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The Pharmacy Guild of Australia

5th Community Pharmacy Agreement

HMR – Refining Patient Eligibility Criteria

Researchers: *Healthcare Management Advisors*

Research & Development

FULL FINAL REPORT

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Acronyms

AACP	The Australian Association of Consultant Pharmacy
AMA	Australian Medical Association
AMS	Aboriginal Medical Service
CALD	Culturally and linguistically diverse
CDM	Chronic Disease Management
CIA	Chronic Illness Alliance
COPD	Chronic obstructive pulmonary disease
DMMR	Domiciliary Medication Management Review
DoH	Department of Health
DoHA	Department of Health and Ageing
DHS	Department of Human Services
5CPA	Fifth Community Pharmacy Agreement
GP	General Practitioner
The Guild	The Pharmacy Guild of Australia
HMA	Healthcare Management Advisors
HMR	Home Medicines Review
MBS	Medicare Benefits Schedule
N/A	Not applicable
NSAIDS	Non-steroidal anti-inflammatory drugs
OTC	Over the counter
PhARIA	Pharmacy Accessibility Remoteness Index of Australia
PBS	Pharmaceutical Benefits Scheme
PMS	Patient Management Software
QUM	Quality use of medicines
RACGP	The Royal Australian College of General Practitioners
RFT	Request for Tender
PSA	Pharmaceutical Society of Australia
SEIFA	Socio-Economic Index for Areas
SHPA	The Society of Hospital Pharmacists of Australia

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Abstract

The project was initiated to collate and assess evidence of the benefit of HMRs to different cohorts of patients. This was to inform recommendations detailing appropriately targeted criteria for HMR patient eligibility.

The project sought information on the relative need for HMR services from a range of sources including the literature, stakeholders in peak bodies, clinicians 'on the ground' and HMR Programme operational data. With one exception, these information sources provided no guidance on relative need for HMR services for different cohorts of patient.

The only data source that provided useful insights on relative need was the national survey of GPs and pharmacists conducted for the project.

The project team examined options for revising criteria affecting eligibility for a HMR. In the absence of a strong evidence base, the preferred approach was developed through a 'brainstorming process' using the HMA team's expert associates, with additional input from the Advisory Panel. The option proposes the refinement of eligibility criteria by requiring the referring GP to identify patients in need of a HMR using summary categories of need. This has superior characteristics compared to the other options by providing: a clear definition of who is entitled; focuses scarce HMR resources on the high need groups with these characteristics; provides guidance to clinicians on who is eligible; avoids overlaps in definitional categories; enables are more structured referral, potentially supporting a more focussed review and report; and is administratively simple, because clinicians only have to assess two classes of need characteristics.

The project recommends implementation of this option after further consultation with relevant stakeholders.

Key Findings

The project was initiated to collate and assess evidence of the benefit of HMRs to different cohorts of patients in order to draft a set of recommendations detailing appropriately targeted criteria for HMR patient eligibility.

At present there are two sources that specify criteria affecting eligibility for a HMR: the Medical Benefits Schedule (MBS) definition for Item 900, *Domiciliary Medication Management Review*; and the *Programme Specific Guidelines Home Medicines Review*.

The project sought information on the relative need for HMR services from a range of sources including the literature, stakeholders in peak bodies, clinicians 'on the ground' and HMR Programme operational data. With one exception, these information sources provided no guidance on relative need for HMR services for different cohorts of patient.

The only data source that provided useful insights on relative need was the national survey of GPs and pharmacists conducted for the project.

The project team examined three options for revising criteria affecting eligibility for a HMR. Two of the options were based on findings from the national survey conducted for the project: ***option 1 - incremental change to existing referral parameters***; and ***option 2 – a weighting system to identify patients most likely to benefit from a HMR***. The analysis showed significant limitations with these approaches. Options 1 still relies on a list of single factor reasons for referral. Option 2 would be complex to administer.

Option 3 -need categorisation was developed through a brainstorming process involving expert associates and advice from the Advisory Panel. It built on experience from other programmes including chronic disease management and team care coordination, and design principles for health programme development. Option 3 proposes the refinement of eligibility criteria by requiring the referring GP to identify patients in need of a HMR using summary categories of need. The proposed eligibility criteria under this approach are:

- people with chronic disease and/or complex management problems
- *plus one or more* of the following: instability of health status and/or medicines therapy, using a high risk medicine(s), have likelihood of compromised adherence, new therapeutic goals, potentially incomplete understanding of patient's pattern of medicine use by health professionals, or failure to respond to treatment in the way expected.

Option 3 has superior characteristics compared to the other options by: providing a clear definition of who is entitled; focuses scarce HMR resources on the high need groups with these characteristics; providing guidance to clinicians on who is eligible; avoids overlaps in definitional categories; enables a more structured referral, potentially supporting a more focussed review and report, and is administratively simple, because clinicians only have to assess two classes of need characteristics.

The project recommends that ***option 3 – needs categorisation*** is implemented after further consultation with relevant stakeholders.

Executive Summary

Context

The Home Medicines Review (HMR) Programme aims to enhance the quality use of medicines and reduce adverse medicines events. This is undertaken through a comprehensive medication review conducted by an accredited pharmacist in the patient's home.

The HMR programme was introduced in October 2001. Demand for HMRs was low in the initial years after introduction of the programme. Data on the number of HMR services claimed since the commencement of 5CPA highlights significant growth in demand has occurred over the life of the agreement. In 2010-11 there were 63,088 HMR services claimed. By 2012-13 this had grown to 115,892, an increase of 83.7% from 2010-11 levels.

In March 2013 the then Minister for Health, the Hon Tanya Plibersek, MP., announced that research would be undertaken to make sure the targeting of the HMR Programme was appropriate. This resulted in a request for tender (RFT) that initiated this project. The terms of reference for the project were to:

> *"…collate and assess evidence of the benefit of HMRs to different cohorts of patients in order to draft a set of recommendations detailing appropriately targeted criteria for HMR patient eligibility. In order to achieve this…*
>
> *• Undertake a systematic review of both Australian and international literature (including grey literature) to ….Identify alternatively-named models of complex medication management services and document their referral and eligibility parameters….document the characteristics of patients who are demonstrated to have benefited most from a HMR or equivalent model, and identify and document the characteristics of the most cost-effective HMR or equivalent model.*
>
> *• Analyse available HMR data and learnings from each HMR referral pathway…*
>
> *• Map learnings and findings from the above steps …..*
>
> *Based on the findings of the systematic review and analysis of data, develop options for an appropriately targeted approach to HMR patient eligibility.*

At present there are two sources that specify criteria affecting eligibility for a HMR: the Medical Benefits Schedule (MBS) definition for Item 900, *Domiciliary Medication Management Review*; and the *Programme Specific Guidelines Home Medicines Review*. An examination of their contents identified six problems with how these criteria operate:

- The *'at risk factors'/'reasons for requesting an additional review'*, despite the implication in the source documents, do not operate as eligibility criteria.
- The current factors labelled as 'eligibility criteria' do not assist in managing demand
- The current factors lack nuance in identifying underlying need for a HMR for a specific individual
- Clinicians are not encouraged to assess the causal factors underlying an individual's need because the *'at risk factors'/'reasons for requesting an additional review'* are so broad
- Many of the *'risk factors'/'reasons for a review request'* are not explicitly defined or are ambiguous, and
- There is a lack of alignment between the MBS definition and the *Programme Specific Guidelines*.

Based on these observations it was concluded that the current criteria affecting eligibility for a HMR are problematic. At a minimum they are confusing. At worst their combined effect contributes to ineffective targeting of scarce programme resources.

Project method

The project methodology was guided by a *needs assessment* framework. This sought to collect information on relative benefits from a HMR for different patient cohorts using a range of information sources - the literature, consumers, peak bodies, clinicians 'on the ground' and HMR Programme operational data.

Findings: evidence on relative need for HMRs

The data collection processes for the project were extensive. A summary of the assessed value of each information source in informing HMR eligibility criteria development / relative needs of different patient cohorts for a HMR is presented in Table ES.1.

Table ES.1: Value of data collection processes to inform assessment of relative need for a HMR

Need Dimension	Project Data Source	Value in Informing Criteria Development / Relative Needs of Different Patient Cohorts for a HMR
Epidemiological need	Peer reviewed and grey literature	Nil
Felt need	Consumer focus groups	Nil
Normative need	Industry peak bodies	Nil
	Consumer peak bodies	Nil
	Local level consultations with clinicians (GPs, pharmacists and hospital physicians)	Limited – used to inform design of the national survey
	National survey: GPs and pharmacists	Moderate – useful in the absence of information from other sources
Expressed and comparative need	HMR Programme administrative data	Nil

Options for eligibility refinement

The project team examined three options for revising criteria affecting eligibility for a HMR. Two of the options were based on findings from the national survey conducted for the project: ***Option 1 - incremental change to existing referral parameters***; and ***Option 2 – a weighting system to identify patients most likely to benefit from a HMR***.

Option 3 -need categorisation was developed through a brainstorming process involving expert associates and advice from the Advisory Panel. It built on experience from other programmes including chronic disease management and team care coordination, and design principles for health programme development. It proposes the refinement of eligibility criteria by requiring the referring GP to identify patients in need of a HMR using summary categories of need. The proposed eligibility criteria under this approach are:

- people with chronic disease and/or complex management problems
- *plus one or more* of the following: instability of health status and/or medicines therapy, using a high risk medicine(s), have likelihood of compromised adherence, new therapeutic goals, potentially incomplete understanding of patient's pattern of medicine use by health professionals, or failure to respond to treatment in the way expected.

The options were compared against a series of design principles for HMR eligibility criteria developed by the project. The comparative analysis is presented in Table ES.2.

