

PBS Hospital Medication Chart (PBS HMC) Project:

Development, trial and evaluation of the PBS HMC in public and private hospitals:

Phase 1 summary evaluation report



June 2016

Introduction

The Australian Commission on Safety and Quality in Health Care (the Commission) and the Australian Government have identified improving the safety and quality of medication usage in Australia as a key priority. Reducing error and harm from medicines through safe and quality use is an important element of the Commission's work, and contributes to it achieving its objective of leading and coordinating national safety and quality improvements in health care through the National Safety and Quality Health Service (NSQHS) Standards.

There is a risk of harm associated with the use of medicines, which are Australia's most prevalent form of health therapy. An error in the delivery of medicines, such as the wrong medicines being prescribed or used, or the right medicines being used inappropriately, can lead to patients being harmed. Between 2%-5% of Australian medication charts contain prescribing errors and administration errors in prescribing occur at a rate of between 5% and 18%.¹

Standardisation of hospital medication charts is an important strategy for reducing adverse medicine events in acute care². In April 2004, Australian Health Ministers agreed that all public hospitals should use a common medication chart to support standardisation and medication safety. The Commission was appointed to develop and implement the National Inpatient Medication Chart (NIMC), which has reduced the incidence of prescribing errors in the medication management cycle in Australia.³

In 2012 the Commission was engaged by the Australian Government Department of Health (the Department) to develop a national standard chart for use in residential aged care facilities. The National Residential Medication Chart (NRMC) was intended to meet the specific requirements of this clinical setting, and to enable medication ordering, supply, administration and Pharmaceutical Benefits Scheme (PBS) claiming in a single form. The chart was developed to improve safety through the inclusion of standard fields, layout and intuitive design. Implementation of the NRMC resulted in considerable improvements in safety and quality for residents in aged care facilities. The NRMC reduced the administrative burden on pharmacists and clinicians, and improved efficiencies by allowing PBS claiming through the single form, removing the need to issue a separate prescription.

A review of chemotherapy funding arrangements in 2013 highlighted the administrative burden related to medication charting, prescribing and claiming in the hospital setting. Following this, the Australian Government proposed the simplification of a number of administrative processes to reduce the administrative burden faced by prescribers, pharmacists and hospitals when prescribing, dispensing and claiming for PBS medicines.

The Department established the PBS Hospital Medication Chart (HMC) project to enable prescribing, supply and claiming from a standardised medication chart in the hospital setting. The Commission was appointed by the Department to develop the PBS HMC for use in public and private hospitals and to trial and test the safety and effectiveness of the new chart.

For the PBS HMC to be considered suitable for national implementation, the trial had to demonstrate improvement in workflow efficiency, a financial advantage, and no negative impact on the safe management and supply of medication. This report outlines how this has been achieved.

The Commission's trial and evaluation project demonstrated that the safety performance of the PBS HMC compares favourably with the medication charts in use at the trial sites. No medication incidents were associated with the PBS HMC, and there was a reduction in medication transcription errors.

1 Roughead E SS, Rosenfeld E. Literature Review: Medication Safety in Australia 2013. 2014.

2 Australian Council for Safety and Quality in Health Care. Second National Report on Patient Safety – Improving Medication safety. Canberra: Australian Council for Safety and Quality in Healthcare, 2002.

3 Coombes I, Reid C, McDougall D, et al. Pilot of a National Inpatient Medication chart in Australia: Improving prescribing Safety and Enabling Prescribing Training. Br J Clin Pharmacol 2011; 72(2): 338–349

Clinicians assessed the PBS HMC design and usability positively. The qualitative assessment showed that:

- Prescribers appreciated not having to transcribe medication orders, particularly discharge medications, onto a separate paper prescription.
- Nurses appreciated being able to identify the prescribing doctor by the identification at the front of the chart.
- Nurses appreciated only needing to write patient names in one place.
- Pharmacists reported that it was easier to dispense prescriptions for pharmacy. This process was also quicker for nurses as the discharge section had already been completed.
- Pharmacists reported improvements in the pharmacy workflow. Dispensing and document storage were streamlined.
- Pharmacists and medical practitioners appreciated the reduction in the number of prescriptions to be completed, and in the associated paperwork, freeing them up for clinical work.
- Pharmacists reported that the chart saved them time on the 'owing' prescriptions and in particular for streamlined authorities. The time required to follow up with doctors on 'owing' prescriptions was greatly reduced.⁴
- The chart's authority feature allowed doctors to obtain phone authorities straight away, and pharmacists to supply the medication to patients quicker than before.

