# AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

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# Phased implementation of the National Residential Medication Chart in NSW residential aged care facilities: Evaluation Report

**April 2014** 

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# **EXECUTIVE SUMMARY**

The national residential medication chart (NRMC) phased implementation in NSW took place over a period of eight months in 2013. The purpose was to embed the medication chart into the residential aged care sector so as to test the functionality and usability of the design and layout in a live environment. The key feature of prescribing, administering, supply and claiming of medicines supported by the Pharamceutical Benefits Scheme (PBS) and its Repatriation Schedule (RPBS) directly from the NRMC was coupled with the intention to improve safety through standard fields and layout, and intuitive design.

Before the phased implementation, the NRMC had undergone a rigorous development and refinement process over 18 months as part of the overall National Residential Medical Chart project. A substantial body of work related to medication charts that had been used specifically in the sector was undertaken, in conjunction with widespread national consultation and human factor testing. This resulted in the endorsement of NRMC1 and a general consensus that the chart was ready for initial use and evaluation in a live environment. Commencing with NRMC1, the phased implementation resulted in two further iterations – NRMC2 and NRMC3.

Residential aged care facilities (RACFs) were selected on the basis of size, location, types and level of care, approved provider status and operational characteristics, such as models of care and associated staffing mix. The phased implementation involved 22 RACFs delivering care to 1,689 residents. Evaluation of the NRMC was based on the data from 4,673 NRMCs used by 1,747 RACF staff, 220 prescribers (general practitioners) and 16 pharmacies.

The final analysis and evaluations demonstrated that the NRMC phased implementation met its objectives. Inbuilt mechanisms were able to comprehensively assess the functionality and usability of the NRMC in relation to paperless prescribing, administering, supply and claiming of PBS/RPBS medicines in selected RACFs in NSW, and could identify any unintended consequences. The phased implementation also provided a snapshot of the current quality use of medicines and practices in a sample of the residential aged care sector. Areas were identified for improvement to the NRMC design, layout and content and support materials such as user and implementation guides. A key feature was the successful involvement of stakeholders. This was driven by the initial NRMC project plan, in which there was an undertaking to ensure ongoing opportunity for end users and key stakeholders to shape the NRMC. The inbuilt mechanisms and collaborative approach facilitated this, with revisions to each iteration of NRMC determined by consensus.

The findings indicate that there are measurable improvements when the NRMC is implemented into the residential aged care environment. The phased implementation found:

- a reduction in the number of medications prescribed per resident from 13.8 to 5.7
- a decrease in the number of medication-related incidents from 9.2 errors per 1000 prescriptions to 3.5 errors per 1000 prescriptions

- an increase in administration signatures
- increased recognition and response to anomalies as a result of improved access and recording of medicine information in the one location.

The reduction of paperwork and improvement to NRMC version control of consecutive medication charts when changes to medicines occurred also contributed to the accuracy of medicines supplied.

This paper provides the context of the NRMC phased implementation, describes its objectives and the method used, and presents the key findings. Recommendations are provided, based on these findings, for future implementation of medication charts into RACFs.

# **1. INTRODUCTION**

Medicine is a ubiquitous health intervention, particularly for older people in residential aged care. While errors occur frequently, few result in residents receiving the wrong medicine (or other errors) and even fewer result in harm. However the volume of medicines used means that the risk is significant.

Errors can occur in all stages of the medication management cycle including prescribing, dispensing, administering and reconciling. Reducing the opportunity for error can reduce the occurrence of errors and reduce the harm experienced by residents.

For example, standardising presentation of medicine information through a medication chart offers significant benefits. This is particularly the case when it is associated with standardised processes for prescribing, dispensing, administering and reconciling.

The Australian Commission on Safety and Quality in Health Care (the Commission) developed and implemented Australia's nationally standard general ward medication chart, the National Inpatient Medication Chart (NIMC), to reduce the incidence of slips and lapses by health professionals throughout the medication management cycle.

The NIMC has improved safety in the acute care settings for which it is designed. But when used in RACFs, it proved problematic. This was largely due to significant differences in medication management in the two settings, including:

- the existence of long-stay residents
- that many doctors prescribe only every six to eight weeks
- the paper-based signature authentication required for Pharmaceutical Benefits purposes (unlike most public hospitals)
- the use of prepackaged dose administration aids often administered by staff other than registered nurses.

Before the development of a national residential medication chart, there had been considerable interest in addressing some of the medicine safety and quality issues faced by RACFs by developing a standard medication chart similar to the approach used in acute care. A standardised NRMC potentially offered similar benefits to those derived from the NIMC for the acute care sector. The NIMC is based on sound principles and experience, which was incorporated into the NRMC development process.

#### 1.1 The project

The phased implementation of the NRMC was an integral component of the larger National Residential Medication Chart Project that aimed to develop a standard medication chart for use in Commonwealth-funded RACFs. The chart was designed to also be the main communication tool for medications information between prescribers, dispensers, administrators and reconcilers. It was to also initiate supply and claiming of most PBS/RPBS medicines directly from the chart, without the additional need for a written prescription.

The NRMC is intended to:

- define standard requirements for medication charts to be used in RACFs
- facilitate supply and PBS/RPBS claiming from a medication chart in RACFs.

The project formed part of a larger initiative, the Supply and Claiming of PBS/RPBS Medicines from a Medication Chart in Residential Aged Care Facilities, an initiative under the Fifth Community Pharmacy Agreement. The initiative was managed jointly by the Australian Government Department of Health (formerly the Department of Health and Ageing) as the Commonwealth's representative and the Pharmacy Guild of Australia, with oversight by the Agreement Consultative Committee.

As part of the larger NRMC project, major pieces of work were undertaken that informed the layout, inclusions and design of the first iteration of the NRMC, known as the NRMC1. These included an analysis of medication charts in RACFs, surveys of RACF staff and approved providers and an heuristic analysis of the NRMC.

### 1.2 Stakeholders

The NRMC Reference Group, which oversaw the project, comprised representatives from:

- Australian Medical Association
- Royal Australian College of General Practitioners
- The Pharmacy Guild of Australia
- Pharmaceutical Society of Australia
- Aged and Community Services Australia
- Leading Aged Care Services, formerly the Aged Care Association Australia
- Australian Nursing Federation
- consumer groups
- Department of Veterans' Affairs
- Department of Health, formerly the Department of Health and Ageing (DoHA)
- Department of Human Services (Medicare)
- Governments of NSW, SA, and Victoria
- aged care sector management.

The First Tier Communications Group comprised important stakeholders, such as:

- Aged Care IT Vendors Association
- Australian Aged Care Quality Agency, formerly the Aged Care Standards and Accreditation Agency [the Agency]
- Australian and New Zealand Society for Geriatric Medicine
- Australian College of Nurse Practitioners
- COTA (Council on the Ageing) Australia
- Department of Social Services Office of Aged Care Quality & Compliance (OACQC), formerly within DoHA
- Medical Software Industry Association
- Australian Nursing Federation (ANF)
- Australian College of Nursing, formerly the Royal College of Nursing Australia and The College of Nursing

• subject matter experts including medication management proprietors, directors of nursing, managers and academics.

The Second Tier Communications Group consisted of 326 persons across various disciplines in the residential aged care sector who had registered interest in the project. This group received regular updates through email lists.

# 2. PURPOSE

#### 2.1 Phased implementation aim

The aim of the phased implementation was to implement and evaluate the first iterations of the NRMC using standardised safety and prescribing fields to facilitate supply and PBS/RPBS claiming from a medication chart in RACFs. This paperless prescribing was a critical element in establishing the validity of the NRMC.

#### 2.2 Phased implementation objectives

The objectives of the NRMC phased implementation were to:

- assess the functionality and usability of the NRMC in relation to paperless prescribing, administering, supply and claiming of PBS/RPBS medicines in selected RACFs in NSW
- 2. collect baseline data on the current quality use of medicines (QUM) practices for prescribers, RACF staff and pharmacy staff
- 3. assess any unintended consequences of the NRMC
- 4. identify potential areas for improvement in the NRMC design, layout and content
- 5. identify potential areas for improvement in the NRMC support materials, such as user and implementation guides
- 6. develop recommendations, based on the above results, for future implementation of medication charts in RACFs.

After evaluation of the NRMC for medication safety and administrative efficiency, further amendments may be required to PBS/RPBS legislation and documentation to support safe transition from existing medication charts and PBS/RPBS supply practices to the new arrangements. Once these are known, the NRMC and other commercially available charts would need to be updated to comply with PBS/RPBS and state and territory legislation. RACFs may then consider using compliant equivalent charts for ordering and administering medication, and for pharmacists to use to supply medications and claim reimbursement for eligible PBS/RPBS medicines.

## 3. SCOPE

#### 3.1 Participants and setting

RACFs were eligible for inclusion if they provided residential aged care services subsidised by the Australian Government and governed by the *Aged Care Act 1997* and the *Aged Care Principles*. Aged care services delivered through transitional care, multipurpose health services, flexible care for Aboriginal and Torres Strait Islander people, and other flexible care packages such as Community Aged Care Package, Extended Aged Care at Home and Extended Aged Care at Home Dementia were outside the scope of this project, as they are managed by the states and territories and operate across diverse settings such as community care and direct hospital care.

Ideally, RACFs in all states and territories would have been included. However legislative restrictions at the time limited the phased implementation to RACFs in NSW. Fortunately, prior to the phased implementation, other states and territories had been intensely involved in the initial development of the NRMC. Despite the phased implementation being restricted to NSW, the governance was strengthened by multi-jurisdictional representation, and sites selected included RACFs on the northern and southern borders of NSW, where a diversity of practices occurs due to blended approaches to legislative and regulatory requirements. Prescribers, pharmacists and staff also often cross jurisdictions in their work where RACFs are located close to state boarders. Adding to this, cross-regional medication advisory committees are often inclusive of inter-jurisdictional RACFs.

RACFs were selected on the basis of size, location, types and level of care, approved provider status and operational characteristics, such as models of care and associated staffing mix. As a result, the results can be generalised nationally.

