAC layout/wording according to suggestions made</td>
</tr>
<tr>
<td>How to address warfarin &amp; variable-dose meds</td>
<td>Encourage hospital pharmacists to avoid using “daily” when typing directions, where possible</td>
</tr>
<tr>
<td></td>
<td>Include full directions (with dates) for variable/weaning doses, and hand-write doses to be given each day in the administration section of the IRCMAC</td>
</tr>
<tr>
<td>Theme / Issue</td>
<td>Actions/strategies to address issues raised</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------</td>
</tr>
</tbody>
</table>
| • How will RCFs distinguish between an IRMAC that includes all medications versus only new medications? | • Hospital pharmacists to indicated on the IRMAC (in ‘comments’ field)  
  o Included in hospital protocol for RCF discharges |
| • Hospital pharmacists’ workload & workflow; short-notice of discharge especially in acute wards | • Provided education to pharmacists & technicians re rationale & procedures  
• Streamlined/simplified process as much as possible (e.g. don’t require dose-times to be specified, replace Austin fax-letter with IRMAC + standardised fax cover-sheet)  
• Encouraged ward pharmacists to use the “medication changes” section on their inpatient care plans more consistently.  
• Piloted & refined process and software  
• Provided education to ward staff (nurses & ward clerks) so they could appreciate the process and the time the pharmacist required to complete it after discharge script received (so that pharmacists are given adequate time before patient transport booked)  
• Agreed that pharmacists could fax IRMAC to RCF after discharge (but before next dose due) in cases of urgent / short-notice discharges |
| • Medical discharge summaries not routinely sent to RCFs (only to GPs) | • Decided that this issue was beyond the scope of this project, but included ‘change status’ and ‘medications ceased’ on IRMAC to at least partly address this information gap. |
| • Discharge summaries / summary of changes not sent to community pharmacists | • IRMAC (with change status / medications ceased) faxed to community pharmacy |
| • Community pharmacists’ concerns about medication supply (e.g. original scripts going missing, need to collect & re-pack medications, drug chart sometimes used as a prescription, etc) | • No change to medication supply processes at this stage, as described in Section 6.3.1 and 7.2.3.  
  o Nb. Community pharmacists generally supportive of this approach and can see benefit for them with use of IRMAC and current supply arrangements. |
MEDICATION MANAGEMENT AFTER DISCHARGE FROM HOSPITAL USING AN INTERIM RESIDENTIAL CARE MEDICATION ADMINISTRATION CHART SUPPLIED BY AUSTIN HEALTH / NORTHERN HEALTH

RECOMMENDED POLICY & PROCEDURE

Preamble

1 Medication-related problems occur in up to two thirds of patients transferred from hospital to aged care homes (ACHs)\(^c\).

2 Modified medication management procedures are required to ensure timely and safe medication administration for residents during the interim period between discharge from hospital and review by their General Practitioner (GP) at the ACH.

3 This policy is to be used in conjunction with, and does not replace the ACH’s existing policies regarding the medication management of residents.

Policy

1 After a resident has been discharged from hospital, a hospital-provided interim medication administration chart can be used by aged care home staff for up to 7 days until the next medication review by the GP.

2 The Austin Health / Northern Health interim residential care medication administration chart does not need to be signed by a medical practitioner when it is accompanied by a copy of the corresponding discharge prescription that has been signed by the hospital medical practitioner.\(^d\)

Standard Operating Procedure

This document provides a standard operating procedure (SOP) for managing residents’ medications in the interim period following discharge from hospital to an ACH, before the resident has been reviewed by their GP.

Austin Health / Northern Health Interim Residential Care Medication Administration Chart (hereafter referred to as the ‘interim medication chart’)

- The purpose of the interim medication chart is to:
  - Provide an accurate list of the medications that the hospital medical team has prescribed for the resident to receive until they are reviewed by their GP.
  - Communicate medication changes made during the resident’s hospital stay.
  - Be used to record medication administration in the interim period (for up to seven days) until the resident’s long-term ACH medication chart is written and signed by their GP.

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\(^c\) Australian Catholic University and Aged Care Association Australia (2007). *For their sake: can we improve the quality and safety of resident transfers from acute hospitals to residential aged care?*

\(^d\) It is not a legal requirement for the medication administration chart to be signed by a medical practitioner provided the medications have been prescribed by a medical practitioner and dispensed by a pharmacist (Drugs and Poisons Unit, Department of Human Services Victoria).
• The interim medication chart is produced by the hospital pharmacist based on the hospital discharge prescription and will be accompanied by a copy of the discharge prescription signed by the hospital medical practitioner.
• Before producing the interim medication chart, accuracy and completeness of the discharge prescription is reviewed by the hospital pharmacist. This review also involves identifying medication changes by reconciliation with medications prior to admission and the inpatient medication chart.
• The interim medication chart will contain a complete list of the resident’s current medications and is designed to replace the pre-admission medication chart, EXCEPT when the only change made in hospital is the addition of new medication(s) (e.g. uncomplicated hospital admission requiring the addition of an antibiotic) - in this case the interim chart is to be used in conjunction with the ACH pre-admission medication chart (This will be clearly documented in the “Comments” field of the interim chart).
• The interim medication chart will list both the GENERIC medication name and one BRAND name. The brand listed will be the brand dispensed by the hospital if medications have been supplied, but it may not necessarily correspond with the brand dispensed by the community pharmacy.

