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ON SAFETY AND QUALITY IN HEALTH CARE

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NIMC 2012 National Audit Report Supplement

From measurement to action

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1. Introduction

This document is a supplement to the NIMC 2012 National Audit Report that describes the results of a national audit of the National Inpatient Medication Chart (NIMC) undertaken during 2012.[1] The NIMC is a suite of nationally standard medication charts that present and communicate information consistently between health professionals providing care to patients on the intended use of medicines for an individual patient. The NIMC 2012 National Audit audited the:

- NIMC (acute) and private hospital version
- NIMC (long stay) and private hospital version
- NIMC (paediatric)
- NIMC (paediatric long-stay)
- NIMC (GP e-version).

The NIMC 2012 National Audit includes data submitted to the Australian Commission for Safety and Quality in Health Care (the Commission) by public and private hospitals in eight jurisdictions.

The NIMC 2012 National Audit provides a national overview of NIMC use and compliance with its safety features, as well as an opportunity to identify potential improvements that might be required to the structure and content of the NIMC and related support materials. Gaps in practice that are evident from the results can be used to guide more detailed examination of factors limiting improvement and tailor strategies to improve the use of the NIMC's safety features.

Although use of the NIMC safety features incorporated into its design has improved, in a number of areas the use of certain other safety features has been resistant to improvement. This supplement outlines some important gaps in practice identified through review of longitudinal trends over five successive national audits starting with the post-implementation audit of the NIMC pilot chart in 2006.

The purpose of the supplement is to explore ways to move from measurement to action. Features of the NIMC with poor compliance, and subsequent risk of patient harm, have been identified and a range of actions recommended that can be taken at local, state and national level to improve the safety and quality of medication documentation and prescribing. The supplement also includes recommendations for future NIMC national audits.

For participating hospitals, the NIMC national audit provides data that can support internal quality improvement strategies. Repeated involvement in audits enables hospitals to measure trends in performance that will identify local gaps in practice. It will also suggest areas for improvement in prescribing and administration of medicines that may guide targeted education programs, and other evidence-based interventions.

Participation in NIMC national audits, and review of the results, provides hospitals with evidence to assist verifying their services against relevant action items in the National Safety and Quality Health Service (NSQHS) Standard 4 Medication Safety: [2]

- Criterion 4.2.1: The medication management system is regularly assessed
- Criterion 4.5.2: Quality improvement activities are undertaken to reduce the risk of patient harm and increase the quality and effectiveness of medicines use
- Criterion 4.7.1: Known medication allergies and adverse medicine reactions are documented in the patient clinical record.

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[1] The NIMC 2012 National Audit Report www.safetyandquality.gov.au/publications/nimc-2012-national-audit-report-pdf-2-10kb/ (Accessed 21 January 2014)

[2] Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney: Australian Commission on Safety and Quality in Health Care, 2011.

2. Current use of the NIMC safety features

The NIMC 2012 National Audit Report shows variable levels of compliance with NIMC safety features.

There are ongoing improvements in the use of some NIMC safety features for example:

- use of generic medicine names
- paediatric dose calculations
- recording of adverse drug reaction details.

However there were a number of areas of the NIMC where there was an obvious reduction in compliance or continuing poor compliance, and scope for further improvement. These were:

- complete patient identification
- documentation of weight
- warfarin prescribing in warfarin section
- documentation of target INR for warfarin orders and patient warfarin education
- documentation of PRN maximum 24 hour dose
- documentation of indication
- sustained release dosage forms of medicine identified
- use of recommended terms and abbreviations
- documentation of dose administration
- orders ceased correctly.

For each of these elements, a range of improvement activities have been identified for action by the health service organisations and other organisations at state and national level. They are described in Section 6 and provide a focus for local, state and national activities to improve the quality and safety of prescribing and documenting on the NIMC.

3. Using the audit results to define the quality gap

Health service organisations

Much of the responsibility for improving the safety and quality of prescribing and documentation on the NIMC rests with health service organisations. By undertaking an analysis of their NIMC audit results, health services organisations can identify areas for improvement and undertake activities to enhance the safety of prescribing and administration of medicines in their institution.

Hospitals participating in the national NIMC audit or conducting their own audits of the NIMC should review their data for areas where compliance with the NIMC safety features is low. Where the local data indicates that unsafe practices are occurring and there is the risk of harm (e.g. using the error-prone abbreviations such as u for units when prescribing heparin or insulin) these areas should be targeted for improvement activities.