Under the legislation extant in 2012, NSW was able to exempt specific RACFs and pharmacies to enable supply and claiming from a medication chart, thus enabling use of the NRMC. Exemptions were issued under the provisions of the Poisons and Therapeutic Goods Regulation 2008 to allow medical practitioners to order medications on the NRMC for use as a prescription for pharmacist dispensing, and for pharmacists to dispense from a copy of a prescription issued on the NRMC.

#### 3.2 A paper-based approach

The phased implementation required a stable environment for testing and modification of the proposed NRMC essential fields, both for medicines ordering and for PBS/RPBS supply and claiming. Although both paper and e-systems exist in the medication management systems of RACFs in NSW, it was clear from industry surveys that there was low, and inconsistent, information technology readiness in the sector.<sup>1,2</sup> As a consequence, a paper-based chart was the preferred option because of the consistency across RACFs and the flexibility for rapid modification as required during the development process.

The NRMC project created significant expectations, and a design for the chart that met multiple stakeholder expectations proved a challenge, particularly in a paper-based medication chart restricted to one dimension and limited space. The limits of paper-based charting disciplined the content and design of essential information fields, and ensured that only critical information was included in the NRMC. This meant that the design required a balance of safety priorities with regulatory concerns, in the context of evidence such as incident data and end user feedback. While the potential in electronic medication chart systems for 'drop down' fields and unlimited medicine ordering spaces was evident, a paper-based chart provided the most stable medium for effective testing and modification, and was the only practical option.

The required medication chart information fields identified by testing and development provide a sound basis for national standardisation, and will inform safer electronic medication management systems.

### 4. METHOD

The phased implementation of the NRMC used both qualitative and quantitative methods for data collection and analysis. Subject matter experts, the NRMC Reference Group and the First and Second Tier Communications Groups also interpreted and shaped the meaning of the data collected within the broader contexts of medication safety, and of PBS/RPBS supply and claiming.

As the NRMC relies on both a safe process and effective communication between RACF staff, pharmacy, prescribers and the recipients of care, the mixed method approach allowed the exploration of different aspects of the NRMC on different levels, in a way that was cognisant with participants' experience and the aims and objectives of the NRMC project.

Feedback on the NRMC's usability and functionality from RACF staff, pharmacists and medical practitioners in the field was particularly important in that professional and practice interests influence the knowledge base and embedded approaches to medication safety. Medication practices, such as the use of multiple medication charts and traditional approaches to medication safety, are deeply rooted in the historical practices of nursing, pharmacy and medicine that are simultaneously influenced by the reliance of RACFs on the commercial pharmaceutical sector for medication packaging and systems. Because of these influences, powerful professional, industrial and commercial groups had the potential to inhibit the voice of others during the process of medication chart development. It was a key challenge to manage stakeholder diversity and equity of voice to enable appropriate weighting to evidence and to ensure the workability of the chart.

The stakeholders included non-nurse care staff, registered nursing staff, medical practitioners, pharmacists, industrial, professional, commercial, government and consumer bodies. The adoption of a level playing field among participants was critical to provide opportunity for all participants to speak and be heard, and to allow minority views to be considered on their merit, rather than on the basis of who expressed them.<sup>3</sup> The methods employed also had the ability to view the various discourses at play through iterative feedback loops and had the ability on some occasions to "rattle the cage".<sup>4</sup>

The approach consisted of a series of hard data collection and iterative feedback loops with feedback returned to participants during the ongoing analysis. Data collected through the audit tools was analysed using a process based on descriptive statistics. Inter-rater reliability was facilitated by the NRMC team conducting all audits for each site to ensure consistency and reliability in recording and interpretation. This process also provided independent, reliable verification and trustworthiness of the data which would not have been able to be guaranteed if sites had collected and provided the audit data themselves, as self-reported data has the potential for inadequate, inconsistent audit and risk-averse reporting.

Feedback received from sites was collated, analysed and fed back into the iterative process until the data reached what is referred to as "saturation point". Saturation is a tool used for ensuring that adequate and quality data are collected to support the study.<sup>5</sup> This method adopted a process of seeking out instances of "negative cases" to either

confirm or negate findings. This involved searching for and discussing elements of the data that did not support or appeared to contradict patterns or explanations emerging from the initial data analysis. For example, generalisation in terms of usability of the chart by registered nurses may not always be congruent with the usability of the chart by non-registered nurses. Similarly, large high care sites may have specific issues related to implementation that may also not resonate with smaller low care sites. Negative cases can add significant weight to findings because they represent the most clear-cut example of a point of interest or difficulty. Investigation of negative cases provided substantive improvement data in the design of the NRMC across diverse settings by adding weight to specific approaches that were not necessarily the traditional, dominant view.

# **5. DATA COLLECTION**

#### 5.1 Design

Data collection was based on a mixed quantitative and qualitative design that addressed the objectives of the phased implementation. The audit tools were purpose-built to facilitate effective analysis. Pre-, during- and post-NRMC implementation data enabled cross-comparisons between the NRMC and existing medication charts in use at each RACF, and provided valuable information for the final iteration of the NRMC.

The data collection tools and inbuilt feedback mechanisms provided ongoing data from prescribers, RACF staff and pharmacists that were recorded in issues registers. Inbuilt mechanisms and audits aimed at capturing a broad array of feedback included the following.

- Information sessions with each RACF that included prescribers, RACF staff and pharmacists. Six RACFs hosted sessions with prescribers outside of business hours.
- An audit conducted in the three months prior to the implementation. The audit identified the space required for particular types of medicines (i.e. regular, PRN and short term medicines). Information about incidents and accidents, as well as non-compliance with the aged care accreditation standards and/or the *Aged Care Act 1997*, was also captured.
- Audits were conducted during and after the phased implementation. These audits collected information related to prescribing, administration, and the supply and claiming of PBS/RPBS medicines from the NRMC. This information was discussed with each site and incorporated into the revision of support materials and/or iterations of the NRMC.
- Focus groups conducted at each site during the phased implementation. Overall, these groups comprised 60% RACF staff, 30% prescribers and 10% pharmacists.
- Ongoing feedback, data analysis and discussion with sites about the usability and functionality of the NRMC and support materials through ongoing issues registers, teleconferences, email and onsite visits.
- Frequent discussion with prescribers, pharmacists and RACF staff during onsite visits. These conversations were noted and lessons were incorporated into revisions of support materials and NRMC iterations.
- A workshop with representatives from participating RACFs held towards the end of the implementation period to consider input into the final NRMC recommendations. The 44 participants included care staff, dementia care workers, registered nurses, quality managers and directors of nursing. Prescriber and pharmacist feedback from sites was also communicated at this workshop via the participants.
- A meeting with 80% of participating pharmacists, held midway through the phased implementation, to discuss issues specific to the supply and claim of PBS/RPBS medicines from the NRMC.

• Separate evaluation surveys for prescribers, pharmacists and RACF staff.

#### 5.2 Timing

The phased implementation began in April 2013 and took approximately eight months, including pre-, during- and post- quantitative and qualitative evaluations. Commencement dates varied between RACFs and were negotiated to take account of local circumstances, such as charting cycles and stakeholder preparedness.

#### 5.2 Pre-testing

Before the implementation started, the NRMC was introduced in a small rural facility on the NSW/Queensland border without the capability for supply and claiming of PBS/RPBS. In this way, the NRMC was used as a medication chart in the traditional sense to accommodate medicine orders and administration signatures. Prescribers continued to write separate prescriptions to permit supply and claiming by pharmacists. This step enabled a testing of the layout, functionality and usability of the NRMC simply as a medication chart. It was also useful in that this particular site had both non-registered care staff such as personal care assistants (PCAs) and registered nurses (RNs) administering medicines dispensed through multi-dose administration aids (DAAs) and original packaging single dose administration respectively. The site also had three medical practitioners and two pharmacies – one in NSW and the other in Queensland. These circumstances offered the potential for a broad range of issues to be identified and resolved.

#### 5.3 The live environment

NSW Ministry of Health provided the legislative exemption to enable participating RACFs to commence the phased implementation in early March 2013.

The first supply and claim from the NRMC took place on 3 April 2013. Fifteen RACFs used the first iteration of the NRMC (NRMC1). The second iteration of the NRMC (NRMC2) was introduced on 1 August 2013 – the 15 original RACFs switched to NRMC2, and were joined by a further seven RACFs. Following ongoing revision, NRMC3 was released in December 2013 (Figure 1). NRMC3 underwent minor adjustments in early 2014 and became the final iteration of the NRMC that is expected to be released for national rollout.



Figure 1: Commencement dates of RACFs, cohorts of prescribers and NRMC iterations

### **5.4 Confidentiality**

All data collected were held in secure storage and individual identifiers removed. No identifying data was made available to monitoring or regulatory bodies. Capacity for obtaining permission from sites was inbuilt into the NRMC project design, in partnership with RACFs, for cases in which critical issues were identified that might have required information release.

### 5.5 Inclusion and exclusion criteria

Diversity of sampling was a critical element of the project design. To ensure diversity, RACFs were selected according to geographical distribution, RACF size, type and level of care provided, and approved provider status.

In May 2012, 181 RACFs within five regions of NSW were identified as potential participants. Five geographical clusters of rural/remote and metropolitan were originally chosen. This was later expanded to six regions to improve the diversity in models of care. The six regions were as follows:

- New England (rural/remote with the potential to reflect Queensland influences in terms of medication management practice)
- Riverina (with the potential to reflect Victorian influences in terms of medication management practice)
- Orana Far West (regional)
- Sydney (outer, metropolitan, culturally and linguistically diverse)
- Central Coast (semi regional)
- Illawarra (younger people with dementia residing in aged care, culturally and linguistically diverse)

The potential 181 RACFs were reduced to 54 when exclusion criteria were applied. The exclusion criteria focused on workloads and resource implications of each site and included:

- the impact of impeding accreditation of each site
- existing non-compliance or sanctions
- negative media exposure

 risk factors as identified by the aged care accreditation standards that included recent changes in ownership or management; recent increase in numbers of beds; recent increase in level of care; recent changes to management systems; and past history of significant non-compliance with the aged care accreditation standards and/or the Aged Care Act 1997.<sup>6</sup>

Despite these exclusion criteria, it was important that the phased implementation included RACFs with histories of poor resident outcomes related to medication management to ascertain the effectiveness of the NRMC in these environments. These RACFs were selected through a process with OACQC within the DoHA and the NRMC project team. They were all located in Sydney to facilitate timely NRMC team liaison as required. These RACFs were monitored closely throughout the phased implementation.

