AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE

National Inpatient Medication Chart 2010 National Audit Report

February 2012

Acknowledgment
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1. Executive summary

1.1 Overview

This report forms a component of an ongoing National Inpatient Medication Chart (NIMC) quality improvement process and describes findings from audits of the NIMC undertaken during 2010 and reported to the Australian Commission for Safety and Quality in Health Care (ACSQHC). Data from seven jurisdictions (Australian Capital Territory, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia) are included in the overall aggregate analysis.

The findings are described in relation to the specific sections of the NIMC as they relate to the safety features that were introduced, through the NIMC, to reduce medication errors and adverse drug events. Comparisons from these 2010 audits are made with the post-implementation audit of the NIMC pilot chart in 2006 and the national audit undertaken in 2009 and reported by the Commission. It should be noted that the sites in each of the three audits are not matched and many audit criteria have changed since the NIMC pilot.

The report describes differences between jurisdictions compared with previous audits and the 2010 data. Comments are made in each table of results. Conclusions are made on current use of the NIMC. The report identifies areas for improvement in the use of the chart and recommends changes to the audit process for consideration by the Commission's Health Services Medication Expert Advisory Group.

1.2 Background

In 2004, Australian Health Ministers agreed to implement a standard National Inpatient Medication Chart (NIMC) in all Australian public hospitals to reduce harm to patients from medication errors. An initial pilot in 31 sites, and analysis of 22 matched sites data, showed a significant reduction in prescribing errors and reduced risks of subsequent adverse drug events (ADEs). The NIMC was subsequently implemented across public hospitals in all jurisdictions and many private hospitals during 2006 and 2007. The Commission is charged with maintaining national version control of the NIMC and is advised on this responsibility by an expert, representative group, the Health Services Medication Expert Advisory Group (formerly the NIMC Oversight Committee).

The Commission recommends that hospitals undertake annual audits of NIMC use and share these findings with the Commission with the objective of further improving the NIMC.

1.3 Aims

The aims of the ongoing NIMC quality improvement process are to:

1. Evaluate use of the NIMC and compliance with its safety features; and
2. Recommend changes to ensure the NIMC continues to assist in reducing the risk of harm to patients from medication errors and preventable adverse drug events (ADE).

1.4 Method

This analysis is a snapshot observational audit of use of the NIMC to evaluate the current effectiveness of its safety features. The audits were undertaken in public and private hospitals in seven jurisdictions. All hospital participants in the 2010 national audit used a new web-based *NIMC Audit System* for data submission and reporting.

The hospitals collected data using the paper-based *NIMC Audit Form*[1] and/or *NIMC Audit Tool Spreadsheet* and uploaded their data into the web-based *NIMC Audit System* www.safetyandquality.gov.au/nimcaudit. The *NIMC Audit System* reported on local audit outcomes and benchmarked local data against state, national and peer group data of all participating hospitals.

Participation in the audits was voluntary. Where appropriate, the 2010 data has been compared with 2009 audit and post implementation pilot audit from 2006. It should be noted that the sites were unmatched and that many prescribing audit definitions have been altered between the 2006 audit and the 2009, 2010 audits.

1.5 Results of 2010 Audit

Sixty nine public and private hospitals from Australian Capital Territory, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia participated in the NIMC 2010 National Audit from August to December 2010.

The national audit included 2,591 patients with 3,720 medication charts and 30,005 medication orders.

The NIMC continues to have a variable effect on some aspects of prescribing safety since its introduction in 2006-07, with a corresponding potential to reduce medication errors and possible ADEs. Compared to the 2006 post pilot audit and the 2009 data, there continue to be improvements in a range of prescribing practices that potentially could improve patient safety.

Large improvements were seen in documentation of previous adverse drug reactions (ADR), the use of the NIMC or Medication Management Plan to document medication histories and in the documentation of warfarin indication and target international normalised ratio (INR). Examples of improvements are listed in Table 1.

Table 1: Examples of improvements in compliance with safety features of the NIMC

Criteria for safe prescribing	Rate of compliance (%)		
	2006 post NIMC pilot N=1,234*	2009 audit N=864*	2010 audit N=2,591*
Patient identification completed (all patients)	19.8	31.3	32.8
Patients' weight documented • all patients • paediatric patients	19.1	23.1 75.7	24.4 N/A
Complete details of previous ADR documented (drug name and reaction or nil known)	29.4	62.7	77.3

Clinicians can access *medication history* either via NIMC or *Medication Management Plan (MMP)*	9.0	13.1	33.8
MMP forms with complete ADR documentation	N/A	56.0	87.1
Indication for warfarin documented	34.3	62.1	70
Warfarin education for patients documented	11.0	10.0	12.6
Warfarin orders prescribed in warfarin section with target INR range documented	34.3	69.6	95.7
Patients with drugs prescribed of a similar class (duplication)	0.9	1.6	1.0
Medicines prescribed by generic name	73.0	80.2	78.8
Sustained release forms of drugs identified	37.7	46.4	61.3
Intermittent medications with administration section boxes blocked correctly	N/A	59.5	78.2

*number of patients

Although the documentation of ADR increased by 14.6% compared to the 2009 audit, re-prescribing of similar class of medicine that previously caused ADR to patients increased from 7.7% in 2006, 7.3% in 2009 to 12.8% in 2010 audit.

The 2010 audit data showed an overall reduction in prescribing error rates compared to the 2009 audit (see Table 2 below), however many remain higher than the 2006 audit. This can partly be explained by the introduction of nationally endorsed, unacceptable error-prone abbreviations in 2008 which were not considered as errors in the 2006 audits.[2]

Although there are marked improvements in the use of certain safety features of the NIMC as outlined in Table 1, opportunities for medication errors remain, particularly in the area of clarity and quality of the documentation of prescribing decisions. See Table 2. The high rates of unclear dose, route and frequency errors, especially PRN frequency at 46.2%, and the use of error prone abbreviations in 24.6% of orders are of particular concern.

Table 2: Examples of prescribing errors

Criteria for missing, incorrect or unclear medication orders	**Audit results (%)**		
	2006 post-NIMC pilot N = 15,416#	**2009 audit** N = 9,047#	**2010audit** N = 30,005#
Unclear orders for drug name, route, dose and frequency	74.0*	49.4	37.8
Unclear drug names prescribed	3.0	7.6	4.0
Route errors (*missing, unclear, incorrect*)	6.5	13.3	10.3
Dose errors (*missing, unclear, incorrect*)	4.3	18.4	14.2
- Dose unclear only	N/A	16.4	13.1

Regular, PRN, Variable frequency errors *(missing, unclear, incorrect*)	15.5	20.0	19.6
- PRN frequency errors only	32.2	35.6	46.2
Error prone abbreviations used	N/A	22.6	24.6
Indication documented	22.8	14.5	20.2
Orders ceased correctly	N/A	24.1	49.5

[#] drug orders *based on patient numbers, not drug orders.

The number of errors relating to missing (undocumented) routes and missing doses remained low in 2010 (1.0% and 0.7% respectively). Incorrect route, dose and frequency errors were also low at 0.7%, 0.5% and 0.2% respectively.

Despite the warfarin section not being used for all patients receiving warfarin, of those patients for whom the warfarin section was used, indication documented increased from 60.9% in 2009 to 70% in 2010 and the documentation of the target INR increased from 70% in 2009 to 95.7% in 2010. Documentation of patient education on warfarin remains low at 12.6%.

Documentation of indications for regular, PRN, variable and warfarin orders (excluding stat only orders) at 20.2% was an improvement on 2009 but continues to remain low and is similar to the 2006 figure.

Only 36% of paediatric medication orders charted on paediatric NIMCs had a dose calculation documented. This was an improvement on the 2009 audit however the result are artificially low as medicines that did not require a dose calculation were counted as not having a dose calculation documented. There was also some use of paediatric charts in adult patients in combined women's and children's hospitals that would have affected the results.

Thirty-eight percent (n=993) of patients received a pharmaceutical review at least once and one third of the medication orders (33.4%) were annotated by pharmacists clarifying the prescription details. Of the 11.6 average medications orders per patient, 3.9 orders had pharmacist annotation.

Eleven percent of medication doses were not administered, or not signed for, by nursing staff (an average of one dose omitted or not signed per patient). A similar figure was reported in the 2009 audit.

1.6 Summary recommendations

1.6.1 Possible focuses for improving use of the NIMC

The 2006, 2009 and 2010 NIMC national audits have established baselines for continuous quality improvements aiming for 100% compliance in critical safety features of the NIMC. There is low compliance with several safety features and in some elements a large variation in the level of compliance between the different jurisdictions and private facilities. Table 3 lists key areas of medications safety that could be targeted for further improvement.

Recommendation: The Health Services Medication Expert Advisory Group consider strategies to address poor levels of compliance with NIMC safety features which carry a high risk for causing patient harm. (See Table 3 below)

Table 3: NIMC Safety features with poor compliance

Safety feature	2010 audit result
1. Patient identification	32.8% complete ID documented
2. Patient weight	24.4% documented (all patients)
3. Patients with previous ADR same class re-prescribed	12.8%
4. Warfarin orders prescribed in warfarin section 5. Indication for warfarin documented 6. Warfarin education recorded	63% of warfarin orders 70% of warfarin orders 12.6% documented
7. Clinician can access medication history either via the NIMC, MMP or equivalent	33.8% had complete medication history
8. Sustained release box	61.3% ticked for SR products
9. Designated medicine name, route, dose and frequency sections	4% of orders had unclear name 8.6% of orders had unclear route 13% of orders had unclear dose 15% of orders had unclear frequency 46.2% of PRN orders had frequency errors (*unclear, missing, incorrect)* 24.6% of orders contained one or more *error prone abbreviations*
10. Paediatric dose calculation box	36.4% of paediatric orders had dose calculation documented
11. Intermittent medicines	78.2% administration section boxed correctly
12. Indication box	20.2% indications documented (*exclude stat only*)
13. Pharmacy annotations and review	33.5% of medication orders were annotated by pharmacists 38.3% had a pharmaceutical review documented
14. One or more doses assumed omitted or administration not signed	11% of orders

1.6.2 Possible focus for future NIMC national audits

The lessons learned from post audit processes have been identified for future national auditing.

Recommendation:

The Health Services Medication Expert Advisory Group consider the recommendations on conduct of future NIMC national audits. (See Table 4 below)

Table 4: Recommendations for future audits

Issue	Assessment and background	Recommendation
1. Inter-rater reliability of auditors	Some of the 2010 audit results showed a large variation amongst jurisdictions. This may have been a result of variations in prescribers' behaviour but may also have been due to misinterpretation by the auditors.	Revise NIMC auditor support materials. Develop an education package that auditors are required to complete before auditing.
2. Inability to compare 2010 data with 2006 post-NIMC pilot data	Unmatched sites. Five of the 22 sites in the 2006 post-implementation audit participated in the 2010 audit. The remaining sites did not participate. Since 2006 pilot the definitions of errors have changed. The introduction of unacceptable error-prone abbreviations may have caused the increase in number of "unclear" orders. Similarly definitions have changed for ADR documentation and patient identification.	Consider approaching the original 22 pilot sites to participate in the 2012 national audit. Compare their results against the 2006 audit results as a separate subset within the *NIMC Audit System* capability.
3. Use of ADR alert stickers	45% compliance with this element. Stickers are not available in all jurisdictions.	Research availability of ADR alert stickers in all jurisdictions and report in the context of availability.
4. Availability of warfarin guidelines	36% compliance with this element compared to 12.4% in 2009. Hospital policy on the requirement of warfarin guidelines at end of patients' bed varies across jurisdictions.	Consider whether this audit data element is a useful measure for health services and jurisdictions.
5. Duplication errors	Although duplication errors were less than 1%, it is unknown if the errors are regular and PRN orders for the same drug or two regular orders on separate medication charts.	Recommend enhance audit tool functionality to enable additional information to be collected on duplicated orders.
6. Errors associated with "Unclear" orders	24.6% of orders contained one or more *error prone abbreviations* compared to 22.6% in 2009.	Continue to audit and target education to raise awareness of *error prone abbreviations*. Report use of *error prone abbreviations* as "Unclear" from errors relating to a missing or an incorrect dose, route or frequency. (as per the *Guide to NIMC auditing*)

Issue	Assessment and background	Recommendation
7. Paediatric dose calculation box	A proportion of paediatric medications that do not require a dose calculation (e.g. pancreatic enzymes, topical preparations) Current audit tool only allows a "Yes" or "No" answer. This affects the accuracy of dose calculation results.	Recommend *NIMC Audit System* enhancement to this data element to allow "N/A" for paediatric medications that do not require dose calculation
8. *NIMC Audit System* enhancements of audit reports	Reporting function does not provide breakdown measures by chart type (NIMC, NIMC Long Stay, NIMC Paediatric and Long Stay)	Recommend enhancement of reporting functionality to include capability to report by chart type.
9. Unfamiliarity with the web-based *NIMC Audit System* and process	All hospital participants in the 2010 national audit used the new web-based *NIMC Audit System* for data submission and reporting.	Promote use of the *NIMC Audit System* and support materials to standardise auditing and reduce variation
10. Inability to assess local influences on improvements in use of NIMC e.g. staff education, policies	NIMC auditing is used to inform NIMC quality improvement but does not account for local factors that may influence the quality of prescribing and documentation on the NIMC e.g. policies, education, level of clinical pharmacy service, training of staff completing audit and the extent to which participating hospitals utilise audit results to promote change and improve practice.	Consider collecting information on local NIMC quality improvement activities to provide information on the context in which the NIMC is used.