Table ES.2: Analysis of the options against the assessment criteria

	Comparison of the options		
Principles	**Option #1**	**Option #2**	**Option #3**
(criteria for assessment)	***Incremental change***	***Weighting system***	***Need categorisation***
Clearly defines entitlement	1	1	2
Assists in targeting to those most in need	1	1	2
Clinician assisted to classify underlying need	0	1	2
Specific / avoids ambiguity	0	0	2
Administratively simple	0	-1	2
Total Score	**2**	**2**	**10**

Legend: the following scoring system was applied: Fully complies with the principle=2; partially complies with the principle=1; no significant change from current arrangements=0; worse compared to current arrangements=-1.

The analysis highlights significant limitations associated with options 1 and 2:

(1) Compared to current arrangements, Option 1 would better reflect clinician's assessment of need for a HMR but is not fundamentally different in the approach to eligibility specification. It still relies on a list of single factor reasons for referral.

(2) Option 2 would change the approach to assessment by the clinician, because of the weighted scoring requirement. However, it would be complex to administer because the GP would have to select the relevant conditions for a patient from an extensive list of risk factors.

The analysis shows that Option 3 has superior characteristics. Key features include:

- a clear definition of who is entitled
- focusing scarce HMR resources on the high need groups with these characteristics
- provides guidance to clinicians on who is eligible
- enables a more structured referral, potentially supporting a more focussed review and report
- avoidance of overlaps in definitional categories, and
- administrative simplicity, because clinicians only have to assess two classes of need characteristics.

Conclusion

The project recommends that *Option 3 – needs categorisation* is implemented after further consultation with relevant stakeholders.

Recommendation: the introduction of refined patient eligibility criteria based on need categorisation should be explored. Under this approach a patient will be identified as needing a HMR service if they meet two conditions:

- ***the patient is 'at risk' of medication misadventure*** **because they have:**

  1A Chronic disease and/or

  1B Complex management requirements

- ***plus the patient has one of more of the following***

  2 Instability of health status and/or medicines therapy

  3 Using a high risk medicine(s)

  4 Likelihood of compromised adherence

  5 New therapeutic goals

  6 Potentially incomplete understanding of patient's pattern of medicine use by health professionals

  7 Failure to respond to treatment in the way expected

Further issues that require examination before revised eligibility criteria can be implemented are identified. These include: refinement of definitions around inclusion and exclusion criteria, linkages between MBS definitions and the *Programme Specific Guidelines*, enhancing quality assurance, the relationship of HMRs to other medication management services, and assessing the impact of the proposal on demand for HMRs.

Final report

1 Context

Summary of context: the main features of the Home Medicines Review (HMR) Programme are described including its scope, funding and activity levels. The criteria that currently affect eligibility for a HMR are presented, along with a critique of how they apply in practice. The analysis concludes that a different approach is required to specifying HMR eligibility criteria. Principles that should be applied to guide a new approach are specified.

1.1 HMRs: description

The Home Medication Review (HMR) Programme aims to enhance the quality use of medicines and reduce adverse medicines events. This is undertaken through a comprehensive medication review conducted by an accredited pharmacist in the patient's home.

A HMR is only available following a referral from the patient's GP. The programme involves cooperation between the GP, pharmacist, other health professionals and their patient (and, where appropriate, their carer).[1]

The patient may choose to be referred to their usual community pharmacy or an accredited pharmacist who meets the patient's needs.

A Hospital Referral Pathway has been developed under the existing HMR programme. This pathway is aimed at those patients deemed most at risk of medication misadventure within ten days of discharge from hospital. This additional pathway aims to reduce the incidence of medicine misadventure and hence readmission post-discharge as well as improve continuity of care between the hospital and community sector. The pathway will provide an opportunity for patients in urgent need to be referred for a HMR where timely referral for a HMR service from their GP is not possible. There will be a phased implementation of this pathway, with experiences gained and data collected to inform a potential national rollout at a later stage.[2]

Direct referral and hospital initiated referral were both recommendations of the Campbell report.[3]

The objectives of a HMR are to:

- Achieve safe, effective, and appropriate use of medicines by detecting and addressing medicine-related problems that interfere with desired patient outcomes
- Improve the patient's quality of life and health outcomes using a best practice approach, that involves cooperation between the general practitioner, pharmacist, other relevant health professionals and the patient (and where appropriate, their carer)
- Improve the patient's, and health professional's knowledge and understanding about medicines
- Facilitate cooperative working relationships between members of the health care team in the interests of patient health and wellbeing, and
- Provide medication information to the patient and other health care providers involved in the patient's care.[4]

The HMR Programme is funded under the Fifth Community Pharmacy Agreement (5CPA). Indicative funding of up to $52.1 million is allocated to the HMR Programme across five years.[5]

Demand for HMRs was low in the initial years after introduction of the programme in October 2001. Data on the number of HMR services claimed since commencement of the 5CPA shows significant growth in demand. In 2010-11 there were 63,088 HMR services claimed. By 2012-13 this had grown to 115,892, an increase of 83.7% from 2010-11 levels (see Appendix A for details of HMR claims over the first four years of the 5CPA, by jurisdiction).

In March 2013 the then Minister for Health, the Hon. Tanya Plibersek, MP, announced that research would be undertaken to make sure the targeting of the programme was appropriate, resulting in the request for tender (RFT) that initiated this project.

1.2 Project scope

The RFT specified that the following tasks were to be undertaken:

> *"collate and assess evidence of the benefit of HMRs to different cohorts of patients in order to draft a set of recommendations detailing appropriately targeted criteria for HMR patient eligibility.*
>
> *In order to achieve the above, it is expected the successful provider would:*
>
> *• Undertake a systematic review of both Australian and international literature (including grey literature) to:*
>
> *- identify alternatively-named models of complex medication management services that meet the criteria of HMR (e.g. Medication Review Service, Pharmacist-led Medication Review, etc.) and document their referral and eligibility parameters;*
>
> *- identify and document the characteristics of patients who are demonstrated to have benefited most from a HMR or equivalent model, and*
>
> *- identify and document the characteristics of the most cost-effective HMR or equivalent model;*
>
> *• Analyse available HMR data and learnings from each HMR referral pathway, including but not limited to the phased implementation of the hospital initiated referral pathway;*
>
> *• Map learnings and findings from the above steps against current referral and eligibility parameters for the HMR Programme, and identify areas where further refinement is warranted; and*
>
> *• Based on the findings of the systematic review and analysis of data, develop options for an appropriately targeted approach to HMR patient eligibility.*

1.3 Current eligibility criteria and critique

At present there are two sources that specify criteria affecting eligibility for a HMR: the Medicare Benefits Schedule (MBS) definition for Item 900, *Domiciliary Medication Management Review*; and the *Programme Specific Guidelines Home Medicines Review*. The main features of these sources relating to patient eligibility are:

(1) ***MBS Item 900 Domiciliary Medication Management Review****:*

(a) *Patient eligibility*: "the item is available to people living in the community who meet the criteria for a DMMR. The item is not available for in-patients of a hospital, or care recipients in residential aged care facilities."

(b) *Target group:* "patients who are likely to benefit from such a review: patients for whom quality use of medicines may be an issue or; patients who are at risk of medication misadventure because of factors such as their co-morbidities, age or social circumstances, the characteristics of their medicines, the complexity of their medication treatment regimen, or a lack of knowledge and skills to use medicines to their best effect"

(c) *Risk factors known to predispose people to medication related adverse events*: "currently taking five or more regular medications; taking more than 12 doses of medication per day; significant changes made to medication treatment regimen in the last three months….."

(2) ***Programme Specific Guidelines Home Medicines Review****:*

(a) *Patient eligibility*: "The Patient is a current Medicare/DVA cardholder; the Patient is living in a community setting; the Patient is at risk of or experiencing medication misadventure; and the GP confirms that there is an identifiable clinical need and the Patient will benefit from a HMR Service."

(b) *Ineligible patients*: "HMR Services are not available to in-patients of public or private hospitals, day hospital facilities, transition care facilities or to residents of a Government Funded Facility."

(c) *Reasons why an additional review may be requested within 24 months of a previous review*: "Discharge from hospital after an unplanned admission in the previous four weeks; significant change to medication regimen in the past three months; change in medical condition or abilities (including falls, cognition, physical function);……"

The comprehensive wording relating to eligibility in both these sources is given at Appendix B, *Patient eligibility criteria for a HMR – Comparison of Details in* MBS Item 900 and the *Programme Specific Guidelines Homes Medicines Review*.

Examination of this material highlights six problems with the criteria:

(1) **The 'at risk factors'/'reasons for requesting an additional review, despite the implication in the source documents, do not operate as eligibility criteria:** they are not mandatory and therefore only perform an advisory function. In other health programmes the mandatory nature of more effective eligibility criteria require a decision maker to exercise their judgement as to whether a patient should be entitled to a service.

(2) **The current factors labelled as 'eligibility criteria' do not assist in managing demand.** Rather, they simply define who is 'in scope' or 'out of scope' because they apply to an overwhelming majority of the population. For example:

(a) The MBS item specification states:

(i) in scope people are "people living in the community" (a large proportion of the population);

(ii) out of scope people are "in-patients of a hospital" and "care recipients in residential aged care facilities" (a small proportion of the population)."

(b) The *Programme Specific Guidelines* state that in scope people are: "current Medicare/DVA cardholders" – once again, a large proportion of the population.

The eligibility criteria for any non-universal health programme should define the target group. The HMR Programme is a non-universal programme - it has an indicative budget allocation of $52.1 million. It therefore needs to have some mechanism for targeting, otherwise underlying demand for HMRs will always exceed supply capacity (either from a budget or workforce perspective).

Based on this analysis, more appropriate terms for the population groups specified as in scope and out of scope would be 'inclusion criteria' and 'exclusion criteria'.

