AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

National Inpatient Medication Chart 2011 National Audit Report

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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 2011 and reported to the Australian Commission for Safety and Quality in Health Care (Commission). Data from public and private hospitals in seven jurisdictions 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 of the NMC introduced to reduce medication errors and adverse drug events. Comparisons of the 2011 audit are made with the post-implementation audit of the NIMC pilot chart in 2006 and the national audits undertaken in 2009 and 2010. It should be noted that the sites in each of the audits are not matched and many audit criteria have changed since the NIMC pilot.

The report identifies areas for improvements 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 recent years, hospitals have seen increased through put of patients, new drugs have emerged that are increasingly difficult to use safely and effectively, medical care has become more complex and specialised, and the population has aged, factors that tend to increase the risk of medication errors.

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).[1] 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 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.

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 2011 national audit used a new web-based *NIMC Audit System* for data submission and reporting. The use of web-based tool is less burdensome than using NIMC Audit Spreadsheet and manual analysis of data.

Hospitals collected data using the paper-based *NIMC Audit Tool Form*[2] and/or *NIMC Audit Tool Spreadsheet*[3] 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 and limited by availability of hospital staff to undertake the audit. Where relevant, the 2011 data has been compared with 2010, 2009 audits 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 those conducted in 2009, *2010 and 2011.*

1.5 Results of 2011 Audit

The data for the 2011 NIMC audit was provided by 106 public hospitals and 38 private hospitals located in seven States and Territories. A total of 5,195 patients' charts were audited and 39,271 medication orders reviewed. The 2011 audit data showed 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 adverse drug events. The improvements in safe prescribing practices can be partly attributed to the chart design and layout. There is some evidence of increased use of the NIMC online learning by universities may also have influenced the quality of prescribing.

This year, with private facilities making up over a third of the hospitals participating in the audit, data from private and public facilities has been analysed separately and comparative tables produced.

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 post-NIMC N= 1,234*	2009 audit N=864*	2010 audit N=2,591*	2011 audit N=3,760*
Patient identification completed (all patients)	19.8	31.3	32.8	47.6
Patients' weight documented • all patients • paediatric patients	19.1	23.1 75.7	24.4 N/A**	24 N/A
Complete details of previous ADR documented	29.4	62.7	77.3	78
Clinicians can access *medication history* either via NIMC or *Medication Management Plan (MMP)* *MMP forms* with complete ADR documentation	9.0 N/A	13.1 56.0	33.8 87.1	27 87.9
Indication for warfarin documented Warfarin education for patients documented	34.3 11.0	62.1 10.0	70 12.6	43.2 15
% warfarin orders prescribed in warfarin section with target INR range documented	34.3	69.6	95.7	(data error)
Medicines prescribed of a similar class (duplication)	0.9	1.6	1.0	1.1
Medicines prescribed by generic name	73.0	80.2	78.8	73.5
Sustained release forms of drugs identified	37.7	46.4	61.3	61.3

*N = number of patients, ** N/A =data not available

Almost 50% of patients had a complete patient identification on all pages of the medication chart. 63.8% of patients in private facilities had a complete patient identification on medication charts compared with 40.3% patients in public hospitals (see figure 2.1). Only a quarter of the patients had their weight documented.

The recording of patient medication history or cross referencing location of medication history on separate form/medication management plan (MMP) decreased from 33.8% to 27% in 2010 and 2011 audits respectively. 30.9% of patients in private facilities had medication history recorded on current chart or cross referenced to a MMP or equivalent compared with 25.2% patients in public hospitals. 15.9% of patients' medication history were documented on their NIMC and 8.9% of patients had a medication history cross referenced on current chart to a previous chart or to a MMP form. There was high compliance (87.9%) with the recording of adverse drug reactions (ADR) details in the MMP form.

The ADR documentation rate on the NIMC was maintained at 78% between the 2010 and 2011 audits. The rate of re-prescribing a similar class of medicine that previously caused an ADR reduced from 12.8% in 2010 to 10.3% in the 2011 audit with public hospitals reporting fewer incidents of re-prescribing than private facilities 9.3% vs 12.7%. (See figure 2.1).

There was a reduction in warfarin orders prescribed in warfarin section of the medication chart, 34.7%, compared with 63.1% in 2010 and 79.3% in 2009. Reduced compliance in using the warfarin section in the 2011 audit may have be influenced by limited use of the section by prescribers in private facilities (26.6% of patients versus 39.5% of public patients on warfarin, see figure 3.1). There was a drop in the documentation for warfarin indication from 70% in 2010 to 43.2% in 2011 with private facilities having a lower rate than public hospitals 17% vs 53.9% Documentation of patient education on warfarin increased slightly from 13% to 14.6% in 2010 and 2011 audit respectively. In 2011 audit, more private

patients (22.4%) were reported to have received warfarin education compared with public patients on warfarin (11.1%) (see figure 3.1).

The rate of compliance with the sustained release formulation boxes ticked (61.3%) and the intermittent medicines administration boxed and crossed (71.6%) on the NIMC remained unchanged between the 2010 and 2011 audits. Duplicate orders (or similar class of medicines) prescribed which may have the potential to cause overdosing errors continued to remain low at 1.1%.

The 2011 audit data also showed an overall improvement in prescribing compared to 2010 and 2009 audits (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 error rates

Criteria for missing, incorrect or unclear medication orders	Audit results (%)			
	2006 post-NIMC N = 15,416 orders	2009 N = 9,047 orders	2010 N = 30,005 orders	2011 audit N = 39,271 orders
Unclear orders for drug name, route, dose and frequency	74.0[#]	49.4	37.8	24
Unclear drug names prescribed	3.0	7.6	4.0	3.3
Route errors (*missing, unclear, incorrect*)	6.5	13.3	10.3	8.5
Dose errors (*missing, unclear, incorrect*)	4.3	18.4	14.2	9.7
- Dose unclear only	N/A	16.4	13.1	8.2
All frequency errors *(missing, unclear, incorrect*)	15.5	20.0	19.6	10.9
- PRN frequency errors only	32.2	35.6	46.2	23.1
Error prone abbreviations used	N/A	22.6	24.6	16.9
Max PRN dose documented	N/A	N/A	42.5	26.8
Orders ceased correctly	N/A	24.1	49.5	35.3

[#]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. All error (missing, unclear, incorrect) rates relating to route (8.5%), dose (9.7%) and frequency (10.9%) were lower than in the 2009 and 2010 audits. Incorrect route, dose and frequency errors were below 1%. Errors of unclear drug name, route, dose and/or frequency continued to decrease. Less drug orders were reported unclear in private facilities (15.9%) compared with public (27.8%) sites (see figure 10.1). The frequency errors for PRN orders halved from 46.2% in 2010 to 23.1% in 2011.

There were fewer (16.9%) error prone abbreviations used in 2011 compared to previous audits and consistent across both private (15.6%) and public (17.5%) facilities (see figure 10.1). This may partly be attributed to increased awareness of the national *Terminology, abbreviations and symbols in the prescribing and administration of medicines in Australian hospitals*.[4]

There was very poor compliance with the documentation of indication for regular, PRN, variable and warfarin orders with only 11.3% of orders having an indication compared with 20% in 2010, the lowest rate recorded to date. More drug orders had the indication recorded in public hospitals (15.8%) than in private facilities (7.4%) (see figure 10.1).

Only 23.2% of paediatric medication orders charted on paediatric charts had a dose calculation documented. This figure is lower than that reported in 2010 (36.4%) and 2009 (25%). Results include orders that did not require a dose calculation and there was also some use of paediatric charts in adult patients in combined women's and children's hospitals that would have affected the result. Of the paediatric orders with a basis for dose calculation documented, 94.9% of doses were correctly calculated, an improvement over 2010 figures.

Thirty four percent of patients received a pharmaceutical review at least once and one quarter of the medication orders (26.8%) were annotated by pharmacists. It may indicate a resourcing issue with pharmacists not available to review charts on the wards or limited pharmacy services available at the time of auditing during weekends and/or nights.

'PRN' medications are susceptible to medication errors. Although PRN frequency errors were halved between 2010 and 2011, 46.2% to 23.1%, orders without a maximum daily dose to be given in 24 hours increased. In 2011 only 26.8% of the PRN orders had a recorded maximum daily dose compared to 42.5% in 2010. Documentation of maximum daily dose for PRN orders was greater in public facilities (29.8%) compared with private sites (20.9%) (see figure 10.1).

Nine percent of medication doses were not signed as administered and remains a cause for concern.

1.6 Conclusion

The 2011 national audit provided a snapshot of NIMC use in 144 public and private hospitals across Australia. The audit was a more representative sample compared with earlier audits comprising 3,760 patients and over 39,000 medication orders. It highlighted areas of good compliance with safety features in the NIMC and also identified areas that need further improvements.

Opportunities remain for improving:

- Accurate patient identification documentation; (in alignment with National Safety and Quality Health Service standard 5: Patient Identification and Procedure Matching);
- Complete and accurate adverse drug reaction information;
- Documentation of complete and accurate medication histories on NIMC, MMP or equivalent documentation (in alignment with National Safety and Quality Health Service standard 4: Medication Safety);
- Use of acceptable abbreviations and symbols and avoiding error-prone ones;
- Documentation of doses administered.

Ongoing evaluation of the use of the NIMC provides information at a local, state, national, and peer group level on the safety of prescribing, dispensing, administration and reviewing of medication. This information can be used to focus effort on quality improvement activities and to monitor their effect on reducing the risk of harm to patients from medication errors and preventable adverse drug events.

2 Background to the National Inpatient Medication Chart

In recent years, hospitals have seen increased through put of patients, new drugs have emerged that are increasingly difficult to use safely and effectively, medical care has become more complex and specialised, and the population has aged, factors that tend to increase the risk of medication errors.

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 pre and post-pilot data has been published by Coombes *et al* in the British Journal of Clinical Pharmacology in 2011.[1]

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). Part of that process is to audit the use of the NIMC and monitor compliance with its safety features and the potential effect on reducing the risk of medication errors.

The aim of the audits undertaken in 2011 was to evaluate if NIMC safety features continued to be of benefit to patient care and identify if there were specific aspects of prescribing behaviour, the NIMC itself or the audit process that might require modification and should be considered by an expert representative group, the Health Services Medication Expert Advisory Group.

3 Method – 2011 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 definitions and examples of types of prescribing errors are explained in detail in the *NIMC Audit Tool Form*[2] and *Guide to Auditing the NIMC*[5].

Types of charts audited were:

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

Stand alone anticoagulation, continuous infusions, insulin, chemotherapy, acute and chronic parenteral analgesia, discharge and electronically generated charts were excluded from the audits.

All hospitals (public and private) were invited to participate in the audit through the Commission's Health Service Medication Expert Advisory Group jurisdictional and private hospital contacts. 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 undertook the audit during August and November 2011. The *Guide to Auditing the NIMC*[5] provided guidance for the

auditors. Data collected were entered electronically and/or submitted to the web-based *NIMC Audit System* upon completion of audit between August and November 2011.

The *NIMC Audit System* provided:

a) An electronic *NIMC Audit Tool Form*[2] into which patient audits were entered directly into the *NIMC Audit System*;

b) Data uploading function from the *NIMC Audit Tool* (Excel) spreadsheet[3] 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.*[5] Hospitals were encouraged to audit all NIMC charts. If this was not feasible, the following sample size was recommended.

Table 3: 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 patients' current 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 NIMC on medical, surgical, paediatric and mental health wards were audited to identify and document prescribing errors using established definitions in the *NIMC User Guide*[6] and *Guide to Auditing the NIMC*.[5] All medication orders on active NIMC 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 2011 data has been compared with post-implementation pilot data from 2006, 2009 and NIMC 2010 National Audit results.