1.7 Conclusion

The 2010 national audit was a more representative audit than previous audits comprising over 30,000 medication charts from 69 public and private hospitals across seven jurisdictions. The audit demonstrated ongoing improvements in the safety of prescribing, administering and reviewing documentation in many areas of the NIMC compared to the 2009 and 2006 post-NIMC pilot audits.

Opportunities remain for:

- further reducing prescribing errors, particularly those associated with the communication of prescribing decisions to other medical, nursing and pharmacy staff;
- improving pharmacist documentation; and
- reducing the number of doses of medicines not administered or not signed for as administered.

The national audit process continues to:

- Highlight areas of improvement in patient safety;
- Assist in identifying specific areas for improvement which some or all jurisdictions may wish to use as a focus for medication safety activities in 2012; and
- Add to the evidence base for NIMC quality improvement.

The are limitations on comparing the data between audits as different hospitals may participate in the audit and there may be variation in the quality of the auditing as some of the elements, especially the prescribing errors, are subjective.

2 Background to the National Inpatient Medication Chart

Medication errors are among the most common incidents reported in public hospitals[3-4] with prescribing errors potentially the most serious of medication errors.[5] A recent study commissioned by the General Medical Council UK (GMC) found that 5.9% of consultants and 10.3% of trainee doctors in UK hospitals had made prescribing errors in one week.[6] Approximately 50 percent of medication errors and adverse drug events ADEs are deemed preventable.[7-9 10]

The causes of prescribing errors and ADEs are multifactorial[7-8 11] and multiple interventions are required to reduce errors, at the level of the individual, team, system, environment and culture.[8 12] Research into why prescribing errors occur identified that a culture exists where drug selection is seen as the critical component of prescribing.[8 11] The processes of selecting forms, routes and doses of drugs and communicating those decisions by completing a medication chart is seen as a low risk chore which is frequently delegated to inexperienced junior doctors.[8]

Prescribing can be considered as a four stage process, with each stage affecting the next. These steps are:

1. Gathering patient and drug information;
2. Making a decision in selecting the correct drug, form, route, dose and duration of treatment depending on the patients characteristics and other co morbid diseases and drug therapy;
3. Communicating the decisions by generating instructions for the supply and administration of these drugs; and
4. Reviewing the outcome and revising the prescribing decisions.[13]

Solutions developed to reduce prescribing errors should consider all of the stages of prescribing. Electronic prescribing with clinical decision support (EP-CDS) and forcing function to ensure complete and legible communication and instructions offers a partial solution to reducing prescribing errors,[14] but such systems are currently not widely available in Australian hospitals and have also been associated with introducing errors not seen in paper systems.[14-15]

The medication chart remains a critical form of communication of prescribing decisions and instructions between doctors, pharmacists and nurses, and acts as a record of medication administration and supply. Changes to the layout of medication charts have been shown to reduce the frequency of prescribing errors.[16] In 2004, when a standard chart was introduced to five sites in one area of South East Queensland a significant reduction in the frequency of prescribing errors was observed, 20% to 15.8% of orders per patient.[17] At that time, multiple different medication charts existed within and across Australian hospitals.

A lack of standardisation in prescribing charts has been cited as contributing to some prescribing errors.[18] Standardisation of medication charts has the potential to reduce the opportunity for errors caused by unfamiliarity with different charts as clinicians move between clinical units and hospitals.[19 20] Standard systems also provide an opportunity to train both students and clinicians in their use by using centrally produced material. There have been calls for a standard chart in the UK to improve safety of prescribing.[6 21]

In 2004, Australian Health Ministers agreed the introduction of a common medication chart. *"To reduce the harm to patients from medication errors, by June 2006, all public hospitals will be using a common medication chart. This means that the same chart will be used wherever a doctor or nurse works and where ever the patient is within a hospital". [*Australian Health Ministers' Joint Communiqué, 23 April 2004].

Development of the *National Medication Inpatient Chart* (NIMC) was overseen by the National Inpatient Medication Chart Working Group chaired by Dr John Youngman. A range of safety features was included in the chart after considering evidence from the analysis of medication errors. Multiple versions of the chart design were developed and tested before the final version was piloted in 2006. (See Appendix 1 for a copy of the current NIMC.)

The aim of the pilot study was to determine whether a standardised chart, shown to reduce significantly prescribing errors in a five site study in one state, could be successfully adapted, introduced and achieve similar benefits in a range of sites across other States and Territories.[17] The pilot intervention (introduction of the chart) was preceded and accompanied by local education of doctors, nurses and pharmacists.

The NIMC pilot study was a prospective, before-and-after, observational audit of prescribing errors including documentation of adverse drug reaction (ADR) details and specific details regarding prescribing of warfarin. It was undertaken by trained pairs of nurses and pharmacists using a standard data collection tool.

The main outcome measures were:

- Frequency of prescribing errors per patient;
- Rate of errors per order per patient and the completion of ADR details; and
- Warfarin documentation before and after the introduction of the NIMC.

The pilot study reviewed 1,328 patients' charts, including 15,557 orders from 22 public hospitals. The post implementation audit in the same 22 sites included 1,234 patients' charts and 15,416 orders. After the introduction of the NIMC, prescribing errors decreased by almost one-third, from 6,383 with a median (range) of 3 [0-48] per patient pre to 4,293, 2 [0-45] per patient post ($p<0.001$). The documentation of drugs causing previous ADR increased significantly from 81.9% to 88.9% ($p<0.001$). The documentation of the indication for warfarin increased from 12.1 to 34.3% ($p=0.001$) and the documentation of target INR increased from 10.8% to 70% ($p<0.001$).

Following the pilot, the NIMC was implemented widely across Australia in 2006 and 2007 in public hospitals and many private hospitals.

The Commission is responsible for maintaining national version control of the NIMC and for reducing national barriers to implementation. The Commission is advised on these responsibilities by an expert, representative group, the Health Services Medication Expert Advisory Group. Annual audits of NIMC use are undertaken by jurisdictions and private hospitals in a range of sites and the results shared with the Commission as part of an ongoing NIMC quality improvement process.

The aim of the audits undertaken in 2010 was to evaluate if NIMC safety features continued to be of benefit to patient care and if there were specific aspects of prescribing behaviour, the NIMC or the audit process that might require modification and should be considered by the Health Services Medication Expert Advisory Group.

3 Method – 2010 Audit

This analysis is a snap shot observational audit of in-hospital prescribing and use of the NIMC to evaluate the current effectiveness of the safety features of the NIMC. The clinical appropriateness of drug, route, dose and frequency was not otherwise examined.

The study involved a prospective chart audit of prescribing and administration documentation and errors. The definition of prescribing error was adapted from that of Dean et al: *"A prescribing decision or prescription writing process that results in an unintentional, significant reduction in the probability of treatment being timely and effective or increases the risk of harm, when compared with generally accepted practice".*[22] Agreed definitions and examples of types of prescribing errors aligned with the stages of prescribing are explained in each separate result table and are explained in detail in the *NIMC Audit Form*[1] and *Guide to Auditing the NIMC*[23].

Types of charts audited were:

- NIMC;
- NIMC long-stay version;
- NIMC paediatric version;
- NIMC long-stay paediatric version.

Stand alone anti-coagulation, continuous infusions, insulin, chemotherapy, acute and chronic parenteral analgesia, discharge and electronically generated charts were not included in the audits.

All hospitals (public and private) were invited to participate in the audit through the Commission's Health Services Medication Expert Advisory Group jurisdictional and private hospital contacts. (See Appendix 2 – *NIMC 2010 National Audit memo*) Participation was voluntary. Sites were recruited on the basis that they used a conforming NIMC and were authorised to share their data. The Director-General, or equivalent, in each State and Territory provided written approval for public hospitals to provide NIMC hospital-level data to the Commission.

All participating hospitals across States and Territories including private hospitals completed the audit during August and October 2010. The *Guide to Auditing the NIMC*[23] provided guidance for the auditors. Data were entered electronically and submitted to the Commission *NIMC Audit System* between February and May 2011.

The *NIMC Audit System* provided:

a) An electronic *NIMC Audit Form* into which patient audits were entered directly into the NIMC Audit System;

b) Data uploading function from the *NIMC Audit Tool* (Excel) spreadsheet into which hospitals collected and stored patient audits;

c) Reporting function that generated an audit summary report of the hospital's audit along with reports comparing their results with de-identified data from peer and all hospitals at State and national levels.

Hospitals were guided in the number and type of charts to audit as indicated in the *Guide to Auditing the NIMC.* Hospitals were encouraged to audit all NIMC charts. If this was not feasible, the following sample size was recommended.

Table 5: Suggested hospital audit sample size

Number of adult beds in hospital	Sample size
150 or more	20% of current patients
30-149	30 current patients
Less than 30	All current patients

Audit teams audited patient's active medication charts. It was recommended that audit teams comprised a registered nurse and a pharmacist if available, otherwise a medical officer or another nurse.

All available NIMCs on medical, surgical, paediatric and mental health wards were audited to identify and document prescribing errors using established definitions in the NIMC User Guide and Guide to Auditing the NIMC.[23] All medication orders on active NIMCs were reviewed including those cancelled or previously changed.

Inter-rater reliability was not determined. However, both observers had to agree on errors. A third auditor was involved if any disagreement occurred.

Analysis of data

Where appropriate, the 2010 data has been compared with post-implementation pilot data from 2006 and NIMC 2009 National Audit results.

It must be noted that the sites in the 2006 pilot, the 2009 and 2010 audits were unmatched. Five of the 22 pilot sites that participated in the 2006 post-implementation audit participated in the 2010 audit. In addition, many prescribing audit definitions have been amended since the 2006 audit.

The pre and post-pilot data has been published by Coombes I *et al* in the British Journal of Clinical Pharmacology in 2011.[24]

4 Results of 2010 NIMC audit

Sixty nine hospitals from all States and Territories (except NSW) participated in the NIMC 2010 National Audit. Participating hospitals included 18 small regional and remote hospitals, 14 principal referral hospitals, 10 medium group hospitals, three specialist women and children hospital and two private hospitals. See Table 6.

The results of the data analysis are presented in tables relating to individual NIMC safety features.

The tables list the national data that compares results of the three audits, the 2006 post-pilot NIMC audit, the 2009 and 2010 national audit data. The national data is followed by a discussion on the results from the various jurisdictions (J1 –J7) and private hospitals.