#### 5.6 Recruitment

Information sessions were held in May and early June 2012 to inform RACFs in each region. After seeking expressions of interest, 32 RACFs were both interested and eligible. Under the project's funding parameters, at least 20 RACFs were required to complete the implementation, so having 32 RACFs allowed for withdrawal due to unforeseen circumstances. As the process rolled out in 2013, 10 RACFs withdrew, leaving 22 RACFs which delivered care to 1,689 residents (Table 1). They ranged from small standalone regional RACFs of 32 beds through to large metropolitan group-based RACFs with more than 100 beds.

The models of care at the RACFs varied greatly and consisted of low care non-nursing, high care nursing, mixed ageing in place models and a model of special dementia care workers. There were privately owned and operated RACFs, as well as faith-based and community-run aged care homes. At 60% of the sites (14 of 22), only RNs dispensed medications. At other sites, combinations of RNs and non-registered nurses, such as PCAs and dementia care workers, were used (Table 1). All sites used a mix of single and multi-DAAs for the delivery of medicines. About 36% of staff delivering medicines were identified as of culturally and linguistically diverse (CALD) backgrounds. Four RACFs reported a history of non-compliance against the aged care accreditation standards and/or the *Aged Care Act 1997* in the area of medication management.

**Table 1:** Participant RACFs, approved provider status, bed numbers and ratios and special needs group where identified

	Location	Approved	Beds	Level of	Special	Staffing model
		provider		care	needs	
				(high:low)	group	
1	New England	Local council	32	8:24	Nil	RN manager, PCAs
2	Riverina	Faith-based	122	60:62	Nil	RN
3	North Western	Faith-based	114	78:36	Nil	RN
•	Sydney					
4	North Western Sydney	Faith-based	122	120:2	Dementia	RN
5	North Western Sydney	Faith-based	67	37:30	Nil	RN manager, PCAs
6	South Western Sydney	Faith-based	83	81:2	Dementia	RN, dementia care workers (DCWs)
7	South Western Sydney	Faith-based	40	26:14	Dementia	RN, DCWs
8	South Western Sydney	Faith-based	124	96:28	Dementia	RN
9	South Western Sydney	Faith-based	40	30:10	Dementia	RN, DCWs
10	Central Coast	Faith-based	84	53:31	Dementia	RN
11	Orana Far West	Private	66	59:7	Dementia	RN
12	Western Sydney	Private	134	109:25	Nil	RN
13	Western Sydney	Private	86	86:0	CALD	RN
14	North Western Sydney	Private	53	53:0	Dementia	RN
15	Eastern Sydney	Private	42	42:0	CALD	RN
14	Central Coast	Faith-based	50	50:0	Palliative care	RN
17	Northern Sydney	Private	56	56:0	Nil	RN
18	Illawarra	Private	90	30:60	Dementia, young people	RN, DCWs
19	Northern Sydney	Private	79	79:0	Dementia	RN
22	Western Sydney	Private	104	104:0	Dementia	RN

### 6. FINDINGS AND EVALUATION

The analysis involved large volumes of quantitative and qualitative data collected from the 22 participant RACFs delivering care to 1,689 residents. Audits were undertaken of 4,673 charts across three iterations of the NRMC that had been used by 1,747 staff at RACFs, 220 prescribers (general practitioners) and staff at 16 pharmacies. The audits recorded numbers and categories of medicines, incidents and accidents related to medication management, and any identified issues of non-compliance with the aged care accreditation standards and/or the *Aged Care Act 1997*.

Throughout the implementation, intensive iterative feedback loops provided insight into the audit data which led to the identification of issues and/or workflow conflict. These iterative feedback loops comprised issues registers, short surveys, regular onsite support, phone and email contact, workshops, meetings and focus groups. Proposed suggestions for revisions to the NRMC were then shared with sites and other key stakeholders of the NRMC project to obtain a degree of consensus related to elements of design and layout. To complement this iterative process of consensual practice-based problem solving, the NRMC development also used the available literature on medicine safety, design principles, human factor/heuristic analysis and legislative frameworks. Detailed information of the method used in the NSW phased implementation is provided in Section 4.

The initial experiences of the NRMC led to critical information, predominately from pharmacists, relating to the supply and claim of PBS/RPBS medicines. This was fed into support documentation for prescribers. The relationship between the prescriber, the RACF staff and the pharmacy, combined with the provision of effective NRMC support materials, was identified early as inherently important to the success of change management. It became clear that there were varied but strongly held views regarding interpretation of legislative requirements and professional responsibilities.

The ongoing challenge throughout the NRMC phased implementation was balancing the discussions to ensure that unrelated professional and workplace issues did not interfere with the process. To enable clear information to emerge from this discursive practice, points of consensus were identified to enable effective avenues of conversation and ongoing progress of the project. An intense dialogue on the necessity for, and completion of, essential prescription fields in the NRMC that would enable supply and claim of PBS/RPBS medicines proved to be a dominant feature of this discursive practice.

The findings presented in this section highlight the data that was identified as important to the prescribing functions of the NRMC, as well as data that was deemed important to the development of the NRMC as an effective tool for safe and correct medication management. Data collection and analysis consistently revisited and refocused on the six objectives of the NRMC NSW phased implementation and the findings are presented according to these objectives. Recommendations resulting from the NRMC NSW phased implementation findings are then presented in Section 7.

# 6.1 Objective 1: Assess the functionality and usability of the NRMC in relation to paperless prescribing, administering, supply and claiming of PBS/RPBS medicines in selected RACFs in NSW

The functionality and general usability of the NRMC was assessed positively. The combined feedback from prescribers, pharmacists, RACF staff surveys, workshops, audits and the inbuilt mechanisms within the phased implementation suggested that using the NRMC led to an overall reduction in prescriber, pharmacy and RACF staff workload, and contributed to a reported improvement in the quality use of medicines for residents.

The initial prescribing on the paper-based NRMC was reported by prescribers and pharmacists as time-consuming and, at times, arduous due to the requirement to complete the essential fields of the prescription box by hand. Prescribers reported that the four month duration of the supply of PBS/RPBS prescribed medicines, once correctly charted on the NRMC, resulted in a reduction of administrative workload over time, as they did not have to write prescriptions and/or repeats for the majority of medicines during this period. Also, pharmacists and RACF staff said that the time required to "chase" prescriptions owing from prescribers, which was substantial prior to the introduction of the NRMC, had reduced significantly once prescribers mastered how to complete the NRMC prescription box.

#### 6.1.1 Initial feedback NRMC1: safety and administration of medicines

Suggestions for the minor revisions to NRMC1 for functionality and safety of administration of medicines reached saturation quite early. These suggestions focused on better positioning of the resident ID information, clarification and consistency of information fields on the front page, re-sequencing of sections in the chart to improve functionality, revision of required space for medicines in each section to reduce the numbers of charts required for individual residents, and the provision of prompts for prescribers to promote the completion of essential fields for prescribing on the chart.

# 6.1.2 Initial feedback NRMC1: paperless prescribing, supply and claiming of PBS/RPBS medicines and completion of essential fields

Feedback about paperless prescribing, supply and claiming of PBS/RPS medicines and completion of essential fields revealed problems. Pharmacists indicated that they became increasingly frustrated over time that the essential fields in the NRMC for PBS/RPBS supply and claiming were not being completed by participating prescribers. Similarly, prescribers' feedback indicated that they became increasingly frustrated when contacted to return to the RACFs to complete these fields on the chart so that supply and claim of PBS/RPBS medicines could proceed.

The required fields that were problematic were contained within the prescription box of NRMC1 applicable to PBS/RPBS requirements, and the boxes for communicating the prescriber's intentions for the duration of each medicine (i.e. stop and start dates) (Figure 2).



**Figure 2:** Essential fields (in red) required for mandatory completion to enable supply and claim of PBS/RPBS medicines directly from the NRMC1

Essential prescription box fields most frequently not completed in the NRMC1 were:

- PBS/RPBS: Prescribers are required to strike through the option that does not apply
- Ongoing: Prescribers to tick this box if their intention was for the medicine to be supplied for the duration of the chart
- Stop and start date: Required when the prescriber has not ticked the "ongoing" box.

While the streamlined authority code (a four digit code that prescribers enter where applicable for particular PBS medicines, see Figure 3) was not a mandatory field, it was also reported by pharmacists to be problematic, although to a lesser degree. At the times this field was not completed by prescribers when applicable, pharmacists reported tension about their ability to supply the correct quantity of the prescribed medicine and, in some cases, reported concern about the impact of an increased cost to the consumer under PBS/RPBS rules.

Pharmacists also reported that when there was an increased cost to residents for these medicines as a result of the prescriber not completing the streamlined authority code, pharmacists were incorrectly and unfairly blamed by the resident and the RACF staff for this increase. Low levels of completing the streamlined authority code by prescribers remained an issue as reported by pharmacists throughout the NRMC phased implementation.



**Figure 3:** Streamline authority code (in green) required for completion when applicable for some medicines to enable correct supply and claim of PBS/RPBS medicines directly from the NRMC1

The remaining fields required for mandatory completion in the prescription box that prescribers are historically familiar with when writing up a medication chart (Figure 4) were completed consistently. These fields included:

- the name and strength of the medication
- adequate directions for use with regard to dose, route and frequency of administration
- the date the medication is ordered
- the medical practitioner's signature.