It must be noted that the sites in the 2006 pilot, the 2009, 2010 and 2011 audits were unmatched. In addition, a number of audit definitions have been amended since the 2006 post-implementation pilot audit.

4 Results of 2011 NIMC audit

One hundred and fourty four hospitals from all States and Territories (except Tasmania) participated in the NIMC 2011 National Audit. Participating hospitals included 38 private hospitals, 34 small regional and remote acute hospitals, 16 medium group hospitals, 12 principal referral hospitals, and five specialist women and children hospitals. See Table 4.

National aggregate of 2011 audit is presented in figures and Tables relating to individual NIMC safety features. The results are compared with those of 2006 post-pilot NIMC, 2009 and 2010 national audits.

4.1 Demographics

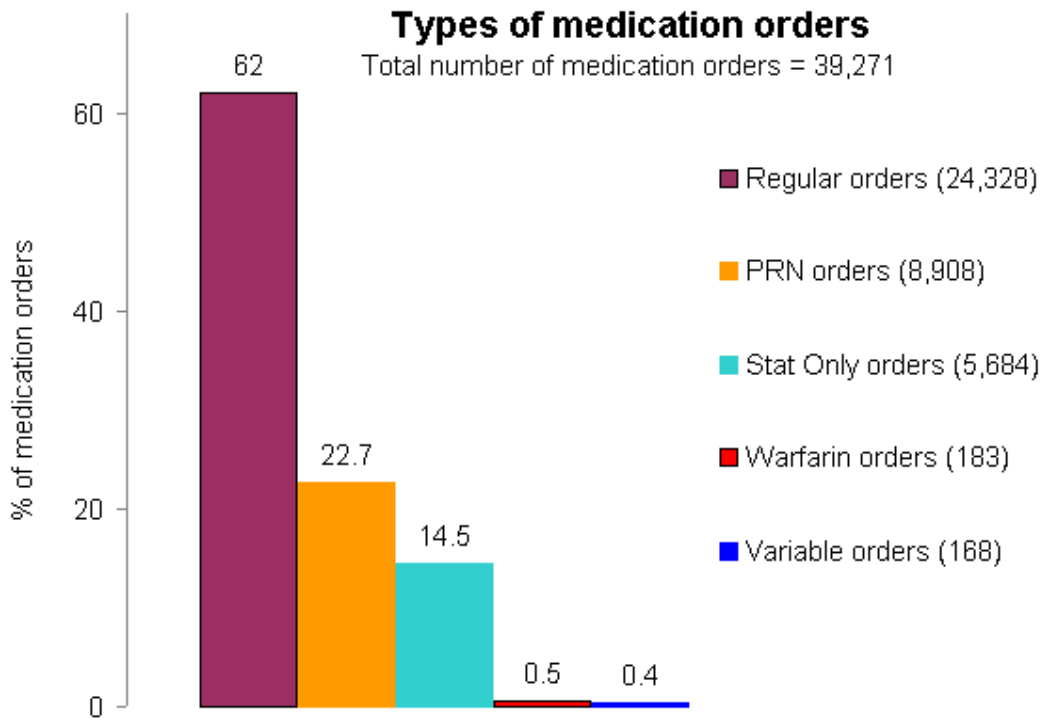
4.1.1 Patients and medication charts

There were 3,760 patients including paediatric patients in the NIMC audit. A total of 5,195 medication charts and 39,271 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 orders. Variable dose and warfarin orders accounted for less than 1% of all orders. See Figure 1.

Figure 1: Types of medication orders



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 4: Hospital participation by peer group

Peer group	Private	Small Regional and Remote Acute	Medium Group	Un-peered & Other	Principal Referral	Multi Purpose Services	Large Major Cities	Specialist Women & Children	Large Regional & Remote	Psychiatric	Rehabilitation	Total
No. of hospitals	38	34	16	15	12	11	5	5	5	2	1	144

Data used for aggregate analysis

The break down of data on number of patients, medication charts and orders is provided in the following tables. The breakdown on type of charts (i.e. NIMC, paediatric NIMC and long stay) could not be reported.

Table 5: Number of patients, medication charts and orders compared with previous national audits

Audit year	2009	2010	2011
Patients	**864**	**2,591**	**3,760** Public = 2593, Private = 1167
Medication charts	**1,138**	**3,720**	**5,195**
Medication orders			
Regular orders	5,539	18,252	24,328
PRN orders	2,049	6,298	8,908
Stat Only orders	1,391	5,194	5,684
Warfarin orders	30	140	183
Variable dose orders	38	121	168
Total orders for all patients	**9,047**	**30,005**	**39,271**

4.2 Use of NIMC safety features

4.2.1 Patient identification, weight and a*dverse drug reaction (ADR)* documentation

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

Figure 2: Patient identification and adverse drug reaction documentation

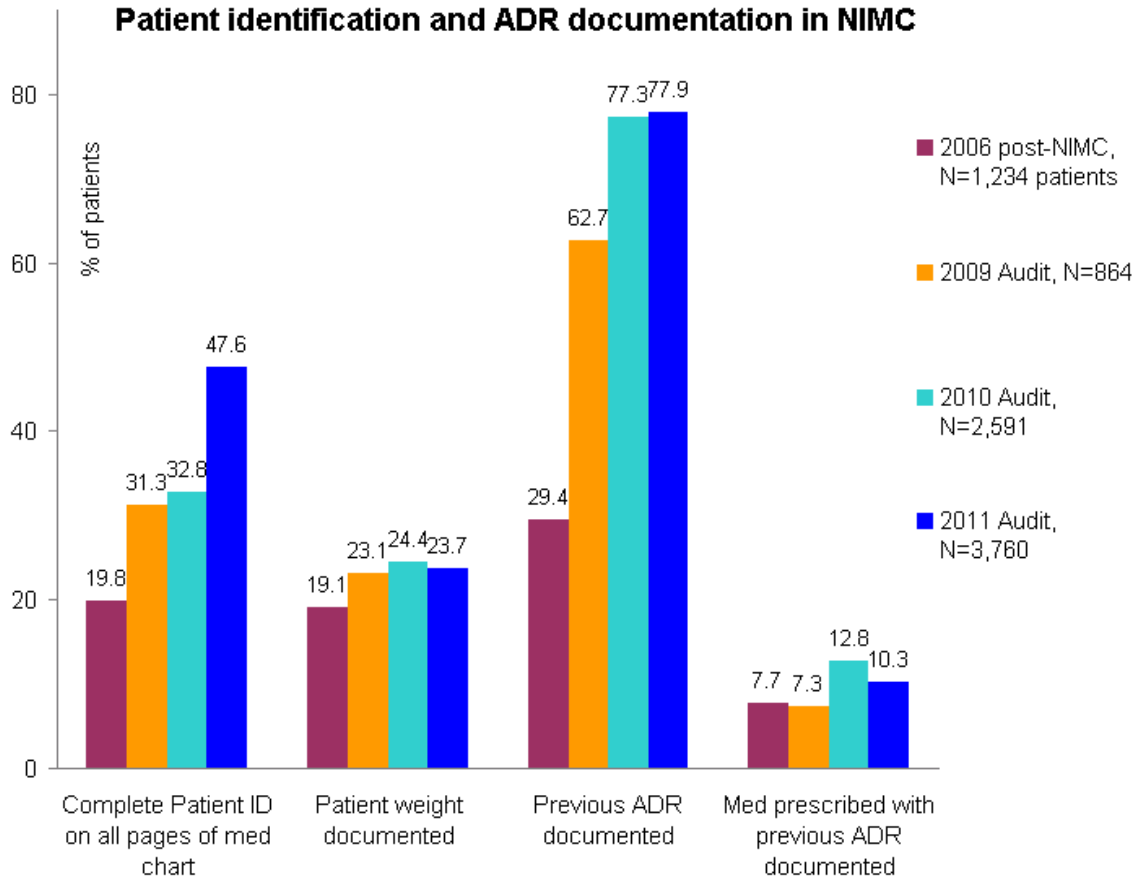
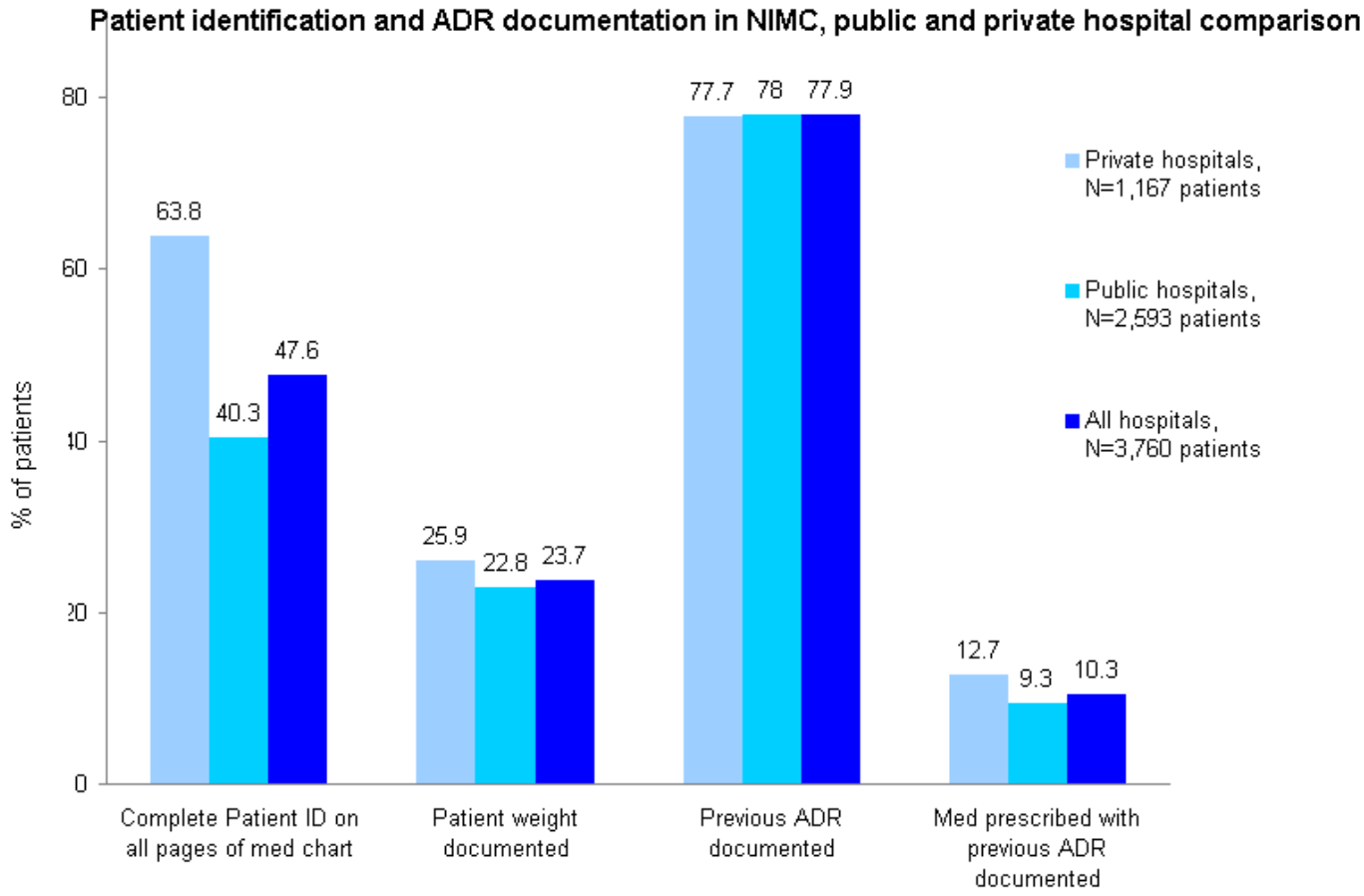