4.1 Demographics

4.1.1 Patients and medication charts

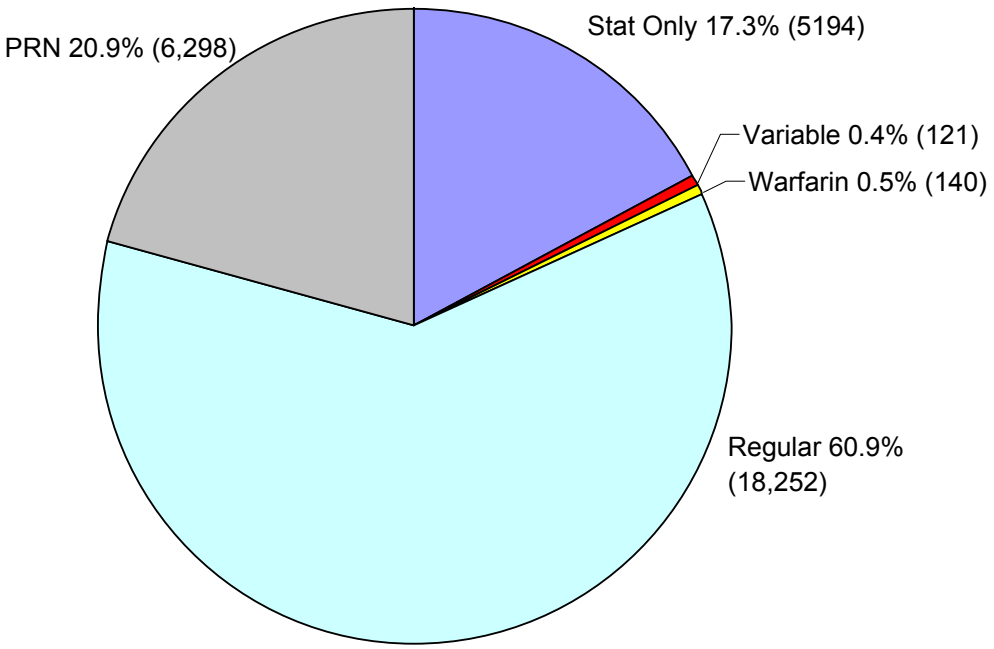
There were 2,591 patients including paediatric patients in the NIMC audit. A total of 3,720 medication charts and 30,005 medication orders were reviewed.

4.1.2 Medication orders

Over 60% of orders were for Regular medication orders with *PRN* orders being the next most common order. Variable dose and Warfarin orders accounted for less than 1% of all orders. This translates to 7% of adult patients prescribed warfarin. See Figure 1 below.

Figure 1 Types of medication orders

Total number of medication orders = 30,005



4.1.3 Hospital demographics by peer group

The break down of hospital participation by peer grouping is provided in the table below. The peer grouping of hospitals is based on the Australian Institute of Health and Welfare (AIHW) classification.

Table 6: Hospital participation by peer group

Peer group	Total
Small Regional and Remote Acute *(includes two non-acute hospitals)*	**18**
Principal Referral	**14**
Medium Group	**10**
Multi Purpose Services	**10**
Un-peered & Other	**4**
Large Major Cities	**3**
Large Regional & Remote	**3**
Specialist Women & Children	**3**
Private	**2**
Psychiatric	**1**
Rehabilitation	**1**
Sum	**69**

Data used for aggregate analysis

The break down of data on number of patients, medication orders and by State and Territory is provided in the following tables. The reporting functionality did not allow for a breakdown by type of chart i.e. NIMC, paediatric, long stay.

Table 7: Number of patients, medication charts and orders by State and Territory and Private hospitals

	J1	J2	J3	J4	J5	J6	J7	Private	2010	2009
Patients	**365**	**201**	**50**	**50**	**266**	**1,519**	**80**	**60**	**2,591**	**864**
Medication charts										
All medication charts	**473**	**317**	**59**	**63**	**432**	**2,200**	**103**	**73**	**3,720**	**1,138**
Medication orders										
Stat Only orders	622	439	36	95	536	3,395	71	0	5,194	1,391
Variable dose orders	14	10	0	1	10	85	1	0	121	38
Warfarin orders	10	11	0	2	9	101	7	0	140	30
Regular orders	2,103	1,586	319	348	1,831	11,063	599	403	18,252	5,539
PRN (as required) orders	698	587	91	109	626	3,838	205	144	6,298	2,049
Total orders for all patients	**3,447**	**2,633**	**446**	**555**	**3,012**	**18,482**	**883**	**547**	**30,005**	**9,047**

4.2 Use of NIMC safety features

4.2.1 Patient identification and weight – National

Complete identification requires unique record number (URN), patient name, patient address, and date of birth on pages 3 & 4 of the NIMC. Weight is to be recorded on at least one medication chart for NIMC or NIMC Long Stay and on pages 3 and 4 of NIMC Paediatric.

Criteria	2006 post-NIMC pilot audit	2009 audit	2010 audit	Target	Comment
% of patients with *complete identification* on all pages of medication chart	19.8	31.3	32.8	100%	Low compliance, only 1/3 of charts have complete patient identification.
% of patients with *weight* documented	19.1	23.1	24.4	100%	Low compliance with recording weight for all patients.
Paediatrics only	N/A	75.7	N/A	100%	

Patient identification and weight – by jurisdictions (J1 – J7) and private facilities

There was wide variation between jurisdictions in rates of recording both patient ID (range 16 – 56.3%) and patient weight (range 7.5 – 56%. Private hospitals performed better in both areas (86.7% for patient ID and 63.3% for weight).

4.2.2 Adverse drug reaction (ADR)

Complete ADR documentation requires nil known, unknown or ADR with drug name(s) and reaction documented and a clinician's signature.

ADR documentation – National

Criteria	2006 post-NIMC pilot audit	2009 audit	2010 audit	Target	Comment
Of the patients whose charts were audited, % with *complete ADR documentation* on all charts	29.4%	62.7%	77.3%	100%	Improvement with recording of complete ADR details, completed more than twice as often than in post-NIMC audit. However further improvement is needed.
Of the patients with a previous ADR, % of patients with ADR *alert stickers in place*	ADR stickers not widely used in 2006	29.7%	45.4%	100%	Improved compliance with application of ADR alert stickers. Note: stickers are not used in all jurisdictions and reporting reflects that.
Of the patients with a previous ADR, % of patients with *similar class of ADR medication prescribed* on chart	7.7%	7.3%	12.8%	0%	Increased proportions of patients with previous ADR were re-exposed to a similar class of drug. This is a cause for concern.

ADR documentation - by jurisdictions (J1 – J7) and private facilities

All jurisdictions demonstrated a significant improvement in ADR documentation since the 2006 audit.

4.2.3 Medication history

Criteria	2006 post-NIMC pilot audit	2009 audit	2010 audit	Target	Comment
Of the patients whose charts were audited, % where clinicians can access *medication history* either via NIMC or *Medication Management Plan (MMP)* Medication history, including "nil Regular medications", on current medication chart	9.0%	13.1%	33.8%	100%	Improved compliance with recording of patients' medication history or cross referencing location of medication history on separate form/MMP. 15% of patients have a medication history documented on their medication chart 15% of patients had a medication history cross referenced on current chart to a previous chart or to MMP. 3.8% of patients had their medication history documented on MMP and not cross referenced on a current chart
Of the patients whose charts were audited, % with a medication history documented on *MMP form*	N/A	9.8%	18.8%	100%	Twice as many patients had a *MMP form* or equivalent in "end of bed" folder compared with 2009 audit.
Of the MMP forms audited, % with *complete ADR documentation*	N/A	56.0%	87.1%	100%	High compliance with recording of ADR details in MMP form
Of the medications documented on the MMP form, % with *Dr's Plan on Admission* documented	N/A	69.3%	63.1%	100%	Similar level of compliance maintained with recording of *Dr's Plan on Admission*
Of the medications documented on the MMP form, % with *Reconcile* column ticked	N/A	67.1%	56.1%	100%	Decrease in number of medicines documented as reconciled in 2010

4.2.4 Warfarin

Total warfarin orders refer to warfarin orders prescribed in the Warfarin and Regular sections of the NIMC.

Criteria	2006 post-NIMC pilot audit	2009 audit	2010 audit	Target	Comment
Of the patients whose charts were audited, % with *Guidelines for Anticoagulation using Warfarin* at end of patients' bed or with NIMC	N/A	12.4%	35.8%	100%	Increased level of compliance with availability of warfarin guidelines at the point of prescribing although figure is still low. Hospital policy on the requirement of warfarin guidelines at end of patients' bed varies across jurisdictions which influences the result.
Of the total warfarin orders prescribed, % of warfarin orders prescribed in *Warfarin section*	N/A	79.3%	63.1%	100%	Reduction in compliance with prescribing warfarin in warfarin section compared to 2009. 36.9% of warfarin orders were prescribed in regular section of the NIMC.
Of the warfarin orders prescribed in warfarin sections, % of warfarin orders with *target INR** range documented	70%	69.6%	95.7%	100%	Improved compliance with documenting the target INR when warfarin was prescribed in warfarin section compared to 2006 pilot.
Of the warfarin orders prescribed in warfarin sections, % of warfarin orders with *indication* documented	34.3%	60.9%	70.0%	100%	Improved compliance with documentation of the indication when prescribing warfarin compared with the 2006 pilot.
Of the patients prescribed warfarin, % of patients with warfarin education recorded	11.0%	10.0%	12.6%	100%	Continued low compliance with documentation of warfarin education. Should be focus of attention for improvement.

*INR = International Normalised Ratio

4.2.5 Variable dose medication

Variable dose medication – National

Criteria	2006 post-NIMC pilot audit	2009 audit	2010 audit	Comment
% of medications prescribed in the *variable dose section**	N/A	0.4%	0.4%	The number of variable dose medications exceeded the count of variable orders audited for prescribing and administration details.
% variable dose orders prescribed in the *variable dose section*	N/A	N/A	60.2%	Over half the variable dose orders can be accommodated in the current section.

*Variable dose medications can be prescribed in variable dose and regular order sections.

Variable dose medication – by jurisdictions (J1 – J7) and private facilities

The percent variable dose orders prescribed in the variable dose section ranges from 0% to 100% which reflects the limitation on the use of the section for medicines administered once daily or less. Note a small number of variable dose orders in some jurisdictions and none in private sector.

4.2.6 Duplicated orders

Duplicated orders refer to once only, stat, telephone, regular (including variable dose and warfarin), and PRN medication orders duplicated for the same medication or class of medication.

Duplicated orders – National

Criteria	2006 post-NIMC pilot audit	2009 audit	2010 audit	Comment
Of the patients whose charts were audited, % of orders where there were *duplicated orders* with the potential to harm	0.9%	1.6%	0.9%	While duplicated order numbers are small (and improved from 2009 to 2010), they are a clinically significant issue that warrants further research.

Duplicated orders – by jurisdictions (J1 – J7) and private facilities

Results varied across the jurisdictions and private sector from 0% to 4.3% of orders being duplicated and having the potential to cause harm.

4.2.7 Sustained release form specified

Sustained release medications are prescribed in the Regular order sections of the medication chart and indicated by ticking a sustained release box.

Sustained release form specified – National

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comment
Of the sustained release (SR) medications prescribed, % with *SR box ticked*	37.7%	46.4%	61.3%	Improved compliance with using the SR tick box to identify slow release forms of medications since the 2006 post-NIMC pilot.

Sustained release form specified – by jurisdictions (J1 – J7) and private facilities

All jurisdictions demonstrated improvement in this category over previous audits although there remains significant variation across jurisdictions ranging from 21.6% to 86.7%. Private hospitals have very low compliance in using the SR tick box to identify slow release formulation of medications.

4.2.8 Pharmaceutical review

Pharmaceutical review – National

Criteria	2006 post NIMC audit	2009 audit	2010 audit	Comment
Of the patients whose charts were audited, % with at least one *pharmaceutical review* documented in charts	N/A	39.9%	38.3%	Similar compliance with documentation of pharmaceutical review compared with 2009.

Pharmaceutical review – by jurisdictions (J1 – J7) and private facilities

The documentation of pharmaceutical review in NIMC varied ranging from 2% to 49.3% across jurisdictions and 6.3% in private hospitals.

4.2.9 Drug name errors

Drug name errors – National

Unclear name refers to a medication that could be interpreted as another medication or the order is illegible.

Criteria	2006 post-NIMC pilot audit	2009 audit	2010 audit	Comment
Of the medication orders audited, % of medications (each drug order type) with brand name	27% excluded "acceptable combination names"	19.8%	17.3%	The list of approved combination names may differ between facilities and was not taken into account. The practice of using generic names has continued to improve since introduction of NIMC, and may reflect a consistent approach to generic prescribing.
Of the medication orders audited (each drug order type), % of medications with name unclear	3.0%	7.5%	4.0%	Some improvement in clarity of medicines names compared with 2009. This may have been influenced by the introduction of the *Recommendations for Terminology, Abbreviations and Symbols used in the Prescribing and Administration of Medicines* in 2008 and the principle of not abbreviating any medicine name.

Drug name errors – by jurisdiction (J1 – J7) and private facilities

Extent of use of prescribing by brand name was similar across jurisdictions and the private sector, ranging from 15.3% to 30.2%.