(3) **The current factors lack nuance in identifying underlying need for a HMR for a specific individual**. They lack nuance because each 'at risk factor'/'reason for requesting an additional review' listed in the definitions above is not sufficient on its own to be causal factor for needing a review. For example the *Programme Specific Guidelines* state that a change in medical condition or abilities (including falls, cognition, and physical function) can be a reason for requesting an additional review. But these are not usually sufficient conditions on their own to justify referral for a HMR; they generally need to exist in tandem with other patient characteristics.

(4) **Clinicians are not encouraged to assess the causal factors underlying an individual's need because the 'at risk factors'/'reasons for requesting an additional review' are so broad.** There was some evidence from the project field work that the breadth of these factors promotes a 'tick and flick' approach to needs assessment, which can be reinforced by decision support software.

(5) **Many of the 'risk factors'/'reasons for a review request' are not explicitly defined or are ambiguous.** This lack of clarity and ambiguity will not assist clinicians in their decision making process. Examples of these problems are:

(a) *Lack of specificity:* both the MBS item definition and *Programme Guidelines* identify a risk factor as 'significant change to medication in the last three months'. But what is 'significant' and why is '3 months' important? Why not 2 months or 4 months…..or some other time period?

(b) *Ambiguity* occurs where multiple casual factors are joined into the one definition. For instance the MBS item specifies the following at risk factors:

(i) "suspected non-compliance or inability to manage medication related device", and

(ii) "patients having difficulty managing their own medicines because of literacy or language difficulties, [or] dexterity problems or impaired sight, [or] confusion/dementia/ or other cognitive difficulties"

(6) **There is a lack of alignment between the MBS definition and the *Programme Specific Guidelines*:** for instance:

(a) The *Programme Specific Guidelines* refer to a mandatory criterion as being "at risk of or experiencing medication misadventure."

(b) The MBS Item definition does not refer to this criterion as mandatory but elaborates with examples of patients being at risk of misadventure because of "their co-morbidities, age or social circumstances, the characteristics of their medicines, the complexity of their medication treatment regimen, or a lack of knowledge and skills to use medicines to their best effect."

1.4 Principles for effective eligibility criteria

Based on these observations it was concluded that the current criteria affecting eligibility for a HMR are problematic. At a minimum they are confusing. At worst their combined effect contributes to ineffective targeting of scarce programme resources.

The problems identified above can guide the approach that should be taken to developing more effective patient eligibility criteria for the HMR Programme, as shown in Table 1.1.

Table 1.1: Developing Principles for Effective HMR Eligibility Criteria

Problem with existing approach (referred to as 'at risk factors'/'reasons for requesting an additional review'/'eligibility criteria' – depending on the source document)	**Derived Principle for Effective HMR Eligibility Criteria (in response to the identified problem)**
• Do not operate as eligibility criteria – they are advisory, not mandatory	• Clearly define who is entitled to receive a service
• Do not assist management of demand – most of the Australian population is within scope	• Assist in targeting the programme to those most in need or those most likely to benefit
• Lack nuance in assessing the specific needs of an individual patient	• Assist clinicians to appropriately classify the nature of underlying patient need for a HMR service, whilst not inappropriately restricting access
• Clinicians are not encouraged to assess the causal factors underlying need because the 'at risk factors'/'reasons for requesting an additional review' are so broad	
• Individual factors are not explicitly defined or are ambiguous.	• Be specific and avoid ambiguity
• Two sources of information on eligibility which sometimes contain different application of criteria and overlapping / different terms	• Be administratively simple to interpret and apply.

Based on this analysis, effective criteria to determine eligibility for a HMR should therefore:

- Clearly define who is entitled to receive a service
- Assist in targeting the programme to those most in need or those most likely to benefit
- Assist clinicians to appropriately classify the nature of underlying patient need for a HMR service, whilst not inappropriately restricting access
- Be specific and avoid ambiguity, and
- Be administratively simple to interpret and apply.

Application of these criteria should also enhance capacity to evaluate the HMR programme and develop quality assurance activities.

2 Project method

Summary of approach: the project methodology was guided by a *needs assessment* framework. This sought to collect information on relative benefits from a HMR for different patient cohorts using a range of information sources - the literature, consumers, stakeholders in peak bodies, clinicians 'on the ground' and HMR Programme operational data. The project commenced in October 2013 and was completed in December 2014.

2.1 Conceptual framework

The project used a *needs assessment* approach to identify the benefits of a HMR service to different cohorts of patients and assess the implications for eligibility criteria. A needs assessment:

> *is the process of identifying and analysing the priority health problems and the nature of the target group for the purpose of planning*[6]

In undertaking a needs analysis there are five types of need that should be considered. These need types and their relationship to HMR services are described below:

(1) **Comparative need:** benchmark or statistical comparisons (e.g. at the Primary Health Network, state or national level) can be used to gain information on:

   (a) Characteristics of people who are receiving a service, and
   (b) Service provision indicators.

(2) **Epidemiological need:** insights into levels of need for a service at a population level can be gained from peer reviewed and grey literature.

(3) **Normative need:** the views of experts and experienced service providers on the desirable 'norm' for service provision through consultations and surveys can be considered.

(4) **Expressed need:** characteristics of demand for a programme can be examined to assess insights on relative demand for a service.

(5) **Felt need:** views and preferences of consumers and carers can be obtained from focus groups.

2.2 Application

This conceptual framework guided the six stage project, which involved:

(1) **Project planning:** a detailed project plan was agreed with the Advisory Panel.

(2) **Situation analysis:** discussions were held with stakeholders to inform the literature search terms and identify issues to be considered in the project. Monash University, one of the project team's associates, then undertook a systematic review of the literature to identify information on *epidemiological need* for HMRs.

(3) **Additional data collection:** the project team undertook Australia-wide consultations with health professionals and peak bodies to collect information on *normative need* for HMRs. In addition, HMA conducted focus groups with consumers and carers to collect information on *felt need* for HMRs.

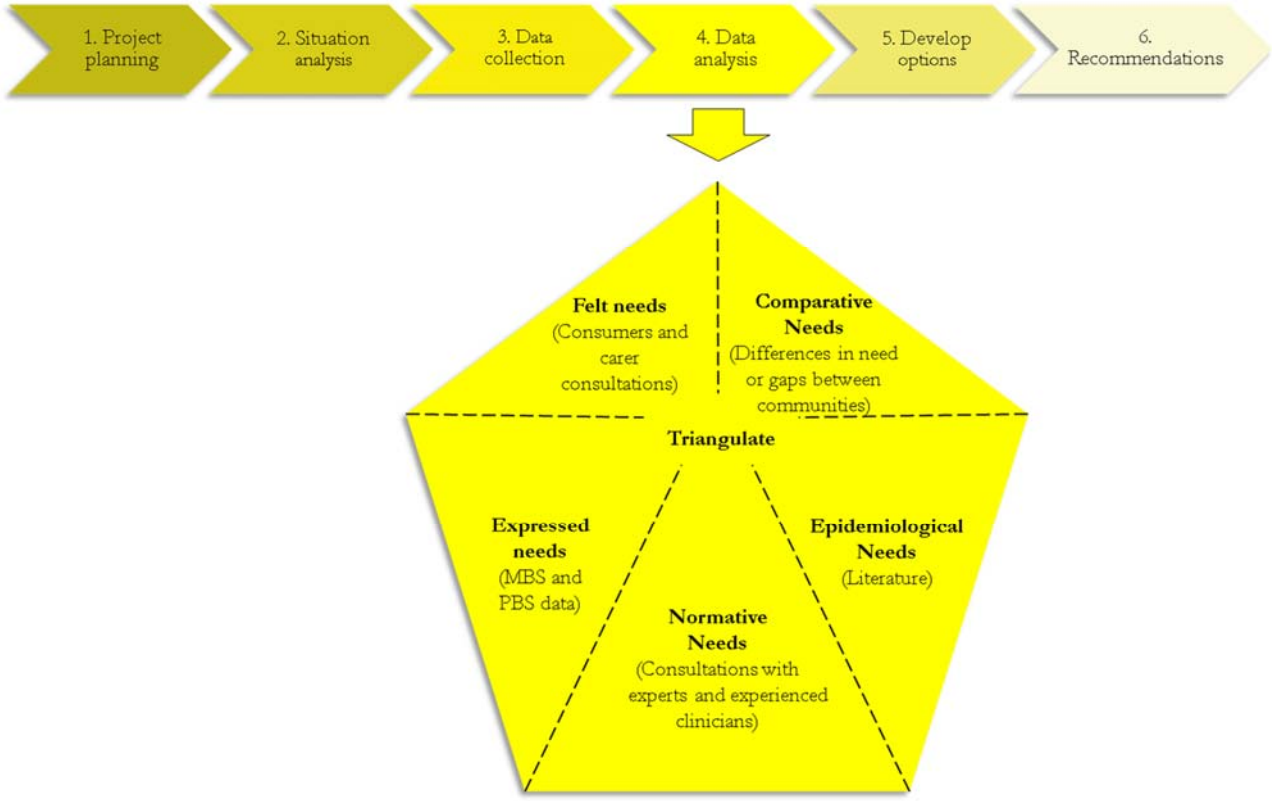
(4) **Data analysis:** HMA examined HMR Programme administrative data to assess if there was information that could inform an assessment of *comparative* and *expressed need* for HMRs.

(5) **Developed options:** Data from the various collection processes was triangulated to identify what conclusions could be drawn about relative needs for HMR services for different patient cohorts. HMA prepared an options paper on different approaches to specifying eligibility criteria for HMR services, based on findings from the data collection and analysis. The options were critiqued at a workshop with Advisory Panel members.

(6) **Recommendations and final report:** HMA prepared a final report summarising the main findings from the project (this document).