Figure 2.1: Patient identification and adverse drug reaction documentation in NIMC by hospital sector



4.2.2 Medication history documentation

Criteria	2006 post-NIMC pilot audit	2009	2010	2011	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%	27% (Public = 25.2% Private = 30.9%)	Compliance decreased in the recording of patients' medication history or cross referencing location of medication history on separate form/MMP. 15.9% of patients have a medication history documented on their NIMC 8.9% of patients had a medication history cross referenced on current chart to a previous chart or to a MMP form. 2.2% 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%	11% (Public = 12.8% Private = 7%)	Similar number of patients had a *MMP form* or equivalent in "end of bed" folder as in 2009 audit.
Of the MMP forms audited, % with *complete ADR documentation*	N/A	56.0%	87.1%	87.9%	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%	56.9%	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%	65.9%	Increase in number of patients whose medicines were reconciled in 2011

4.2.3 Warfarin prescribing and documentation

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

Figure 3: Warfarin prescribing

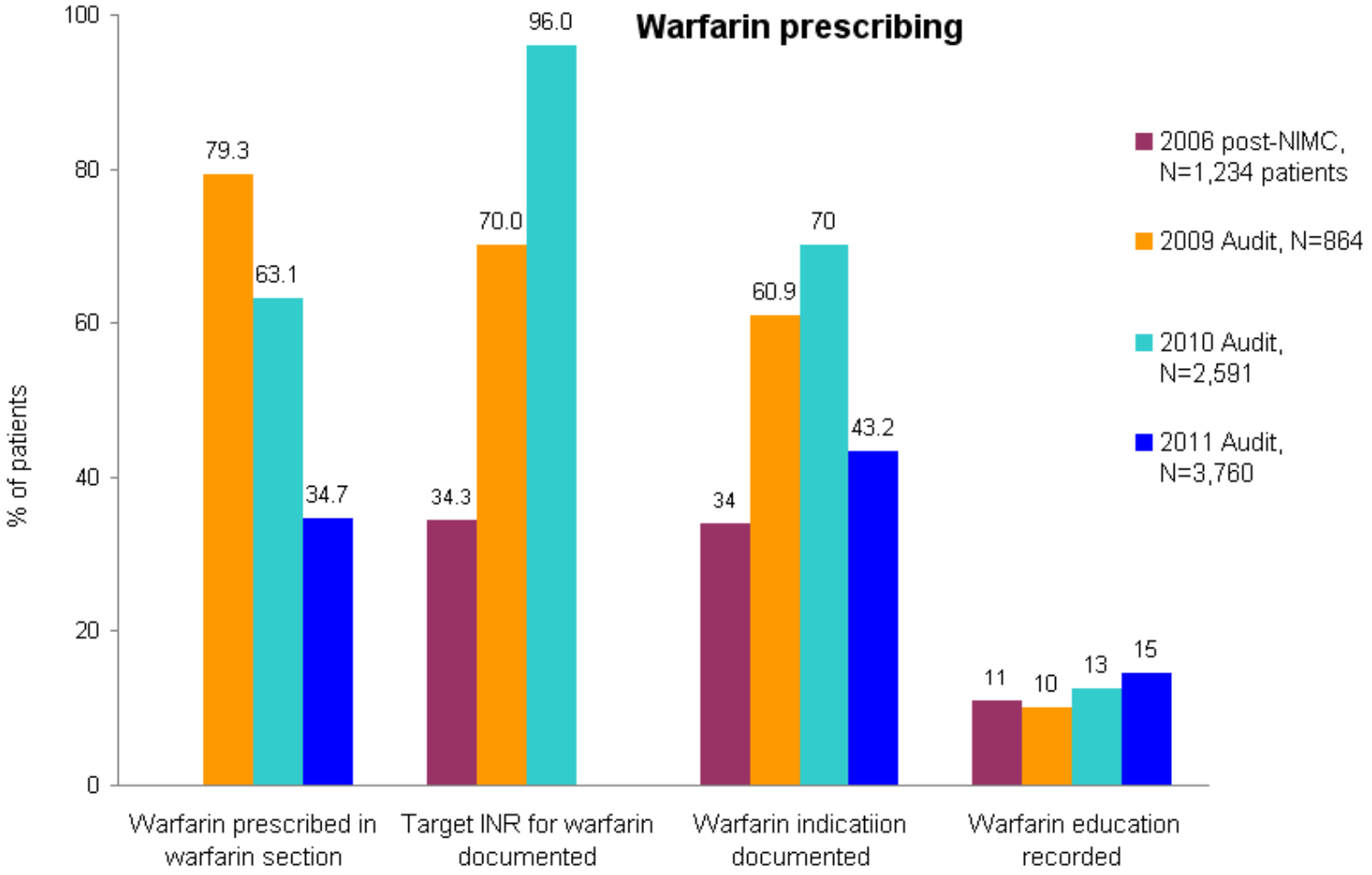
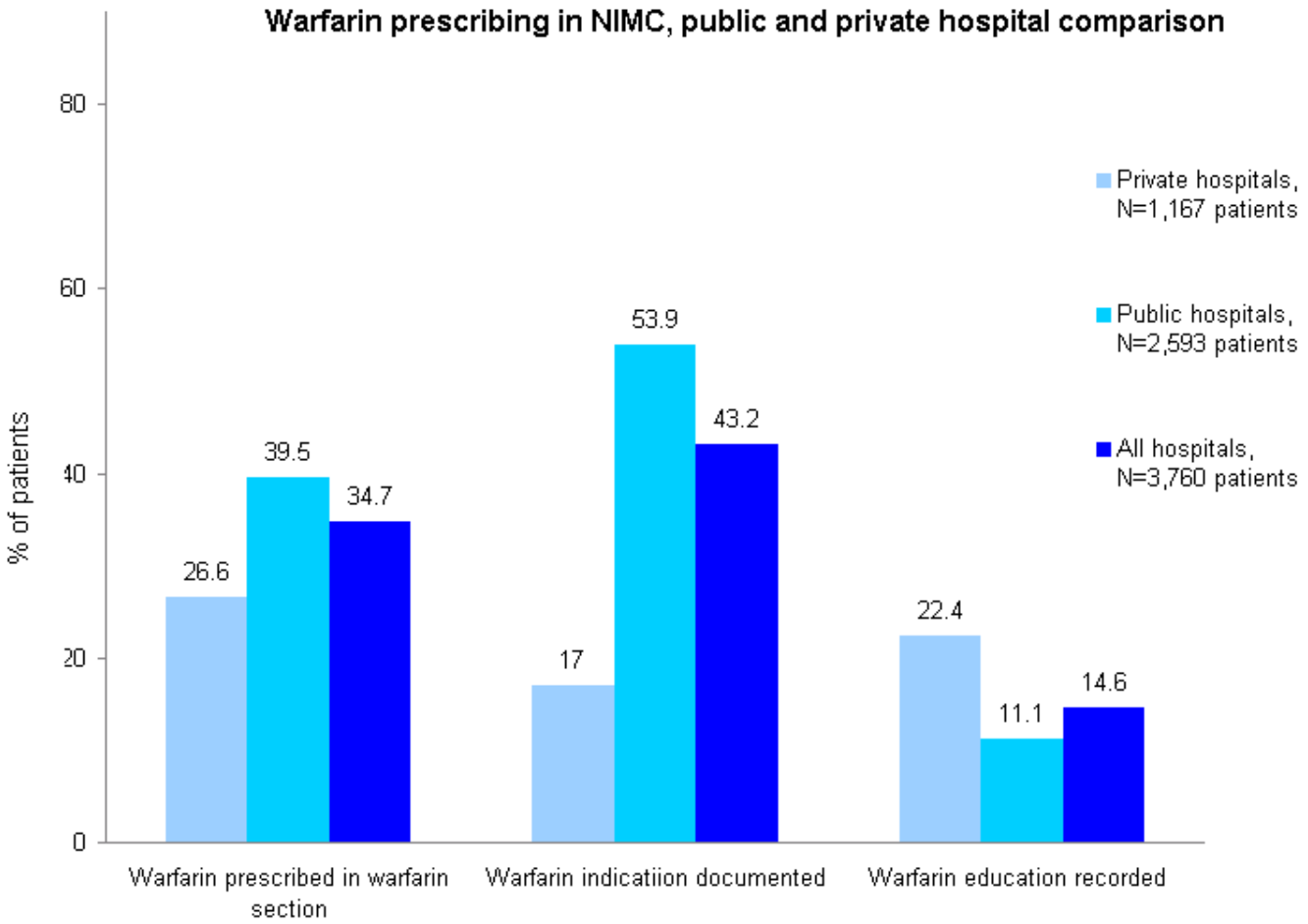


Figure 3.1: Warfarin prescribing using NIMC by hospital sector



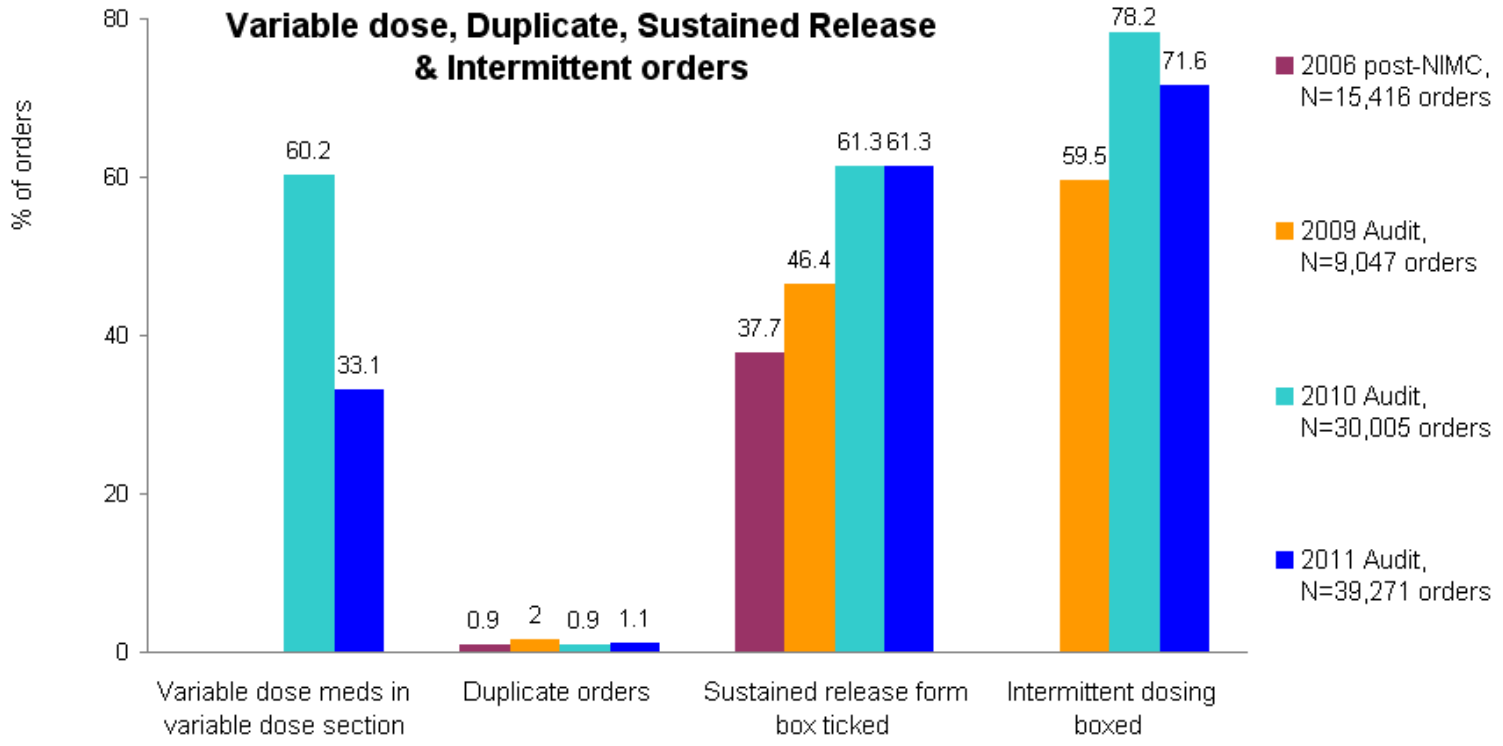
4.2.4 Variable dose, duplicate orders, sustained release formulation and intermittent medications

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.