4.2.10 Route errors

Errors include missing, unclear or incorrect route prescribed. Unclear route may be where an abbreviation is used that could be misinterpreted. For example, SC can be mistaken for SL and vice versa; or the wrong route for the medication is prescribed such as Ampicillin 1g IV ordered when it should have been prescribed IM.

Prescribing	2006 post-NIMC pilot audit	2009 audit	2010 audit	Comment
Of the medication orders audited (each drug order type), % of medications with *missing* route	N/A	1.2%	1.0%	Good compliance with documentation of route
Of the medication orders audited (each drug order type), % of medications with *unclear* route	N/A	10.9%	8.6%	Minor improvement in compliance with clearly documenting the route. See comments in all route errors below.
Of the medication orders audited (each drug order type), % of medications with *incorrect* route	N/A	1.2%	0.7%	Good and improving compliance with indicating the correct route
All route errors	6.5% (no breakdown of missing, unclear, incorrect)	13.3%	10.3%	The introduction of the *Recommendations for Terminology, Abbreviations and Symbols used in the Prescribing and Administration of Medicines* in 2008 identifying error-prone abbreviations for route of administration may have contributed to the increase in route errors compared to 2006 data. Although 2010 data shows some improvement on 2009 data, further improvement is needed.

Route errors – by jurisdiction (J1 – J7) and private facilities

The majority of jurisdictions reported an overall reduction in all route errors in 2010 ranged from 5.2% to 20.6%.

4.2.11 Dose errors

Dose errors – National

Dose is unclear when metric and arabic systems are not used or error prone abbreviations are used e.g. u for units, mcg for microgram. Incorrect dose for the medicine is recorded when an incorrect dose is prescribed e.g. Heparin 50,000 units subcutaneously BD as opposed to 5000 units.

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comment
Of the medication orders audited (each drug order type), % of medications with *missing* dose	N/A	0.8%	0.7%	Very few orders have no dose ordered.
% of medications with *unclear* dose	N/A	16.4%	13.1%	Low compliance with clearly documenting the dose although an improvement from 2009 audit. The more extensive list of error prone abbreviations may be contributing to the high error rate.
% of medications with *incorrect* dose	N/A	1.1%	0.5%	Good compliance with prescribing the correct dose
All dose errors	4.3%	18.4%	14.2%	Decrease in dose errors compared with 2009 audit. The main category of error was unclear orders. See above.
Paediatric doses calculated and documented	N/A	25.2%	36.4%	Improved compliance with documenting paediatric dose calculation. However this is artificially low as paediatric medications that do not require dose calculation (e.g. pancreatic enzymes, inhalers/nebuliser, topical preparations) were included as no dose calculation documented. The audit tool needs to be enhanced to include N/A option.
Paediatric doses correctly calculated	N/A	92.3%	58.7%	

Dose errors – by jurisdiction (J1 – J7) and private facilities

Most jurisdictions performed poorly with a variation in dose error rates in 2010 from 6.5% to 18.5% compared with 0.8% to 23.6% in 2009.

All jurisdictions reported variable rates of documentation of paediatric dose calculations in 2010, ranging from 10.5% to 60.6%. Of the orders with documented dose calculation three jurisdictions reported ≥95.9% of paediatric doses as correctly calculated. Two jurisdictions reported rates of 32.4% and lower resulting in a national rate of 58.7% compared to 92.3% in the 2009 audit.

4.2.12 Frequency errors

Frequency is unclear if illegible or error prone abbreviations are used. For example, *Frusemide 40mg qd* is not an error prone frequency abbreviation. Wrong frequency is the incorrect frequency for medication prescribed, for example *Gentamicin 320mg IV BD* as opposed to once daily.

Frequency errors – National

Criteria	2006 post-NIMC pilot	2009 audit*	2010 audit#	Comment
Of the medications audited (regular, PRN, variable), % of medications with *missing* frequency	N/A	5.1%	4.4%	Moderate compliance with documentation of frequency
Of the medication orders with frequency documented % of medications with *unclear* frequency	N/A	14.4%	14.9%	Poor compliance with clearly documenting the frequency reflecting a high use of illegible or error prone abbreviations.
Of the medication orders with frequency documented % of medications with *incorrect* frequency	N/A	0.5%	0.2%	High compliance with prescribing the correct frequency
Regular frequency errors only *(missing, unclear, incorrect)*	(9.0%)	14.2%	10.4%	Additional criteria of unclear abbreviations may have contributed to increase in error rate in 2009 audit
PRN frequency errors only *(missing, unclear, incorrect)*	(32.2%)	35.3%	46.2%	Commonly, minimal hourly interval not used. Most frequency errors are for PRN orders and could be a focus for further attention.
All variable, regular, PRN frequency errors	(15.4%)	20.0%	19.6%	Similar high rate overall of frequency errors

*2009 denominator excludes stat, variable dose and warfarin as no frequency required (pre-printed for variable dose and warfarin)
#2010 denominator excludes stat and warfarin orders as no frequency is required for these orders.

Frequency errors – by jurisdiction (J1 – J7) and private facilities

All jurisdictions reported between 5.5% and 22.5% of errors in the frequency ordered for all orders. This rate was higher for PRN orders. The rate of frequency errors in regular medication orders reduced across jurisdictions from the 2009 audit to the 2010 audit.

4.2.13 Intermittent medication

When medicines are prescribed for intermittent administration, for example once weekly, the administration boxes on those days when the medicine is not to be administered are required to be blocked or crossed out. This is to reduce the risk of the medicine being given on days it is not ordered.

Intermittent dosing of medication – National

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comment
Of the intermittent (i.e. weekly) medications prescribed, % of administration sections with boxes blocked correctly	N/A	59.5%	78.2%	Compliance has improved. However the risk of intermittent medications being administered daily remains high.

Intermittent dosing of medication – by jurisdiction (J1 – J7) and private facilities

The percent of intermittent medications with the administration boxes blocked correctly ranged from 42.9% to 100%.

Frequency of administration times equal to prescribed frequency

Frequency matches administration times – National

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comment
% of the orders of **regular, variable** medicines where times match frequency	98.1%	N/A	93.4%	Good compliance has been maintained since the 2006 post-NIMC pilot

Frequency matches administration times – by jurisdiction (J1 – J7) and private facilities

Most jurisdictions performed well with frequency of administration matches prescribed frequency in 2010 from 62.6% to 97.3% and private facilities at 93.3%.

4.3 Prescribing errors

This section includes the data that measure the effect of the chart features designed to improve the completeness and clarity of prescribing instructions on the quality of prescribing.

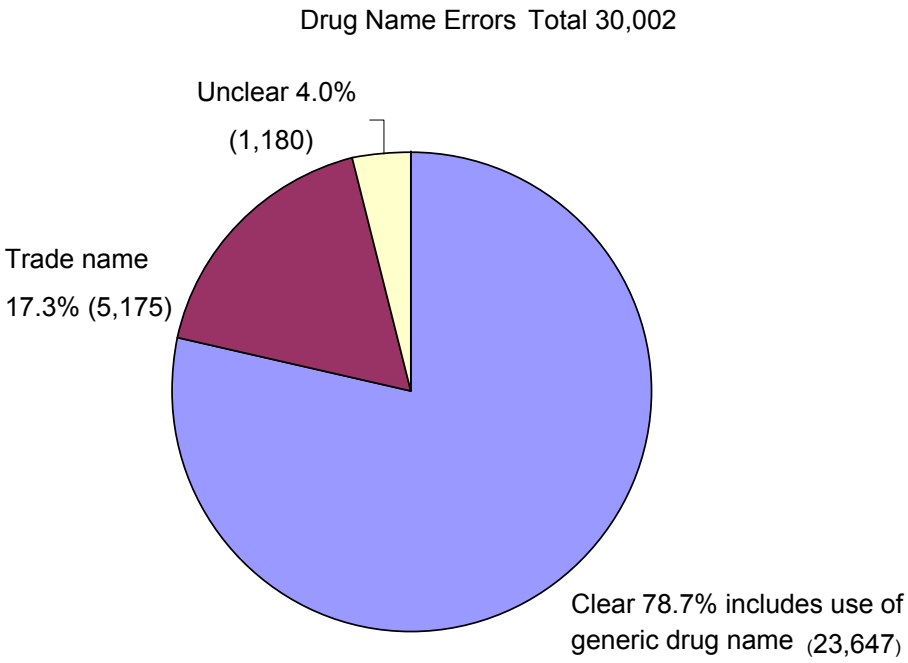
4.3.1 Drug Orders

Errors in drug orders, i.e. prescribing errors, are defined as unclear (includes use of error prone abbreviations), illegible or missing orders, when prescribing drug names, route of administration, dose and frequency. The majority of errors were unclear orders with frequency errors having the highest rate of unclear orders at 14.9%. (See Figure 3)

Drug name errors

Four percent of drug names were unclear, i.e. were illegible and could be misinterpreted as another drug, or were they were abbreviated e.g. 3TC for Lamivudine. See Figure 2 below.

Figure 2: Drug name errors by type



Route of administration, Dose and Frequency Errors

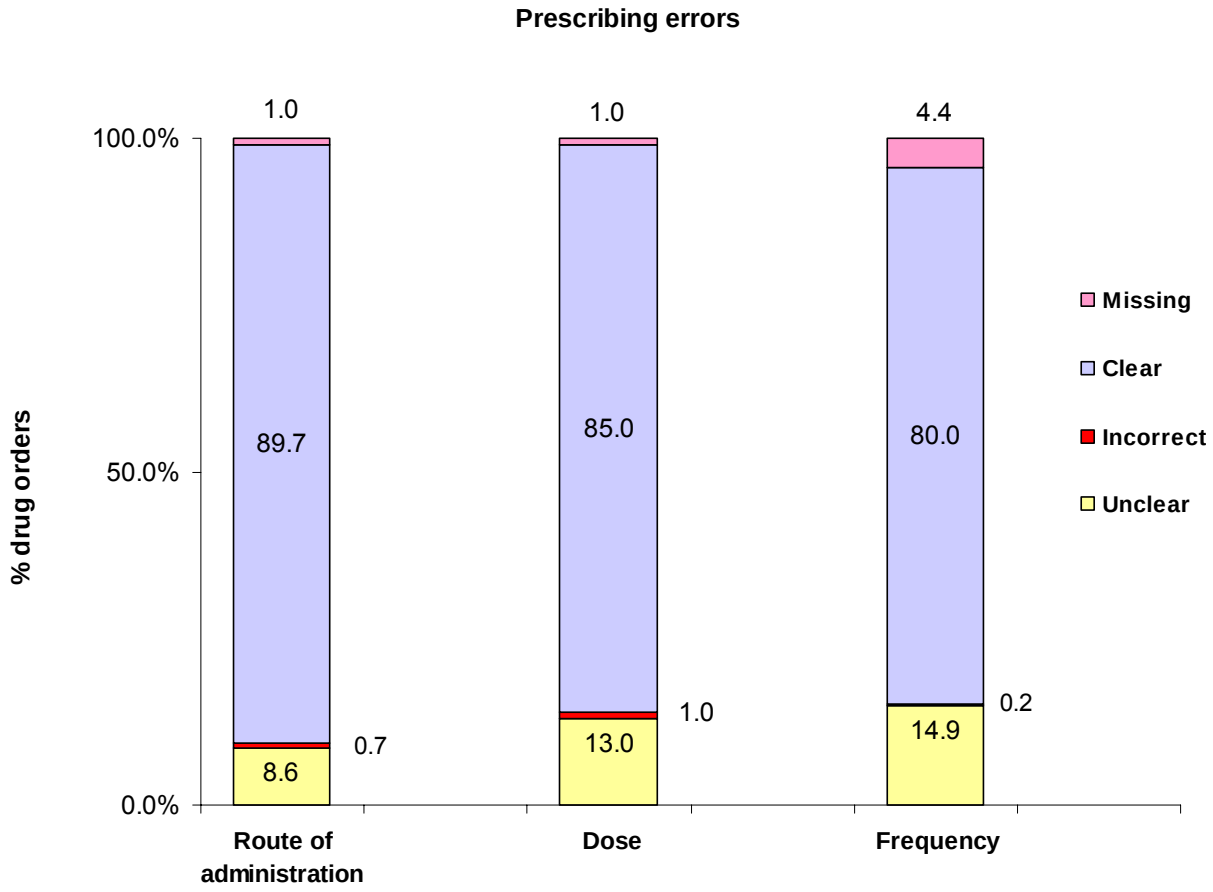
8.6% of orders had unclear route of administration i.e. contained an unapproved abbreviation or illegible route. The route of administration was not specified (missing) in 1% of orders.