The relationship between these different projects stages and the overall needs assessment approach is summarised in Figure 2.1.

Figure 2.1: Methodology for assessing HMR eligibility criteria using a needs assessment approach



The project commenced in October 2013. Ethics committee approval for the project methodology and survey tools was obtained in December 2013. Face to face consultations with consumers, carers, peak bodies and clinicians (GPs, community pharmacists and accredited pharmacists) occurred from January to March 2014. The national survey of GPs, community pharmacists and accredited pharmacists was open for responses from late August 2014 to end September 2014. The project was completed in December 2014.

Further details on the implementation approach and findings from the project activities are presented in Chapter 3.

3 Findings: evidence on relative need for HMRs

Summary of findings: most of the information sources examined in the project - the literature, peak body stakeholders, consumer focus groups and HMR Programme operational data - gave no guidance on relative need for HMR services by different patient cohorts. The only data source that provided useful insights was the project's national survey of GPs and pharmacists.

3.1 Systematic literature review

Approach

Monash University's *Centre for Medicine Use and Safety* in the Faculty of Pharmacy and Pharmaceutical Sciences undertook two systematic reviews of the peer reviewed literature:

(1) The first review examined pharmacist-led medication reviews in community settings and provided an overview and quality assessment of 32 systematic reviews.

(2) The second review examined HMR research in Australia, with a focus on referral and eligibility parameters, and patient groups who have benefitted and costs. This analysis examined and quality assessed 57 original research studies.

Monash University then undertook an additional examination of the 'grey literature' and prepared an evidence synthesis that addressed the specific research questions posed by the Advisory Panel. The evidence synthesis is at Appendix C. The full systematic reviews are available at Appendices D (*Pharmacist-led medication review in community settings: an overview of systematic reviews*) and E (*Systematic review of Home Medicines Review research in Australia*).

Findings

The three specific research questions to be answered by the literature review and the associated findings were:

1. **Identify alternatively-named models of complex medication management services that meet the criteria of HMR (e.g. Medication Review Service, Pharmacist-led Medication Review, etc.) and document their referral and eligibility parameters**

   Findings: the analysis outlined three different types of medication review that exist internationally, comprising: Type 1 (prescription review -least comprehensive); Type 2 (concordance and compliance review); and Type 3 (clinical medication review - most comprehensive). HMRs in Australia are an example of a Type 3 medication review.

   The literature review identified no alternatively-named international models of medication review that were entirely consistent with the current Australian HMR model in terms of referral, eligibility and the health system context. However, it was observed that many international models have eligibility criteria around multiple medication use and multiple chronic diseases. All programmes have core/essential criteria and other listed guidelines for identification of patients. Only medication therapy management in the United States listed high cost medications as a patient eligibility criterion.

   Monash University could find no models that specifically excluded particular patient or disease groups.

   Type 1 and 2 medication reviews were common in the community setting across Europe, with Type 3 comprehensive medications reviews being rare. Nationally agreed procedures for Type 3 medication review programmes are established in Denmark, Finland, the Netherlands and Spain. However, none were evaluated to be equivalent to the Australian HMR programme.

2. **Identify and document the characteristics of patients who are demonstrated to have benefited most from a HMR or equivalent model**

   Findings: Monash University found that there was a range of patient groups that benefit from the conduct of a HMR, including:

   - those at risk of medication misadventure, including older people, those with polypharmacy use, patients with mental health diagnoses, chronic heart failure, diabetes and those taking high-risk medications such as anticoagulants, and
   - older males and younger people with long-term and persistent disease or other serious health problems.

   Qualitative research suggested Indigenous and culturally and linguistically diverse (CALD) populations, and consumers receiving palliative care, with poor medication adherence, recently discharged from hospital, and living in rural and remote areas were under served in terms of receiving HMRs.

   Most importantly, Monash University found the following:

   "We identified no robust research[1] directly comparing the benefits of HMR or equivalent models in different patient groups. We identified a considerable body of evidence on which patient groups benefit from HMR in Australia, but there was no evidence that allowed a clear ranking of which patient groups benefit most…..There was insufficient evidence in the literature to rank which patient groups benefit most from [a] HMR."

3. **Identify and document the characteristics of the most cost-effective HMR or equivalent model**

   Findings: The overview of systematic reviews found that half of the systematic reviews (n=13) described changes in the health care costs and/or medication costs associated with pharmacist-led medication reviews. One-quarter of the original research studies reported significant cost reductions. However, these were not true cost-effectiveness studies, but rather simple cost assessments of the programme. Additionally, Monash University observed that it was important to consider differences in health care systems between regions and countries when interpreting the results.

   Monash University concluded that, based on the available evidence, it was not possible to conclusively document the characteristics of cost-effective HMR or equivalent models.

Implications for refining eligibility criteria

Based on the findings from the Monash University literature review described above the project team concluded that there was no evidence from the peer reviewed literature or the grey literature that could inform assessments of the relative benefit of HMRs for different patient cohorts.

3.2 Consumer consultation findings

Approach

The project team worked with the Chronic Illness Alliance (CIA) to identify consumer and carers with prior experience of HMRs. The recruitment process facilitated by the CIA targeted population groups identified in the literature as likely to benefit from a HMR. The project ran five focus groups attended by a total of 32 consumers and 4 carers. One of the focus groups was conducted in a regional area of Victoria, whilst the other focus groups were held in metropolitan Melbourne. The focus groups were facilitated by HMA and used a series of structured questions to obtain the views of attendees on the benefit of HMR services, providing insights on *felt need*.

The five focus groups covered the following areas: intellectual disability (n=2 attendees), carers of people with dementia (n=4 attendees), cardiovascular disease/heart failure (n=13 attendees), and mental health (two groups, n=17 attendees).

Findings

All consumers and carers who attended the focus groups recognised the benefits that could result from participation in HMR services. There was acknowledgement that those with the most complex conditions were likely to benefit most.

[1] Monash University emphasis.

Where consumers had specialists involved in managing their chronic condition(s) and attended health maintenance support groups, they perceived the benefits from a HMR to be limited. Participants in the focus groups felt that those most likely to benefit were patients with a newly diagnosed chronic disease who did not have a strong relationship with a specialist or a health maintenance support group.

Some consumers with multiple co-morbidities said that they generally had more confidence in their specialist's advice on medicines than that of a pharmacist. However, some people said their specialist did not pay much attention to the supplements they are taking and assumed their GP would monitor their use of these other medicines.

Consumers saw the value of HMR services when:

- there was a significant change in their existing condition
- new conditions emerged (not related to their existing conditions), or
- they had surgery.

At times of significant change in health conditions or medication regimens a HMR was seen to be of value as the pharmacist could advise on strategies to support consumers manage their medicines. One person said:

> *"When you are taking lots of medicines, it's changing your habits ….remembering to take them, that's the hardest part."*

Those consumers with multiple comorbidities reported they generally had positive relationships with their local pharmacists who provided a personalised service and monitored their prescriptions carefully.

Implications for refining eligibility criteria

Overall the consultations with consumers and carers found there was support for the benefits obtained from accessing HMR services. However, there was nothing in the information provided that could inform the project on the relative benefit of HMRs for different patient cohorts.

3.3 Other consultation findings

Approach

The project team conducted several consultation processes to seek views on the relative benefits of HMR services from a *normative need* perspective. These comprised consultations with:

- industry peak bodies *5 (Appendix F lists these organisations), and
- consumer organisation peak bodies *13 (see Appendix F).

The discussion guides for these consultations are at Appendix G.

In addition there were local level consultations with clinicians in fourteen locations across metropolitan, regional and rural / remote Australia. In total the project team met with 13 GPs, 12 community pharmacists, 13 accredited pharmacists, 6 hospital physicians and 10 hospital pharmacists to seek their views on which categories of patient would benefit most from HMR services.

In designing the interview questionnaire for the local level consultations the project identified 40 different characteristics where the patient was likely to benefit from a HMR, based on findings from the literature and previous consultations. During the face-to-face consultation the participating clinicians were asked:

> *Which of the following groups of patients who may have [condition XXXX] would benefit most from a HMR? Are any sufficient on their own to justify a clinical need for a HMR?*

The discussion guides for these consultations are at Appendix G.

Findings

Peak body consults: consultations with the peak bodies provided little guidance on relative benefit from accessing HMR services for different patient categories. All the peak bodies emphasised the importance of having flexible eligibility criteria that enabled clinicians to exercise their discretion on a case-by-case basis. Comments from the head of one industry body were illustrative of the general peak body position:

> *"All factors must be considered in the context of a patient's situation. Having standard eligibility criteria may miss patients who could really benefit. The bottom line is there should be an 'out clause' for GPs if there are standard eligibility criteria, so that patients who just don't fit can still be referred."*

Consumer organisation peak bodies: organisations consulted tended to advocate for the needs of the consumer group they represented. Several organisations had observations on needs that were specific to a class of patient who benefits from HMRs. However, none of this consultation advice was useful in assessing relative benefit from accessing a HMR.

Local level clinician consultations: the local level consultations operated as a pilot for development of the national survey (see Appendix G for a copy of the consultation frameworks used to guide these discussions).[7] From the local level consultations the project found that:

- clinicians were able to distinguish between patient characteristics from an extensive list, enabling them to rank the likely level of benefit from a HMR service for different characteristics, and
- a large majority of clinicians identified some of the 40 patient characteristics included in the local consultation tool as having no benefit from conducting a HMR e.g. there was a 68% 'no benefit' response rate for conducting a HMR for patients with a fractured neck of femur.