Collecting additional data to explain why compliance is low will assist hospitals determine where they need to focus their quality improvement activities. For example, where there is low compliance in the documentation of patient identification (patient ID), an audit of the elements required for complete patient ID may identify that the main issue is that the first prescriber is not printing the patient's name in the patient identification section. This then enables any improvement activities to be targeted to this area. Ideally this information should be collected at the time of the NIMC audit, but it may require an additional audit to be undertaken.

Hospitals can also review their results to identify if there are differences between wards or medical units. They can explore whether there are lessons that can be learned from high performing units that can be used to improve performance in other units or wards. Benchmarking audit results at individual ward or unit level may energise activity and lead to improvement in poor performing areas of the hospital.

Where the reasons for suboptimal use of some of the safety features are not obvious, then health service organisations may elect to conduct targeted observational audits, hold focus group sessions or brainstorm with their staff to explore the issues and determine any barriers to using the NIMC safety features and safely documenting on it. Some of these activities, such as clinical audits, could be undertaken by medical and other health science students and interns as part of their training in medication and patient safety.

Once areas for improvement have been identified hospitals should consider using quality improvement methodology such as the Plan-Do-Study-Act (PDSA) model to drive change. This will require collecting data on a repeated basis to track whether changes are leading to improvement. A sampling strategy that uses 20 randomly selected patient charts per month (five per week) can be relatively quick and appropriate.[3] Information on the PDSA model and a PDSA worksheet can be accessed from the Institute of Healthcare Improvement at www.ihi.org

State and territory health departments

State and territory health departments can support health service organisations by reviewing their state/territory data and providing feedback on the data to contributing hospitals. Those hospitals performing well can be asked to provide information on the reasons for their high level of performance and share their lessons with other organisations.

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The Commission can use the results of NIMC national auditing to:

- identify areas for improvement in the audit process, data collection tools and the functionality of reporting system
- improve the NIMC Audit User Guide and support materials.

The results can be used to identify high performing organisations and determine factors that contribute to their success.

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[3] Agency for Health Care Research and Quality. Preventing Hospital-Acquired Venous Thromboembolism. A Guide for Effective Quality Improvement. Rockville,MD. AHRQ, 2008. www.ahrq.gov

4. Improving overall use of the NIMC

Health service organisations, state and territory health departments, private hospital groups, professional colleges and organisations and the Commission all have a role in:

- improving overall use of the NIMC and related charts
- reducing the risk of patient harm from avoidable medication errors.

Poor utilisation of certain NIMC safety features can be improved by educating prescribers, nurses and pharmacists about the NIMC and the principles of safe prescribing, dispensing and administering of medicines. This can be done during undergraduate training as well as after the health professional enters the workforce.

Health service organisations

The level of non-compliance with some of the NIMC safety features may be the result of a number of factors including:

- organisational culture in relation to the safe prescribing and documentation on the NIMC
- workflow and work practices
- poor awareness of the rationale for the NIMC safety features
- poor knowledge of how to use the NIMC safety features
- poor understanding of the risks from using error-prone abbreviations.

It is important that those responsible for medication management system governance at the health service organisation understand the factors influencing NIMC use at their facility. This can be achieved by undertaking staff surveys, brainstorming or focus group activities, and will help target quality improvement activities where they will be most effective.

Health service organisations should identify gaps in local policies relating to NIMC use and resources to support the safe use of the NIMC, for example the availability of an endorsed list of accepted trade names or list of approved abbreviations. There are NIMC support materials available from the Commission's web site that health services can use to develop policies and local materials for educating staff (see Appendix 1).

Education on safe prescribing and documentation on the NIMC, including use of approved abbreviations, should be included in orientation programs for all newly graduated prescribers, nurses and pharmacists and international graduates. In addition, health service organisations should consider making completion of the NIMC e-learning module and the NPS MedicineWise medication safety modules mandatory for these staff.[4] A record of completion of the modules can serve as evidence for Item 1.4 of NSQHS Standard 1 Governance for Safety and Quality of Health Service Organisations.

When local data identifies particular areas in which use of the NIMC safety features could be improved, and education of staff is identified as an appropriate intervention, health service organisations should utilise educational strategies known to influence behaviours such as one-on-one education (academic detailing), working in small groups and using case studies and patient stories.

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[4] NIMC Online training course is available from http://learn.nps.org.au/mod/page/view.php?id=4278 (Accessed 16 January 2014)

Evidence of activity to improve the use of the NIMC will assist health service organisations meet NSQHS Standard 1 Governance for Safety and Quality in Health Service Organisations Item 1.4 and Standard 4 Medication Safety Item 4.5.2.