Overall 13% of doses prescribed were unclear. In only 1% of orders was the dose not prescribed (missing).

14.9% of dosage frequencies prescribed were regarded as unclear and 4.4 % of orders did not specify the frequency of dose administration. See Figure 3 below.

Instructions were missing in ≤ 1% of orders.

Figure 3: Route of administration, Dose and Frequency errors by type



4.3.2 Unclear orders

Almost 40% of medications prescribed had at least one or more unclear instructions for drug name, route, dose or frequency.

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comments
Of the medication orders audited (each drug order type), % of orders prescribed with one or more **unclear** instructions for drug name, route, dose **or** frequency	74.0% of patients had at least one error	49.4%	37.8%	High incidence of unclear orders, although an improvement on 2009. Note: 2006 pilot data was entered per patient not per order.

4.3.3 Prescribing errors by chart type

The data comparing prescribing errors between paediatric and adult chart types were not available.

4.3.4 Error prone abbreviations in use

Error prone abbreviations include use of U or u for unit, OD for once daily, SC or S/C for subcutaneous, and no leading zero before a decimal point (e.g. .5mg for 0.5mg).

Error prone abbreviations – National

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comment
Of the medication orders audited (each drug order type), % of orders containing **one or *more error prone abbreviations***	N/A	22.6%	24.6%	High use of error prone abbreviations to document route, dose and frequency

Error prone abbreviations – by jurisdiction (J1 – J7) and private facilities

Use of error prone abbreviations varied considerably across jurisdiction and private facilities, ranging from 7.6% - 50.2%.

4.3.5 Indication documented

Indication documented - National

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comment
Of the medications audited (regular, PRN, variable, warfarin & all), % of orders with indication documented	22.8%	14.5%	20.2%	Low compliance with documentation of indication for all medications (excluding stat only). Results remain lower than in the 2006 pilot but improved between 2009 and 2010 audits. This could be considered a future focus for quality improvement.

Indication documented – by jurisdiction (public hospitals) and private facilities

The indication of use for a drug was poorly documented across all jurisdictions and was lowest in the private facilities.

4.3.6 Pharmacy annotation

Pharmacy annotation – National

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comment
Of the medication orders audited (each drug order type), % of orders with pharmacist annotation	36.2% of charts in post pilot had 1 or more order annotated	26.6%	33.5%	There is still significant documentation gap in pharmacist annotation of medication orders. Although it is recognised that not all orders will require an annotation.

Pharmacy annotation – by jurisdiction (public hospitals) and private facilities

There was considerable variation between jurisdictions (2% to 46.8%) which may indicate the availability of pharmacists at the time of audit and/or variation in practice. The rate was lowest in the private facilities.

4.3.7 Prescriber signature and identifier

Prescriber signature – National

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comment
Of the medication orders audited (each drug order type), % of orders **signed by prescriber**	98.8%	97.2%	97.5%	Maintained high compliance with prescriber signing orders.
Of the medication orders with prescriber signature (each drug order type), % of orders where **prescriber name is clear**	78.3%	66.6%	77.5%	Moderately good compliance with the prescriber clearly documenting their name.

Prescriber signature – by jurisdiction (public hospitals) and private facilities

All jurisdictions reported high compliance with prescribers signing orders. The rates of compliance with the prescriber clearly documenting their name were lower and displayed much greater variation.

4.3.8 Ceased Orders

Orders are ceased correctly when a clear line is drawn through the prescription and administration records and a reason is provided for the cessation.

Ceased orders – National

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comment
Of the ceased medication orders audited (regular, PRN, variable, warfarin & all), % of orders ceased correctly	N/A	24.1%	49.5%	Much improved compliance with ceasing of medications according to hospital policy/medication chart guidelines. However a high risk of ceased orders being transcribed on another chart or at the point of discharge remains and could be considered a future focus for attention. May be useful to research strategies employed by hospitals which have shown the greatest improvement.

Ceased orders - by jurisdiction (public hospitals) and private facilities

There was a large variation between jurisdictions with rates of orders being ceased correctly ranging from 0% - 68.3%. Compliance was highest in the private facilities (91.2%).

4.3.9 PRN maximum dose documentation

PRN maximum dose documentation – National

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	Comment
PRN Maximum dose per 24 hours documented	N/A	N/A	42.5%	Poor compliance in documenting maximum dose per 24 hour box. Issues have been raised regarding the inappropriateness of maximum dose in 24 hours for opioid prescribing. This may have contributed to the low result.

PRN maximum dose documentation – by jurisdiction (public hospitals) and private facilities

There was a large variation between jurisdictions with rates of documenting maximum dose in PRN section ranging from 14.7% - 51.9%. Compliance was highest in the private facilities at 59%.

4.3.10 Administration documentation errors

Administration not signed for (assumed omitted) – National

Criteria	2006 post-NIMC pilot audit	2009 audit	2010 audit	Comment
Of the doses required (regular, stat only, variable, warfarin), % of *doses omitted* or administration not signed *(excludes PRN orders)*	8.3%	9.6%	11%	The percent of doses omitted or not signed for has increased since 2006 pilot. The 11% error rate is a cause for concern.

Administration not signed for (assumed omitted) - by jurisdiction (public hospitals) and private facilities

There was wide variation in percent of doses not documented as administered across the jurisdictions, ranging form 2.7% to 14.9% and was highest in the private facilities (16.9%).

5 Discussion of 2010 NIMC audit data

The data for the 2010 audit of the NIMC was provided by 67 public hospitals and two private hospitals located in seven States and Territories. A total of 2,591 patients' charts were audited and 30,005 medication orders reviewed.

The 2010 audit data showed the NIMC has had a variable effect on some aspects of prescribing safety since its introduction in 2006-07, and with a corresponding potential to reduce medication errors and possible adverse drug events. The improvements in safe prescribing practices can be partly attributed to the chart design and layout. The increasing use by universities of the on line learning tool for the NIMC may also have influenced the quality of prescribing.

Examples of improvements in compliance with the safety features of the NIMC are listed in Table 1 below.

Table 1: Examples of improvements in compliance with safety features of the NIMC

Criteria for safe prescribing	Rate of compliance (%)		
	2006 audit N=1,234*	**2009 audit** N=864*	**2010 audit** N=2,591*
Patient identification completed (all patients)	19.8	31.3	32.8
Patients' weight documented			
• all patients	19.1	23.1	24.4
• paediatric patients	N/A	75.7	N/A
Complete details of previous ADR documented *(drug name and reaction or nil known)*	29.4	62.7	77.3
Clinicians can access *medication history* either via NIMC or *Medication Management Plan (MMP)*	9.0	13.1	33.8
MMP forms with complete ADR documentation	N/A	56.0	87.1
Indication for warfarin documented	34.3	62.1	70
Warfarin education for patients on warfarin	11.0	10.0	12.6
Warfarin orders prescribed in warfarin section with target INR range documented	34.3	69.6	95.7
Patients with drugs prescribed of a similar class (duplication)	0.9	1.6	0.9
Medicines prescribed by generic name	73.0	80.2	78.8
Sustained release forms of drugs identified	37.7	46.4	61.3
Intermittent medications with administration section boxes blocked correctly	N/A	59.5	78.2

*Number of patients

The 2010 audit data also showed an overall reduction in prescribing error rates compared to 2009 audit (see Table 2 below). However opportunities for medication errors and possible adverse drug events remain as a result of incomplete or unclear communication of prescribing decisions.

Table 2: Examples of prescribing errors

Criteria for missing, incorrect or unclear medication orders	Audit results (%)		
	2006 post-NIMC pilot N = 15,416#	2009 audit N = 9,047#	2010 audit N = 30,005#
Unclear orders for drug name, route, dose and frequency	74.0*	49.4	37.8
Unclear drug names prescribed	3.0	7.6	4.0
Route errors (*missing, unclear, incorrect*)	6.5	13.3	10.3
Dose errors (*missing, unclear, incorrect*)	4.3	18.4	14.2
- Dose unclear only	N/A	16.4	13.1
Regular, PRN, Variable frequency errors (*missing, unclear, incorrect*)	15.5	20.0	19.6
- PRN frequency errors only	32.2	35.6	46.2
Error prone abbreviations used	N/A	22.6	24.6
Indication documented	22.8	14.5	20.2
Orders ceased correctly	N/A	24.1	49.5

#Medication orders, *Based on patient numbers instead of medication orders

As shown in Table 2, the communication of prescribing decisions improved in relation to drug name, dose, route and frequency. The error rates relating to missing (undocumented) route (1%), missing dose (1%) and missing frequency (4.4%) remained low. Incorrect route, dose and frequency errors were also low ranging from 0.2% to 1%. However almost 40% of medicines prescribed had at least one or more unclear instruction for drug name, route, dose of frequency.

The frequency errors for PRN orders increased from 35.6% to 46.2% in the 2009 and 2010 audits respectively. The use of error prone abbreviations remained unacceptably high in 2010. This may partly be explained by the introduction of nationally endorsed, unacceptable abbreviations which were not included as errors during the 2006 audits.[2]

Documentation of ADR increased by 14.6% compared to 2009 audit, however re-prescribing of medicines that previously caused ADRs increased from 7.3% in 2009 to 12.8% in the 2010 audit.

Despite the warfarin section not being used for all patients receiving warfarin, of those patients for whom the warfarin section was used, compliance with the completion of the indication documented increased from 60.9% in 2009 to 70% in 2010 and the documentation of the target INR increased from 70% in 2009 to 95.7% in 2010. Documentation of patient education on warfarin remained low in both 2009 and 2010.

The 2010 audit showed an improvement in documentation of indication for regular, PRN, variable and warfarin orders (exclude stat only) compared with the 2009 audit but no improvement over the 2006 audit.

Only 36% of paediatric medication orders charted on paediatric NIMCs had a dose calculation documented. This was an improvement on the 2009 audit however the result are artificially low as medicines that did not require a dose calculation were counted as not having a dose calculation documented. There was also some use of paediatric charts in adult patients in combined women's and children's hospitals that would have affected the results. Of the orders with documented dose calculation three jurisdictions reported ≥95.9% of paediatric doses as correctly calculated. Two jurisdictions reported rates of 32.4% and lower resulting in a national rate of 58.7% compared to 92.3% in the 2009 audit.

Thirty eight percent (n=993) of patients received a pharmaceutical review at least once and one third of the medication orders (33.4%) were annotated by pharmacists clarifying the prescription details. Of the 11.6 medications orders per patient, 3.9 orders had a pharmacist annotation.

Eleven percent of mediation doses were not administered, or not signed for, by nursing staff (an average of one dose omitted per patient). A similar figure was reported in the 2009 audit.

Compliance issues

The design of the NIMC includes a range of safety features that were derived from an analysis of common medication errors. Table 8 lists the level of compliance with these features determined from the 2010 audit results. A detailed discussion of audit results follows.

Table 8: Compliance with NIMC safety features

Medication error	Safety feature	Issues relating to compliance with safety features
Patient wrongly identified	Prompt for complete patient identification (ID) on top of page 3 and back page. Prompt for prescriber to print name below computer generated ID label.	32.8% patients have complete ID documented. This should be a focus for improvement.
Re-exposure of patients to a drug/ class of drug previously causing an ADR	Prompt for details of drug and description of ADR.	77.3% of charts had complete details of previous ADR documented (drug name and reaction or nil known). 12.8% of patients with at least one or more previous ADRs were re-prescribed a similar class of drug. This continues to be an area for improvement.
Dosing error due to lack of patient weight to inform decision	Prompt for patient weight.	24.4% of all patients had weight documented on the NIMC. This should be a focus of attention for improvement. The proportion of paediatric patients with documented weight could not be analysed. Specialist Women's and Children's aggregated data shows 77.9% of patients, including paediatrics, had weight documented on the NIMC.
Discontinuity of appropriate therapy	Addition of medication history section.	The medication history section was completed in 30% of patients (includes cross referencing to a Medication Management Plan or MMP). The national MMP was introduced in October 2010. Future audits will measure uptake of the national MMP in hospitals and the continuing need for a medication history section on the NIMC.
Warfarin dose and duration errors	Designated section of chart for prompt for indication and target INR. INR can be documented in dosing section.	36.9% of warfarin orders were not prescribed in warfarin section. 4.3% of orders did not have a target INR documented and 30% did not have an indication documented. This is a major improvement compared with 2009 audit. Only 12.6% of patients prescribed warfarin were recorded as receiving education. This should be a focus of attention for improvement.