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

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.

Figure 4: Variable dose, duplicate orders, sustained release form and intermittent medications



4.2.5 Pharmaceutical review and pharmacy annotation

Pharmaceutical review

Criteria	2006 post NIMC audit	2009 audit	2010 audit	2011 audit	Comment
Of the patients whose charts were audited, % with at least one *pharmaceutical review* documented in charts	N/A	39.9%	38.3%	34.3%	The documentation of "Pharmaceutical review" of medication charts by pharmacists remained the same since 2009.

Pharmacy annotation

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	2011 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%	26.8%	There is still a significant documentation gap in pharmacist annotation of medication orders. It is recognised that not all orders will require an annotation. Also the timing of NIMC auditing undertaken in hospitals may effect the results e.g auditing is done on a Monday as most hospitals have limited pharmacy services if any on the weekends.

4.3 Prescribing errors

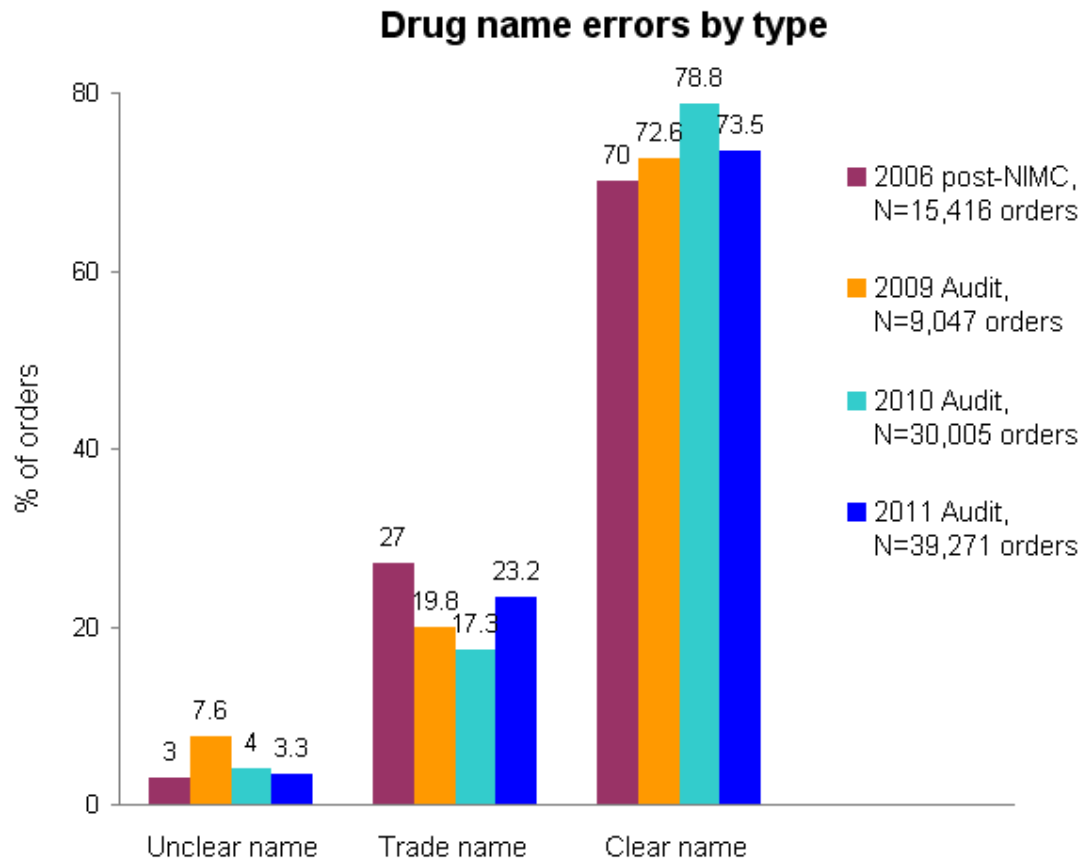
This section includes the data that measure the effect of the chart features designed to improve the completeness and clarity of prescribing instructions on the quality of prescribing.

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

4.3.1 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 5.

Figure 5: Drug name errors

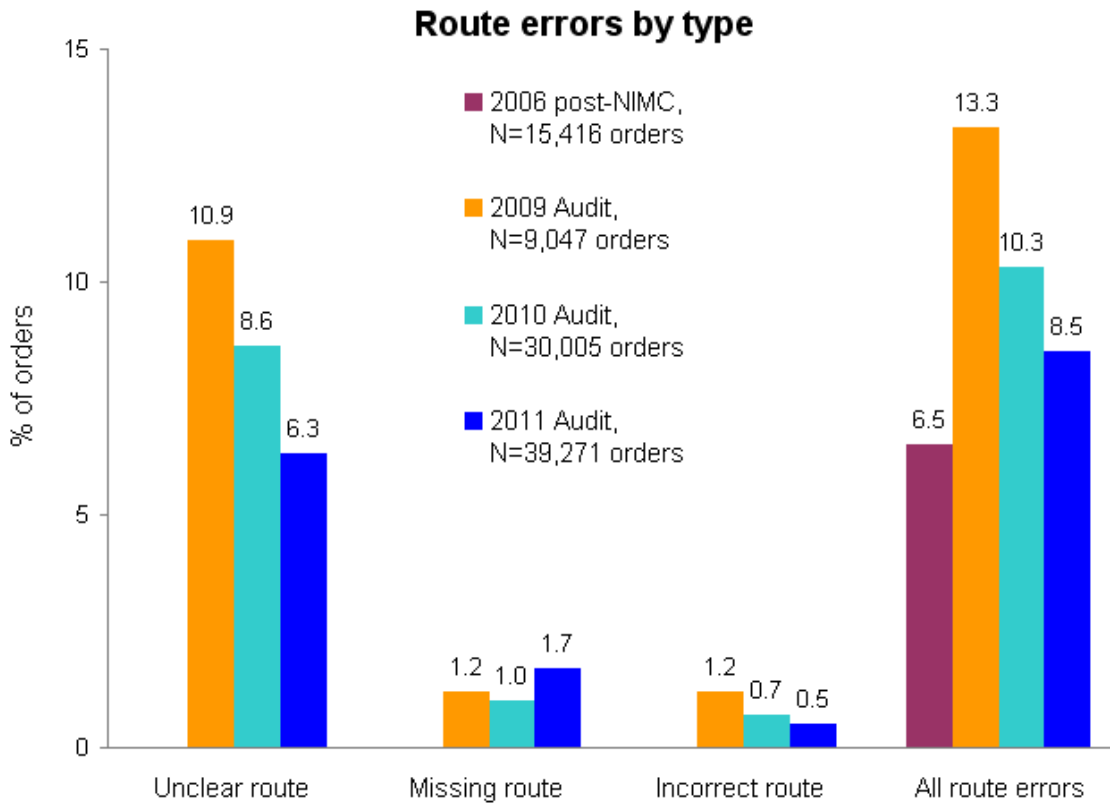


Clear name includes generic names and trade/brand names for combination products approved for use in the facility.

4.3.2 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. See Figure 6.

Figure 6: Rout errors



4.3.3 Dose errors

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. The prescriber must document the dose calculation in the dose calculation box (e.g. mg/kg/dose) to facilitate safe use of medications particularly in the paediatric and neonates. See Figures 7 and 8.

Figure 7: Dose errors

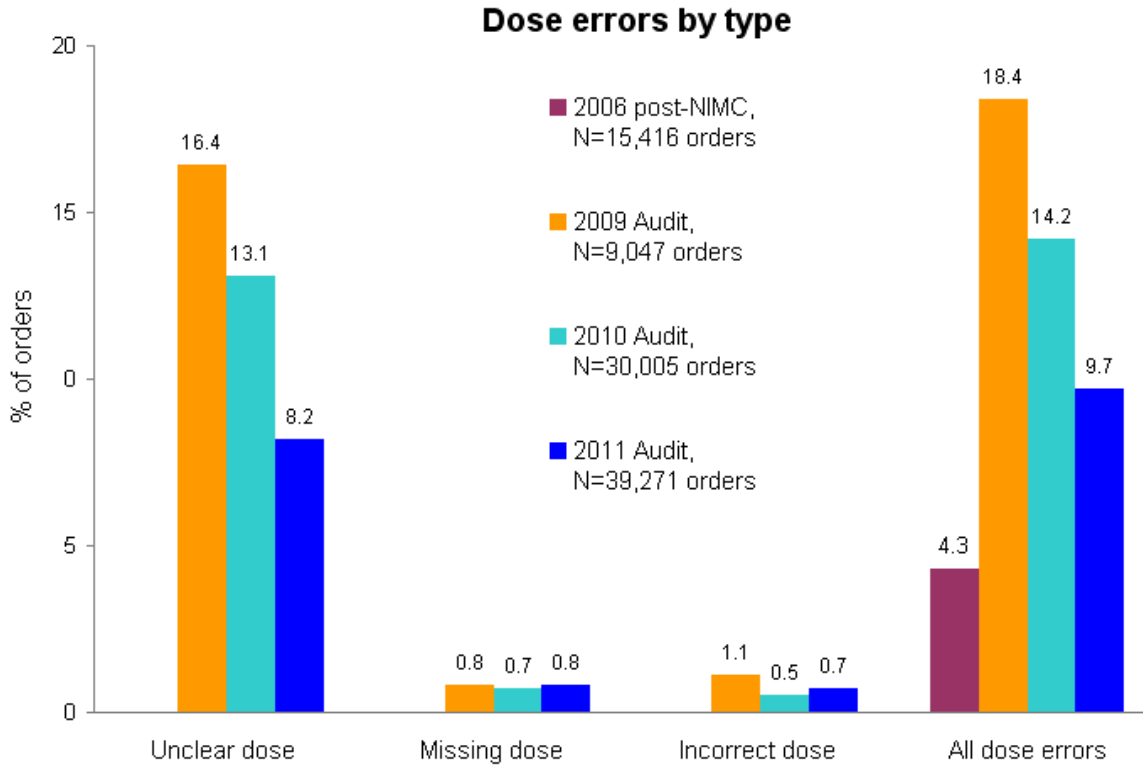
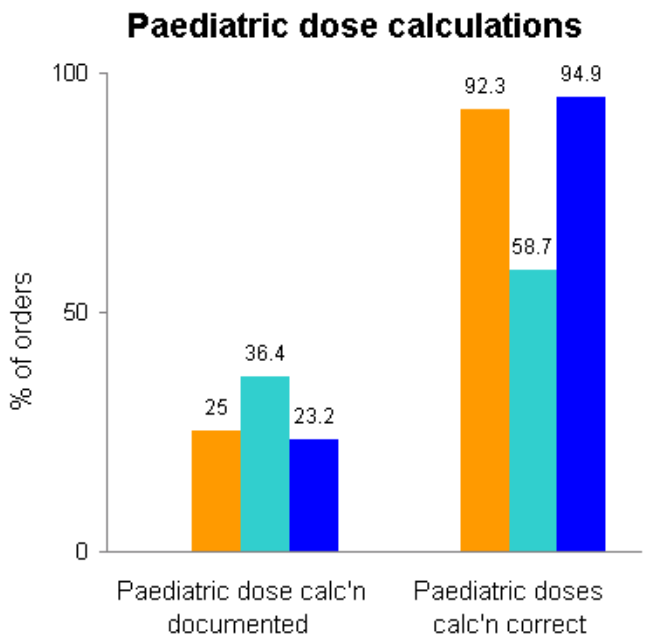