**Figure 4:** Remaining essential fields (in red) required for completion to enable supply and claim of PBS/RPBS medicines directly from the NRMC1

# 6.1.3 Remedial action NRMC1: paperless prescribing, supply and claiming of PBS/RPBS medicines and completion of essential fields

Because of this ongoing tension, support materials were introduced that better met the needs of prescribers and RACF staff. Although revisions of the support materials are detailed in Section 6.5, they are also important to discuss here, because of the impact that the support materials had on the process of supply and claim of PBS/RPBS medicine. A GP checklist and a quick start guide was made available at each RACF for

each prescriber and also for RACF staff. This enabled a collaborative approach so prescribers could complete the essential fields to meet the requirements of a valid prescription. It also reduced the time prescribers spent in returning to the RACF to correct the chart, and the time for RACF staff in liaising with prescribers and pharmacists. Further audits and liaison with sites, in particular with the pharmacists, saw a marked improvement. The following comment from a participating pharmacist in a survey captures this improvement.

**Q** How often does a medication order not include the necessary information for you to calculate the quantity to be supplied, (ie. It does not have either the 'Ongoing' or 'start' and 'stop date' fields completed?)

"At an earlier stage the answer to this would have been ALWAYS. It has improved quite a bit now following the improved resources coupled with audit visits. If any of these fields are missed, management is contacted and informed. Then we basically play the waiting game and provide owings and chase up scripts (which can very laborious) until the chart is corrected. There has been an improvement which is very positive, however the issue rapidly grows if the doctor doesn't correct or the nursing home doesn't reinforce the system enough."

The completion rates of the prescription boxes improved markedly with the introduction of the revised support materials. Initially, the completion rate of essential fields was low at 36.5%. The completion rate improved to 74% with the introduction of the revised tools for the first cohort of prescribers using NRMC1, then improved further to 94.4% with the commencement of the second cohort of prescribers and NRMC2 in August 2013. Ordinarily, it would be difficult to ascertain whether this improvement in the completion of essential fields by prescribers was a direct result of the improvements to these support materials or as a result of prescribers learning the process over time through change management. However, the second cohort of prescribers who commenced with NRMC2 from 1 August 2013 only used the revised support materials, and data suggest a high rate of completion of the essential fields required for supply and claiming of PBS/RPBS medicines directly from the chart on the initial charting (Figure 5). The NRMC3 went a step further following feedback and embedded the prescribers' checklist into the chart. This had the added advantage of locating and communicating information efficiently without the need to locate a secondary document.

Cohort 1	August 2013		
IRMC1 15 RACFs Driginal userguides Completion of required fields for upply and claim by prescribers at 16.5%	Cohort 1 + Cohort 2 NRMC2 15 + 7 RACFs Introduction of Checklist and quick start support materials for prescribers. Revised user guides	December 2013 Cohort 1 + Cohort 2 NRMC3 22 RACFs Checklist embedded into the	
	Completion of required fields improved to 74% with Cohort 1 and then to 94.4% with Cohort 2	Completion of required fields remained consistent at 98%	

**Figure 5:** Commencement dates for RACFs, iterations of the NRMC and timing of revised support materials for prescribers

# 6.1.4 Initial feedback NRMC2: paperless prescribing, supply and claiming of PBS/RPBS medicines and completion of NSW Ministry of Health essential fields for prescriber details

Another issue arose following the introduction of NRMC2. In order for the prescription to comply with NSW legislation, a prescriber name and signature had to be visible on each page of the medication order. The chart, therefore, had an additional field watermarked for prescriber signature and name that had to be completed for each order on the chart (Figure 6).

sted	PBS/RPBS	1. Medicine	Dose	
s comple	🗌 СТБ		Route	
n unless	Ongoing		Frequency	
iptia	Start date	Strength		
ot a valid prescr	// Initial	Streamlined authority code	Non	
	Stop date	Prescriber signature and	d name	)
2	inital	Date of prescribing		

**Figure 6:** Essential fields (in red) required for completion in NSW to enable supply and claim of PBS/RPBS medicines directly from NRMC2

This revision was driven by the risk that the first page of the NRMC, which included the full prescriber details, may not always accompany the NRMC when a copy was provided to the pharmacy. If this happened, the prescription would no longer meet NSW legislative requirements and could not be used by the pharmacist.

This requirement led to a new complexity in the phased implementation. There was a widespread reluctance from prescribers to complete their signature and then write their

name for every order on the NRMC. One prescriber viewed this as "nonsensical repetition". As described in the principles for implementation of supply and PBS/RPBS claiming from a medication chart in RACFs from the Australian Medical Association,<sup>7</sup> the following issues are paramount for prescribers and successful implementation of the NRMC:

- the introduction of the medication chart as a PBS/RPBS prescription in residential aged care must reflect, not dictate, medical practice
- it should streamline work processes for medical practitioners
- state/territory drugs and poisons legislation must be nationally consistent and enable the resident's medication chart to be treated as a prescription.

The insistence from pharmacy that prescribers complete this field to comply with NSW legislative requirements created considerable problems and had a profound negative effect on the goodwill for the project that had existed to date between the RACFs, prescribers and pharmacies. A renewed spike of feedback and complaints about this issue ocurred with the introduction of NRMC2 as a direct result of this unresolved issue. Complaints from RACFs focused on a belief that pharmacists were being "overzealous" in the expectation that prescribers complete this field when it did not affect supply and claim of PBS/RPBS medicines.

Pharmacists concurred with RACFs and prescribers that they thought this design was repetitious and added no real safety benefit or value to the process. Pharmacists also reported that their insistence of prescriber compliance related to this matter was affecting their relationship with RACFs. They also thought that RACF staff blamed the pharmacists for undue workload on the prescriber, rather than this new element of the NRMC layout. Similar to the occasions when the essential prescription fields and/or the streamlined authority codes were not completed in NRMC1, data suggested that pharmacists were blamed for this issue in NRMC2.

This issue, brought about by differencies between Commonwealth, state and territory requirements, is still to be resolved. It is important to note that the potential risk of errors occurring at a PBS/RPBS medicines supply and claim level identified by NSW did not translate into actual errors in the NRMC phased implementation.

#### 6.1.5 Duration of supply

A final improvement to the chart focused on the prescriber's intention for a medicine to be supplied for the duration of the NRMC and how to communicate this to the pharmacist accurately and unambiguously. Instead of a prescriber having to authorise a "quantity" of medicine to be supplied, the NRMC introduced the concept of using the combination of "duration" and "dose frequency" to indicate a quantity of medicine to be supplied by the pharmacist. Where indicated by the prescriber, the pharmacist was permitted to supply a medicine for a maximum period of the NRMC of up to four months. The concept of "repeats" in the usual PBS model for ongoing supply of medicine was discarded. As a concept, this was received well by all stakeholders. As a required field however, issues arose over the use of the term "ongoing" in the prescription box designed to indicate the prescriber's intention. Feedback indicated that this term was ambiguous, misleading and

did not accurately reflect that prescriber's intention. As a result this tick box was revised and the term "ongoing" was replaced with the text "Valid for duration of chart" (Figure 7).



#### NRMC1/NRMC2

NRMC3

**Figure 7:** "Ongoing"" tick box (in red) to indicate duration of supply of PBS/RPBS medicines (NRMC1 and NRMC2) replaced by "Valid for duration of chart" tick box (in red) to indicate duration of supply of PBS/RPBS medicines in NRMC3

#### 6.1.6 Administrative workloads

The results of surveys among prescribers, pharmacists and RACF staff surveys about administrative workload were consistent with feedback obtained through inbuilt feedback mechanisms. Feedback was heavily influenced by each group's positioning within the NRMC cycle. For example, feedback obtained from prescribers when first completing the NRMC consistently indicated that the writing up of each medicine order was onerous and time-consuming. The first cohort of prescribers from the 15 RACFs that commenced from April 2013 also expressed greater difficulty in understanding the requirements for prescribing on the NRMC. The second cohort of prescribers, however, benefited from receiving revised support materials that better reflected prescriber needs and preferences. Of particular interest was that, as the phased implementation progressed, prescribers became more positive and expressed views that their administrative workload related to writing prescriptions reduced significantly over time.

Prescribers in the first cohort who had charted over the three cycles of the chart (NRMC1 to NRMC3) stated that:

- they had "mastered what was needed"
- they had become "used to the process"
- prescribing on the NRMC "speeds up all aspects of prescribing, easy to use once familiar with chart".

This is not to say that polarised views about the chart's effects on administrative workload did not continue to exist. A minority of strong views remained both for and against using the NRMC, as shown by the following comments.

• "Should be universally instituted ASAP."

• "If it's not broken don't fix it."

The different views were generally driven by long-term familiarity with previous prescribing systems and length of a prescriber's involvement in the NRMC phased implementation. For example, when asked what had been the most difficult task associated with prescribing on the NRMC the following comments reflect the general sentiment related to the initial transition to a new format:

- "following a new format of having to flick through pages to find the specific section, more time-consuming doing the rounds"
- "familarisation with the new format"
- "confusing"
- "old system was working"
- "go back to previous med charts"
- *"save the trees and the planet".*

Conversely, when asked to consider what has been the most positive effect associated with prescribing on the NRMC, responses focused on reduced workload and writing prescriptions. For example, the majority of responses were specific to the chart replacing the need for prescriptions:

- "no need to write prescriptions"
- "fewer chemist scripts"
- "significant reduction in script writing"
- "speeds up all aspects of prescribing, easy to use once familiar with chart"
- *"no script required Yeah!"*
- "no script (just S4 and S8)".

In terms of the NRMC functionality, the following comments reflect positive improvements reported by the majority of prescribers:

- "clearer separation between regular/PRN/once off prescriptions"
- "the clarity of prescribing medications is improved and standardised"
- "I like that I can see that the medication has been given"
- *"extra space"*
- "more information on it"
- "well laid out and easy to check doses and clarity of administration".

The traditional "chasing of prescriptions" that the pharmacy may be owed following a general practitioner visit to a RACF also dissipated over time. As noted previously, the improvement of support materials greatly assisted issues with the non-completion of prescriber fields. The revised support materials, with the quick start guide and checklist for prescribers, improved this to a point. However embedding the required information in both the user guide for RACF staff and within the NRMC itself further improved completion of all required fields.