Medication error	Safety feature	Issues relating to compliance with safety features
Ambiguous trade names	Prompt for generic names.	82.7% of medicines were prescribed using generic names. There was a slight reduction in use of trade names in prescribing compared with 2009. The result should be interpreted with caution as the list of approved combination names may differ between facilities.
Non-sustained release form administered or SR form inadvertently crushed	Prompt for tick if slow release medication. Explanation in centre of chart for nurses not to crush SR forms of drugs.	Only 61.3% of orders for sustained release products had the SR box ticked. There is more room for further improvement.
Lack of, or unclear, dosing instructions	Designated dose and frequency section. Prompt for prescriber to enter dosing times as well as frequency for regular drugs. Recommended administration times included on medication chart.	Only 62.2% of orders had a clear name, route dose and frequency. The proportion of unclear orders has reduced compared with 2009 audit. 21.8% of orders for intermittent doses were not boxed correctly. Only 36.4% of paediatric doses had the calculation documented on the chart. The result should be interpreted with caution as some paediatric medicines do not require a dose calculation.
Drug prescribed, dispensed or administered for wrong indication	Indication of drug area added to regular and PRN orders	Only 20.2% of medication orders (excluding stat only) had the indication documented. This should be a focus of attention for improvement.
Inability to clarify error with prescriber	Prompt for prescriber to print name and enter contact details	The prescriber name was not clear in 22.5% of orders.
PRN medication dosing errors	Forcing function to enter minimum number of hours between doses (hourly frequency) and maximum dose within 24 hours.	45.5% of PRN orders had a missing and/or unclear dose frequency. 57.5% of PRN orders did not have maximum dose in 24 hours recorded.

Patient details

Patient identification

Whilst many charts have an identifier, either a printed label or written by hand, in order to comply with the NIMC audit criteria, the patient's name must be hand written. In nearly 70% of cases, patients' identification was incomplete. Although this is an improvement compared with 80% in 2006, patient identification is an important safety issue that should be considered a focus for attention in 2012.

Patient weight

Almost a quarter (24.4%) of patients had a weight recorded on the NIMC. Other patients may have their weight recorded in other parts of the patient record. Weight is essential information for dosing certain high risk drugs. Whilst weight documentation is improving, it is still well below the desired level. Weight documentation is critical for safe prescribing with paediatric patients. While paediatric charts with a weight documented could not be analysed in this audit, the aggregate data of three participating Specialist Women's and Children's hospitals showed 77.9% of patients, including paediatric patients, had weight recorded on the NIMC.

Adverse drug reaction details

Three quarters (77.3%) of all patients had a complete ADR history, compared to only one third after the introduction of the NIMC and two thirds in 2009 audit. This positively reflects the NIMC safety feature and the prescribers' perception of the importance of ADR history when prescribing and managing medicines. Patients often have a drug name in the ADR/Allergy box but not necessarily a reaction and some patients still have nothing documented in this domain.

The rate of patients re-exposed to a similar class of drug(s) doubled (12.8%) compared with 2009, although there was an increased documentation of previous ADR on the chart. The clinical significance of the ADR history recorded is unknown, still represents a considerable risk for patient safety.

Medication history documentation

The medication history is infrequently documented on the medication chart. In those sites that have introduced a *Medication Management Plan* (MMP), or equivalent form, the history could be accessed on the NIMC or MMP for 33.8% of patients, an increase on the 13.1% in the 2009 audit.

Compared to 2009, twice as many patients had a medication history documented on a MMP form. With the introduction of national MMP form it will be important to evaluate its use. This could be done in conjunction with the 2012 NIMC audit and will help inform any decision to remove the *medicines taken prior to presentation to hospital* section on the NIMC.

Prescription documentation

Warfarin documentation

Despite the warfarin section not being used for all patients receiving warfarin, of those patients for whom the warfarin section was used, indication documented increased from 60.9% in 2009 to 70% in 2010. Documentation of the target INR for warfarin orders increased from 70% in 2009 and 95.7% in 2010. Documentation of patient education on warfarin was low in both 2009 (10%) and remained so in 2010 (12.6%).

Overall, there is continuing improvement in documentation of warfarin prescribing information that informs subsequent dosing decisions and reduces the risk of unsafe INR levels.

Sustained release form specified

Documentation of this instruction, and ticking of the SR box, has improved from 46.4% to 61.3% reducing the risk of immediate release forms being dispensed and administered in error.

Unclear orders

Instructions for drug name, route, dose or frequency were unclear in almost 40% of medication orders. This is unacceptably high. However this measure is subjective and should be considered in the context of multiple observers/auditors across 69 sites in the audit.

Drug name errors

Generic prescribing remained similar to the 2009 level at around 80%. The use of unclear names reduced to 4%, a similar level as the 2006 post-NIMC pilot. Use of unclear names, particularly for combination products, differed widely across the participating jurisdictions.

Drug route errors

Since the introduction of *Recommendations for Terminology, Abbreviations and Symbols used in the Prescribing and Administration of Medicines* in 2008, route of administration error-prone abbreviations have increased.

Dose errors

The use of error-prone abbreviations remains the most frequent dosing instruction error with 13% of orders having an unclear dose. Less than 1% of orders had missing or incorrect doses.

Frequency errors

Frequency orders had the highest rate of unclear orders at 14.9%.

Over 90% of dosing administration times matched the dosing frequency, a level of compliance that has been maintained since the 2006 post-NIMC pilot.

As required (PRN) dosing frequency was missing or unclear (e.g. no minimum hourly dose interval) in over 45% of orders. Only 42.5% of PRN orders had maximum daily doses to be given in 24 hours documented. This level of non compliance needs to be investigated.

Intermittent doses

The clear indication of intermittent dosing frequency increased from nearly 60% in 2009 to over 78% in 2010. However with 22% of patients without the administration boxes crossed out correctly, there is the risk that these patients may receive daily doses of potentially toxic drugs such as methotrexate and bisphosphonates.

Error prone abbreviations

The use of error-prone abbreviations remains a safety risk. Use of *s/l* for routes, *mcg* for doses, *q4h* and *od* for frequency remain at an unacceptably high level around 25% and it should remain a focus for safe prescribing education. There was a significant variation in the use of error-prone abbreviations across jurisdictions and private facilities.

Indication documented

The documentation of indication overall remains low at 20% and less than in the 2006 audit (22.8%). The 2010 audit data could not be separately to analyse the level of indication compliance on paediatric charts.

Indication for warfarin, which is a NIMC safety feature, remains high at 70%. The indication for PRN orders was not audited separately. This could be audited separately in future audits.

The importance of documenting indication from a patient safety perspective does not appear to be recognised by prescribers and could be considered a future focus for attention.

Ceased orders

About 50% of orders were ceased correctly in both prescribing and administration sections in 2010 an improvement over the 24.1% in the 2009 audit.

There was a large variation between the jurisdictions and private hospitals, ranging from 3% to 91%, indicating room for improvement in some jurisdictions.

Documentation by health profession

Pharmacy annotation

Pharmacy annotation remains low at 33.5% of orders and is a significant gap in documentation by pharmacists. It may indicate a resourcing issue with pharmacists not available to review charts or poor documentation by pharmacists. This reasoning could also apply to the low (38.3%) level of documentation of pharmaceutical review.

Prescriber signature and identifier

Over 97% of orders were signed and two thirds of the prescriber names were legible. Possibly, the use of contact details (e.g. pager number) could also be accepted as a means of identifying the prescriber.

Nursing signatures for orders

Over 10% of ordered administrations appeared to have been omitted or not signed for by nursing staff, a similar rate to 2009. Note that this figure excludes doses that have a reason for not administering code documented. This remains a high level of non compliance with prescribing instructions or signing requirements and risks omitted doses or double dosing. Education should target further improvement in this area.

Limitations

All participating hospitals undertook the NIMC 2010 national audit on a voluntary basis as a quality improvement initiative. As a result the hospitals in the 2006 pilot and those in the 2009 and 2010 audits were unmatched. Five hospitals in the 2010 participated in the 2006 post-pilot audit. A sample of charts was chosen by each participating hospital although guidance was provided on representative sample size according to occupied bed numbers. We assumed that all participating hospitals used a conforming NIMC as described in the audit criteria.

The introduction of the national *Recommendations for Terminology, Abbreviations and Symbols used in the Prescribing and Administration of Medicines* in 2008 and the revision of many prescribing audit definitions over the four years since the pilot may limit audit comparability. Some results should be interpreted with caution.

The 2009 audit data was provided by 25 hospitals from five jurisdictions compared to the 2010 audit date which was provided by 69 hospitals from seven jurisdictions. The less powerful 2009 data may not be representative of prescribing practices. 58% of the 2010 audit data was heavily weighted on one jurisdiction, particularly principal referral hospitals and hence, improvements reported may not be representative across all jurisdictions and peer groupings of hospitals. There were only two private hospitals contributing to the 2010 private hospital aggregate data which limits evaluation of the safety features of the NIMC in this setting.

Some of the data collected required subjective judgement and interpretation by the auditors e.g. determining unclear orders. Lack of consistency in data interpretation by the auditors and differences in local policy/procedures between hospitals and States and Territories may have contributed to variations observed in the jurisdictional data.

6 Recommendations

6.1 Possible focuses for improving use of the NIMC

There was a low compliance with several safety features of the NIMC and in some elements large variation in the level of compliance observed between jurisdictions.

Recommendation 1: The Health Services Medication Expert Advisory Group considers strategies to address poor levels of compliance with NIMC safety features that carry a high risk for causing patient harm. (See Table 3 below)

Table 3: NIMC Safety features with poor compliance

Safety feature	2010 audit result
1. Patient identification	32.8% complete ID documented
2. Patient weight	24.4% documented (all patients)
3. Patients with previous ADR same class re-prescribed	12.8%
4. Warfarin orders prescribed in warfarin section 5. Indication for warfarin documented 6. Warfarin education recorded	63% of warfarin orders 70% of warfarin orders 12.6% documented
7. Clinician can access medication history either via the NIMC, MMP or equivalent	30% had complete medication history
8. Sustained release box	61.3% ticked for SR products
9. Designated medicine name, route, dose and frequency sections	4% of orders had unclear name 8.6% of orders had unclear route 13% of orders had unclear dose 15% of orders had unclear frequency 46.2% of PRN orders had frequency errors (*unclear, missing, incorrect)* 24.6% of orders contained one or more *error prone abbreviations*
10. Paediatric dose calculation box	36.4% of paediatric orders had dose calculation documented
11. Intermittent medicines	78.2% administration section boxed correctly
12. Indication box	20.2% indications documented (*exclude stat only*)
13. Pharmacy annotations and review	33.5% of medication orders were annotated by pharmacists 38.3% had a pharmaceutical review documented
14. One or more doses assumed omitted or administration not signed	11% of orders

6.2 Possible focuses for future NIMC national audits

The lessons learned from post audit processes have been identified for future national auditing.

Recommendation 2: The Health Services Medication Expert Advisory Group considers the recommendations on the conduct of future NIMC national audits. (See Table 4 below)

Table 4: Recommendations for future audits

Issue	Assessment and background	Recommendation
1. Inter-rater reliability of auditors	Some of the 2010 audit results showed a large variation amongst jurisdictions. This may have been a result of variations in prescribers' behaviour but may also have been due to misinterpretation by the auditors.	Revise NIMC auditor support materials. Develop an education package that auditors are required to complete before auditing.
2. Inability to compare 2010 data with 2006 post-NIMC pilot data	Unmatched sites. Five of the 22 sites in the 2006 post-implementation audit participated in the 2010 audit. The remaining sites did not participate. Since 2006 pilot the definitions of errors have changed. The introduction of unacceptable error-prone abbreviations may have caused the increase in number of "unclear" orders. Similarly definitions have changed for ADR documentation and patient identification.	Consider approaching the original 22 pilot sites to participate in the 2012 national audit. Compare their results against the 2006 audit results as a separate subset within the *NIMC Audit System* capability.
3. Use of ADR alert stickers	45% compliance with this element. Stickers are not available in all jurisdictions.	Research availability of ADR alert stickers in all jurisdictions and report in the context of availability.
4. Availability of warfarin guidelines	36% compliance with this element compared to 12.4% in 2009. Hospital policy on the requirement of warfarin guidelines at end of patients' bed varies across jurisdictions.	Consider whether this audit data element is a useful measure for health services and jurisdictions.
5. Duplication errors	Although duplication errors were less than 1%, it is unknown if the errors are regular and PRN orders for the same drug or two regular orders on separate medication charts.	Recommend enhance audit tool functionality to enable additional information to be collected on duplicated orders.
6. Errors associated with "Unclear" orders	24.6% of orders contained one or more *error prone abbreviations* compared to 22.6% in 2009.	Continue to audit and target education to raise awareness of *error prone abbreviations*. Report use of *error prone abbreviations* as "Unclear" from errors relating to a missing or an incorrect dose, route or frequency.