The chart remains in use at seven of the hospitals that trialled the PBS HMC.

To support the project, the Australian Government and Australian states and territories ensured legislation was in place to facilitate the use of the PBS HMC for prescribing, supply and claiming of eligible PBS and Repatriation Pharmaceutical Benefit Scheme (RPBS) medicines directly from the PBS HMC.

This report summarises the process, outcomes and recommendations resulting from the development and trial (Phase 1) of the PBS HMC in public and private hospitals. It includes recommendations for the wider implementation of the chart in private and public hospitals

⁴ An 'owing prescription' is a prescription not yet received by a pharmacy, although the prescribed medicine has been ordered via a valid process (verbal or other valid process) and has been supplied in anticipation of receipt of the prescription.

The trial and evaluation process

The PBS HMC project builds on the Commission's work in standardising medication information in Australian health care. It drew on the Commission's expertise in developing standardised medication safety and quality resources, including medication charts, and support materials.

The PBS HMC project includes two phases:

- **Phase one** – development, trial, and scientific testing of a standardised, evidence-based, medication chart. The PBS HMC was based on the NIMC. It was trialled in one public and nine private hospitals, and refined through heuristic analysis.
- **Phase two** – development of guidelines and support materials for software vendors to enable the prescribing, administration and claiming of PBS and RPBS medicines electronically without a separate paper prescription.

Benefits of the PBS HMC

The PBS HMC is a national, standardised medication chart, which enables the prescribing, administering, supply and claiming of eligible PBS and non-PBS medicines without the need to issue a separate prescription. The new chart aims to:

- reduce the regulatory and administrative burden for health professionals
- improve efficiency in hospital settings
- improve medication safety by reducing medication transcription errors
- improve the quality use of medicines.

Other intended benefits of the PBS HMC include:

- improved safety of PBS medicines prescribed, dispensed and administered to patients in acute care settings
- streamlined processes for PBS prescribing, dispensing and claiming in public and private hospitals
- improved workflows for healthcare providers.

Evaluation methodology

A framework to evaluate the PBS HMC trial was developed by the Commission, in consultation with the Department and endorsed by the project reference group. The evaluation methodology included:

- hospital trials of the PBS HMC
- a 'human factors' evaluation
- feedback from clinicians using the PBS HMC.

The data and lessons learned from the evaluation would inform the final development of the PBS HMC, guidance and support materials. The evaluation also sought to identify any limitations or constraints on use of the chart.

PBS HMC development

Development of the PBS HMC was based on the NIMC and includes additional key elements required for PBS claiming processes. The developed PBS HMC was supported and endorsed by the PBS HMC Reference Group. Before the trial, the chart underwent further modification following technical advice and input from a wide range of stakeholders, with the support and oversight of the PBS HMC Reference Group. Ensuring patient safety has been a guiding principle in developing the PBS HMC.

The new functions of the PBS HMC required the incorporation of new elements into the baseline NIMC. The additional elements decreased font size and reduced the space for handwriting. Thereby potentially creating new risks in using the PBS HMC through increased visual 'clutter'.

Human factors evaluation

A 'human factors' evaluation was conducted by the University of Queensland. Researchers conducted a literature review, and observed clinicians using the chart in the hospital and identified sources of potential error resulting from the modifications to the NIMC ('task analysis'). The team then conducted a detailed assessment of the risk-prone features of the chart identified in the observation phase against hospital prescribing and administration practices ('heuristic analysis'). The evaluation resulted in recommendations for further design modifications and implementation approaches to mitigate potential risks and improve safety and usability of the final chart.

Hospital trial

A trial in hospitals was conducted to assess the PBS HMC suitability for implementation and to secure evidence regarding outcomes for hospitals and clinicians. The trial evaluated:

- the safety and quality of the PBS HMC relative to the NIMC
- its compliance with regulatory requirements for PBS data fields
- financial advantages to the hospital
- workflow utility and efficiencies for hospitals, clinicians and pharmacies.

For the PBS HMC to be considered suitable for national implementation, the trial needed to demonstrate improvement in workflow efficiency and/or a financial advantage, with no negative impact on the safe management and supply of medication.