Reports from pharmacy provide insight into the supply and claim functionality of the chart and the impact on their workload when fields are not completed. Pharmacists indicated that they either contacted the facility or chased up with the GP when they received an incomplete chart. This was reported as extremely frustrating and time-consuming. Time and resources dedicated to auditing of charts when received at the pharmacy was cited as the largest issue in relation to supply and claim from the NRMC. When gaps were identified by the pharmacy audits, the responsibility fell to the GP to either return to the facility to correct the chart, or to send the pharmacist a traditional prescription.

The emailing of copies of the NRMC was well received by pharmacy. Reports cited an improved clarity, improved version control and a reliable source of medication orders. The main issue identified through this process however was the requirement (both state and PBS) for hard copy endorsement which required the printing of the e-copy of the chart. As stated in the following comment, pharmacists thought this was extremely outdated practice and conflicted with the concept of "paperless prescribing."

"Copies in the first instance are received via email NRMC box and stored electronically. Printed off and placed in folders as hardcopies, as they are used for endorsement for dispensing. This is a 'draconian' process and we should have a mechanism in place to endorse electronically to save printing and storage (so much for 'paperless claims!')."

Pharmacists who had previously used a single sheeted system of medication ordering and supply stated that their workload around supplying up to date signing sheets for RACFs had been removed with the introduction of the NRMC. This group of pharmacists also reported that the previous accusations from RACF staff that they had increased medication incidents because of incorrect paperwork from the pharmacy had been removed with the introduction of the NRMC.

In terms of the original NRMC being maintained and stored at the RACFs, pharmacy feedback was mixed. The majority liked the idea as it reduced administrative workload for them; however, concerns persisted about receiving all the information required for supply and claim when there were changes such as ceased medications, or new medications. The incident data from the phased implementation revealed that the management of changes to medications were communicated accurately and efficiently, with fewer recorded errors with packaging of DAAs than with the previous medication charts and the faxing of changes.

As with feedback from the prescriber and pharmacists, the feedback from RACFs reflected an initial increase in workload, largely due to the preparation of the charts for prescribers. It took time for some RACFs to ensure all staff had the information technology skills required to populate e-templates for resident ID, provide prescriber and pharmacy details, and electronically scan the NRMC for emailing to pharmacy. Some RACFs had invested in medication e-systems that communicated with pharmacy and these also required set ups of log in capacity for each staff member.

The re-education and practice change from the traditional faxing of medication charts to the GP and/or pharmacy to the newer process of emailing the NRMC to pharmacies was reported initially to be time-consuming and frustrating for staff. However, as staff became more familiar with this process, the functionality of emailing the NRMC resulted in reports of improved benefit related to version control and record keeping, assurance that the pharmacist received any changes accurately due to improved quality of the record, and improved retention of records via e-backup systems. Other recognised improvements included the ability to print the current medicines for residents as per the chart for hospital admission; and the ability to set up group emails so that each time a change occurred in the chart a copy could be received by managers, prescribers and the pharmacy simultaneously.

This process supported the rapid identification of errors in real time where charts were updated and emailed at the same time, and was reported to be a critical improvement in the currency of medicine given to residents, particularly those residents with medicines pre-packed by the pharmacy. This is consistent with pre-audit data which highlighted that DAA packing errors, as a result of poor version control of medication administration signing pages, were a significant contributor to recorded incident data.

There was also a perception from RACF staff that the NRMC improved prescribing and user friendliness for the prescribers. It was evident that RACF staff sympathised with reports from prescribers of their large workload when reviewing residents. It was important to RACF staff that medication chart improvements supported prescribers' workload when visiting residents as "[the doctors] were always so busy". The following comments illustrate this.

- "Easier for MOs to review charts as they can go directly to specific sections"
- "Column for doctors to sign and write their details"
- "Most things are all together eg: weights, BGL [blood glucose level], Insulin. Easier for the doctor when doing rounds"
- "Everything. i.e. weights, BGLs are all together makes it easier for the DRs to review"
- "Easier for the doctor as the chart is all together."

In terms of functionality and usability for medicine administration, the use of the NRMC as the central point data and the provision of sections for different types of medicines were reported by RACF staff as the biggest improvement. The following comments depict RACF staff sentiment about these features.

- "Comprehensive information. I don't have to looking for the details in other files."
- "You can clearly see charts for what they are. They are easily identified as the medication chart. Unlike the old system with bits of paper that looked like any type of documentation."
- "All information in one chart eg: BGL, the insulin order together with the BGL instructions by LMO for IDDM patients, Warfarin chart."
- *"PRN section and the effectiveness detail is great for reviewing medicines as the doctors and RNs can see for themselves what's happening."*
- "Medication chart explains the 6 rights of medication. Prevents the wrong medication."
- "All the doctors and pharmacy details plus information on the resident and their medication considerations are all on the front page. Makes it really effective to use from an [nursing] agency perspective as we see so many different charts which makes us worry about mistakes."
- "We sometimes don't know enough about the resident when giving meds, but this chart tells us the important things right up front. Very good".
- "All information in one spot, not waiting on scripts, staff paying more attention, all good."

# 6.2 Objective 2: Collect baseline data on the current quality use of medicines practices for prescribers, RACF staff and pharmacy staff

Quality use of medicines is an integral driver in the residential aged care sector as the residents receiving care often have co-morbidities that require multiple medicines. The safe and effective use of medicines can be enhanced by standardising information presentation and through centralising medicine information for each resident in a central document. The latter has the benefit of reducing the volume of fragmented documentation containing critical resident medication and other relevant care information. There are clear safety benefits to be obtained through a standard approach to medication charting across the varied models of the residential aged care sector and in the context of the diverse array of packaging and supply systems.

Quality use of medicines (QUM) involves:

- judicious selection of treatment options (including choice between medicine, nonmedicine and no treatment)
- appropriate choice of medicine when medicine is required
- safe and effective use of medicines.

In the past, QUM has largely been positioned in the domains of prescribers and pharmacists, and until recently has had minimal visibility in RACFs. The introduction of medication advisory committees and the Australian Pharmaceutical Advisory Council best practice guidelines has introduced QUM to the sector. The concepts associated with QUM as reported by RACFs in this project remain largely focused on administration and monitoring of medicines, referred to as "medication management". This is consistent with the aged care accreditation standards and associated assessment tools used to assess compliance of RACFs.<sup>8-12</sup>

Safe and correct administration is reported by RACF staff as a constant source of stress, particularly for RNs who are dependent on the accuracy of information provided by other health professionals. RACF staff reported high levels of anxiety around administration of medicines, as they perceived that they would be blamed if a resident received medicine incorrectly or when there was a delay in the receipt of medicines. It was reported that stress levels of staff in the administration of medicines was exacerbated when prescribers were rushed, where a prescriber's handwriting was illegible, when staff experienced difficulties in obtaining confirmation signatures for phone orders, and when incorrect DAAs were received.

While these issues were not resolved completely, RACF staff reported less stress and an increased control of medicine administration. Reasons stated focused on increased confidence that the information was clearer and that the NRMC promoted a holistic approach to medication administration. The following comment from a RACF staff member illustrates this improved level of confidence when asked about the positive aspects of the NRMC:

"knowing exactly the amount of medication prescribed, how many times it is to be given and who the medication is given to! [NRMC] has really helped me have a better understanding of medication administration." Another aspect of QUM is decision-making and choices about medicine. The resident ideally needs to be central to this decision-making, however decision support in the residential aged care sector operates differently to other health contexts given the high acuity and vulnerability of residents. For example, 11 RACFs identified residents from the special needs group of people living with dementia who would have little or no choice related to their medicines. It is also reported in the literature that support for residents in terms of autonomy and QUM in aged care is not promoted, with very low numbers of residents self-medicating.<sup>13</sup> This is consistent with the NRMC data where only 17 residents out of 1,689 (approximately 1%) were identified as self-medicating. However it is positive that this group stated that they could use the NRMC to understand which medicines they had been prescribed and, if they chose, had somewhere to sign when they had taken them.

Feedback regarding QUM from pharmacists indicated that improved version control, the reduction of faxed communications, the reduction of owing prescriptions and increased RACF responsibility in maintaining and communicating medicines prescribed on the chart all contributed to QUM.

Findings from the prescriber survey combined with ongoing feedback obtained from the inbuilt mechanisms within the NRMC phased implementation suggest that there have been improvements in QUM in terms of continuity of care for residents. It was reported that improvements to continuity of care would occur because of improved inter-health professional communication of medicines information. All prescribers believed that there would also be some improvement in prescriber workflows, safety of administration, and the monitoring and evaluating of medicines. However it was noted that change management during implementation is most effective when it is collegial and inclusive of prescriber, RACF staff and pharmacists.

Pre-, during- and post-implementation data enabled cross-comparison between existing medication charts in use at each RACF prior to the NRMC implementation and the three iterations of the NRMC. Two auditors in the NRMC team conducted the audits for each site to provide inter-rater reliability. The following audits were conducted:

- pre-NRMC phased implementation audit (1,970 medication charts across 27 RACFs)
- during-NRMC phased implementation audit (2,106 NRMCs across 22 RACFs)
- post-NRMC phased implementation audit (2,567 NRMCs across 22 RACFs).

The three sections of the audit included background data, incident data and medication chart data. Section 1 of the audit collected background information about each RACF, including geographical location, numbers of CALD staff and residents, physical layout of the building, types and levels of staff delivering medicines, the types of medication systems and charts used, organisational support and how the RACF communicates externally to prescribers and pharmacies. The age of the RACF may reflect mature embedded systems and processes utilised by an experienced staff base compared to a newer service that is developing systems and up-skilling staff. The numbers of medication zones may reflect multiple storage areas for medicines and charts, and possibly different types and levels of staff skilled for particular resident mix (such as dementia/stroke). CALD influences will affect communication with residents and influence the usability of medication charts. Compliance history was also included in this section.

Section 2 of the audit collected data detailing medication incidents. Errors of resident identification and the delivery of medicines from the chart were supplied, along with details on outcomes and contributing factors.

Section 3 was designed to provide pre- and post-implementation data for direct crosscomparison of medication charts used prior to the phased implementation and the various iterations of the NRMC in use during the phased implementation process. Compliance in completing specific fields such as resident identification, pharmacy and prescriber details, and administration signatures were audited. The numbers and types of medicines prescribed in each section also provided comparison data for the purpose of understanding the NRMC as a tool for prescribing.