Issue	Assessment and background	Recommendation
7. Paediatric dose calculation box	A proportion of paediatric medications that do not require a dose calculation (e.g. pancreatic enzymes, topical preparations) Current audit tool only allows a "Yes" or "No" answer. This affects the accuracy of dose calculation results.	Recommend *NIMC Audit System* enhancement to this data element to allow "N/A" for paediatric medications that do not require dose calculation
8. *NIMC Audit System* enhancements of audit reports	Reporting function does not provide breakdown measures by chart type (NIMC, NIMC Long Stay, NIMC Paediatric and Long Stay)	Recommend enhancement of reporting functionality to include capability to report by chart type.
9. Unfamiliarity with the web-based *NIMC Audit System* and process	All hospital participants in the 2010 national audit used the new web-based *NIMC Audit System* for data submission and reporting.	Promote use of the *NIMC Audit System* and support materials to standardise auditing and reduce variation
10. Inability to assess local influences on improvements in use of NIMC e.g. staff education, policies	NIMC auditing is used to inform NIMC quality improvement but does not account for local factors that may influence the quality of prescribing and documentation on the NIMC e.g. policies, education, level of clinical pharmacy service, training of staff completing audit and the extent to which participating hospitals utilise audit results to promote change and improve practice.	Consider collecting information on local NIMC quality improvement activities to provide information on the context in which the NIMC is used.

7 Conclusion

The 2010 national audit was a more representative audit than previous audits comprising over 30,000 medication charts from 69 public and private hospitals across seven jurisdictions. The audit demonstrated ongoing improvements in the safety of prescribing, administering and reviewing documentation in many areas of the NIMC compared to the 2009 and 2006 post-NIMC pilot audits.

Opportunities remain for:

- further reducing prescribing errors, particularly those associated with the communication of prescribing decisions to other medical, nursing and pharmacy staff;
- improving pharmacist documentation; and
- reducing the number of doses of medicines not administered or not signed for as administered.

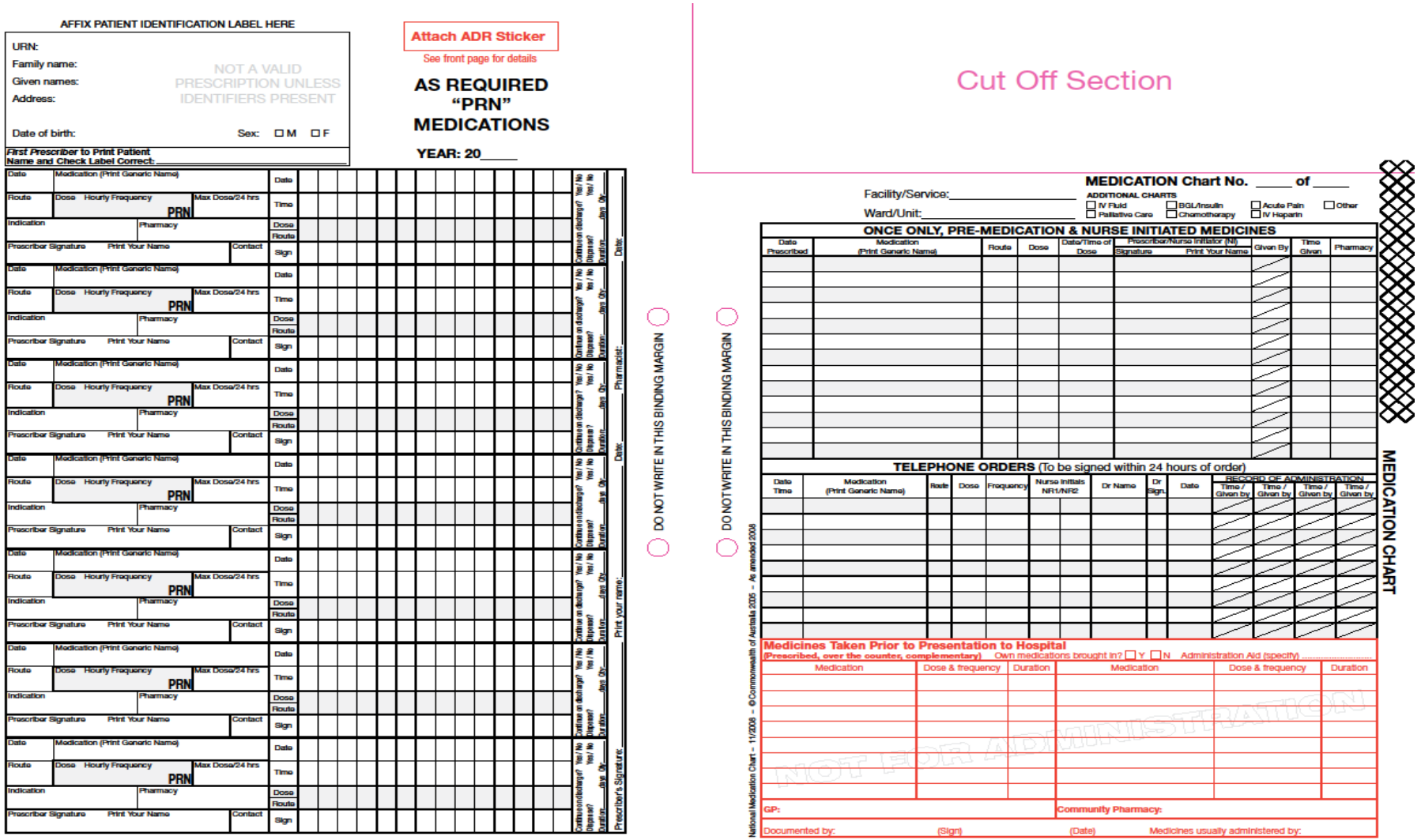
The national audit process continues to:

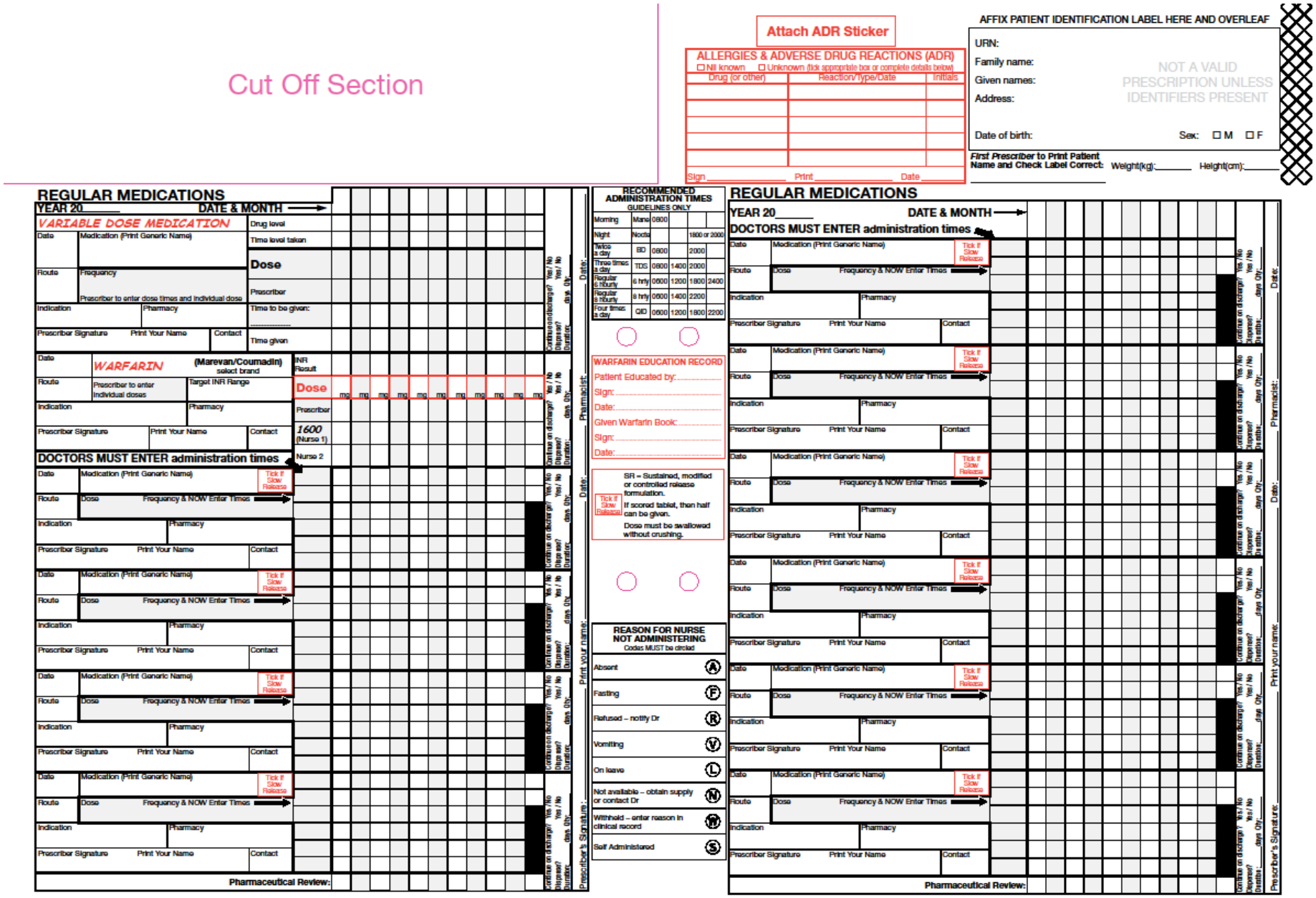
- Highlight areas of improvement in patient safety;
- Assist in identifying specific areas for improvement which some or all jurisdictions may wish to use as a focus for medication safety activities in 2012; and
- Add to the evidence base for NIMC quality improvement.

The are limitations on comparing the data between audits as different hospitals may participate in the audit and there may be variation in the quality of the auditing as some of the elements, especially the prescribing errors, are subjective.

National Inpatient Medication Chart

Appendix 1




Cut Off Section
Attach ADR Sticker
ALLERGIES & ADVERSE DRUG REACTIONS (ADR)
Nil known
Unknown (tick appropriate box or complete details below)
Drug (or other)
Reaction/Type/Date
Initials
Sign
Print
Date
AFFIX PATIENT IDENTIFICATION LABEL HERE AND OVERLEAF
URN:
Family name:
Given names:
Address:
NOT A VALID PRESCRIPTION UNLESS IDENTIFIERS PRESENT
Date of birth:
Sex: M F
First Prescriber to Print Patient Name and Check Label Correct:
Weight(kg):
Height(cm):
REGULAR MEDICATIONS
YEAR 20
DATE & MONTH
VARIABLE DOSE MEDICATION
Drug level
Time level taken
Dose
Prescriber
Time to be given:
Time given
WARFARIN
(Marevan/Coumadin)
select brand
INR Result
Target INR Range
Prescriber to enter individual doses
1600
(Nurse 1)
Nurse 2
DOCTORS MUST ENTER administration times
Medication (Print Generic Name)
Tick if Slow Release
Route
Dose
Frequency & NOW Enter Times
Indication
Pharmacy
Prescriber Signature
Print Your Name
Contact
Continue on discharge?
Dispense?
Duration
Pharmaceutical Review:
RECOMMENDED ADMINISTRATION TIMES
GUIDELINES ONLY
Morning
Mane
0800
Night
Nocte
1800 or 2000
Twice a day
BD
0800
2000
Three times a day
TDS
0800
1400
2000
Regular 6 hrly
6 hrly
0000
1200
1800
2400
Regular 8 hrly
8 hrly
0000
1400
2200
Four times a day
QID
0600
1200
1800
2200
WARFARIN EDUCATION RECORD
Patient Educated by:
Sign:
Date:
Given Warfarin Book:
Sign:
Date:
SR = Sustained, modified or controlled release formulation.
If scored tablet, then half can be given.
Dose must be swallowed without crushing.
REASON FOR NURSE NOT ADMINISTERING
Codes MUST be circled
Absent (A)
Fasting (F)
Refused – notify Dr (R)
Vomiting (V)
On leave (L)
Not available – obtain supply or contact Dr (N)
Withheld – enter reason in clinical record (W)
Self Administered (S)
Pharmacist:
Print your name:
Prescriber's Signature:
Date:

NIMC National Audit 2010 Memo

To **NIMC Oversight Committee jurisdictional contacts**

Private hospital contacts

From **Graham Bedford**

Date **19 May 2010**

Re **NIMC national audit 2010**

Introduction

The National Inpatient Medication Chart (NIMC) national audit will take place in August and September 2010.