Hospitals were recruited to the trial through a call for expressions of interest. The trial aimed to recruit a representative sample of both public and private hospitals. Participation in the trial required hospitals to modify their medicines dispensing and claiming software. At the time of recruitment to the trial, this functionality was not available from the major vendors of medicine dispense and claiming software systems used in most public hospitals.

Vendors of dispensing software systems used in private hospitals released the required software features in mid-2015. This enabled the trial to commence on a phased implementation basis in private hospitals. The lack of access to modified dispensing software within the project timeframes resulted in a number of public hospitals withdrawing from the trial.

Nine private and one public hospital met the trial criteria and participated in the trial. The limited representation of public hospitals in the trial, and its implications for uptake of the PBS HMC in public hospitals, are outlined as part of the recommendations section of this report.

Results

Trial implementation of the chart

A 16-week trial of the standardised PBS HMC was conducted in nine private and one public hospital in Western Australia, Queensland, New South Wales and Victoria. The level of implementation of the trial PBS HMC at trial sites varied. Three sites implemented the chart across the whole hospital, and the remaining seven sites trialled the chart in one to three wards. Minor, local changes to the PBS HMC were approved only if they would not impact on the evaluation of the trial.

Trial sites were asked to develop implementation plans to support effective use of the chart. The plans addressed executive support, clinical leadership and appointment of a trial monitor. The Commission developed implementation resources, including:

- a user guide
- fact sheets for clinicians
- an online learning module.

The online learning module was mostly completed by pharmacists. Use of the module varied between trial hospitals, with use generally highest by trial sites that implemented the PBS HMC across the whole hospital. Approximately half of surveyed clinicians completed the module. Two thirds of respondents, including 45% of nurses and 57% of doctors, indicated they had used some of the training resources; 87% of those respondents agreed the resources were valuable.

Uptake and use of the PBS HMC varied across the trial sites. Successful implementation was associated with the chart being trialled in all clinical departments. Implementation was less successful in sites which trialled the chart in select clinical departments. In some cases, this resulted in some clinicians discontinuing the use of the PBS HMC when patients were transferred to non-trial wards.

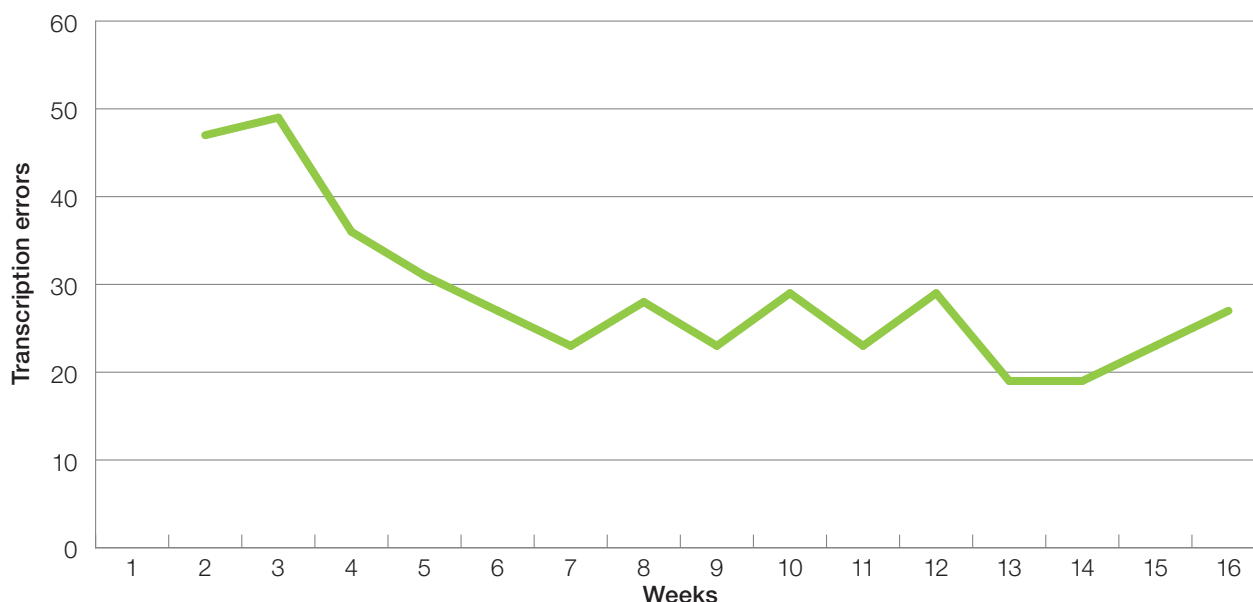
The trial identified a range of factors that were likely to have influenced successful implementation of the PBS HMC. Factors for successful implementation included executive sponsorship and clinical engagement, user training and engagement, implementation planning, and whole-of-hospital implementation. These findings have informed the recommendations for the full implementation of the final PBS HMC.