The findings from the local level consultations are presented in Appendix I. The findings from the local level consultations were considered in a workshop with the Advisory Panel. Based on expert advice from that discussion, a revised list of conditions/patient characteristics was prepared for inclusion in the national survey tool:

- some characteristics were removed, based on findings from the local level consults that suggested a majority of clinicians considered them a very low priority for conduct of a HMR service, and
- other characteristics were added, based on further consideration by the Advisory Panel members.[8]

Implications for refining eligibility criteria

Findings from the additional consultations with the peak bodies and consumer representative organisations provided useful insights into how eligibility criteria operate 'on the ground'. However, they provided no additional information on approaches to ranking relative benefit from a HMR service by patient cohort. The local level consultations were useful in providing a 'proof of concept' for the design of the national survey.

3.4 National survey

Approach

From the analysis of the literature review and consultations, four broad domains of need for HMRs were identified:

- instability in medications or medical conditions
- difficulty managing medications
- particular diseases/conditions with associated medication issues, and
- factors that may add complexity to the management of medications.

Each domain was broken down into several different types of patient disease or condition. The survey tool asked respondents to identify *How beneficial is a HMR likely to be for different types of patients within each of the four broad HMR domains of need*? The survey also asked respondents to assess the relative priority of individual diseases and conditions where the patient was likely to benefit from a HMR. There were a total of 25 diseases or conditions for which respondents to the national survey were asked to categorise the level of benefit from a HMR. These are identified below in Table 3.1.

The survey tools for the national survey are at Appendix H.

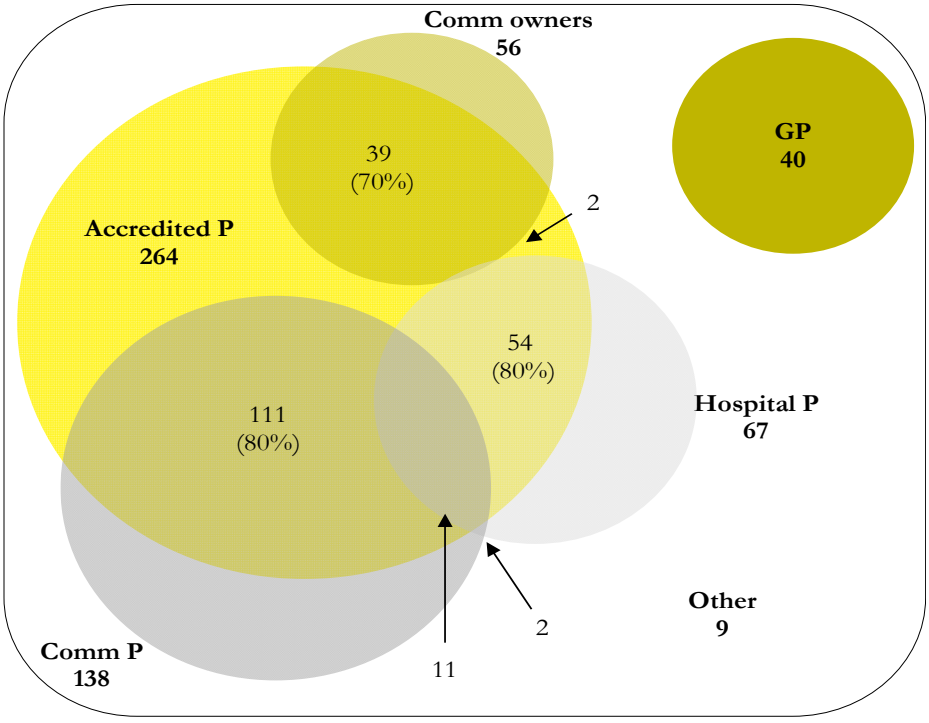
Table 3.1: Summary of diseases of conditions used in the National Survey, by domain

Domain	Disease or condition
Patients with instability in their medication(s) and/ or medical condition(s)	• Patients with significant changes to their medicine regimen/ medical condition in the last three months
	• Patients with symptoms suggestive of an adverse medicine reaction
	• Patients who have been discharged within the last four weeks from a health service (includes discharge from a hospital, outpatient or rehabilitation service)
	• Patients who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital
	• Patients who have had multiple unplanned admissions, presentations and/ or representations in the past twelve months
Patients with difficulty managing their medication(s)	• Patients having difficulty managing their medication(s) because of literacy or language difficulties (e.g. dysphasia)
	• Patients at risk of, or unable to manage or continue managing their medication(s) due to confusion, dementia and/or other cognitive difficulties
	• Patients at risk of, or unable to manage or continue managing their medication(s) due to dexterity limitations and/or impaired vision
	• Patients who are suspected or known to be non-adherent with their medication regimen
	• Patients who are socially isolated or lacking social support
Particular disease(s) or condition(s) with associated medication issues	• Patients who have severe or unstable Ischaemic Heart Disease (IHD)
	• Patients with newly diagnosed Atrial Fibrillation (AF)
	• Patients with recent Acute Myocardial Infarction or Acute Coronary Syndrome
	• Patients with other cardiovascular conditions
	• Patients who have had a significant fall or recurrent falls
	• Patients with mental health problems
	• Patients with diabetes
	• Patients with asthma
	• Patients with Chronic Obstructive Pulmonary Disease
Factors that may add complexity to the management of medication(s)	• Patients taking five or more medicines regularly
	• Patients taking more than 12 doses of medicine per day
	• Patients attending a number of different doctors, both general practitioners and specialists
	• Patients with multiple chronic conditions
	• Patients taking medicine with a narrow therapeutic index or requiring therapeutic monitoring
	• Patients taking or suspected to be taking alternative or complementary medicines

The following categories of benefit for different types of patient for use in the national survey tools were used: *extremely beneficial; very beneficial; moderately beneficial; small benefit; no benefit,* and *I don't know*.

Availability of the survey for completion was marketed to GPs and pharmacists via their peak bodies (The Royal Australian College of General Practitioners (RACGP), The Australian Association of Consultant Pharmacy (AACP), The Pharmacy Guild of Australia (The Guild), The Society of Hospital Pharmacists of Australia (SHPA), and the Pharmaceutical Society of Australia (PSA)). The survey was available for completion on 22 August 2014 and closed on 30 September 2015. At the close of the survey there were 40 completed GP responses and 329 completed pharmacist responses. The professional categorisation of respondents is shown in Figure 3.1.

Figure 3.1: Type of national survey respondent, by professional category



Key to diagram	
Abbreviation	*National survey: type of clinician respondent*
Accredited p	= Accredited pharmacist
Comm p	= Community pharmacist
Hospital p	= Hospital pharmacist
Comm owners	= Community pharmacist owners
GP	= General practitioner
Other	= Other survey respondents e.g. academic pharmacist

Illustration of respondent characteristics

- There were 40 GP respondents and 329 pharmacist respondents
- Of the 329 pharmacists:
  - There were 264 accredited pharmacists, of whom
    - 111 were also community pharmacists,
    - 54 were also hospital pharmacists, and
    - 39 were also community pharmacy owners
- Of the 329 pharmacists, 56 respondents were community pharmacist owners, of whom
  - 39 were accredited pharmacists, and
  - 17 were not accredited pharmacists (ie 56 less 39)
- There were:
  - 11 respondents who were both community pharmacists and hospital pharmacists;
  - 2 respondents who were community pharmacists and hospital pharmacists but not accredited pharmacists; and
  - 2 respondents who were community pharmacist owners, hospital pharmacists and accredited pharmacists.

Findings

As shown in Figure 3.2, both GPs and pharmacist responses showed the same trend in which **domains** were considered to be of *extreme importance*. GPs tended to be more conservative in their responses. For instance, the highest rating domain was 'difficulty managing medications', which was rated *extremely important* by 74% of GPs and 80% of pharmacist respondents. This was followed by 'instability in medications or medical conditions' which was rated *extremely important* by 51% of GPs and 74% of pharmacists, and 'factors that may add complexity to the management of medications' which was rated *extremely important* by 45% of GPs and 62% of pharmacists. The domain that was rated *extremely important* the

least was 'particular diseases/conditions with associated medication issues' with only 36% of GPs and 54% of pharmacists rating it as *extremely important*.

Figure 3.2: Percentage of respondents that perceived the HMR domain to be *extremely important*