#### 6.2.1 Audit data and QUM

Overall the audits found that there was a reduction in the number of medications prescribed and a decrease in the number of errors.

#### 6.2.1.1 Regular medicines prescribed

The number of regularly prescribed medicines per chart decreased from 9.7 to 4.8 for all three iterations over the course of the project (Table 2). The number of regular medicines prescribed in charts prior to the NRMC ranged from 0 to 32 whereas the range on the NRMC was 5 to 15 medicines per chart. With the introduction of the NRMC, 5% of residents who had been prescribed more than 11 regular medicines required a second chart. These charts were clearly marked "chart 1 of 1 and chart 1 of 2" respectively and stored together as a single file. Residents with more than one chart were often new admissions who needed to have their medicines stabilised or were residents with extremely complex disease states requiring complex medicine regimes, outside the norm of prescribing for aged care residents.

**Table 2:** Numbers of medicines prescribed, averages across the NRMC phased implementation audits

	Pre-NRMC N=1,970 charts	NRMC1 N=2,106 charts	NRMC2; NRMC3 N=2,567 charts
Total medicines Medicines per chart	27,186 13.8	13,378 6.4	14,505 5.7
Total regular medicines Medicines per chart Range of doses prescribed	19,109 9.7 0-32	10,102 4.8 3-17	12,378 4.8 5-15
PRNs Prescribed:administered Medicines per chart Range of doses prescribed	7,427:155 3.8 3-17	2,846:85 1.4 1-9	1,501:45 0.6 0-4
Nurse-initiated medicines Medicines per chart	90 0.05	63 0.03	71 0.03
Short term medicines Medicines per chart Range of doses prescribed	363 0.18 0-3	207 0.1 0-6	256 0.1 0-9
Variable dose medicines Medicines per chart % of warfarin % of other Range of doses prescribed Average number of doses Pathology type and frequency	84 0.04 92% 8% 1-6 2 INR weekly to 3 weekly	90 0.04 100% 0% 1-4 1 INR weekly to 2 weekly	96 0.04 100% 0% 1-2 2 INR weekly to 2 weekly
Insulin Medicines per chart Range of doses prescribed Average number of doses	68 0.03 1-7 2	65 0.03 1-4 2	66 0.03 1-3 2
PRN insulin prescribed PRN insulin administered Pathology type and frequency	0-2 1 BGL, most commonly weekly	0-2 0 BGL, most commonly weekly	0-1 0 BGL, most commonly weekly

#### 6.2.1.2 PRN (as required) medicines prescribed

PRN medicines prescribed during the phased implementation reduced from an average of 3.8 per chart for the pre-NRMC audit to an average of 0.6 per chart over the course of the phased implementation. Prior to commencement of the NRMC, 20% of PRNs that had been prescribed on existing charts for a period of 12 months or more had not been administered. These medicines were typed onto a single sheet where prescribers signed off each time they had reviewed the residents and did not required recharting. Prescriptions were requested when current stocks of these medicines expired.

PRNs continued to be prescribed with the introduction of the NRMC, although only 3% of PRNs prescribed were actually administered. As pharmacies supplied these medicines per patient, in response to RACF staff requests, this could result in considerable financial cost for residents for medicines that were rarely used. The requirements for appropriate storage, recording of PRN medicines, expiry and disposal of these medicines also had an impact on medication management at each site. Feedback from sites indicated that prescribers received considerable pressure from staff to prescribe PRNs, largely driven by staff concern that they may not be able to get a GP after hours in cases where the resident requires PRN medicines. The majority of PRNs prescribed during the phased implementation focused on pain management, behaviour management, indigestion, heartburn and constipation.

#### 6.2.1.3 Nurse-initiated medicines

The administration of nurse-initiated medicines to residents remained low at less than 1% of all medicines ordered per resident. All but one of the RACFs kept a nurse-initiated medicine list that had been approved by the medication advisory committee for use as required by each resident. Of particular interest is that the most commonly prescribed PRNs were aperients, analgesia and antacids and these also appeared in the nurse-initiated medicine approved lists at each RACF. The practice of prescribing these commonly used nurse-initiated medicines in the PRN section created seemingly unnecessary workload for prescribers with no real impact on the numbers of residents receiving PRN medications. The sequencing of the NRMC was revised to locate the PRN section prior to the nurse-initiated section as an attempt to resolve this practice. In some RACFs, this worked well with a reduction of PRN medications prescribed.

#### 6.2.1.4 Short term medicines

Overall, there was minimal change in the prescribing of short term medicines over the course of the project. The most frequent short term medicines prescribed both before and during use of NRMC were the antibacterials cephalexin, roxithromycin and trimethoprim, with a peak of respiratory-related antibiotics in winter. All RACFs kept information on antibiotic use as per best practice guidelines for infection monitoring and surveillance.

#### 6.2.1.5 Variable dose medicines

There was no change in the use of variable dose medicines, with less than 1% of residents prescribed warfarin and/or prednisolone. This result varies from the staff survey conducted in 2012 where respondents estimated about 20% of their residents were prescribed variable dose medicines. This conflict in perception and actual data from the audits may have been a result of the staff cognitive load around high-risk drugs and the skewed perception of increased numbers by RACF staff; alternatively, it could be a result of sampling.

The frequency of pathology related to the use of these medicines ranged from weekly to monthly.

#### 6.2.1.6 Insulin

The numbers of prescribed doses of insulin were unexpectedly low, given the high acuity of the residents. Insulin was consistently prescribed in only 0.3% of cases before and during use of the NRMC. The numbers of prescriptions per chart where residents were prescribed insulin ranged from 1 to 3, with an average of 2 regularly prescribed doses. The number of prescribed PRN (supplementary) doses averaged 1 with a range of 0 to 2. Interestingly, no PRN doses had been administered. BGL assessment frequency ranged from three times per day to weekly, with a an overall average of daily.

As a consequence of the low level of variable dose medicine and insulin prescribing, there was discussion with sites about removing this section from the NRMC as it added unnecessarily to the length of the chart. Having it available as a separate chart when required was reported by sites as being more beneficial. The recommendations from the workshop of RACFs suggested the following in relation to variable dose medicines and insulin:

"That consideration be given to the provision of a mainstream NRMC that does not include variable dose and insulin sections together with a complex NRMC that does include variable dose and insulin sections, or a suite of NRMC subcharts for variable dose and insulin to be used in conjunction with a main NRMC without the variable dose and insulin sections, as a preferred option over the one large NRMC."

Consideration of safety issues in relation to a suite of charts where prescribed doses may be missed, or also charted and administered twice if also inadvertently prescribed on the main chart in the regular medicines section, resulted in the sections for variable dose and insulin remaining within the NRMC.

#### 6.2.2 Medication incidents

Incident reporting is a common feature in residential aged care. The processes for recording and managing incidents are an essential component of residential aged care management and an effective tool for demonstrating compliance with the aged care standards and accreditation. The information about incidents was extracted from the

reporting documentation of each site during the audit. Results of each respective audit aimed to cover a span of the preceding three months.

A total of 251 medication incidents were recorded by sites in the three months prior to the NRMC phased implementation. The phased implementation resulted in 74 incidents with NRMC1, and 51 incidents with NRMC2 and NRMC3 combined, over the six month period after implementation. The numbers of medicine incidents when compared to numbers of medicines prescribed was low at 9.2 (0.9%), 5.5 (0.6%) and 3.5 (0.4%) per 1000 prescriptions respectively. The NRMC phased implementation recorded a decrease incidents associated with both pharmacy supply and the actions of staff. All measured incident data in the phased implementation resulted in a decrease of each type of incident (Table 3).

Errors attributed to pharmacy medicine supply included incorrect packaging of DAA and administration signing sheets being delivered to the sites, and were a significant proportion of all incidents recorded prior to the introduction of the NRMC at 57%. These errors were almost halved over the course of the implementation. This reduction was associated with the removal of signing sheets and improved version control of charts, so pharmacies could pack DAAs in accordance with the most recent medication orders.

#### Table 3: Number of medicine incidents

	Pre-NRMC N=251	NRMC N=74	NRMC2; NRMC3 N=51		
Pharmacy medicine supply					
Incorrect packaging	117	40	25		
Incorrect signing sheet	20	N/A	N/A		
Shortage of stock	5	0	0		
RACF incidents					
Resident identification	4	0	0		
Incorrect dose	20 Errors involved non-packaged medications such as transdermal patches (6); PRNs (8); and controlled drugs (6)	0	0		
Incorrect route	Ŭ Ŭ	0	0		
Incorrect time	18 Four occurred on the same day	9	4		
Incorrect medicine	1 Incorrect type of insulin	0	0		
Medicines not given	28 17 were medicines refused by a resident, and 11 were signed but not given.	13 Most involved non-packed medications such as transdermal patches (2); short term medicine such as Panadol elixir (6); and Movicol sachets (4)	14 Most involved non- packed medications such as transdermal patches (4); short term medicine (3); monthly medicines (Vit B injection)(3); and drugs of addiction (S8) medicines (2).		
Medicine found	38 Found either on the floor, in resident clothing or on a bedside locker	12	8		

There were relatively few resident identification incidents recorded prior to the NRMC implementation. Four incorrect resident incidents had occurred and there was one recorded incident of an incorrect non-prescribed medicine delivered to a resident prior to the NRMC. There were no recorded incidents of incorrect resident identification or of incorrect medicine delivered to a resident.

There were no incidents of administration of incorrect dose or incorrect route during the NRMC phased implementation. This compares to the administration of 20 incorrect doses of prescribed medicine in the three months prior. These errors involved medications that were not packed in a DAA, such as transdermal patches, PRNs, and controlled drugs. No residents had been transferred to acute care following identification of these incidents. Residents were all reviewed and monitored by registered nursing staff, medical practitioners were advised and family were notified.

Eighteen residents received medicine at the incorrect time in pre-NRMC implementation, with four incidents on the incorrect day. There were 13 incidents like this using the NRMC. The number of incidents where medicines were not given remained consistent before and during implementation with 28 and 27 respectively.