Medication safety and quality use of the PBS HMC

27,712 prescriptions were dispensed from the PBS HMC during the trial in four states. There were considerable improvements in the safety of PBS medicines prescribed, dispensed and administered to patients in the trial sites. The safety performance of the PBS HMC compared favourably to the medication charts used at the trial sites:

- No medication incidents were associated with the PBS HMC.
- There were reductions in medication transcription errors (Figure 1).
- Feedback from pharmacists also identified a reduction in transcription errors.

Figure 1: Trends in medication transcription errors in ten trial sites



The hospital trial identified some potential human factor risks related to use of the PBS HMC, which were confirmed by feedback from clinicians using the chart. The evaluation also identified opportunities to mitigate these risks through change management strategies, process changes, improved training and improved chart design. Areas identified for modification in the final PBS HMC design to mitigate potential risks included:

- reducing visual clutter
- increasing the prominence of safety-critical information through positioning font size and shading
- improving the grouping of elements on the chart to better support its use,
- increasing space for handwritten information to potentially improve the legibility and prominence of the handwritten information
- enabling more medication orders per chart to reduce the risks and inefficiencies associated with re-charting.

Design strategies to mitigate the risks identified were incorporated into the final PBS HMC. These changes are likely to contribute to greater acceptability of the charts by users. Implementation, guidance and communication materials will be developed by the Commission to support rollout of the final PBS HMC when it is issued for use.

Compliance with regulatory requirements in the PBS data fields

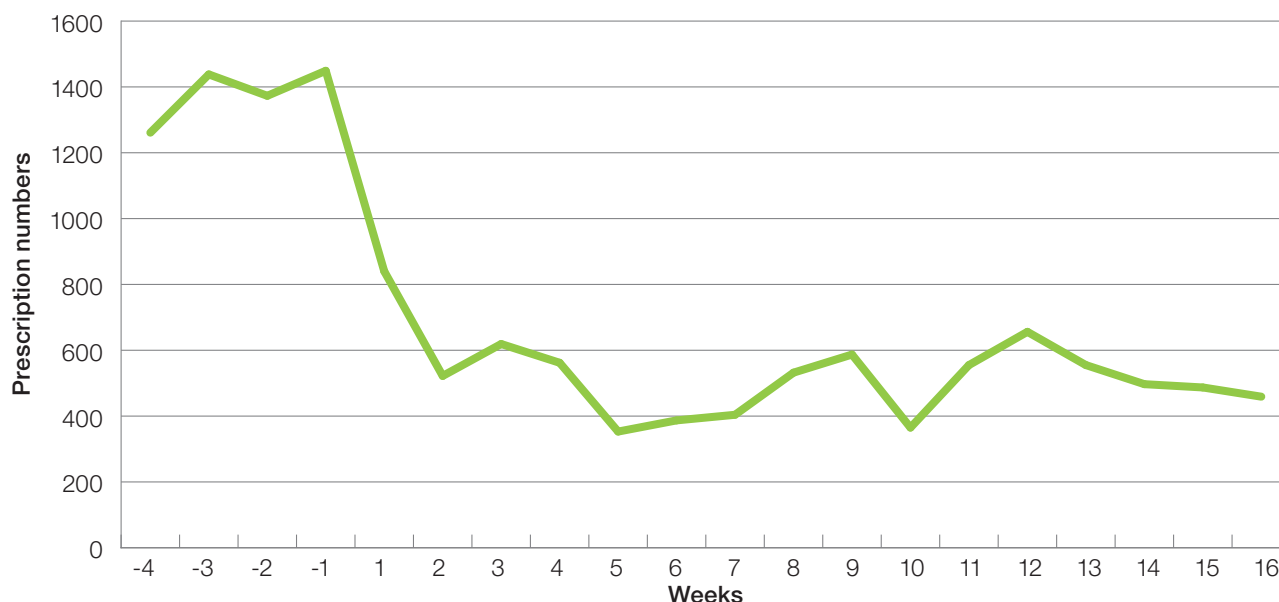
The trial identified that the PBS HMC streamlined the processes of PBS prescribing, dispensing and claiming in public and private hospitals. The trial found that the compliance and efficiency objectives were met, including:

- the PBS HMC is PBS compliant and consistent with current PBS arrangements;
- the PBS HMC facilitates centralised communication regarding medicines during a patient's episode of care; and
- users of the trial PBS HMC commented that changing to the PBS HMC had saved substantial sums of money in terms of owing prescriptions.