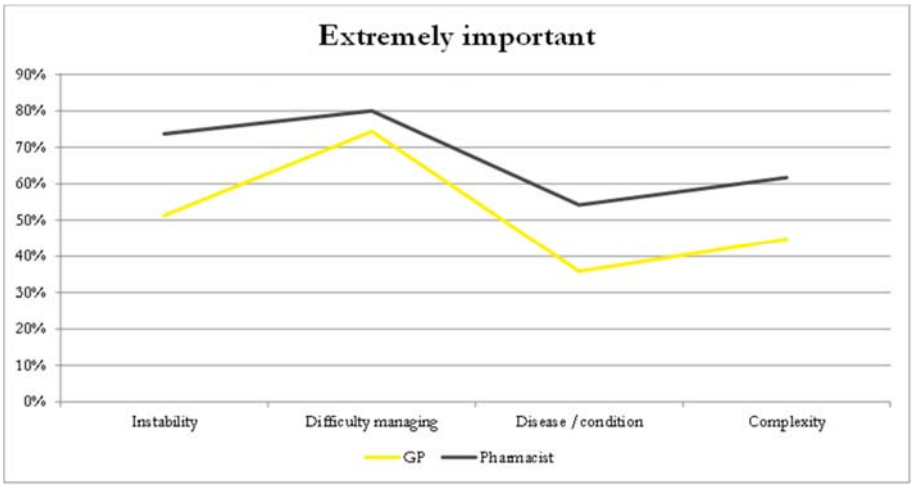


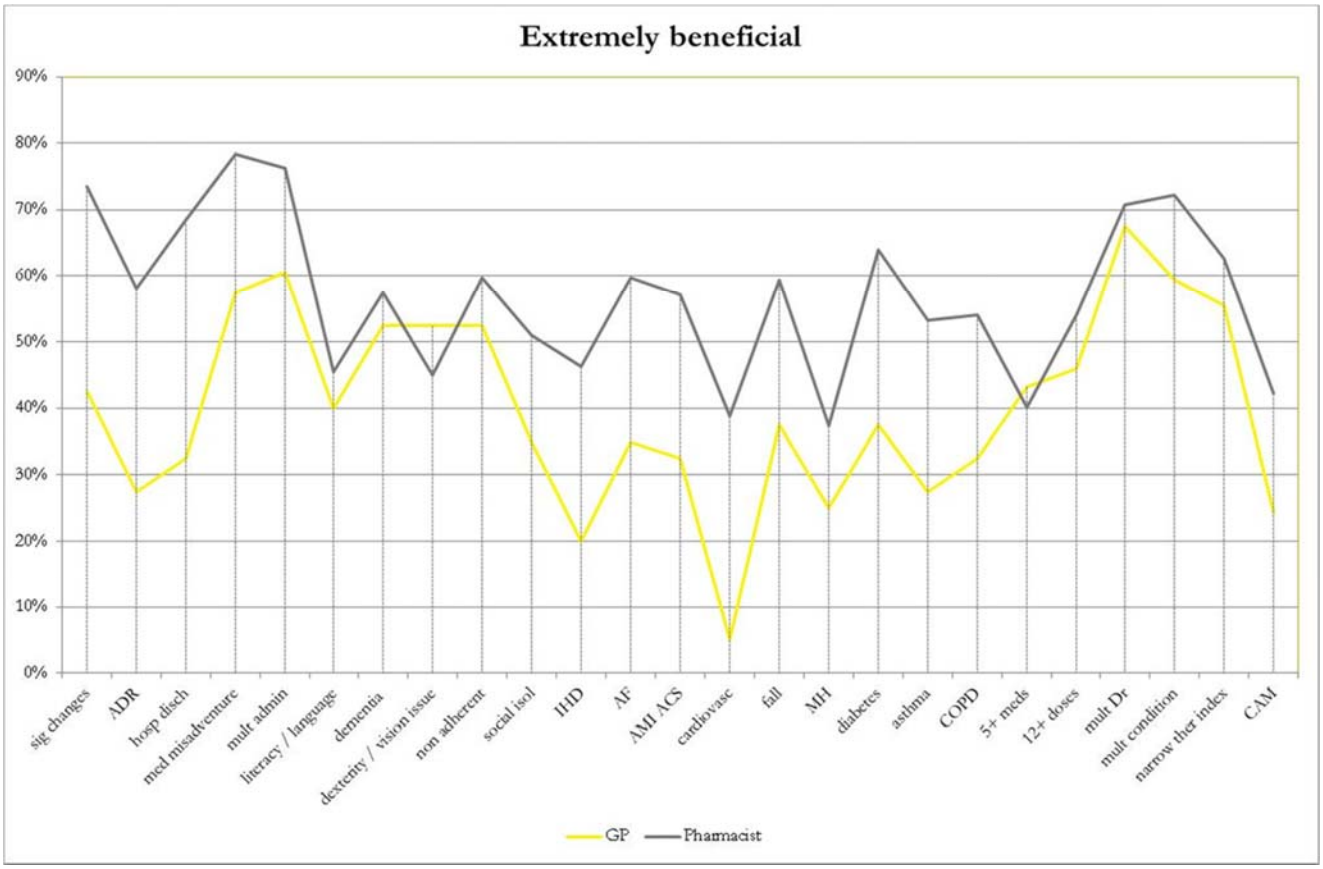
Figure 3.3 shows that the **patient groups** for which a HMR was considered extremely beneficial by over 55% of both GPs and pharmacists were patients:

- attending a number of different doctors, both general practitioners and specialists
- who have had multiple unplanned admissions, presentations and/ or representations in the past twelve months
- with multiple chronic conditions
- who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital, and
- taking medicine with a narrow therapeutic index or requiring therapeutic monitoring.

The **patient group** rated lowest by GPs and pharmacists was 'patients with other cardiovascular conditions', where conduct of a HMR was considered of *extreme benefit* by only 5% of surveyed GPs and 39% of surveyed pharmacists. Other patient groups with a low rating of *extreme benefit* were patients:

- with mental health problems (25% of GPs considering there was *extreme benefit* from conducting a HMR and 37% of pharmacists)
- taking or suspected to be taking alternative or complementary medicines (24% of GPs and 42% of pharmacists), and
- who have severe or unstable Ischaemic Heart Disease (IHD) (20% of GPs and 46% of pharmacists).

Figure 3.3: Patients likely to find a HMR *extremely beneficial* - perception of GPs and pharmacist respondents by disease/condition



In addition to 'tick box' responses to the survey questions, GPs and pharmacists were provided several opportunities to write 'free text' responses throughout the survey. *General comments* included (but not were limited to):

- the most important part of a HMR was often providing education to the patient on their medications, their disease(s) / condition(s) and the importance of adherence to their regime
- follow up is important, therefore a one-off HMR sometimes has limited value
- communication between the GP and pharmacist needs to improve
- HMRs were useful to demonstrate proper technique for medication aids such as asthma inhalers
- frequency of HMRs should be increased (two years is too long for some patients), and
- cap on the number of HMRs a pharmacist can perform can place pharmacists in a position of needing to prioritise referrals.

Further details on the findings of the national survey are presented in Appendix J.

Implications for refining eligibility criteria

Respondents to the national survey provided a clear ranking of relative benefit of HMR services for patients on a range of 25 disease / condition characteristics. These assessments varied by professional category. This raises the question of whether the perceptions of one professional group should carry more weight than another.

A limitation of the survey was the size of the GP sample (n=40). This was not sufficiently large to be statistically representative.

3.5 Other information sources

One other information source that was explored through the needs analysis was the HMR Programme administrative data made available by the Department of Health (DoH). It was hoped that this could inform an analysis of *expressed* and *comparative need*.

The project team was given access to a database of records derived from The Pharmaceutical Benefits Schedule (PBS) *HMR Claim Cover Sheet* and *Claim and Confirmation for HMR Service* forms completed by HMR service providers. The project team found that the administrative data categories did not provide meaningful data that could usefully inform the research objectives. For example, the reasons for GP referral identified on the PBS Claim form were broader than the existing MBS eligibility criteria: *poly-pharmacy*; *suspected adverse event*; *using medicine with a low therapeutic range*; and *other.*

3.6 Evidence on relative need: summary implications

The data collection processes for the project were extensive but most sources proved to be limited value in informing the overall review objective. A summary of the assessed value of each information source in potentially informing HMR eligibility criteria development / potential to inform relative needs of different patient cohorts for a HMR is presented in Table 3.2.

Table 3.2: Value of data collection processes to inform assessment of relative need for a HMR

Need Dimension	Project Data Source	Value in Potentially Informing Criteria Development / Potential to Inform Relative Needs of Different Patient Cohorts for a HMR
Epidemiological need	Peer reviewed and grey literature	Nil
Felt need	Consumer focus groups	Nil
Normative need	Industry peak bodies	Nil
	Consumer peak bodies	Nil
	Local level consultations with clinicians (GPs, pharmacists and hospital physicians)	Limited – used to inform design of the national survey
	National survey: GPs and pharmacists	Moderate – useful in the absence of information from other sources
Expressed and comparative need	HMR Programme administrative data	Nil

Our analysis of information collected from the various data collection processes concluded that only one source provided evidence on the relative need of different patient cohorts for HMRs – the project's national survey. All the other data sources – the literature, consultations with industry and consumer groups, and programme administrative data – provided limited or no useful insights on the key policy question.

4 Options for eligibility refinement

Summary of approach to options analysis: the project team examined three options for revising criteria affecting eligibility for a HMR. Two of the options were based on findings from the national survey: *option 1 - incremental change to existing referral parameters*; and *option 2 – weighting system to identify patients most likely to benefit*.

Option 3 -need categorisation was developed through a brainstorming process involving expert associates and advice from the Advisory Panel. It built on experience from other programmes including chronic disease management and team care coordination, and design principles for health programme development. It recommends the refinement of eligibility criteria that requires the referring GP to identify patients in need of a HMR.

The options were assessed against the principles for effective eligibility criteria proposed earlier in the report. Based on this assessment the project found that *Option 3 - need categorisation* most effectively met the design principles.

4.1 Potential options: approach to development

The project terms of reference required HMA to:

> *"draft a set of recommendations detailing appropriately targeted criteria for HMR patient eligibility."*

The project team identified three options for examination. The first two options explored use of data obtained from the national survey on relative benefits for different patient cohorts. These were:

- ***option 1: incremental change to existing referral parameters***, refocussing on the patient groups most likely to benefit, and
- ***option 2: weighting system to support clinicians to identify patients most likely to benefit***, requiring clinicians to specify a range of weighted criteria for each patient.

The project team identified practical problems with implementing both these options. In the absence of a strong published evidence base it was decided to use policy development techniques to frame an alternative approach. This involved a 'brainstorming session' with HMA's expert associates to identify criteria that would:

- reflect the clinical experiences of both GPs and pharmacists, including their understanding of chronic disease and associated management plans and findings from team care coordination, and
- better respond to standard principles for health programme design, including specification of a clear target group and use of agreed definitions to inform eligibility rules[9].

The option developed through this process is ***option 3: need categorisation***.

A more detailed description of each option, and their pros and cons, is provided below.

Option #1: incremental change to existing referral parameters

Description: revise the wording in the MBS item definition and the *Programme Specific Guidelines* to only identify characteristics where there is a high level of benefit from the conduct of a HMR, as identified in the national survey.

Characteristics for inclusion in the revised definition would be those identified by more than 50% of GPs as being exceptionally beneficial.