Procedure

1. Check medication availability and organise further supply

Facility administering from original packaging

1.1 Check whether there is adequate supply of the resident’s current medications to correspond with the interim medication chart (i.e. new, changed and existing medications).
1.2 Contact community pharmacy to inform of resident’s arrival and have medications dispensed (if necessary) prior to next scheduled dose.

Facility administering from dose administration aid

1.3 Contact community pharmacy to inform of resident’s arrival and ensure medications are delivered to the facility in a dose administration aid prior to resident’s next scheduled dose.
1.4 If medications are not available in a dose administration aid in time for next scheduled dose, administer medications from the original dispensed packaging (if available).

2. Organise medical review and long-term ACH medication chart

2.1 Contact resident’s usual GP to inform of ACH admission. Request a medical review of resident by GP within 7 days. Inform GP that an interim medication chart has been provided and will be used in the interim period.

3. Administer medications using interim medication chart

3.1 Record medication administration on the interim medication chart until long-term medication chart has been updated / written.
3.2 File interim medication chart in resident’s ACH file upon completion of its use.
### HOW TO USE THE INTERIM RESIDENTIAL CARE MEDICATION ADMINISTRATION CHART

1. **Ensure all medications listed on the interim medication chart are available**
   - Contact community pharmacy (if necessary) to arrange supply prior to first scheduled dose

2. **Contact resident’s general practitioner (GP)**
   - Inform of resident’s admission
   - Request a medical review within 7 days
   - Inform GP that a 7-day interim medication chart has been supplied and will be used until GP attends
     - An urgent GP / locum visit is not required purely to write up the facility long term medication chart

3. **Administer medications using the Interim Medication Chart until GP is able to write / update the long-term medication chart**
   - File interim medication chart in resident’s ACH file upon completion of its use

*The Austin Health / Northern Health Interim Medication Administration Chart has been developed in consultation with the Aged Care Standards & Accreditation Agency, Australian Nursing Federation, Nurses Board of Victoria, and the Victorian Department of Human Services (Drugs and Poisons Unit, Aged Care Branch, Ambulatory & Continuing Care Programs Branch, Quality Use of Medicines Program), with financial support from the JO & JR Wicking Trust.*
FREQUENTLY ASKED QUESTIONS

1. Is the interim medication administration chart legal, given that it is not signed by a medical practitioner?
   - **Yes:** The interim medication administration chart has been developed in consultation with the Drugs & Poisons Unit (Department of Human Services), and they are satisfied that it meets all legal requirements for medication administration in residential care.
   - The interim chart is not a prescription, therefore there is no legal requirement for it to be signed by a medical practitioner. The interim chart allows you to record the administration of medications that have been dispensed & labelled with directions by a pharmacist.
   - “The legal authority to administer medications is on the dispensed medication, with the chart being a means to record the transaction”.
     *Drugs and Poisons Unit, Department of Human Services Victoria*

2. Does the chart comply with the APAC/ANF “Nursing Guidelines for the Management of Medicines in an Aged Care Setting”?
   - **Yes:** The interim medication administration chart has been developed in consultation with the Australian Nursing Federation, and they are satisfied that it meets the guidelines for medication administration in residential care, provided it is accompanied by a copy of the corresponding discharge prescription that has been signed by a medical practitioner.

3. Does the chart comply with aged care accreditation standards?
   - **Yes:** The interim medication administration chart has been developed in consultation with the Aged Care Standards and Accreditation Agency, and they are satisfied that it meets their criteria for a safe and legal medication administration system in residential care.

4. How can I be sure that the medication chart is accurate?
   - The interim medication administration chart provided by Austin Health / Northern Health is based on the hospital discharge prescription. Before the interim chart is produced, a hospital pharmacist checks the discharge prescription against the resident’s pre-admission medications and inpatient medication chart, and addresses any discrepancies with the medical team.

5. Does the interim medication chart REPLACE the existing long-term facility chart?
   - **Yes:** In most cases the chart will contain a complete list of the medications that the hospital medical team would like the resident to take until they are reviewed by their GP.
   - **No:** If there were no changes to the resident’s pre-admission medications in hospital, then the chart may only include any NEW medications that were added. In this case the chart should be used in addition to the long-term facility chart. **This will be clearly stated in the “Comments” section of the interim medication chart.**

For further information, please refer to [www.nevdgp.org.au](http://www.nevdgp.org.au)
Protocol for Patients Discharged to a Residential Care Facility (RCF)

(This protocol applies only after the discharge prescription has been reviewed and reconciled against the patient’s pre-admission medication list and current inpatient medication chart)

- **Contact RCF nurse in charge** to inform them of discharge, and:
  - notify about medication supply arrangements,
  - notify that an interim medication administration chart will be provided that can be used for up to 7 days, until GP reviews the resident, and
  - obtain community pharmacy name & fax no. (if unknown)

- **Dispense medications** (PBS/prescribed quantities; Charge as usual):
  - ALL medications for residents going to a new facility, or
  - NEW / CHANGED medications only for residents returning to a facility

- **Generate interim medication administration chart**
  - Complete “change status” and “medications ceased”
    - include rationale for changes if known (optional)
  - Annotate time last dose of each medication was given

  ^ Interim medication chart needs to be produced even if no medications are supplied, unless there have been no medication changes, in which case only the comments page needs to be completed indicating no changes.