State and territory health departments and private hospital groups

State and territory health departments, and private hospital groups, can assist health service organisations with quality improvement activities by providing resource materials that support safe prescribing and documentation on the NIMC. Examples of resources relevant to improving the safety of prescribing and documenting on the NIMC are provided in Appendix 1.

State and territory health departments, and private hospitals, could consider mandating completion of the NIMC online training modules for all newly qualified medical, nursing and pharmacy staff and international graduates.

Education and training organisations

Education and training providers have a responsibility for providing graduates with the knowledge and skills to competently prescribe and document the administration of medicines on the NIMC. This can be achieved through specific training on the use of the NIMC and by incorporating the NIMC and the Recommendations for Terminology, Abbreviations and Symbols Used in the Prescribing and Administration of Medicines into education programs and teaching materials. Education should be targeted at those areas where the national audit demonstrates less than satisfactory use of NIMC safety features and the avoidance of unsafe abbreviations.

Completion of the NIMC e-learning module and the NPS MedicineWise medication safety modules should be encouraged.

Professional colleges and organisations

Medical, nursing and pharmacy professional colleges and organisations have a responsibility to actively promote safe medication practices through their professional standards, guidelines and safety and quality activities. This could include improving the standard of prescribing and documenting on the NIMC.

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The Commission is responsible for the maintenance of the NIMC. This includes reviewing the NIMC issues register as well as the results of the National NIMC Audit and other feedback to identify whether there is evidence for changing the NIMC to improve the quality and safety of prescribing and documentation of administration of medicines.

The Commission has a role in developing resources to assist health service organisations and training providers educate students and staff on the rationale for, and the safe use of, the safety features on the NIMC. Resources are available from the Commission web site (see Appendix 1). These could be augmented with case studies, articles in the Commission's Medication Safety Update and medication safety fact sheets.

5. Electronic medication management systems

The introduction of electronic medication management systems (EMMS) provides the opportunity to incorporate NIMC safety features designed to reduce medication errors and patient harm in electronic ordering systems and into routine work practices.

Areas in which EMMS can potentially improve the safety of prescribing and administration of medicines include:

- complete patient identification
- adverse drug reaction documentation
- warfarin prescribing and monitoring
- documentation of indication
- clarity of orders
- correct ceasing of orders.

However EMMS can introduce new types of errors such as selection errors from drop-down menus (e.g. wrong medicine, wrong dose, wrong route, editing errors) and errors in constructing orders.[5]

Health services with EMMS should continue to audit the quality and safety of prescribing to identify the types of errors occurring in the e-system and any trends in errors.

[5] Westbrook JI, Baysari MT, Li L, Burke R, Richardson K, Day R. The safety of electronic prescribing: manifestations, mechanisms and rates of system-related errors associated with two commercial systems in hospitals. J Am Med Inform Assoc 2013(0):1-9.

6. Activities to improve use of specific NIMC safety features

The following tables list a range of potential actions that could be undertaken at local, state and national levels to address areas identified from the NIMC 2012 National Audit and earlier NIMC national audits in which the NIMC safety features were poorly used.

The actions are aligned with the relevant sections of NSQHS Standard 4 Medication Safety and the Australian Safety and Quality Goals for Health Care.

Improving compliance with the use of specific NIMC safety features will result in improved outcomes for patients. These are listed below in Table 1.

Table 1: Outcomes resulting from improved use of NIMC safety features

NIMC safety feature	Outcome
Prompt to complete patient identification	1. Patients are correctly identified and receive intended medicines
Allergies and adverse drug reactions (ADR) section with prompt for name of medicine(s) and description of reaction	2. Patients are not exposed to a similar class of medicine previously causing an ADR
Section to record medicines taken prior to presentation to the hospital	3. Patients experience fewer adverse medicines events at admission and discharge from hospital
Warfarin section	4. Patients taking warfarin experience fewer adverse events
Indication box	5. Patients are prescribed, dispensed, or administered medicines, or doses, consistent with the indication
Slow release tick box	6. Patients experience fewer adverse events from administration of wrong formulation of medicine
Boxes to document medicines administered Codes to document reason medicines were not administered	7. Patients receive all doses of medicines ordered
Box to document pharmaceutical review	8. Patients receive a pharmaceutical review
Separate PRN medicines section	9. Patients experience fewer adverse events from PRN doses of medicines
Safe prescribing recommendations	**Outcome**
Use of the Recommendations for Terminology, Symbols and Abbreviations Used in the Prescribing and Administration of Medicines	10. Patients experience fewer adverse events resulting from the use of an error-prone abbreviation