Rationale:

There are some risk factors identified by the national survey that are considered very important by GPs that are not referred to in the MBS item, including patients:

- who have had multiple unplanned admissions, presentations and/ or representations in the past twelve months
- with multiple chronic conditions, and
- who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital.

There are some characteristics referred to in the current MBS item that are not identified as having a high level of benefit by GPs, including patients:

- taking more than 12 doses of medicine per day
- taking five or more medicines regularly
- with significant changes to their medicine regimen/ medical condition in the last three months, and
- having difficulty managing their medication(s) because of literacy or language difficulties (e.g. dysphasia).

Option #2: weighting system to support clinicians to identify patients most likely to benefit from a HMR service

Description: allocate an appropriate score for different referral parameters. A minimum score would be required before referral by a GP can occur. The weighting attracted by a particular characteristic would be determined by the significance of the characteristic identified in the national survey:

- *very high* score (say 4 points) e.g. multiple unplanned admissions, known or suspected medication misadventure
- *high score* (say 3 points) e.g. non-adherence, significant changes to the medication regimen
- *moderate score* (say 2 points) e.g. discharged from hospital, recent falls, diabetes, COPD, and
- *low score* (say 1 point) e.g. taking more than 12 doses per day, taking more than 5 medicines.

A minimum score of, say, 5 points, would be required before a referral could occur.

Rationale:

This approach recognises that people most at risk of medication misadventure often have multiple needs factors driving their underlying need for a HMR service. This approach would require identification of those risk factors.

Option #3: need categorisation

Description: a patient will be identified as needing a HMR if they meet two conditions:

- **the patient is 'at risk' of medication misadventure** because they have:

  1A Chronic disease and/or

  1B Complex management requirements

- ***plus*** **the patient has one or more of the following**

  2 Instability of health status and/or medicines therapy

  3 Using a high risk medicine(s)

  4 Likelihood of compromised adherence

  5 New therapeutic goals

  6 Potentially incomplete understanding of patient's pattern of medicine use by health professionals

  7 Failure to respond to treatment in the way expected.

This option requires a range of patient need characteristics to be identified, but individual patient characteristics are grouped into higher level categories, making it easier to administer than option 2.

Rationale:
This approach:

- recognises there is usually no one single factor that generates need for a HMR
- avoids a long 'shopping list' of need characteristics
- requires the clinician to identify the underlying need drivers, which can inform the accredited pharmacist about the issues needing to be explored during the home visit, and
- uses evidence based categories (see Table 4.1).

The project team developed some preliminary material to illustrate what the supporting guideline for this option could look like. The suggested approach, shown in Table 4.1, includes an explicit definition for each criteria, and illustrative examples.

Table 4.1: Option #3 - what the supporting Guidelines might look like

Criteria	Definition	Illustrative example[(a)]
1A: Chronic disease *and/or*	Condition/disease likely to last for 6 months or more, or a terminal condition (b)	• heart disease, COPD, mental illness, etc.
1B: Complex management	GP plus 2 or more health professionals(c)	• person with diabetes also managed by endocrinologist and podiatrist and/or other health providers
PLUS one or more of the following:		
2: Instability of health status and/or medicines therapy	Frequent or unpredictable change in medical condition, including multiple unplanned admissions, presentations or representations to hospital	• health status: Acute coronary syndrome • medicine therapy: significant addition, deletion or change to medicine dose [anti-psychotics, beta-blockers, diuretics].
3: Using a high risk medicine(s)	Medicines that have a high risk of causing injury or harm if misused or used in error(d) and/or medicines of low/narrow therapeutic index and/or medicines that require monitoring	• anti-infectives • potassium and other electrolytes • insulin • narcotics and other sedatives • chemotherapeutic agents • heparin and anticoagulants • non-steroidal anti-inflammatory drugs (NSAIDS)
4: Likelihood of compromised adherence	The extent to which the consumer actions do not align with the agreed course of action.(e) Can include accidental non-compliance (e.g. forgetting, misunderstanding directions)	• compromised cognition, language, culture, • cognitive disorders, supply chain issues, dexterity, vision, CALD
5: New therapeutic goals	Change in health status or treatment objectives	• new diagnosis, change from curative to palliative, intensification of treatment
6: Potentially incomplete understanding of patient's pattern of medicine use by health professionals	Possible incomplete account of all medical products used	• incomplete picture of medicines including prescribed (e.g. from other specialists), OTC and complementary and alternative medicines
7: Failure to respond to treatment in the way expected	Lack of attainment of therapeutic goals OR adverse medicine reaction	• sub-optimal blood glucose control

Notes: **(a)** The illustrative examples are not intended to be an exclusive list of criteria; **(b)** See Department of Health definition of a chronic disease: *http://www.health.gov.au/internet/main/publishing.nsf/Content/mbsprimarycare-chronicdiseasemanagement* **(c)** See DHS/Medicare definition of a chronic disease management plan: *http://www.humanservices.gov.au/customer/services/medicare/chronic-disease-management-plan*; **(d)** See definition from the New South Wales Clinical Excellence Commission: http://www.cec.health.nsw.gov.au/programs/high-risk-medicines; **(e)** A qualitative measure of the extent to which a consumer's behaviour corresponds with the recommendations agreed with a health care professional, ideally through a concordant approach. *Adherence: "the extent to which a person's behaviour - taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider."* See WHO, 2014: *http://apps.who.int/medicinedocs/en/d/Js4883e/6.html)*

4.2 Examination against assessment criteria

The project team examined the three options against the principles for effective eligibility criteria specified in Chapter 1. The comparative analysis is presented in Table 4.2. The following scoring system was applied:

- *fully complies* with the principle=2
- *partially complies* with the principle=1
- *no significant chang*e from current arrangements=0, and
- *worse* compared to current arrangements=-1.

Table 4.2: Analysis of the options against the assessment criteria

	Comparison of the options		
Principles (criteria for assessment)	**Option #1** ***Incremental change***	**Option #2** ***Weighting system***	**Option #3** ***Need categorisation***
Clearly defines entitlement	1	1	2
Assists in targeting to those most in need	1	1	2
Clinician assisted to classify underlying need	0	1	2
Specific / avoids ambiguity	0	0	2
Administratively simple	0	-1	2
Total Score	**2**	**2**	**10**

The analysis highlights significant limitations associated with options 1 and 2:

- compared to current arrangements, option 1 would better reflect clinician's assessment of need for a HMR but is not fundamentally different in the approach to eligibility specification. It still relies on a list of single factor reasons for referral, and
- option 2 would change the approach to assessment by the clinician, because of the weighted scoring requirement. However, it would be complex to administer because the GP would have to select the relevant conditions for a patient from an extensive list of risk factors.

The analysis shows that Option 3 has superior characteristics. It avoids the problems of options 1 and 2, generated by the need to consider a 'shopping list' of potential eligibility characteristics.

Option 3 requires the GP to be more specific about the underlying reason for referral for a HMR whilst simplifying the GP assessment process:

- it clearly defines the criteria for eligibility, placing more evidence on the presence of chronic disease and/or complex management as a threshold requirement
- it recognises that there is usually some newly emerging characteristic that triggers the need for an assessment of whether a patient's medicines are safe, effective and appropriate
- it enables a more structured referral, potentially supporting a more focussed review and report, and
- it simplifies the list of categories and simultaneously removes overlap between categories and reduces ambiguity by having explicit definitions and examples.

4.3 Summary of findings

Based on the critique of the options the project team concluded that Option 3 most effectively met the principles for effective eligibility criteria. Key features include:

- definition of who is entitled: people with chronic disease and/or complex management problems plus one or more specified characteristics that increase the difficulty of managing therapeutic goals using medicines, instability of health status and/or medicines therapy, using a high risk medicine(s), have likelihood of compromised adherence, new therapeutic goals, potentially incomplete understanding of patient's pattern of medicine use by health professionals, or failure to respond to treatment in the way expected
- focusing scarce HMR resources on the high need groups with these characteristics
- provides guidance to clinicians on who is eligible
- avoidance of overlaps in definitional categories
- enables a more structured referral, potentially supporting a more focussed review and report, and
- administrative simplicity, because clinicians only have to assess two classes of need characteristic.

5 Conclusion

Summary: the project recommends that *Option 3 – needs categorisation* is implemented after further consultation with relevant stakeholders. Further issues that require examination before revised eligibility criteria can be implemented are identified. These include: refinement of definitions around inclusion and exclusion criteria, the links between MBS definitions and the *Programme Specific Guidelines*, enhancing quality assurance, the relationship of HMRs to other medication management services, and assessing the impact of the proposal on demand for HMRs.

5.1 Recommendation

The project found that the evidence base to inform development of draft eligibility criteria for HMRs was limited. In the absence of this information it was decided to use policy development techniques to frame an alternative approach. Based on the overall findings of the project HMA recommends that:

Recommendation: the introduction of refined patient eligibility criteria based on need categorisation should be explored.

Under this approach a patient will be identified as needing a HMR service if they meet two conditions:

- ***The patient is 'at risk' of medication misadventure* because they have:**

  1A Chronic disease and/or

  1B Complex management requirements

- ***Plus* the patient has one or more of the following**

  2 Instability of health status and/or medicines therapy

  3 Using a high risk medicine(s)

  4 Likelihood of compromised adherence

  5 New therapeutic goals

  6 Potentially incomplete understanding of patient's pattern of medicine use by health professionals

  7 Failure to respond to treatment in the way expected

5.2 Issues for further consideration

A number of issues require consideration before the recommended approach is fully implemented:

(1) **Other definitions:** the work of this project has specifically focussed on relative need and benefit for HMR services and their relationship to eligibility criteria and/or 'at risk factors'. Other aspects of wording within the current source documentation require examination. This includes:

(a) Terms relating to legal status (Medicare entitlement and DVA entitlement)
(b) Location of the patient (in the community but not in hospital or a residential care facility).