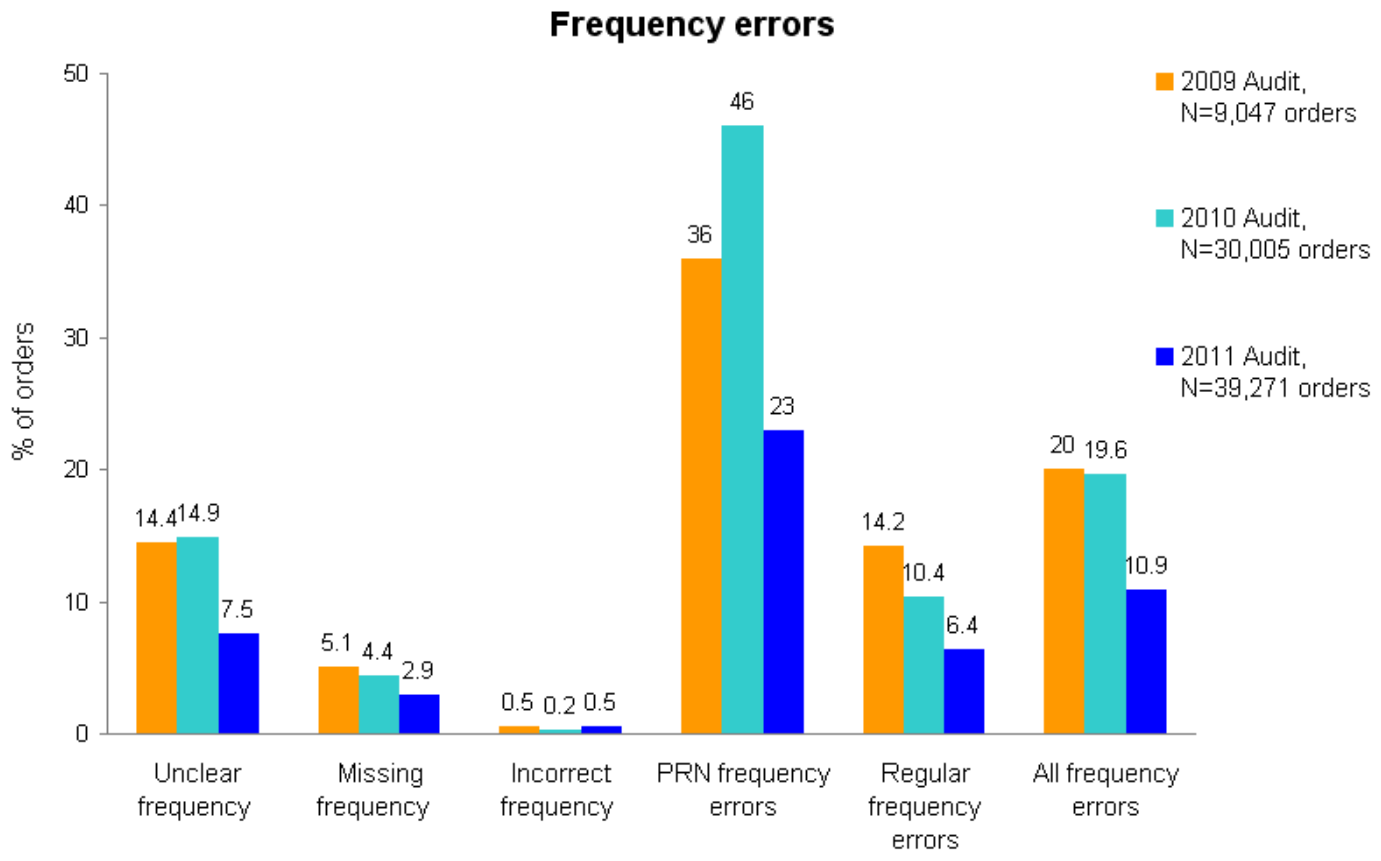
Figure 8: Documentation of paediatric dose calculations



4.3.4 Frequency errors

Frequency is unclear if illegible or error prone abbreviations are used. For example, *Frusemide 40mg qd* is an unclear frequency as “qd” is 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. See Figure 9.

Figure 9: Frequency errors



4.3.5 Communication of prescribing decisions

The communication of prescribing decisions had decreased in relation to unclear drug name, route, dose and/or frequency (24%) including use of error prone abbreviations (16.9%) compared with 2009 and 2010 audits. There were less unclear drug orders in private facilities (15.9%) compared with public (27.8%) sites (see figure 10.1). There were also fewer (16.9%) error prone abbreviations used in 2011 compared to previous audits and this was consistent across both private (15.6%) and public (17.5%) facilities.

Figure 10: Communication of prescribing decisions

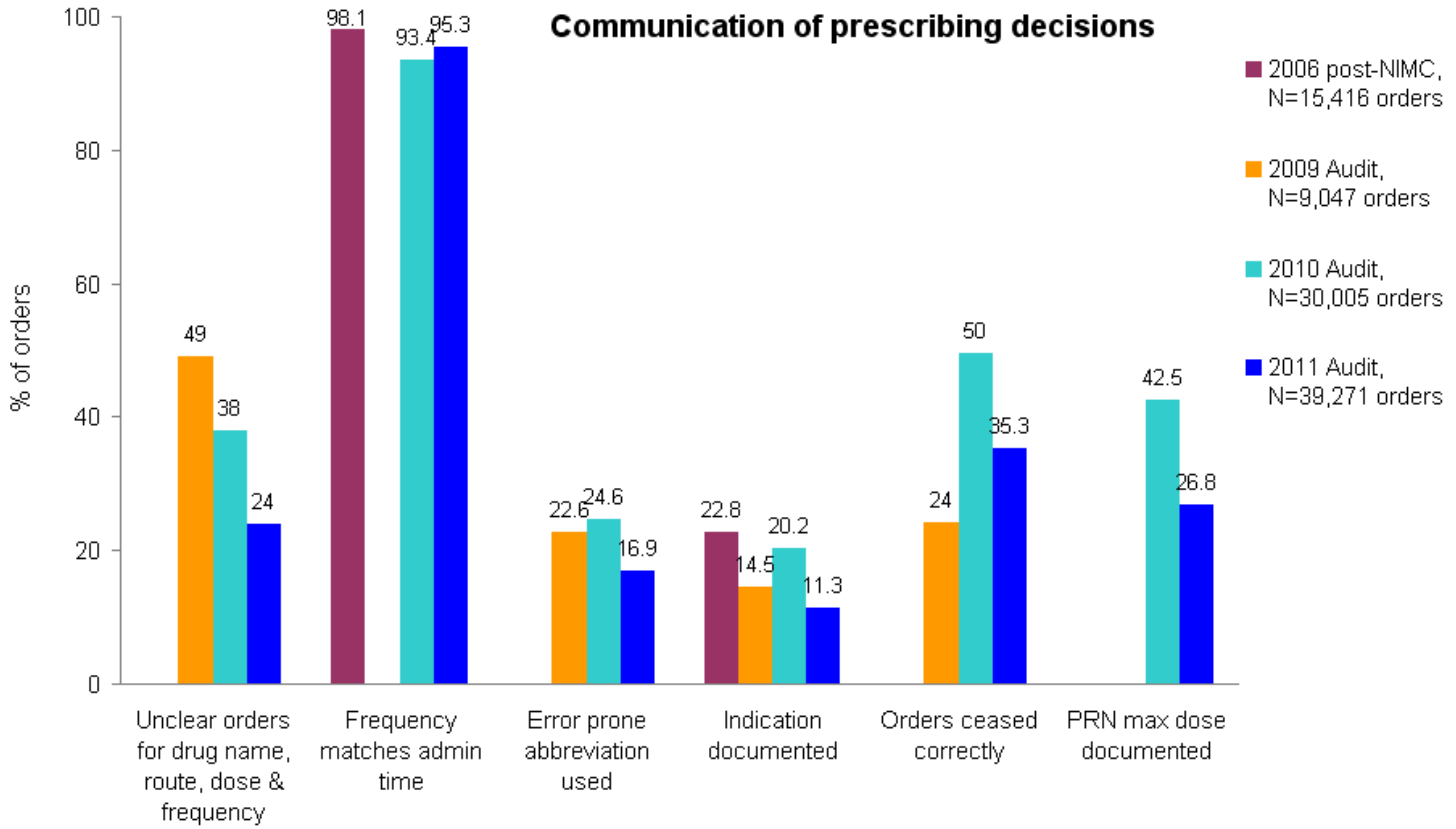
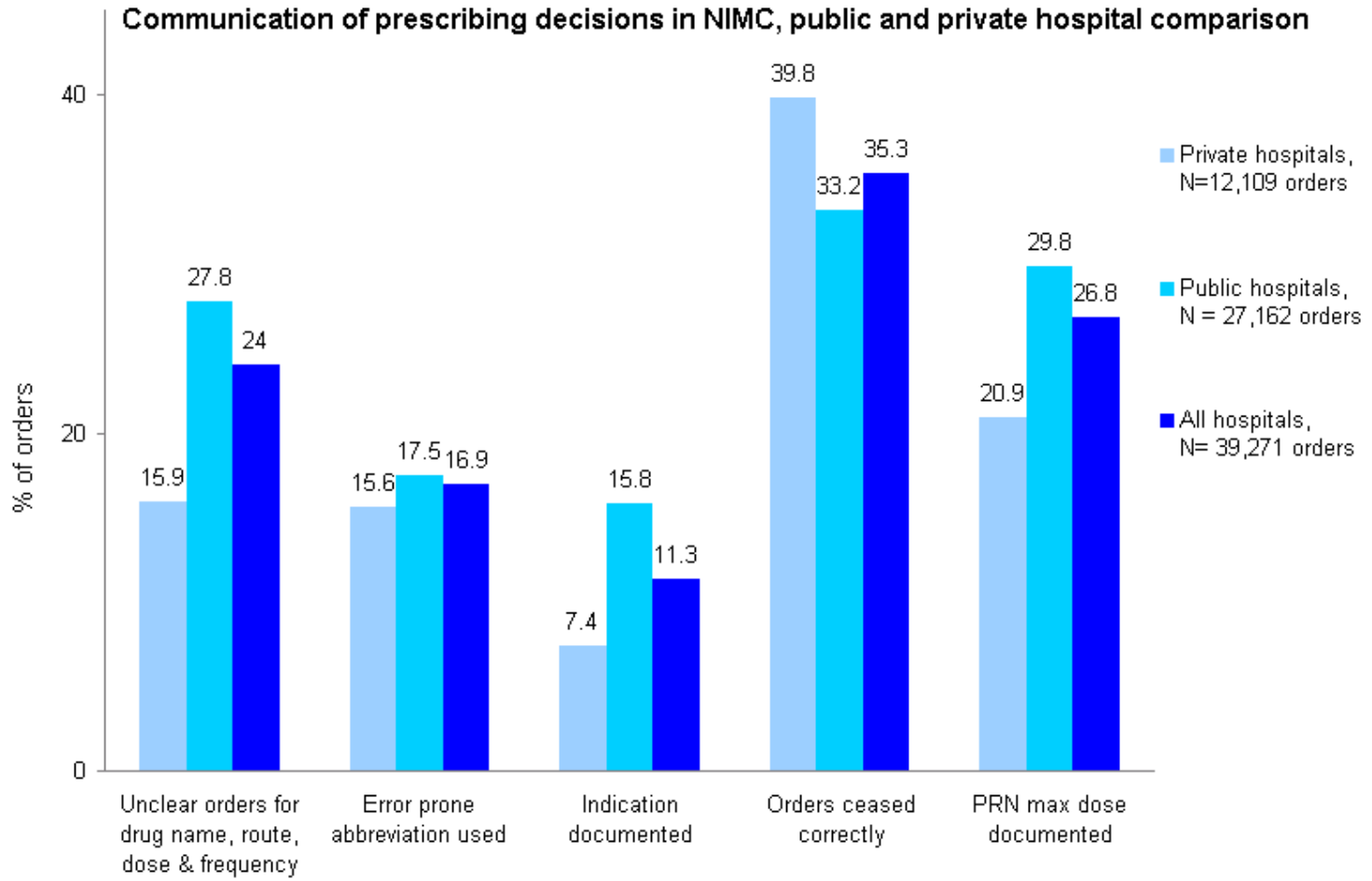