Use of NIMC safety features

Outcome 1: Patients are correctly identified and receive intended medicines	
NIMC safety feature	Prompt: • to complete patient identification (ID) on top of page 3 and back page • for prescriber to print name below computer generated ID label
The problem	54% of patients' charts have incomplete patient ID
Actions needed to achieve the outcome	
Possible actions by health service organisations at local level	Undertake local activities such as audits or focus group meetings to determine: 1. elements of patient ID not recorded 2. issues and barriers to completing ID details. (Issues could include reasons for noncompliance and beliefs that influence prescriber behaviours). Conduct internal benchmarking between clinical areas and explore pockets of poor documentation. Include medication charts when undertaking audits of patient ID. Use information to tailor intervention(s) to improve level of documentation. This may include education and other interventions to remind clinicians why it is important to complete the patient ID. **NSQHS NSQHS Standard 4 Item 4.5 and Standard 5 Patient Identification and Procedure Matching Items 5.1 and 5.5**
Possible actions by state and territory department, private hospital groups	Encourage hospitals to submit results of local audits to state and territory representatives on the Commission's Health Services Medication Expert Advisory Group. Use information from the audits to design interventions and improve documentation. This may include education and other interventions to remind clinicians why it is important to: • complete the patient ID • confirm pre-printed ID labels by handwriting the patients name on the NIMC. Provide case studies in which another patient's pre-printed label was used and the patient received the wrong medicines.

Actions needed to achieve the outcome	
Possible actions by the Australian Commission on Safety and Quality in Health Care	Increase the capability of the NIMC Audit System to allow hospitals to report and access more complete information. Provide guidance on how health services can use local audit results to identify areas for improvement and use local rapid audit and feedback cycles to effect change. Work with states and territories to use local data and design national interventions to improve documentation. This may include education and other interventions to remind clinicians why it is important to complete the patient identification.

Outcome 2: Patients are not exposed to a similar class of medicine previously causing an ADR	
NIMC safety feature	Prompt for details of allergies and adverse drug reactions, including name of medicines and description of reaction
The problem	21.5% of charts had no, or incomplete, documentation of previous ADR (medicine name and reaction, or nil known) 11.2% of patients with at least one or more previous ADRs were re-prescribed a similar class of medicine
Actions needed to achieve the outcome	
Possible actions by health service organisations at local level	Undertake local activities such as audits or focus group meetings to determine: 1. which elements of ADR histories are not being recorded 2. whether particular classes of medicines are implicated 3. level of risk to patients administered medicine from a similar class to medicine previously causing an ADR 4. the issues and barriers to completing ADR details 5. differences between specialties/services e.g. medical, surgical Use information to tailor intervention(s) to improve level of documentation. This may include education to remind clinicians why it is important to complete all ADR details. **NSQHS Standard 4 Medication Safety Items 4.5 and 4.7**
Possible actions by state and territory department, private hospital groups	Encourage hospitals to submit results of local activities to state and territory representatives on the Commission's Health Services Medication Expert Advisory Group. Use information to design intervention(s) to improve the level of documentation. This may include education to remind clinicians why it is important to complete all ADR details. Provide examples of case studies where hospitals have successfully improved the quality of ADR documentation. Provide case studies where re-exposure caused death or permanent harm.

Actions needed to achieve the outcome	
Possible actions by the Australian Commission on Safety and Quality in Health Care	Increase the capability of the NIMC Audit System reporting functionality. Analyse the data to identify: • exemplar sites • significance of prescribing a similar class of medicine. Use information for identifying the type of intervention(s) required to improve documentation. Provide case studies where hospitals have successfully improved the quality of ADR documentation. Provide case studies where re-exposure caused death or permanent harm. Provide a toolkit to help hospitals tailor their interventions to their local situation.