Improved work flows of healthcare providers

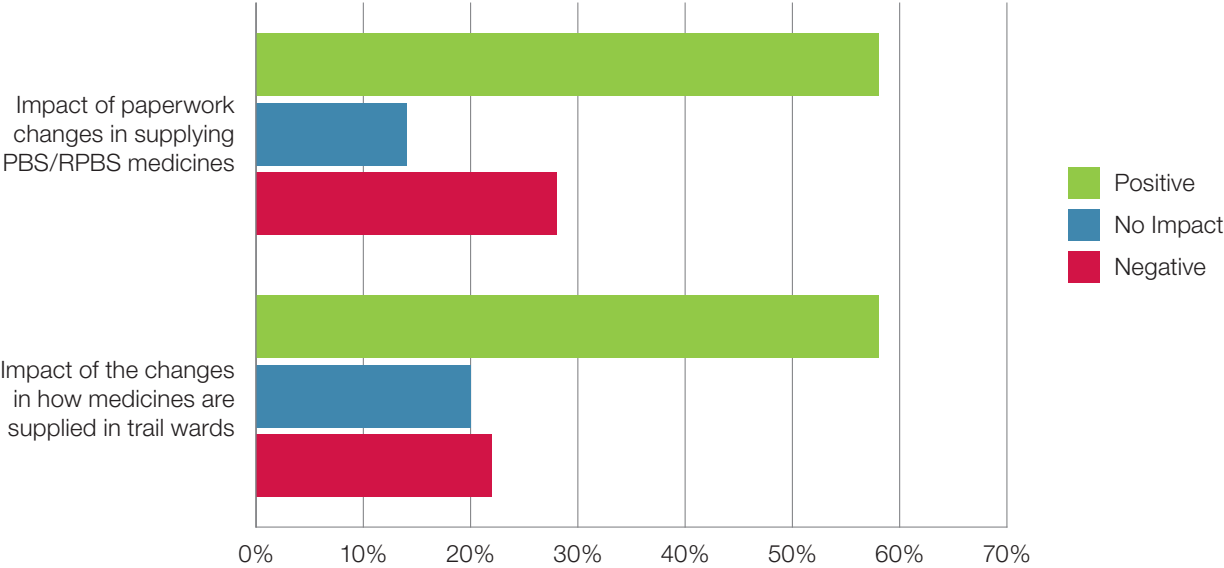
The use of the PBS HMC was found to reduce the administrative burden related to the prescribing, supply, administration, and claiming of PBS and RPBS medications, including reducing the number of 'owing prescriptions'. Figure 2 shows the reduction in owing prescriptions over the course of the trial. Figure 3 shows the positive impact of the chart on the supply of medicines, and on the associated paperwork during the trial.

Figure 2: Trends in owing prescription numbers at ten trial sites



Results

Figure 3: Perceived impact of the PBS HMC on workflows in trial wards



Most users of the chart in the trial (60%) indicated that they would like to continue to use the chart. This included 78% of doctors, 66% of pharmacists and 39% of nurses surveyed. Some users identified a number of issues related to the chart's structure and design, which required modification in the final version of the PBS HMC. A large number of respondents (89%) from the participating public hospital supported continued use of the PBS HMC, as did 53% of respondents from the private hospitals participating in the trial. The chart continues to be used in seven of the ten trial sites.

Conclusions

The PBS HMC project set out to develop, trial and evaluate the PBS HMC in private and public hospitals. The Commission worked closely with the Department; and academic, human factors, jurisdictional, clinical and medication safety stakeholders over two years to develop and test the implementation of the chart.

The hospital trial found the safety performance of the PBS HMC compared favourably to the existing medication charts used at the trial sites. This finding was supported by the chart audits, and the site reports. There were no medication incidents associated with the PBS HMC and a reduction in medication transcription errors.

The supply of PBS eligible medicines in private hospitals and PBS reform public hospitals is burdensome and onerous. The PBS HMC trial and evaluation, including the development of the chart, removed a number of administrative obstacles and facilitated timely supply of PBS medicines. The chart centralises a patient's medicines story in a single document, and assists prescribers to complete timely medicines reviews for discharge.