Figure 10.1: Communication of prescribing decisions by hospital sector



4.3.6 Prescriber signature and identifier

Prescriber signature

Criteria	2006 post-NIMC pilot	2009 audit	2010 audit	2011 audit	Comment
Of the medication orders audited (each drug order type), % of orders **signed by prescriber**	98.8%	97.2%	97.5%	95.7% (Public = 96.3% Private = 94.3%)	Maintained high compliance with prescriber signing orders and is consistent across public and private facilities.
Of the medication orders with prescriber signature (each drug order type), % of orders where **prescriber name is clear**	78.3%	66.6%	79.5%	63.8% (Public = 64.4% Private = 62.5%)	Moderately good compliance with the prescriber clearly documenting their name.

4.3.7 Administration documentation

Administration not signed for or assumed omitted

Criteria	2006 post-NIMC pilot audit	2009 audit	2010 audit	2011 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%	9.3% (Public = 9.1% Private = 9.8%)	The percent of doses omitted or not signed for has increased since 2006 pilot and this figure is consistent across public and private facilities. The 9.3% error rate is a cause for concern.

5 Discussion of 2011 NIMC audit data

The data for the 2011 audit of the NIMC was provided by 106 public hospitals and thirty eight private hospitals located in seven States and Territories. A total of 5,195 patients' charts were audited and 39,271 medication orders reviewed. The 2011 audit data showed the NIMC continues to have 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 of the NIMC online learning tool by universities 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 post-NIMC N= 1,234*	2009 audit N=864*	2010 audit N=2,591*	2011 audit N=3,760*
Patient identification completed (all patients)	19.8	31.3	32.8	47.6
Patients' weight documented • all patients • paediatric patients	19.1	23.1 75.7	24.4 N/A**	24 N/A
Complete details of previous ADR documented	29.4	62.7	77.3	78
Clinicians can access *medication history* either via NIMC or *Medication Management Plan (MMP)* *MMP forms* with complete ADR documentation	9.0 N/A	13.1 56.0	33.8 87.1	27 87.9
Indication for warfarin documented Warfarin education for patients documented	34.3 11.0	62.1 10.0	70 12.6	43.2 15
% warfarin orders prescribed in warfarin section with target INR range documented	34.3	69.6	95.7	(data error)
Medicines prescribed of a similar class (duplication)	0.9	1.6	1.0	1.1
Medicines prescribed by generic name	73.0	80.2	78.8	73.5
Sustained release forms of drugs identified	37.7	46.4	61.3	61.3

*N = number of patients, ** N/A =data not available

Almost 50% of patients had a complete patient identification on all pages of the medication chart. 63.8% of patients in private facilities had a complete patient identification on medication charts compared with 40.3% patients in public hospitals (see figure 2.1). Only a quarter of the patients had their weight documented.

The recording of patient medication history or cross referencing location of medication history on separate form/medication management plan (MMP) decreased from 33.8% to 27% in 2010 and 2011 audits respectively. 30.9% of patients in private facilities had medication history recorded on current chart or cross referenced to a MMP or equivalent compared with 25.2% patients in public hospitals. 15.9% of patients' medication history were documented on their NIMC and 8.9% of patients had a

medication history cross referenced on current chart to a previous chart or to a MMP form. There was high compliance (87.9%) with the recording of adverse drug reactions (ADR) details in the MMP form.

The ADR documentation rate on the NIMC was maintained at 78% between the 2010 and 2011 audits. The rate of re-prescribing a similar class of medicine that previously caused an ADR reduced from 12.8% in 2010 to 10.3% in the 2011 audit with public hospitals reporting fewer incidents of re-prescribing than private facilities 9.3% versus 12.7%. (See figure 2.1).

There was a reduction in warfarin orders prescribed in warfarin section of the medication chart, 34.7%, compared with 63.1% in 2010 and 79.3% in 2009. Reduced compliance in using the warfarin section in the 2011 audit may have be influenced by limited use of the section by prescribers in private facilities (26.6% of patients versus 39.5% of public patients on warfarin, see figure 3.1). There was a drop in the documentation for warfarin indication from 70% in 2010 to 43.2% in 2011 with private facilities having a lower rate than public hospitals 17% vs 53.9% Documentation of patient education on warfarin increased slightly from 13% to 14.6% in 2010 and 2011 audit respectively. In 2011 audit, more private patients (22.4%) were reported to have received warfarin education compared with public patients on warfarin (11.1%) (see figure 3.1).

The rate of compliance with the sustained release formulation boxes ticked (61.3%) and the intermittent medicines administration boxed and crossed (71.6%) on the NIMC remained unchanged between the 2010 and 2011 audits. Duplicate orders (or similar class of medicines) prescribed which may have the potential to cause overdosing errors continued to remain low at 1.1%.

The 2011 audit data also showed an overall improvement in prescribing compared to 2010 and 2009 audits (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 error rates

Criteria for missing, incorrect or unclear medication orders	Audit results (%)			
	2006 post-NIMC N = 15,416 orders	2009 N = 9,047 orders	2010 N = 30,005 orders	2011 audit N = 39,271 orders
Unclear orders for drug name, route, dose and frequency	74.0[#]	49.4	37.8	24
Unclear drug names prescribed	3.0	7.6	4.0	3.3
Route errors (*missing, unclear, incorrect*)	6.5	13.3	10.3	8.5
Dose errors (*missing, unclear, incorrect*) - Dose unclear only	4.3 N/A	18.4 16.4	14.2 13.1	9.7 8.2
All frequency errors *(missing, unclear, incorrect*) - PRN frequency errors only	15.5 32.2	20.0 35.6	19.6 46.2	10.9 23.1
Error prone abbreviations used	N/A	22.6	24.6	16.9
Max PRN dose documented	N/A	N/A	42.5	26.8
Orders ceased correctly	N/A	24.1	49.5	35.3

[#]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. All error (missing, unclear, incorrect) rates relating to route (8.5%), dose (9.7%) and frequency (10.9%) were lower than in the 2009 and 2010 audits. Incorrect route, dose and frequency errors were below 1%. Errors of unclear drug name, route, dose and/or frequency continued to decrease. Less drug orders were reported unclear in private facilities (15.9%) compared with public (27.8%) sites (see figure 10.1). The frequency errors for PRN orders halved from 46.2% in 2010 to 23.1% in 2011.

There were fewer (16.9%) error prone abbreviations used in 2011 compared to previous audits and consistent across both private (15.6%) and public (17.5%) facilities (see figure 10.1). This may partly be attributed to increased awareness of the national *Terminology, abbreviations and symbols in the prescribing and administration of medicines in Australian hospitals*.[4]

There was very poor compliance with the documentation of indication for regular, PRN, variable and warfarin orders with only 11.3% of orders having an indication compared with 20% in 2010, the lowest rate recorded to date. More drug orders had the indication recorded in public hospitals (15.8%) than in private facilities (7.4%) (see figure 10.1).

Only 23.2% of paediatric medication orders charted on paediatric charts had a dose calculation documented. This figure is lower than that reported in 2010 (36.4%) and 2009 (25%). Results include orders that did not require a dose calculation and there was also some use of paediatric charts in adult patients in combined women's and children's hospitals that would have affected the result. Of the paediatric orders with a basis for dose calculation documented, 94.9% of doses were correctly calculated, an improvement over 2010 figures.

Thirty four percent of patients received a pharmaceutical review at least once and one quarter of the medication orders (26.8%) were annotated by pharmacists. It may indicate a resourcing issue with pharmacists not available to review charts on the wards or limited pharmacy services available at the time of auditing during weekends and/or nights.

'PRN' medications are susceptible to medication errors. Although PRN frequency errors were halved between 2010 and 2011, 46.2% to 23.1%, orders without a maximum daily dose to be given in 24 hours increased. In 2011 only 26.8% of the PRN orders had a recorded maximum daily dose compared to 42.5% in 2010. Documentation of maximum daily dose for PRN orders was greater in public facilities compared with private sites 29.8% versus 20.9% (see figure 10.1).

Nine percent of medication doses were not signed as administered and remains a cause for concern.

Compliance issues

The design of the NIMC includes a range of safety features that were derived from an analysis of common medication errors. Table 6 lists the level of compliance with these features determined from the 2011 audit results. A detailed discussion of audit results follows.

Table 6: 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.	47.6% patients have complete ID documented (63.8% in private and 40.3% in public hospitals) This should be a focus for further improvement.
Re-exposure of patients to a similar class of medication previously causing an ADR	Prompt for details of drug and description of ADR.	77.9% of charts had complete details of previous ADR documented (drug name and reaction or nil known). This figure is consistent across private (77.7%) and public facilities (78%). 10.3% of patients with at least one or more previous ADRs were re-prescribed a similar class of medication. 12.7% and 9.3% of patients in private and public hospitals respectively.
Dosing error due to lack of patient weight to inform decision	Prompt for patient weight.	23.7% 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.
Discontinuity of appropriate therapy	Addition of medication history section.	The medication history section was completed in 27% of patients (includes cross referencing to a Medication Management Plan or MMP). 30.9% of patients in private and 25.2% in public hospitals. Recording of patient medication history on MMP or equivalent remained poor ranging from 19% to 11% since the introduction of national MMP form in October 2010.
Warfarin dose and duration errors	Designated section of chart for prompt for indication and target INR. INR can be documented in dosing section.	65.3% of warfarin orders were not prescribed in warfarin section. Low compliance in using the warfarin section of the NIMC may be influenced by prescribing practice in private facilities (26.6% of patients versus 39.5% of public patients on warfarin). 43.2% of warfarin prescriptions had an indication recorded. This figure may be influenced by orders with no indication reported by private facilities (17%) compared to public hospitals (53.9%). Warfarin orders with a target INR documented could not be analysed because of data error. This should be a focus of attention for improvement. 15% of patients prescribed warfarin had a record of receiving warfarin education. (22.4% in private sites compared with 11.1% in public hospitals.) This is a major improvement compared with 2009 audit.
Ambiguous trade names	Prompt for generic names.	73.5% of medicines were prescribed using generic names. There was a slight increase in the use of trade names 23.2% compared with 17.3% in 2010. The result should be interpreted with caution as the list of approved combination names may differ between facilities and hospital sector.