Outcome 3 :Patients experience fewer adverse medicines events at admission and discharge from hospital	
NIMC safety feature	Section to record medicines taken prior to presentation to hospital
The problem	68.4% of patients did not have a medication history recorded on the NIMC or documented on a Medication Management Plan (MMP)
Actions needed to achieve the outcome	
Possible actions by health service organisations at local level	Conduct focus group meetings to explore reasons for not documenting medication history on NIMC/MMP and develop strategies to address any barriers. Undertake activities to increase number of patients with a best possible medication history recorded in a common place in the patient record e.g. NIMC, MMP or equivalent form (paper or electronic). **NSQHS Standard 4 Medication Safety Item 4.5 and 4.6**
Possible actions by state and territory health departments, private hospital groups	Encourage use of MMP or electronic version to record medicines taken prior to presentation to hospital. Provide examples of case studies where hospitals have successfully improved the documentation of medication histories.
Possible actions by the Australian Commission on Safety and Quality in Health Care	Continue to provide resources to assist hospitals increase the number of patients with a best possible medication history recorded in a common place in the patient record e.g. NIMC, MMP or equivalent form (paper or electronic). Promote Commission resources for implementing medication reconciliation. Provide case studies where hospitals have successfully improved the documentation of medication histories. Place Commission training materials, such as Get it right! Taking a Best Possible Medication History training video, on NPS MedicineWise on line learning platform.

Outcome 4: Patients taking warfarin experience fewer adverse events	
NIMC safety feature	Designated warfarin section (acute and GP e-versions) prompts for indication and target INR Dedicated section for recording patient warfarin education
The problem	51.3% of warfarin orders were not prescribed in the warfarin section. 30% of warfarin orders were missing a documented target INR (and which can be documented in the dosing section). 85% of patients prescribed warfarin had no record of receiving warfarin education documented on the NIMC.
Actions needed to achieve the outcome	
Possible actions by health service organisations at local level	Undertake local activities such as focus group meetings to determine the reasons why warfarin is not prescribed in designated warfarin section, and the target INR not documented. Use information for tailoring intervention(s) to improve level of documentation including target INR and indication. Implement local warfarin education policy that requires: • all patients newly prescribed warfarin receive warfarin education • documentation of education provided in one central location i.e. the NIMC warfarin education record. Note that some hospitals may also require documentation in the patient's progress notes • documented reason for not providing patient education in the NIMC warfarin education record • clear identification of those responsible for providing the education. **NSQHS Standard 4 Items 4.5, 4.9, 4.11, 4.13 and 4.15** **Australian Safety and Quality Goals for Health Care Safety Outcome 1.15**
Possible actions by state and territory health departments, private hospital groups	Encourage improvement in compliance with documentation of warfarin education on the NIMC.

Actions needed to achieve the outcome	
Possible actions by the Australian Commission on Safety and Quality in Health Care	Modify NIMC User Guide instructions on warfarin education to include documentation of reason why patients did not require warfarin education. Enhance NIMC Audit System to improve reporting functionality and facilitate interpretation of data. Advocate a requirement to document warfarin education provision as a core requirement in EMMS. Review relevance of dedicated warfarin section with increased use of newer oral anticoagulants.

Outcome 5: Patients are prescribed, dispensed or administered medicines or doses consistent with the indication	
NIMC safety feature	Indication box to prompt documentation of indication for medicine use in regular and PRN order sections
The problem	Less than 18% of medicine orders (excluding once only) had the indication documented
Actions needed to achieve the outcome	
Possible actions by health service organisations at local level	Review medication incident reports for incidents where the knowledge of the indication could have reduced the number of errors and potential adverse events (e.g. wrong dose, wrong medicine). Conduct activities such as focus group meetings to identify issues and barriers to documenting the indication for a medicine. Use information in a marketing campaign to change behaviour. Consider focusing on particular medicines e.g. those with more than one indication and with different doses for the different indications. Conduct internal benchmarking between clinical areas. Investigate pockets of poor documentation and target interventions in these areas. **NSQHS Standard 4 Item 4.5**
Possible actions by state and territory health departments, private hospital groups	Review medication incident reports for incidents where the knowledge of the indication could have reduced the number of errors and potential adverse events. Provide feedback to health service organisations. Provide case studies in which hospitals have successfully improved the documentation of indication.
Possible actions by the Australian Commission on Safety and Quality in Health Care	Promote research into prescriber attitudes and behaviours towards documenting the indication for medicines on the prescription. Liaise with professional colleges and organisations regarding strategies to improve documentation of indication in prescriptions (paper and electronic). Develop tools to assist health service organisations identify local issues contributing to poor documentation and tailor quality improvement interventions.