- **Fax community pharmacy** with:
  - discharge prescription
  - interim medication administration chart

  ^ No need to phone community pharmacy unless there are issues that need verbal clarification; Use standard RCF-discharge fax cover-sheet

- **Deliver medications and interim medication chart to ward**
  - Attach copy of discharge prescription to the interim medication administration chart
    - place in red plastic sleeve (along with interim chart instructions)
  - Put red sleeve in the bag of medications (or hand to ward clerk if no medications supplied)
  - Send medications / red plastic sleeve with patient to RCF

* For medico-legal and patient safety reasons it is the policy of Austin Health Pharmacy Department to supply drugs to patients discharged to a RCF rather than faxing the discharge prescription or sending the original PBS prescription to a community pharmacist for dispensing. Dispensing the medication ensures that:
  - Austin Health pharmacists are involved in reviewing the discharge prescription
  - Austin Health has fulfilled its basic duty of care in ensuring continuity of drug treatment

Discharge prescriptions should only be faxed to community pharmacists for information about drug changes and not for drug supply purposes.
11.7 Appendix G – Emergency Department Interim Residential Care Medication Administration Chart
(pilot version)

**Interim Residential Care Medication Administration Chart**

This interim medication chart is to be used in addition to the resident’s existing medication chart until the resident is reviewed by his/her general practitioner (within 7 days)

<table>
<thead>
<tr>
<th>ALLERGIES &amp; ADVERSE DRUG REACTIONS (ADR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Nil known  ☐ Unknown</td>
</tr>
<tr>
<td>Drug (or other) Reaction &amp; Date (if known)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AFFIX PATIENT LABEL HERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescriber to Print Patient Name: ____________________________</td>
</tr>
<tr>
<td>(and Check Label Correct)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REGULAR MEDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE ADMINISTRATION TIMES</td>
</tr>
<tr>
<td>CHANGE STATUS</td>
</tr>
<tr>
<td>PREScriBER TO COMPLETE THIS SECTION</td>
</tr>
</tbody>
</table>

**SIGN THIS SECTION FOR MULTI-DOSE ADMINISTRATION**
(e.g. multi-dose blister pack)

**SIGN BELOW FOR INDIVIDUAL MEDICATION ADMINISTRATION**

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cross if Slow Release</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Route</th>
<th>Dose and Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prescriber Signature</th>
<th>Print your name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| ☐ New medication, to be given in addition to current medications |
| ☐ New medication, to be given instead of the following medication(s): |
| | ....................................................... |
| ☐ Change of dose for existing medication |

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cross if Slow Release</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Route</th>
<th>Dose and Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prescriber Signature</th>
<th>Print your name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| ☐ New medication, to be given in addition to current medications |
| ☐ New medication, to be given instead of the following medication(s): |
| | ....................................................... |
| ☐ Change of dose for existing medication |

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cross if Slow Release</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Route</th>
<th>Dose and Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Prescriber Signature</th>
<th>Print your name</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| ☐ New medication, to be given in addition to current medications |
| ☐ New medication, to be given instead of the following medication(s): |
| | ....................................................... |
| ☐ Change of dose for existing medication |

**If Slow Release box is crossed, the dose must be swallowed without crushing. If the tablet is scored it can be broken in half.**

Turn over for AS REQUIRED “PRN” MEDICATIONS
# Interim Residential Care Medication Administration Chart

This interim medication chart is to be used in addition to the resident's existing medication chart until the resident is reviewed by his/her general practitioner (within 7 days).

## Allergies & Adverse Drug Reactions (ADR)
- Nil known
- Unknown

<table>
<thead>
<tr>
<th>Drug (or other)</th>
<th>Reaction &amp; Date (if known)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## As Required “PRN” Medications

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication</th>
<th>Date</th>
<th>Time</th>
<th>Administration Details</th>
<th>Change Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Route</th>
<th>Dose and Frequency</th>
<th>PRN</th>
<th>Max Dose /24 hours</th>
<th>Date</th>
<th>Time</th>
<th>Dose</th>
<th>Sign</th>
<th>New medication, to be given in addition to current medications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indication</th>
<th>Date</th>
<th>Time</th>
<th>Dose</th>
<th>Sign</th>
<th>Change of dose for existing medication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Prescriber Signature</th>
<th>Print your name</th>
<th>Date</th>
<th>Time</th>
<th>Dose</th>
<th>Sign</th>
<th>Change of dose for existing medication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Medications Ceased in Hospital

<table>
<thead>
<tr>
<th>Medication</th>
<th>Date ceased</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Comments

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>