#### 6.2.3 Findings from inbuilt feedback mechanisms and QUM

The data collection tools and inbuilt feedback mechanisms provided ongoing data from prescribers, RACF staff and pharmacists, and this was recorded in the issues registers. As discussed in Section 5, there were several inbuilt mechanisms that aimed to capture a broad array of qualitative feedback in relation to QUM.

QUM information from the qualitative feedback mechanisms included improvement to prescriber, RACF staff and pharmacy workflows over time. The greatest improvement identified was the reduction of administrative time spent on prescriptions. Prescribers indicated that not having to generate the traditional paper prescriptions following charting on a medication chart saved them time, and RACF and pharmacy staff indicated that the time spent in following up on "owing" scripts had reduced significantly.

Access to individual medicine information via the booklet format of the NRMC also contributed to the quality use of medicines. As the information about each resident's medication was in a central place, prescribers and RACF staff spent less time locating relevant information during the review of residents. This also improved collaborative clinical decision-making with consistent and current information accessible to the health care team, including the pharmacist.

Improved information management due to a single place of documentation resulted in increased accuracy of resident, prescriber and pharmacy information. It also reduced the requirement and cost of producing and storing separate documents for BGL, weight and pathology at each RACF. There was a significant increase in the reporting of anomalies in BGL readings and weight loss readings, as staff could instantly recognise a change through the visual display of information on graphs. This is detailed in Section 6.3.

Faxed medicine orders were replaced by phone orders recorded on the NRMC instead of loose-leaf, poor quality faxed order sheets. There were improvements to version control and e-backup of charts via email, which contributed to the improved accuracy of DAAs as pharmacies received an e-record of recent changes, rather than loose-leaf pages.

The format of the NRMC also supported resident self-administration. As previously discussed, mechanisms within the residential aged care sector do not often reflect support for residents in terms of autonomy;<sup>13</sup> use of the NRMC was a positive outcome for residents in this regard.

### 6.3 Objective 3: To assess unintended consequences of the NRMC

Discussion of unintended consequences related to medication charts in aged care has been not been publically documented to a great extent. Similarly, practice issues that occur in terms of medication management have been minimally documented in RACFs in Australia.

The aged care accreditation standards and the associated accreditation process have systems in place to identify when RACFs do not comply with the expected medication management standard. There is no evidence to suggest that deficiencies in design and layout of medication charts have directly caused a "does not comply" rating in this sector. However, the RACFs with a history of issues in this area report that there are strong links between poorly documented medicine administration and monitoring where medication charts are not completed or maintained accurately, resulting in residents either not receiving prescribed medicines, receiving the incorrect dose of a prescribed medicine, or residents receiving medicines prescribed for other residents.

There is inherent difficulty in establishing associations between issues identified in this implementation and direct relevance or causation to the attributes of the NRMC. Issues identified could be directly attributed to the NRMC, non-directly attributed to the NRMC via an associated process, or remotely attributed to medication charts in general through historically driven aged care practice. Unintended consequences can, of course, be viewed as negative or positive.

No negative unintended consequences associated with NRMC phased implementation were identified. Positive unintended consequences were:

- increased reporting of anomalies due to graphical representation of specific data
- increased additional administration signatures for high-risk medicines
- perception by RACF staff of a holistic approach to medicine administration
- ownership and retention of original NRMC by the RACF.

#### 6.3.1 Increase reporting of anomalies

RACF staff practices changed as a result of the graphical display of information. For example, when BGLs were displayed graphically as a notable increase or decrease in the BGL level, staff alerted the person in charge so that monitoring of the resident's condition occurred quickly. Similarly, when staff were able to visually record resident weight loss on a graph, increased attention was given to reviewing resident nutritional supplements and/or ensuring that more time was spent with those residents who required assistance with eating.

The recording of nutritional supplement intake over morning and afternoon/evening timeframes also saw a shift away from providing nutritional supplements only at meal times to providing them intermittently through the day. This meant that residents experiencing weight loss tended to also consume their meals as well as nutritional supplements, rather than the previous practice of replacing meals with supplements, which had a negative impact on total calorie intake. Accounts of this behaviour modification as a result of visual graphical information, although an unintended

consequence of the NRMC, is not surprising given the vast amounts of literature related to behaviour change as result of visual stimuli.

#### 6.3.2 Increase administration signatures for high-risk medicines

Having space allocated for two signatures for high-risk medicines such as insulin and variable dose medicines also resulted in an increase in two signatures being provided by participants, despite few identified RACF policy directives or requirements to do so. As stated by a Director of Nursing:

"NRMC is changing RNs' behaviour. They are matching individual medications against the chart before signing, instead of administering all the meds and then signing for them. The RNs are taking warfarin to another RN for checking before administering it and then both RNs are signing."

The presence of these fields reportedly alerted staff to the high-risk category of these medicines and resulted in this behaviour change. This unintended consequence also comes as no surprise given that double-checking of high-risk drugs in vulnerable populations is frequently promoted to reduce medicine administration errors.<sup>14</sup>

#### 6.3.3 Development of a holistic approach

The NRMC created a "holistic sense" of the resident for staff administering medicines, resulting in staff "paying more attention". The NRMC booklet format was perceived as being less fragmented for staff administering medicine. Inclusion of pathology results, different sections for different types of medicines, resident photograph and details, prescriber and pharmacy details, weight monitoring, evaluation sections and a medicine history over a four month duration resulted in reports that staff felt that they knew the whole person more than with previous medication charts.

The following comments are drawn from the staff surveys and the NRMC final evaluation workshop.

- "Holistic approach with all information in once place, individual charts (not all stacked together with other residents in folders)".
- "Balance between what information we need to know and how it is easily located. Not too much noise on the chart, clear instruction when and where you need them".
- "Information all together increases safety and decreases staff time in locating relevant information. It is accessible".
- "Uniformity for both regular staff, new staff and agency staff, also consistent approach across the sector. National and organisational".
- "Good wake up call to RNs as they have to pay attention. Facilitates relationship with GPs on site as the new process is explained".
- "Reduction in medication errors as people are paying attention and all the information is in one place".

- "The way the chart is set out makes staff read it better and it makes sense. Staff are now thinking more about what they are doing, not just being automated. The chart encourages critical thinking as all the relevant information is there".
- "Facilitates compliance and improved consistent communications between GPs, staff and pharmacy resulting in improvements in safety and quality use of medicines for residents".
- "All using the same tool for medication (GPs, carers, nurses). Good for continuity of care".

#### 6.3.4 Ownership of original NRMC by RACF

The fourth unintended consequence related to the RACFs' responsibility for retaining and maintaining the resident medication chart at the RACF as part of *the Aged Care Act 1997, Records Principles 1997.* Section 19.5 (c) specifies the "Kinds of records to be kept — care recipient" where "An approved provider must keep records of … medical records, progress notes and other clinical records of care recipients."

Previously, the use of a single sheet medication system was common practice. This system involved the pharmacist supplying the RACF with a list of prescribed medicines typed onto a single sheet (medication profile) and separate sheets with a list of medicines for staff to sign for when they administered the medicines. It had become common practice in the aged care sector for the supplying pharmacy to determine the layout and type of document to be used for medication administration. Although this system of single sheets with typed medicine orders to sign against had become popular, the general sentiment from the sector was that the system had raised more issues that it solved in terms of version control and maintenance of records.

Feedback early in the project indicated dissatisfaction with computer generated printed medication order sheets supplied by pharmacies that were separate to the medication administration signing sheets. Participants expressed ongoing frustration with multiple reprints of these sheets as a result of changes of medicine and updates to medication orders. They also highlighted the onerous time allocation required for RACF auditing purposes; loss of information between frequently updated versions of the printed medication order sheets that continually got filed at RACFs; uncertainty about the exact numbers of pages of medication orders that existed for each resident at any one time; limited or no access to updated sheets after hours and weekends; and complaints from medical practitioners about the lack of consolidated medicine prescribing and administration history.

RACFs indicated they did not have control over these records and reported that they were pleased to have the original NRMC maintained at their facility, not the pharmacy. This sentiment is captured in the following comments.

• "It is refreshing to have the residents' med charts looking and feeling like a med chart...and not just pieces of paper. The best thing is that the chart provides a proper record and it stays at our facility. We know what medicines the doctor has ordered and we are not relying on the pharmacy to tell us. We feel more in control about what [medicine/s] the resident is supposed to be having. We can also see if

they have been given (much easier as we are all signing on the one section of the book).

• "We feel like we are back in the loop and not just something between the doctors and pharmacy in relation to the control of medication charts".

# 6.4 Objective 4: To identify potential areas for improvement in the NRMC design, layout and content

Analysis has yielded positive and consistent data on improvement for design, layout and content. The use of two critical analysis points built into the implementation assisted this process. Critical analysis points are identified points in time where all feedback received up to a specific date is considered retrospectively. This occurs in isolation from any new emerging data so that an analysis can occur undisturbed. New data received past the critical analysis point is considered at the next critical analysis point.

Critical thinking was applied to the data at each critical analysis point as a way of finding a workable means for resolving issues. This was done through recognising unstated assumptions and values, interpreting the data, appraising evidence, and evaluating arguments recognising the existence (or non-existence) of logical relationships between proposed solutions. Following this process, recommendations were made to test the conclusions and generalisations for inclusion and/or exclusion of fields into the chart.

The timing of each critical analysis point was integral to ensuring that feedback was analysed in time for review by the graphic designer, endorsement by the NRMC Reference Group, compilation by the printer and then distribution to RACFs in time for recharting. It was essential that each revised iteration of the NRMC was received by RACFs with adequate time for prescribers to review residents because the prescription of each medicine was only valid for the duration of the chart. In other words, a new NRMC was required for the supply of medicines each time a previous NRMC had expired.

Critical analysis point 1 was reached on 1 July 2013, and resulted in feedback and redesign for NRMC2. A further feedback process up until critical analysis point 2 on 30 September 2013 resulted in feedback related to the final iteration of the NRMC, referred to as NRMC3 for the purposes of the revision process.