Outcome 6: Patients experience fewer adverse events from administration of wrong formulation of medicine	
NIMC safety feature	Slow release tick box to prompt documentation of medicine ordered in slow release form
The problem	42% of orders for sustained release products had no tick in the tick box
Action needed to achieve the outcome	
Possible actions by health service organisations at local level	Undertake local activities such as focus group meetings for determining the issues and the barriers to ticking the sustained release box. Conduct internal benchmarking between clinical areas. Investigate pockets of poor documentation and target interventions in these areas. Use information from audits or focus groups for tailoring intervention(s) to improve level of documentation. This may include education and other interventions to increase clinician awareness of sustained release products and the importance of ticking the sustained release box. **NSQHS Standard 4 Item 4.5**
Possible actions by state and territory health departments, private hospital groups	Promote use of NIMC on line learning module, NPS MedicineWise medication safety course and relevant training materials.
Possible actions by the Australian Commission on Safety and Quality in Health Care	Develop tools to assist health service organisations identify local issues contributing to poor documentation and tailor quality improvement interventions.

Documentation of professional responsibility

Outcome 7: Patients receive all doses of medicines ordered	
NIMC safety feature	Recommended administration times are included on medication chart Designated area to sign when each dose is administered
The problem	9.9% of doses ordered appeared to have been omitted or not signed for by nursing staff (excludes doses where a reason for not administering code is documented)
Actions needed to achieve the outcome	
Possible actions by health service organisations at local level	Undertake local activity, such as audits and focus groups, to determine the reasons why doses of medicines are missed or not documented. Use information for developing local strategies to address any issues identified. Implement a nursing clinical handover policy that includes a check of medicines administered. **NSQHS Standard 4 Item 4.5**
Possible actions by state and territory health departments, private hospital groups	Encourage hospitals to submit results of local activities to state and territory representatives on the Commission' Health Services Medication Expert Advisory Group. Use information from the audits for designing interventions to improve documentation. Provide examples of case studies in which hospitals have successfully introduced systems to reduce the incidence of missed doses.
Possible actions by the Australian Commission on Safety and Quality in Health Care	Liaise with nursing organisations on developing a standard procedure for administering medicines and documenting doses of medicines administered. Request inclusion in nursing curricula nationally. Use the information in the Commission's evidence briefings on reducing medication administration errors to promote systems and practices that reduce the incidence of missed doses. Provide case studies where hospitals have successfully introduced systems to reduce the incidence of missed doses. Provide audit tools and other resources to assist health service organisations identify local issues contributing to poor documentation of doses administered and tailor quality improvement interventions.

Outcome 8: Patients receive a pharmaceutical review	
NIMC safety feature	Box to document pharmaceutical review to prompt review and documentation of it
The problem	Only 38% of patients had at least one pharmaceutical review documented in medication charts
Actions needed to achieve the outcome	
Possible actions by health service organisations at local level	Undertake local activities such as focus groups to determine underlying problems and the reasons why pharmaceutical review is not documented. **NSQHS Standard 4 Item 4.5**
Possible actions by state and territory health departments, private hospital groups	Review state and territory NIMC audit data to identify health service organisations performing well. Provide case studies from high performing organisations.
Possible actions by professional colleges, organisations	Undertake research to determine why pharmacist review is documented for only 38% of patients and how this can be improved. Issue a position statement on accountability of pharmacists with respect to documenting pharmaceutical review on the NIMC.
Possible actions by the Australian Commission on Safety and Quality in Health Care	Provide case studies from high performing organisations.

Prescribing errors

Outcome 9: Patients experience fewer adverse events from PRN doses of medicines	
NIMC safety feature	Separate PRN medicines prescribing section with prompts to specify frequency and maximum dose in 24 hours
The problem	30% of PRN orders had missing, unclear or incorrect frequency errors. 65% of PRN orders did not specify a maximum dose in 24 hours.
Actions needed to achieve the outcome	
Possible actions by health service organisations at local level	Undertake audits or other local activities such as focus groups to determine the issues relating to prescribing and administering PRN orders. Conduct internal benchmarking between clinical areas. Investigate pockets of poor documentation and target interventions in these areas. Use information from audits and focus groups for tailoring intervention(s) to improve levels of documentation. This may include education and other interventions to increase clinician awareness of importance of clearly specifying the frequency and maximum dose in 24 hours or, where local policy allows, the use of sedation scores to indicate maximum dose of opioid. **NSQHS Standard 4 Item 4.5**
Possible actions by state and territory health departments, private hospital groups	Use information from health service organisations for design intervention(s) to improve levels of documentation. This may include education and other interventions to increase clinician awareness of importance of clearly specifying the frequency and maximum dose in 24 hours.
Possible actions by education and training organisations	Incorporate PRN orders with frequency and maximum dose in 24 hours into student teaching materials and case-based learning scenarios.
Possible actions by colleges and organisations	Provide clinical leadership on improving the prescribing of PRN medicines.