The NIMC audit tool will be used to collect audit data and will be available electronically or in a paper format from the Commission web site. The data elements on the audit tool were agreed by the NIMC Oversight Committee in 2009.

Other support materials, including the audit tool user guide, will also be available from the Commission web site.

Participation and timing

1. All Australian hospitals using the NIMC can participate.
2. Auditing will occur in August and September 2010.

Audit details

1. Two auditors are required to minimise observer bias. One of the auditors must be a registered nurse preferably assisted by either a pharmacist, medical officer or other nurse.
2. Guidance on the number of patients' chart to audit is provided in the user guide and is as follows:

Number of adult beds in hospital	Sample size
150 or more	20% of current patients
30-149	30 current patients
Less than 30	All current patients

3. Patients should be chosen from a range of wards (medical, surgical, critical care, geriatric). Note that no patient details (including UR numbers and date of birth) will be added to the national data.
4. Hospitals can determine how best to manage the audit. For example, a small facility (28 beds) can undertake seven audits per week over four weeks. A large facility (500 beds) can audit 100 patients over four days using a dedicated two person team.
5. In addition to the sample size, it is suggested that general hospitals audit all paediatric patients to audit the paediatric NIMC post-implementation.

Audit results

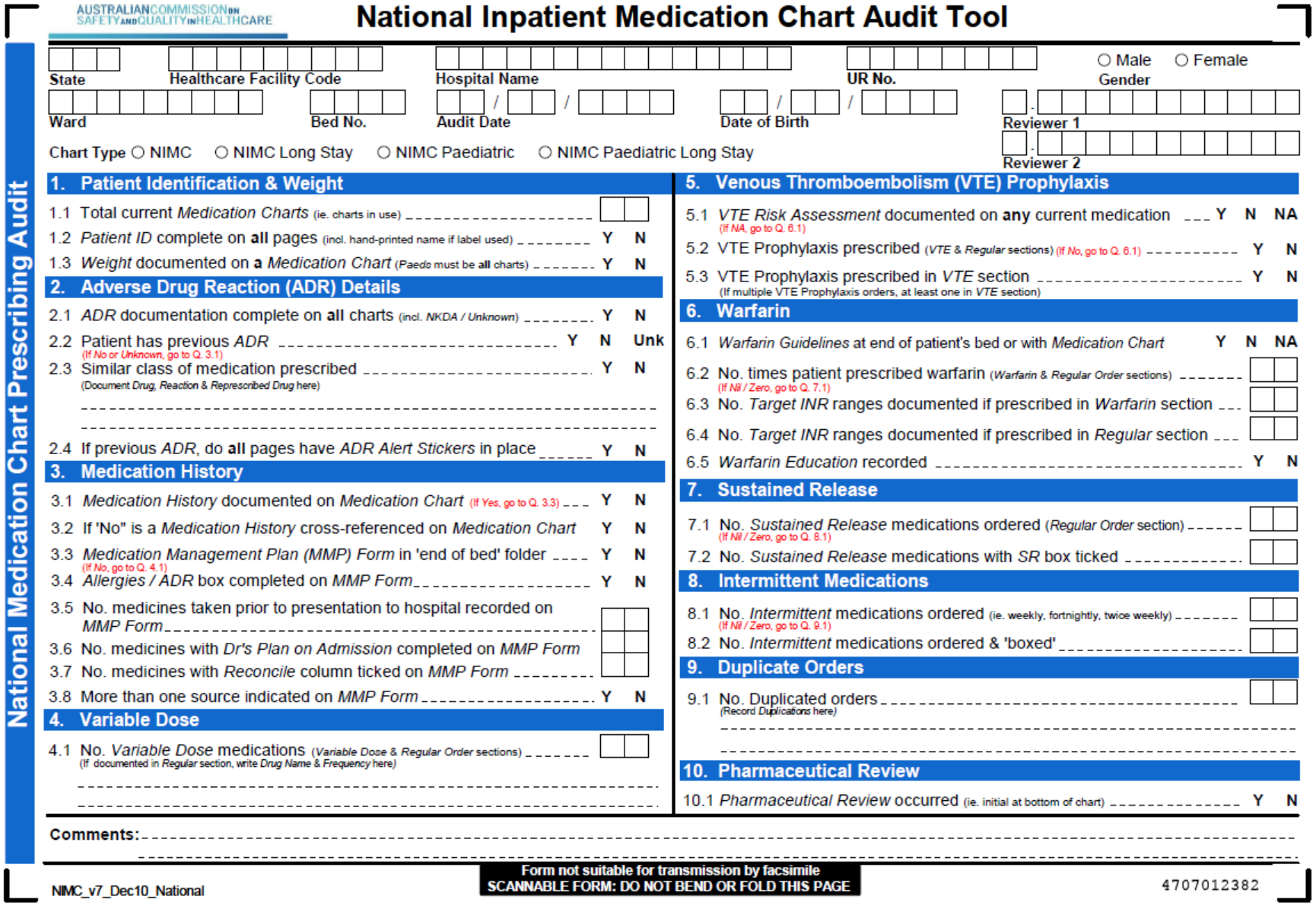
1. Hospitals will record audit results one of three ways.
    a. Manually onto NIMC audit tool forms;
    b. Into a customised spread sheet;
    c. Directly into a web-based application.
2. Hospitals will provide audit results to the Commission one of three ways:
    a. Inputting the data from their completed audit tool onto an audit spreadsheet and uploading their spreadsheet to the audit web site;
    b. Uploading their completed audit spreadsheets to the audit web site; or
    c. Finalising their audit on the web site by the hospital audit coordinator setting the audit to complete.
3. Queensland may have special arrangements for hospitals to forward NIMC audit tool forms to the Safe Medication Management Unit.

Audit reports

1. Reports will be available on the web site on individual hospital audits, and on individual hospital audits compared to peer and all hospitals. Participating states, territories and private hospital groups (as well as area health services or equivalents) will be able to obtain reports.
2. De-identified hospital data will be analysed and form a larger report on the audit which will be available in late 2010 and will be used to quality improve the NIMC.
3. Data will be de-identified and stored by the Commission for future comparisons against subsequent audits.

Next steps

1. The NIMC national audit 2010 web page will be launched in the week of 28 June 2010.
2. Details of the NIMC national audit 2010 web tool (and to be accessed through the Commission's web site) will be made available in the week of 5 July 2010.



AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTHCARE

National Inpatient Medication Chart Audit Tool

National Medication Chart Prescribing Audit

State | Healthcare Facility Code | Hospital Name | UR No. | ○ Male ○ Female Gender

Ward | Bed No. | Audit Date | Date of Birth | Reviewer 1 | Reviewer 2

Chart Type ○ NIMC ○ NIMC Long Stay ○ NIMC Paediatric ○ NIMC Paediatric Long Stay

1. Patient Identification & Weight

1.1 Total current *Medication Charts* (ie. charts in use)

1.2 *Patient ID* complete on **all** pages (incl. hand-printed name if label used) Y N

1.3 *Weight* documented on **a** *Medication Chart* (*Paeds* must be **all** charts) Y N

2. Adverse Drug Reaction (ADR) Details

2.1 *ADR* documentation complete on **all** charts (incl. *NKDA / Unknown*) Y N

2.2 Patient has previous *ADR* Y N Unk
(If *No* or *Unknown*, go to Q. 3.1)

2.3 Similar class of medication prescribed Y N
(Document *Drug, Reaction & Represcribed Drug* here)

2.4 If previous *ADR*, do **all** pages have *ADR Alert Stickers* in place Y N

3. Medication History

3.1 *Medication History* documented on *Medication Chart* (If Yes, go to Q. 3.3) Y N

3.2 If "No" is a *Medication History* cross-referenced on *Medication Chart* Y N

3.3 *Medication Management Plan (MMP) Form* in 'end of bed' folder Y N
(If *No*, go to Q. 4.1)

3.4 *Allergies / ADR* box completed on *MMP Form* Y N

3.5 No. medicines taken prior to presentation to hospital recorded on *MMP Form*

3.6 No. medicines with *Dr's Plan on Admission* completed on *MMP Form*

3.7 No. medicines with *Reconcile* column ticked on *MMP Form*

3.8 More than one source indicated on *MMP Form* Y N

4. Variable Dose

4.1 No. *Variable Dose* medications (*Variable Dose & Regular Order* sections)
(If documented in *Regular* section, write *Drug Name & Frequency* here)

5. Venous Thromboembolism (VTE) Prophylaxis

5.1 *VTE Risk Assessment* documented on **any** current medication Y N NA
(If *NA*, go to Q. 6.1)

5.2 VTE Prophylaxis prescribed (*VTE & Regular* sections) (If *No*, go to Q. 6.1) Y N

5.3 VTE Prophylaxis prescribed in *VTE* section Y N
(If multiple VTE Prophylaxis orders, at least one in *VTE* section)

6. Warfarin

6.1 *Warfarin Guidelines* at end of patient's bed or with *Medication Chart* Y N NA

6.2 No. times patient prescribed warfarin (*Warfarin & Regular Order* sections)
(If *Nil / Zero*, go to Q. 7.1)

6.3 No. *Target INR* ranges documented if prescribed in *Warfarin* section

6.4 No. *Target INR* ranges documented if prescribed in *Regular* section

6.5 *Warfarin Education* recorded Y N

7. Sustained Release

7.1 No. *Sustained Release* medications ordered (*Regular Order* section)
(If *Nil / Zero*, go to Q. 8.1)

7.2 No. *Sustained Release* medications with *SR* box ticked

8. Intermittent Medications

8.1 No. *Intermittent* medications ordered (ie. weekly, fortnightly, twice weekly)
(If *Nil / Zero*, go to Q. 9.1)

8.2 No. *Intermittent* medications ordered & 'boxed'

9. Duplicate Orders

9.1 No. Duplicated orders
(Record *Duplications* here)

10. Pharmaceutical Review

10.1 *Pharmaceutical Review* occurred (ie. initial at bottom of chart) Y N

Comments:

NIMC_v7_Dec10_National

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National Inpatient Medication Chart Audit Tool

11. Prescribing and Administration

UR No.

Legend

Drug Order:
R = Regular
P = PRN
S = Stat/Phone/Once Only
V = Variable Dose
W = Warfarin

Drug Name:
U = Unclear
T = Trade
C = Clear

Route / Dose:
C = Clear & Correct
M = Missing
U = Unclear
I = Incorrect

Frequency:
C = Clear
M = Missing
U = Unclear
I = Incorrect
NA = Not Applicable

Others:
Y = Yes
N = No

Definitions: Error Prone Abbreviations

mcg, µg, ug = microgram
U or u = unit
qd or QD = every day
o.d. or OD = once daily

SC, S/C = subcutaneous
SL, S/L = sublingual
o (degree symbol) = hourly frequency
No leading zero before a decimal point (eg .5mg) = 0.5mg
Trailing zero after decimal point (eg 1.0mg) = 1mg

Order No.	Drug Order	Drug Name	Route	Dose	Frequency	Dose Calc'n Documented	Dose Calc'n Documented Correctly	Error Prone Abbrev'ns Used	Indication Documented	Pharm. Annot.	Pres. Sign	Pres. Clear	Freq. Matches Admin Time	Drug Ceased	Ceased Correctly	Doses Required	Doses Admin	If PRN, Max Dose doc.
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA
						Y N NA	Y N NA	Y N	Y N NA	Y N	Y N	Y N	Y N NA	Y N	Y N NA			Y N NA

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