Medication error	Safety feature	Issues relating to compliance with safety features
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.	The proportion of unclear name, route, dose and frequency orders has reduced to 24% compared to 2009 and 2010 audits. In 2011 audit, less drug orders were reported unclear in private facilities (15.9%) compared with public (27.8%) hospitals. 28% of orders for intermittent dosing administration were not boxed, less than in 2010 audit. (25% in private and 29% in public sites) This may result in patients receiving daily doses, especially toxic drugs, instead of once a week. 23.2% 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. Of the paediatric orders with dose calculation 94.9% of doses were correctly calculated compared to 58.7% in the 2010 audit.
Drug prescribed, dispensed or administered for wrong indication	Indication of drug area added to regular and PRN orders	Only 11.3% of medication orders (excluding stat only) had the indication documented. More drug orders had the indication recorded in Public hospitals (15.8%) compared with orders in private facilities (7.4%). This should be a focus of attention for improvement as it reduces risk of misinterpretation of the order.
Inability to clarify error with prescriber	Prompt for prescriber to print name and enter contact details	The prescriber name was unclear in 36.2% of orders. This figure is consistent across both public and private facilities.
PRN medication dosing errors	Forcing function to enter minimum number of hours between doses (hourly frequency) and maximum dose within 24 hours.	23% of PRN orders had a missing, incorrect and/or unclear dose frequency which is a large improvement from 2010 audit (46%). 73.2% of PRN orders did not have a maximum dose in 24 hours recorded compared to 57.55% in 2010. Prescribers in public hospitals (29.8% of PRN orders) documented maximum daily dose for PRN orders compared with private facilities (20.9%).

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 50% 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

Less than a quarter (23.7%) 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. The weight documentation has remained unchanged and 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 five participating Specialist Women's and Children's hospitals showed 67.6% of patients, including paediatric patients, had weight recorded on the NIMC.

Adverse drug reaction details

Over three quarters (77.9%) of all patients had a complete ADR history similar to that in 2010 audit. The rate of patients being re-exposed to a similar class of medications decreased to 10.3% compared with 12.8% in 2010. The criteria used for assessing completeness of ADR documentation may influence the results. The ADR documentation often would be assessed as incomplete when the medication and/or a reaction were recorded on the chart, but the date of the drug reaction missing.

The results positively reflect the NIMC safety feature and the prescribers' perception of the importance of ADR history when prescribing medicines.

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 an equivalent form, the history could be accessed on the NIMC or MMP for 27% of patients, a slight decrease from 33.8% in the 2010 audit.

11% of patients had a medication history recorded on a MMP form or equivalent. The presence of MMP form assisted staff to be more compliant with recording of ADR details (87.9%) including documentation of *Dr's Plan on Admission* (56.9%) and medication reconciliation column ticked (65.9%). The documentation of a complete and accurate list of patient's current medicines upon admission and comparing this list to the Dr's plan on admission, transfer and/or discharge orders have shown to reduce medication errors and adverse events at transition of care. (High 5 Medication reconciliation project)

Prescription documentation

Warfarin documentation

There was a reduction in warfarin orders (34.7%) being prescribed in warfarin section of the medication chart compared to 63.1% in 2010 audit. This resulted in decreased documentation for warfarin indication from 70% in 2010 to 43.2% in 2011. However, the documentation of patient education on warfarin increased slightly from 13% to 15% in 2010 and 2011 audit respectively. Warfarin orders with a target INR documented could not be analysed due to data error. The results identified the need to improve prescriber's awareness to use the warfarin section of NIMC that informs subsequent dosing decisions and reduces the risk of unsafe INR levels. The results also highlighted an opportunity for pharmacists to consider widespread implementation of inpatient warfarin education program to improve patients' warfarin knowledge and outcomes.

Sustained release form specified

For sustained release medications, ticking the SR box remained unchanged at 61.3%, thus reducing the risk of immediate release forms being dispensed and administered in error.

Intermittent medication orders

A clear indication of intermittent dosing frequency (i.e. "boxed and crossed" to show dose regimen) decreased slightly from 78.2% in 2010 to 71.6% in 2011. However intermittent orders without the administration boxes crossed correctly may present a risk to patients who may be receiving daily doses of potentially toxic drugs such as oral chemotherapy and bisphosphonates instead of once a week.

Unclear orders

Instructions for drug name, route, dose or frequency were unclear in 24% of orders, a major improvement from 37.8% and 49% in 2010 and 2009 audits respectively. However this measure is subjective and should be considered in the context of multiple observers/auditors across 144 sites in the audit.

Drug name errors

Generic prescribing remained similar to the 2010 level at between 70-80%. The use of unclear names reduced to 3.3%, a similar level as the 2006 post-NIMC pilot. Use of unclear names, particularly for combination products would differ widely across the participating jurisdictions and private facilities.

Drug route errors

The 2011 audit showed a reduction in unclear route of administration (6.3%) containing an unapproved abbreviation or illegible route. The route of administration was missing in 1.7% of orders. 91.6% of orders had the clear and correct route in 2011 audit compared with 89.7% of orders in 2010. The introduction of national *Recommendations for Terminology, Abbreviations and Symbols used in the Prescribing and Administration of Medicines* in 2008 have brought about a gradual decline in all route errors.[4]

Dose errors

Overall 8.2% of drug doses were unclear and contained unacceptable error-prone abbreviations, the highest rate of unclear orders reported in 2011 audit. Less than 1% of orders prescribed had either a dose missing or incorrect. 89.9% of orders had the clear and correct dose in 2011 audit compared to 85% in 2010 audit.

23.2% of paediatric medications ordered on paediatric charts had a dose calculation documented. This is lower than in previous audits. Results included orders for medicines that did not require a dose calculation. Also 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 paediatric orders with a dose calculation 94.9% of doses were correctly calculated compared to 58.7% in the 2010 audit.

Frequency errors

7.5% of dosage frequencies prescribed were reported as unclear and 2.9% of orders did not specify the frequency of dose administration. Instructions were incorrect in ≤ 1% of orders. 89% of orders were considered having a clear frequency for administration compared with 80% of orders in 2010 audit.

Over 95% of dosing administration times matched the frequency prescribed, a high 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 23% of orders compared to 46% in 2010 audit. 26.8% and 42.5% of PRN orders had maximum daily doses to be given in 24 hours documented in 2011 and 2010 audits respectively. Poor level of compliance over two consecutive audits warrant investigation.

Error prone abbreviations

Fewer (16.9%) error prone abbreviations were used compared to 2010 audit that has a reduced potential for misinterpretation of medication orders. This may partly be attributed to increased awareness of the national *Terminology, abbreviations and symbols in the prescribing and administration of medicines in Australian hospitals*.[4]

Indication documented

The documentation of indication for medications prescribed remains low at 11.3% and less than in the 2010 audit (20.2%). The 2011 audit data could not be analysed for the level of indication documentation on the paediatric charts.

Documentation of warfarin indication which is a NIMC safety feature, was higher at 43.2%. However this was substantially less than the 2010 result of 70% and requires further investigation.

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

Ceased orders

About 35% of orders were ceased correctly in both prescribing and administration sections in 2011 lower than 50% reported in the 2010 audit. The ceased orders that were not correctly ceased may cause unintentional harm to patients.

Documentation by health profession

Pharmacy annotation

Pharmacy annotation remains low at 26.8% of orders clarifying the prescription details - a significant gap in documentation by pharmacists. It may indicate a resourcing issue with pharmacists not available to review charts on the wards or poor documentation by pharmacists or limited pharmacy services available at the time of auditing during weekends and/or nights. The same reasoning could also apply to the low (34%) level of documentation of pharmaceutical review.

Prescriber signature and identifier

Over 95% of orders were signed by the prescriber but only 63.8% of prescribers printed their name and/or contact details. There needs to be an emphasis on prescribers providing contact details (e.g. pager number) on the chart for orders requiring clarification or confirmation.

Nursing signatures for orders

Nine percent of ordered administrations appeared to have been omitted or not signed for by nursing staff, a similar rate to 2009 and 2010. 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 2011 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, 2010 and 2011 audits were unmatched.

Ideally, all active patient medication charts should be reviewed at the time of auditing. However, due to resource and time constraints, a representative sample size based on occupied bed numbers was chosen by each participating hospital. We assumed that all participating hospitals used a conforming NIMC and audited active charts across different types of wards 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*[4] in 2008 and the revision of many prescribing audit definitions over the four years since the NIMC pilot may limit comparability of audit results. However, fewer unclear orders for drug name, route, dose and frequency including use of error prone abbreviations in 2011 audit is evidence to increased awareness of the terminology, abbreviations and symbols recommendations by clinicians.

The 2011 audit data was provided by 106 public hospitals and 38 private facilities. Given 30% of the patients and medication orders in 2011 data reflected practices in private facilities the results may not be a true representation of changes across all jurisdictions and the public hospital sector. There was limited participation by specialist women and children, large regional and remote, rehabilitation hospitals contributing to the 2011 data which limits evaluation of the safety features of the NIMC in these settings. The audit data on medication orders heavily relied on regular (60%) and PRN (22.7%) orders and less on warfarin (0.5%) and variable dose (0.4%) orders. Hence, the level of compliance with some NIMC safety features of warfarin and variable dose orders limits extrapolation of prescribing practice.

Some of the data collected required subjective judgement and interpretation by the auditors e.g. determining unclear orders and/or assessing completeness of documentation (e.g. patient identification complete on all pages of each NIMC, complete ADR documentation on all charts). Lack of consistency in data interpretation by the auditors and differences in local policy/procedures between hospitals and States and Territories (e.g. presence of Warfarin Guidelines at end of patient's bed or with medication chart) may limit validity of audit results.

6 Conclusion

The 2011 national audit have been worthwhile and provided a snapshot of NIMC use in 144 public and private hospitals across Australia. The audit was a more representative sample compared with earlier audits comprising 3,760 patients and over 39,000 medication orders. It highlighted areas of good compliance with safety features in the NIMC and also identified areas that need further improvements..