Actions needed to achieve the outcome	
Possible actions by the Australian Commission on Safety and Quality in Health Care	Develop tools to assist health service organisations identify local issues contributing to poor documentation and tailor quality improvement interventions. Update educational materials to specify frequency of PRN orders must be written in hourly intervals not times of day e.g. 8 hrly not tds.

Outcome 10: Patients experience fewer adverse events resulting from the use of an error-prone abbreviation	
Medication safety strategy	Use of the Recommendations for Terminology, Abbreviations and Symbols used in the Prescribing and Administration of Medicines
The problem	20% of orders contained one or more error-prone abbreviations
Actions needed to achieve the outcome	
Possible actions by health service organisations at local level	Undertake local activities such as audits and analysis of incident reports to determine error-prone symbols and abbreviations used and identify those at highest risk of causing harm. Use audit data and local examples of unsafe orders for feedback and target education to raise awareness of error-prone and acceptable abbreviations. Undertake qualitative studies and focus groups to identify reasons why prescribers continue to use error-prone abbreviations. Use senior medical staff to act as clinical educators for junior doctors to promote use of acceptable abbreviations. Require all new prescribers, including international graduates, to complete the NIMC on line learning module and NPS MedicineWise medication safety course. **NSQHS Standard 4 Item 4.5 and 4.9**
Possible actions by state and territory health departments, private hospital groups	Identify abbreviations and symbols used with highest risk of causing harm and contribute examples of clinical scenarios as learning resources. Promote available teaching resources such as NIMC on line learning module, NPS MedicineWise medication safety course and jurisdictional resources.
Possible actions by education and training organisations	Incorporate Recommendations for Terminology, Abbreviations and Symbols used in the Prescribing and Administration of Medicines approved terminology and abbreviations into teaching materials and case-based learning scenarios.
Possible actions by professional colleges, organisations	Provide clinical leadership in reducing use of error-prone abbreviations.
Possible actions by the Australian Commission on Safety and Quality in Health Care	Develop case based teaching resource and promote use of existing resources.

7. Future national audits

Improving the quality of the data collected

Variation in the results of audits at health service organisation, and state or territory level, may be due in part to varied interpretation of audit criteria by auditors. Some of the audit criteria require subjective judgement and interpretation, such as determining unclear orders, and 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 interpretation of audit criteria, and differences in local policy/procedures between hospitals and jurisdictions (e.g. presence of warfarin guidelines at end of patient's bed or with medication chart), may limit the consistency and comparability of audit results.

Improving auditor reliability would improve the quality of data collected and provide greater validity to results at all levels, local, state and national.

Actions	
Possible actions by health service organisations	Ensure staff use the NIMC audit support materials and follow the user guide when auditing. Use same staff to audit the chart where possible. **NSQHS Standard 4 Item 4.5**
Possible actions by state and territory health departments, private hospital groups	Conduct workshops for auditors using sample case studies and mock charts.
Possible actions by the Australian Commission on Safety and Quality in Health Care	Develop an on-line learning package for auditors to complete prior to auditing.

Sample sizes for warfarin, PRN and variable dose orders

The NIMC 2012 National Audit provides information mainly on regular (61%) and PRN (22%) medicine orders, with warfarin and variable dose orders only 0.5% of orders respectively. The small sample size for warfarin and variable dose orders limits the interpretation of the results. In order to obtain more meaningful data health service organisations should collect a larger sample of orders for these items. This could be achieved by auditing a large number of charts during the national audit or, alternatively, by conducting focused audits on a larger number of charts to achieve sufficient data strength.

Actions	
Possible actions by health service organisations	Undertake focused audits on prescribing and administration of PRN, warfarin and variable dose orders using a larger sample of patients. Use NIMC auditing to identify areas for focused activity. **NSQHS Standard 4 Item 4.5 and 4.9**
Possible actions by state and territory health departments, private hospital groups	Identify if useful local audit tools exist and make available to other sites.
Possible actions by the Australian Commission on Safety and Quality in Health Care	Develop a repository of audit tools for health services to use. Coordinate a focused audit on PRN, warfarin and variable dose orders on alternate years.

Clinical significance of prescribing and documentation errors

Information on the medicines involved in errors identified during the audit is not collected as part of the NIMC audit and the clinical significance of errors is unknown. For example:

- the clinical implications of discrepancies between the prescribed frequency and documented administration times resulting in under or over dosing (e.g. q4h documented as four times a day)
- incorrect intermittent dosing instructions (methotrexate ordered once weekly but given daily as boxes in administration section of chart not crossed out).