In the public hospital where the PBS HMC was trialled, the chart removed a number of steps from the discharge process. The chart reduced the risk for errors to occur when prescribers transcribe from the chart to a separate prescription.

Use of the PBS HMC in public hospitals is recommended. However, implementation within the public sector is dependent on modification of the dispensing software systems in public hospitals. Implementation of the chart in public hospitals would need to be closely monitored once software adaptations become available.

In the private hospital setting, the PBS HMC eliminated the need for 'owing' prescriptions, a costly administrative exercise that has no clinical relevance. The PBS HMC also ensured an accurate record of a prescriber's intention was available at all times.

The results of the trial identified the modifications required to mitigate potential risks associated with the development of the PBS HMC. These modifications have been included in the final versions of PBS HMC (Appendix 2). The trial and evaluation also identified the conditions required for the successful implementation of the PBS HMC in public and private hospitals. The findings from the project have informed the final development of the PBS HMC, guidance and implementation support materials.

Recommendations

Based on the outcomes of the evaluation and trial of the PBS HMC:

- The PBS HMC is recommended for use in private hospitals.
- The PBS HMC is suitable for use in public hospitals on completion of their dispensing software upgrades. Jurisdictions considering implementation of the PBS HMC should:
 - confirm the expected benefits of implementation against local workflows and requirements in lead sites
 - establish a plan to monitor the performance of the PBS HMC as part of the organisation's clinical governance processes.
- The endorsed charts should be issued as a suite of nationally standard medication charts that present information consistently between healthcare professionals. Local variations to the design of the PBS HMC should be minimal.
- Hospitals should support effective local implementation of the PBS HMC by:
 - undertaking a risk assessment of the new chart and associated workflow changes
 - using the PBS HMC implementation material developed by the Commission for their communication and training.
- The Commission and the Department should develop a stewardship and governance program to support the national implementation of the PBS HMC.
- An evaluation of the PBS HMC and national implementation should be conducted eighteen months after the PBS HMC has been authorised, to assess the ongoing safety performance and utility of the chart.

Appendix

The PBS HMC Reference Group, providing oversight to the project, consisted of⁵:

Mr Steve Morris (Chair)

Executive Director and Pharmacist,
South Australia Pharmacy

Ms Rowena Sierant

Director, Electronic Medication Management Section,
Pharmaceutical Policy Branch, Pharmaceutical
Benefits Division, Department of Health

Ms Judith Mackson

Chief Pharmacist and Associate Director,
NSW Ministry of Health

Ms Naomi Burgess

Director, Medicines and Technology Policy and
Programs, Department of Health, South Australia

Mr Vincent O' Sullivan

National Secretariat, Pharmacy Guild of Australia

Ms Belinda Johnston

Representative, Society of Hospital Pharmacists
of Australia

Ms Jae Yeo

A/g Director, Budget Projects Section, Pharmaceutical
Benefits Branch, Health Programmes Division,
Department of Human Services

Mr Adam Johnston

Consumer Health Forum representative

Mr John Jackson

Director, Pharmacy Practice Unit, EPIC Pharmacy

Ms Sussan Pleunik

Australian College of Nursing, Lecturer in Nursing,
La Trobe University

Dr Shane Jackson

Community pharmacist, Tasmania

Dr Kate Kearney

Medical Officer, Blacktown and Mount Druitt Hospitals

The Australian Government Department of Health

The Australian Government Department of
Human Services.

Participating hospitals

The following hospitals participated in the trial of the PBS HMC:

North Shore Private Hospital, Sydney	Private
St John of God Hospital, Bunbury	Private
The Wesley Hospital, Brisbane	Private
St Andrew's War Memorial Hospital, Brisbane	Private
St Vincent's Private Hospital, Brisbane	Private
St John of God Hospital, Bendigo	Private
John Fawcner Private Hospital	Private
Hollywood Private Hospital, Perth	Private
Joondalup Health Campus, Perth	Private
Peter MacCallum Cancer Centre, Melbourne	Public

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5 Australian Commission on Safety and Quality in Health Care PBS HMC Reference Group Terms of Reference
<http://www.safetyandquality.gov.au/wp-content/uploads/2015/03/PBS-Hospital-Medication-Chart-Reference-Group-Terms-of-Reference-December-2014.pdf>



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