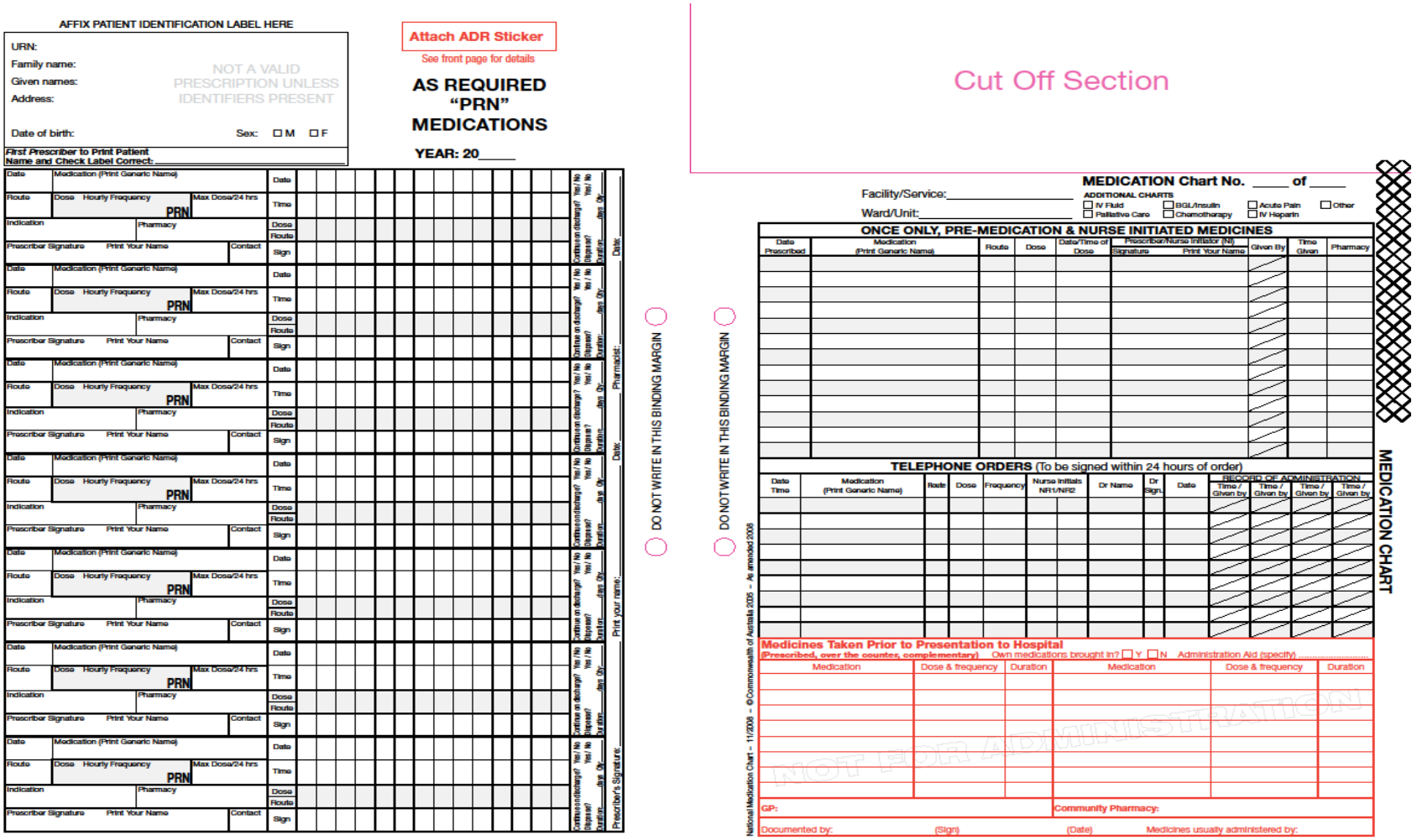
Opportunities remain for improving:

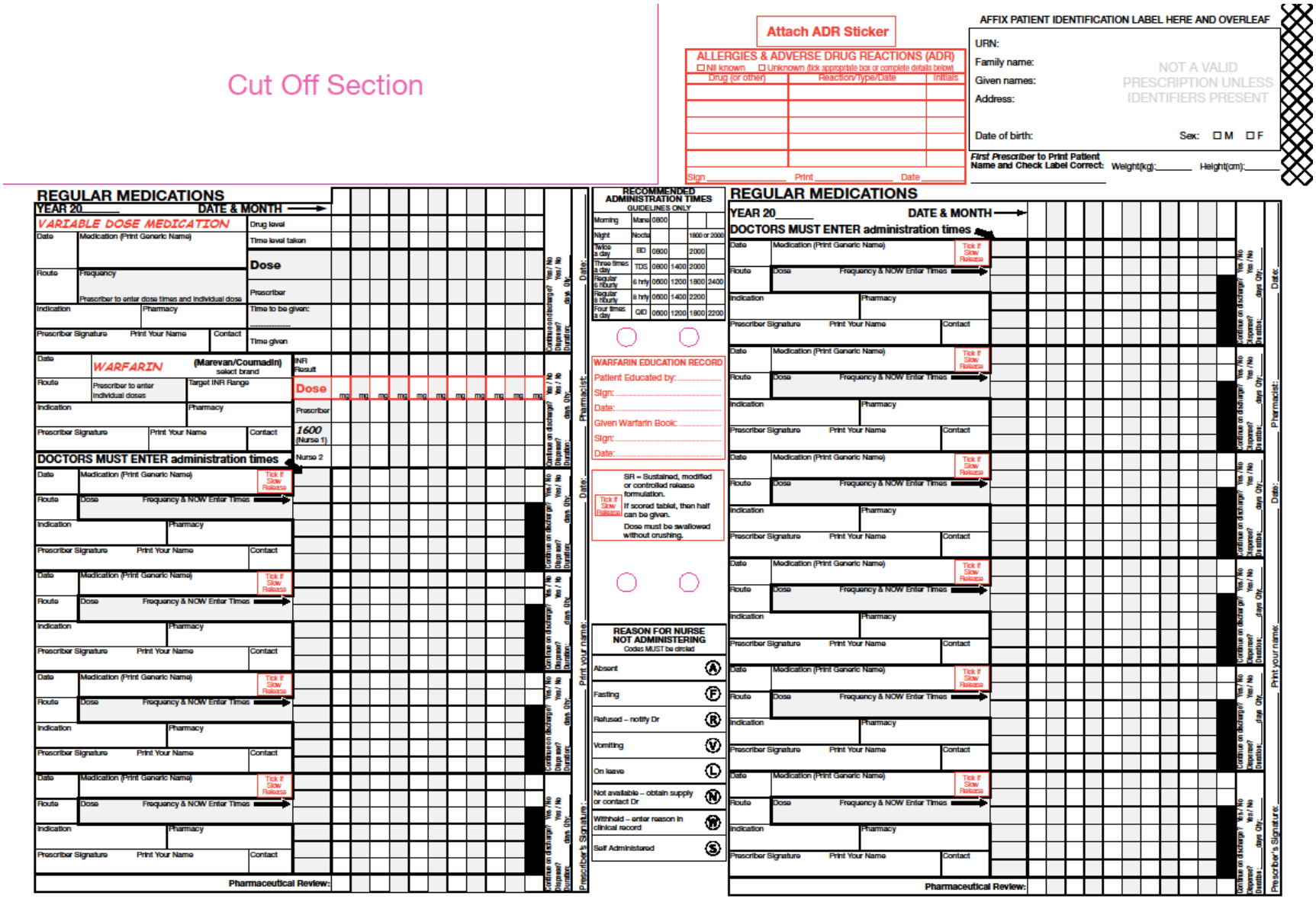
- Accurate patient identification documentation; (in alignment with National Safety and Quality Health Service standard 5: Patient Identification and Procedure Matching);
- Complete and accurate adverse drug reaction information;
- Documentation of complete and accurate medication histories on NIMC, MMP or equivalent documentation (in alignment with National Safety and Quality Health Service standard 4: Medication Safety);
- Use of acceptable abbreviations and symbols and avoiding error-prone ones;
- Documentation of doses administered.

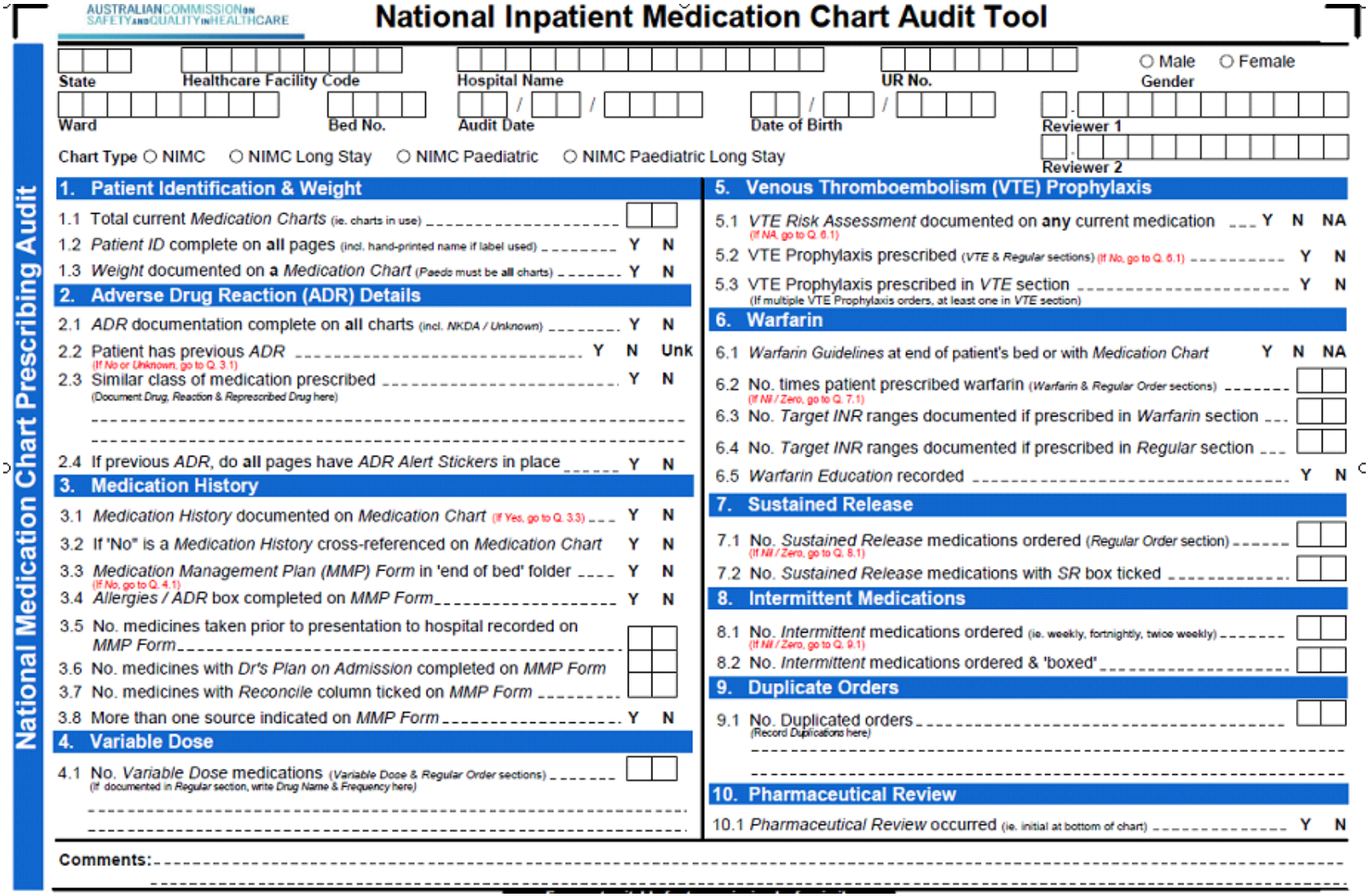
Ongoing evaluation of the use of the NIMC provides information at a national and local level on the safety of prescribing, dispensing, administration and reviewing of medication. This information can be used to focus effort on quality improvement activities and to monitor their effect on reducing the risk of harm to patients from medication errors and preventable adverse drug events.

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
Prescribor
Time to be given:
Time given
WARFARIN
(Marevan/Coumadin)
select brand
INR Result
Target INR Range
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
Prescribor Signature
Print Your Name
Contact
Pharmaceutical Review:
RECOMMENDED ADMINISTRATION TIMES
GUIDELINES ONLY
Morning
Night
Twice a day
Three times a day
Regular q hourly
Four times a day
WARFARIN EDUCATION RECORD
Patient Educated by:
Sign:
Date:
Given Wartarin Book:
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
Fasting
Refused – notify Dr
Vomiting
On leave
Not available – obtain supply or contact Dr
Withhold – enter reason in clinical record
Self Administered
Pharmacist:
Prescriber's Signature:
Print your name:
Date:



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* (If No or Unknown, go to Q. 3.1) _____ Y N Unk

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: _____

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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
						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

References

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