This data could be collected and analysed at a local level to assess the quality of prescribing and documentation and potential patient harm.

Actions	
Possible actions by health service organisations	Conduct clinical audits/medication safety audits on NIMC prescribing and documentation to determine clinical significance of errors and potential harm. Consider using medical students to complete the audits. Involve junior medical officers in the process through medical educators. **NSQHS Standard 4 Item 4.5**

Frequency of national audit

Conducting a full NIMC audit requires a major commitment of clinician time. It is recognised that hospitals have limited resources to conduct activities such as medication chart audits and that the task effort should be commensurate with the benefit derived.

To reduce the resource intensity, but ensure an appropriate level of quality assurance, complete national audits will be conducted biennially. The next national audit will be held during August and September 2014.

In alternate years, health service organisations will be encouraged to conduct focused (part) audits to:

- measure improvements resulting from interventions undertaken
- concentrate on specific areas of higher risk, low performance identified in the previous year's audit.

These audits could be organised at local or state, territory and hospital group level.

Actions	
Possible actions by health service organisations	Conduct full NIMC audit biennially (2014, 2016) Conduct focused audits in alternate years. **NSQHS Standard 4 Item 4.2 and 4.5**
Possible actions by state and territory health departments, private hospital groups	Provide support materials for focused audits in alternate years.
Possible actions by the Australian Commission on Safety and Quality in Health Care	Coordinate the national NIMC audit biennially (2014, 2016) Provide support materials for focused audits in alternate years. Improve reporting function of the audit system including generation of reports at ward/unit level.

Appendix

1. Resources for quality improvement of NIMC use

Australian Commission on Safety and Quality in Health Care
NIMC support materials
www.safetyandquality.gov.au/our-work/medication-safety/medication-chart/support-material/

NSW Therapeutic Advisory Group
Indicators for Quality Use of Medicines in Australian Hospitals
www.ciap.health.nsw.gov.au/nswtag/documents/publications/QUMIndicators/Manual0408.pdf

NPS MedicineWise
National Inpatient Medication Chart 2014 on-line training module
http://learn.nps.org.au/

Medication Safety Course 2014 on-line training module
http://learn.nps.org.au/

Department of Health South Australia
Preventing Adverse Drug Events Guideline
www.sahealth.sa.gov.au/wps/wcm/connect/1b5e2000408f6d68b39fbbe034676b7b/Guideline_Preventing_Adverse_Drug_Events_Jul2013.pdf?MOD=AJPERES&CACHEID=1b5e2000408f6d68b39fbbe034676b7b

Spell it out. Standardised terminology, abbreviations and symbols to be used when communicating about medicines
http://authoring.sahealth.sa.gov.au/wps/wcm/connect/dd45b8804390a6f58bc3dfbc736a4e18/Spell+it+out+Guidelines+2011.pdf?MOD=AJPERES&CACHEID=dd45b8804390a6f58bc3dfbc736a4e18

Victorian Therapeutic Advisory Group
Allergy and adverse drug reaction notice
www.victag.org.au/?cat=23

2. Resources for reducing incidence of omitted doses

Australian Commission on Safety and Quality in Health Care
Evidence briefings on interventions to reduce medication administration errors and improve efficiency.

Electronic medication administration records

www.safetyandquality.gov.au/publications/evidence-briefings-on-interventions-to-improve-medication-safety-electronic-medication-administration-records/

Reducing interruptions during medication preparation and administration

www.safetyandquality.gov.au/publications/evidence-briefings-on-interventions-to-improve-medication-safety-reducing-interruptions-during-medication-preparation-and-administration/

Automated dispensing systems

www.safetyandquality.gov.au/publications/evidence-briefings-on-interventions-to-improve-medication-safety-automated-dispensing-systems/

Barcode medication administration systems

www.safetyandquality.gov.au/publications/evidence-briefings-on-interventions-to-improve-medication-safety-bar-code-medicatiomedication-administration-systems/

NSW Health
Implementation toolkit: Standard Key Principles for Clinical Handover: Patient safety handover checklists that include medicines (p23, 27)
www.archi.net.au/documents/resources/qs/clinical/clinical-handover/implementation-toolkit.pdf

National Health Service, United Kingdom
Reducing harm from omitted or delayed medicines in hospital
Rapid response report
Supporting information
www.nrls.npsa.nhs.uk/alerts/?entryid45=66720