This methodological approach was effective and facilitated the identification of areas of potential improvement in the NRMC design, layout and content. Those relating to safety and usability for administration were identified and were resolved in the initial stages of the phased implementation that involved NRMC1.

These revisions focused on: better positioning of the resident ID information; clarification and consistency of information fields on the front page; re-sequencing of sections in the chart to improve functionality; revision of required space for medicines in each section to reduce the numbers of charts required for individual residents; and the provision of prompts for prescribers to enhance the completion of essential fields for prescribing on the chart. Minor revisions of the NRMC layout occurred over the three iterations. These focused on consistency, minor changes to layout, and re-sequencing of the medicine sections.

Although feedback and identified areas for improvement in relation to paperless prescribing, supply and claiming of PBS/RPBS medicines proved to be more problematic

than safety and administration functions in terms of reaching consensus of layout and essential fields, the methods employed in the phased implementation remained robust and enabled the project to progress.

# 6.5 Objective 5: To identify potential areas for improvement in the NRMC support materials such as user and implementation guides

During the phased implementation, potential areas for improvement to support materials were identified by the audit data and inbuilt iterative feedback mechanisms. Ongoing collation and analysis of this feedback was undertaken with a view to improved functionality and usability of the support materials. Proposed solutions were communicated to the relevant stakeholders through redesigns, discussions and further feedback. The NRMC Reference Group members endorsed revisions of support materials such as user and implementation guides as the phased implementation progressed.

It was recognised early that a revision of the user guides was necessary to ensure consistency of information to prescribers, pharmacists and staff at RACFs. Feedback and identified areas for improvement in relation to support materials for the process of paperless prescribing, supply and claiming of PBS/RPBS medicines proved to be more problematic than safety and administration functions in terms of the completion of essential fields by prescribers. Pharmacists' feedback initially indicated that they had became increasingly frustrated over time that the essential fields in the NRMC for PBS/RPBS supply and claiming were not being completed by participating prescribers. Similarly, prescribers' feedback indicated that they became increasingly frustrated when contacted to return to the RACFs to complete these fields on the chart so that supply and claim of PBS/RPBS medicines could proceed. It became evident on examination of the support material for prescribers in the initial two weeks of the phased implementation that a reduction in the volume of information to a more targeted snapshot/checklist approach would facilitate the completion of necessary fields on the NRMC for supply and claim of PBS/RPBS medicines.

Revision occurred in direct response to sites which were experiencing undue auditing workloads, and in response to feedback from prescribers who were being requested to return to the RACF to complete required information on the medication chart. This resulted in significant improvements, as discussed in Section 6.1.3. The content of NRMC3 was revised to include more relevant and precise information at hand for prescribers and staff.

The evidence suggests a significant relationship between the use of support materials by prescribers with a decreased level of difficulty.

The support materials that rated the highest benefit by prescribers were the revised materials such as the checklist, the quick start guide, and instructions embedded in the chart. Conversely, the user guide did not receive a high rating and over half of the prescribers reported that they did not use it. The majority of reasons cited for not using the NRMC user guide that it was "far too lengthy" and that prescribers "didn't have time". These reasons are inconsistent with the other professional group responses. RACF staff and pharmacists referred to the NRMC user guides frequently and found them to be generally useful. For example:

- "Well laid out and easy to locate information"
- "Good to have easy to access information and guidance about the NRMC"
- "Found the pharmacy user guide extremely useful"
- "The user guide for nursing and care staff is excellent! We are finding that it is such a good education tool for staff around areas like PRNs. The documentation tips and suggestions help support us in better management of medications...and staff take notice of the Commission's guidelines more than us!"

Prescribers who reported that they did not use any of the support materials consistently reported the highest levels of difficulty regarding prescribing directly on the NRMC. This group also reported that they sought the assistance of staff when prescribing on the NRMC. Comments such as the "RN assisted very kindly" and it "would have been difficult without the help of nurses" reflect the general sentiment of this group and reflect historical medical and nursing practices related to QUM in RACFs. Supporting the prescribers to complete the essential NRMC prescribing fields resulted in increased workload for staff at participating RACFs. This is consistent with ongoing feedback from the NRMC phased implementation which previously led to a revision of the user guide for nursing and care staff to include instructions on essential information prescribers need to enter to enable supply and claiming of medicines.

# 7. RECOMMENDATIONS

The final analysis resulted in the following recommendations.

Future implementation of medication charts in RACFs must include a nationally agreed standardised approach that is applicable to the diverse nursing and non-nursing models, as well as to the variety of medicine packaging and supply systems used in the residential aged care sector.

#### **Recommendation 1**

That NRMC3 is endorsed as the nationally agreed standardised medication chart in its current booklet-based format.

The findings indicated that NRMC3 improved outcomes for residents in terms of reduced incidents, and provided a holistic approach to medicines through a central point for relevant medicine information for each resident. The findings also indicated that the process of prescribing, administering, supply and claiming of PBS/RPBS medicines from the NRMC3 improved workflows for prescribers, RACF staff and pharmacists. The booklet format improved version control and access to current information, and facilitated improvements to the accuracy of medicines supplied by pharmacy. The NRMC3 also provided a standard approach that worked effectively across the different models of care and medicine packaging systems characteristic of the residential aged care sector.

#### **Recommendation 2**

That NRMC is considered by the Commonwealth for national implementation in the residential aged care sector.

The phased implementation demonstrated measurable improvements in medicine management. There were improvements to prescriber, RACF staff and pharmacy workflows, a reduction in medication incidents and improvement to the QUM in terms of continuity of care for residents. The proven functionality and usability of the NRMC provides a trustworthy basis for a national standard approach to medicine prescribing, administering, supply and claim mechanism. The Commonwealth legislation that governed the phased implementation provides a sound framework for enabling legislation for national rollout.

#### **Recommendation 3**

That the Commonwealth establish a robust and independent mechanism to monitor and evaluate future national implementation of the NRMC.

The safety and the quality use of medicine outcomes for residents should be central to implementation. Strategies for national implementation of the NRMC will therefore require monitoring for adverse outcomes and evaluation of areas of concern that are identified. The diverse models of care characteristic of the residential aged care sector may prove

challenging for implementation given the wide spectrum of staff skill, complex resident needs and the resource implications of approved providers. Responsibility for NRMC monitoring and evaluation of implementation will require a coordinated activity by a matrix of collaboration between the Commonwealth, state and territory, private facilities and health professionals.

### 8. CONCLUSION

The final analysis and evaluations demonstrated that the NRMC phased implementation met its objectives. Inbuilt mechanisms were able to comprehensively assess the functionality and usability of the NRMC in relation to paperless prescribing, administering, supply and claiming of PBS/RPBS medicines in selected RACFs in NSW, while identifying any unintended consequences. The phased implementation also provided a snapshot of the current QUM practices in a sample of the residential aged care sector. Areas were identified for improvement to the NRMC design, layout and content and support materials such as user and implementation guides. A key feature of the NRMC project was the successful involvement of stakeholders. This was driven by the initial NRMC project plan, in which there was an undertaking to ensure ongoing opportunity for end users and key stakeholders to shape the NRMC. The inbuilt mechanisms and collaborative approach facilitated this with revisions to each iteration of NRMC determined by consensus.

The phased implementation, as part of the NRMC project, successfully facilitated the first examples of supply and PBS claiming from a medication chart in RACFs. It was able to demonstrate that streamlined information between prescribers, dispensers and those administrating medications improved the QUM. Duplication of documentation was minimised and "safe and correct" medication management, as per the aged care accreditation standards, was facilitated. Stakeholders using the NRMC were assisted by support materials, and an improved quality and safety of medication management in RACFs could be demonstrated.

The evaluation of "paperless prescribing" processes during the phased implementation provided valuable insights in terms of effectiveness and potential application across other health care settings where charting on a medication chart also required paper prescription for supply and claim of PBS/RPBS medicines. The process of "paperless prescribing" from a medication chart has enabled an examination of pharmacy supply of PBS/RBPS medicines from a copy of a prescription for the first time in this sector. The inclusion of essential fields to satisfy safety requirements and the legislative requirements for the NRMC demonstrated improvements to information flows, and became the catalyst for review of jurisdictional drugs regulations for consistency with Commonwealth requirements for supply and claim of PBS/RBPS medicines from a medication chart.

The modifications to online supply and claim processes were complex, involved legislative changes and incorporated checks and balances to minimise potential fraud.

The method for the NRMC phased implementation followed a multiple, iterative process that enabled a systematic refinement of opinion and findings with the aim of arriving at a combined or consensual position based on quantitative and qualitative evidence. In other words, the findings and recommendations of the NRMC phased implementation was a "collective judgment" of a group of experts and end users supported by hard data obtained though audits and incident and accident data. This approach to the phased implementation was informed by the theoretical approach of postmodernist grounded theory, as an overarching framework. As minimal data existed on medication charts in the Australian residential aged care sector, this approach was significant to the NRMC

development as the assumptions pivoted on the notion that knowledge develops from the "ground up", is extremely diverse, contextual and needs to be continually constructed and deconstructed. The methodological considerations focused on information collection and discursive constructions of the NRMC that occurred sequentially and at particular times, simultaneously.

The findings indicate that there are measurable improvements in medicine management when the NRMC is implemented into the residential aged care environment. Ongoing improvements could be demonstrated in relation to the QUM through a reduction of prescribed medicines, a decrease in medication related incidents, an increase in administration signatures and increased recognition and response to anomalies as a result of improved access and recording of medicine information in the one location. The reduction of paperwork and improvement to NRMC version control of consecutive medication charts when changes to medicines occurred contributed to the accuracy of medicines supplied.

The NRMC layout and format provided a framework within which a resident's medicine use could be viewed holistically by RACF staff, provided residents who self-medicated with an effective tool for recording medicine taken and, in general, the NRMC was reported by prescribers and RACF staff as providing an improvement to the continuity of care for residents. Implementation in the first instance was reported as resource intensive, however improvement to prescriber, pharmacists, and RACF staff workflows over time were reported as the processes of the NRMC and the supply and claim of PBS/RPBS medicines became familiar.

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