To avoid confusion it would be more appropriate for amended *Programme Specific Guidelines* to refer to these characteristics as 'inclusion and exclusion criteria'. The eligibility criteria proposed in this report should only be applicable to people who are not disqualified by the exclusion criteria.

(2) **Link between source documentation:** ideally there should be alignment between the definitions of eligibility contained in the *Programme Specific Guideline*s and the MBS Item 900 definition. The possibility of ensuring this alignment should be explored.

(3) **Link to quality improvement activities:** the approach to eligibility criteria recommended in this report enhances the scope to more proactively monitor the impact and effectiveness of HMR services because the rationale for a GP referral will be more explicit. This presents opportunities to apply a more rigorous approach to quality improvement activities in the HMR Programme. These opportunities should be explored in the planning phase prior to implementation because changes may be needed to supporting documentation. This approach could be further

enhanced through the introduction of a template for HMR reports. For example, this could require the accredited pharmacist to advise on their findings in response to the explicit reasons for the GP referral.

(4) **Relationship between HMRs and other medication management services:** it was beyond the scope of this project to explore the relationship between HMR services and other medication management services like MedsCheck. Feedback from stakeholders during project consultations suggested a more hierarchical relationship could be more clearly defined. Under such an approach:

(a) the role of HMR services would be to address the medication use needs of patients with chronic conditions and/or complex management requirements who have other complications.

(b) MedsCheck would be employed where medication use requires investigation but the level of resource intensity for a HMR service is not justified based on the current knowledge of the patient's medications and health and wellbeing.

(5) **Impact of proposed changes on demand:** it was beyond the scope of the current project to assess the impact of recommended eligibility requirements on realised demand for HMR services. Some form of assessment should occur.

Appendix A: HMR claim levels

Table A.1: Number of HMRs claimed, by jurisdiction, 2010-11 to 2013-14

Jurisdiction	No of HMRs claimed				% Change Over the Period 2010-11 to 2012-13	% Change Over the Period 2012-13 to 2013-14
	2010-11	2011-12	2012-13	2013-14		
NSW	22,938	26,921	41,605	36,272	81.4%	-12.8%
VIC	15,470	21,182	34,618	32,761	123.8%	-5.4%
QLD	13,430	15,029	22,259	21,655	65.7%	-2.7%
WA	4,036	3,864	5644	6,261	39.8%	10.9%
SA	4,599	4,659	7377	7,360	60.4%	-0.2%
TAS	2,022	2,117	3,726	3,146	84.3%	-15.5%
ACT	334	468	587	721	75.7%	22.8%
NT	259	126	76	61	-70.9%	-19.7%
Australia	**63,088**	**74,366**	**115,892**	**108,237**	**83.7%**	**-6.6%**

Source: 2010-11 to 2012-13 - Department of Health Website: http://www.health.gov.au/internet/main/publishing.nsf/Content/Medication-Management-Review-Data. Accessed 17 November 2014;

2013-14: Department of Heath

Appendix B: Patient Eligibility for a HMR – Comparison of Details in MBS Item 900 *and the* Programme Specific Guidelines Home Medicines Review

***Source:* MBS online** -Item 900 - Domiciliary Medication Management Review **(see http://www9.health.gov.au/mbs/fullDisplay.cfm?type=note&qt=NoteID&q=A42)**	***Source: Programme Specific Guidelines Home Medicines Review*** **Effective from 1 March 2014**
Patient eligibility The item is available to people living in the community who meet the criteria for a DMMR. The item is not available for in-patients of a hospital, or care recipients in residential aged care facilities. DMMRs are targeted at patients who are likely to benefit from such a review: patients for whom quality use of medicines may be an issue or; patients who are at risk of medication misadventure because of factors such as their co-morbidities, age or social circumstances, the characteristics of their medicines, the complexity of their medication treatment regimen, or a lack of knowledge and skills to use medicines to their best effect. Examples of risk factors known to predispose people to medication related adverse events are: • currently taking five or more regular medications; • taking more than 12 doses of medication per day; • significant changes made to medication treatment regimen in the last three months; • medication with a narrow therapeutic index or medications requiring therapeutic monitoring; • symptoms suggestive of an adverse medicine reaction; • sub-optimal response to treatment with medicines; • suspected non-compliance or inability to manage medication related therapeutic devices; • patients having difficulty managing their own medicines because of literacy or language difficulties, dexterity problems or impaired sight, confusion/dementia or other cognitive difficulties; • patients attending a number of different doctors, both general practitioners and specialists; and • recent discharge from a facility / hospital (in the last four weeks).	**Patient Eligibility Criteria** The Patient must satisfy the following mandatory HMR Service eligibility criteria: • The Patient is a current Medicare/DVA cardholder; • The Patient is living in a community setting; • The Patient is at risk of or experiencing medication misadventure; and • The GP confirms that there is an identifiable clinical need and the Patient will benefit from a HMR Service. HMR Services are not available to in-patients of public or private hospitals, day hospital facilities, transition care facilities or to residents of a Government Funded Facility. **Referral** The Patient's GP will assess eligibility and outline the HMR Service to the Patient. If the Patient agrees that a HMR Service is necessary and is willing to have the interview conducted in their home, the GP will obtain Patient consent to participate in the HMR Service. Following a discussion between the GP and Patient, the Patient may choose to be referred to the Patient's choice of/usual Community Pharmacy or to an Accredited Pharmacist who meets the Patient's needs. The HMR referral should include reason for referral and all relevant prescribing and clinical history. The Patient interview must take place within ninety (90) days of the date of the referral to be remunerated under the Home Medicines Review Programme. **Frequency of service** One HMR Service can be conducted per eligible Patient on referral from a GP. A subsequent HMR may only be conducted if more than 24 months has elapsed since the date of the most recent Patient interview or when the Patient's GP specifically deems a subsequent review is clinically necessary, such as when there has been significant change to the Patient's condition or medication regimen. Reasons why an additional review may be requested include: • Prescription of a medicine with a narrow therapeutic index or requiring therapeutic monitoring; • Presentation of symptoms suggestive of an adverse drug reaction; • Sub-therapeutic response to therapy; • Suspected non-compliance or problems with managing medication-related devices; or • Risk of, or inability to continue managing own medicines due to changes in dexterity, confusion or impaired vision. • Provision of a subsequent Home Medicines Review must not be triggered solely by an "anniversary" date; the Service is not intended to be an ongoing review cycle

Appendix C: Evidence synthesis of systematic reviews of pharmacist-led medication review research, Monash University

MONASH University
Centre for Medicine Use and Safety

Evidence synthesis of systematic reviews of pharmacist-led medication review research with a focus on referral and eligibility parameters, patient groups who have benefited and costs

This three part evidence synthesis relates to and should be read in conjunction with two systematic reviews prepared by Centre for Medicine Use and Safety, Faculty of Pharmacy and Pharmaceutical Sciences, Monash University. These systematic reviews are entitled:

(1) Pharmacist-led medication review in community settings: an overview of systematic reviews
   - *32 systematic reviews were analysed and subject to quality assessment*

(2) Systematic review of Home Medicines Review research in Australia: a focus on referral and eligibility parameters, patient groups who have benefited and costs
   - *57 original research studies were analysed and subject to quality assessment*

Overview

The Home Medicines Review (HMR) programme has been operating since 2001. It assists consumers living at home, maximise their independence and minimise their risk of medication errors.

In March 2013, the Hon. Tanya Plibersek, MP, the then Minister for Health, announced that research would be undertaken to ensure the targeting of the HMR programme is appropriate. Under the Fifth Community Pharmacy Agreement, Research and Development Program, the Centre for Medicine Use and Safety, Faculty of Pharmacy and Pharmaceutical Sciences, Monash University was contracted to undertake a systematic review of the literature as part of a broader research project, being led by Healthcare Management Advisors (HMA) to develop recommendations on appropriately targeted criteria for HMR patient eligibility.

Monash University was asked to provide a response to three specific questions based on a systematic review of the literature. The research questions and a summary of our findings are presented below.

(1) **Identify alternatively-named models of complex medication management services that meet the criteria of HMR (e.g. Medication Review Service, Pharmacist-led Medication Review, etc.) and document their referral and eligibility parameters**
- In our literature search we identified no alternatively-named international models of medication review that are entirely consistent with the current Australian HMR model.
- We could find no models that specifically excluded particular patient or disease groups.

(2) **Identify and document the characteristics of patients who are demonstrated to have benefitted most from a HMR or equivalent model**
- We identified no robust research directly comparing the benefits of HMR or equivalent models in different patient groups.
- We identified a considerable body of evidence on which patient groups benefit from HMR in Australia, but no evidence that allows a clear ranking of which patient groups benefit most.

(3) **Identify and document the characteristics of the most cost-effective HMR or equivalent model.**
- Based on the available evidence it was not possible to conclusively document the characteristics of cost-effective HMR or equivalent models.
- Rigorous health economic analyses are urgently required to determine which characteristics of the current HMR programme have the largest impact on economic outcomes.

Research Issue Number 1: Identify alternatively-named models of complex medication management services that meet the criteria of HMR (e.g. Medication Review Service, Pharmacist-led Medication Review, etc.) and document their referral and eligibility parameters

Medication review is a widely used term to describe a broad and multi-faceted range of services provided by pharmacists and other healthcare professionals. In Table C.1, Clyne et al. have outlined three different types of medication review that exist internationally, ranging from Type 1 (least comprehensive) to Type 3 (most comprehensive) (1). Home Medicines Review (HMR) in Australia is an example of a Type 3 medication review. A recent meta-analysis reported that Type 3 clinical medication reviews reduce hospitalisation (2).

In our literature search we identified no alternatively-named international models of medication review that are entirely consistent with the current Australian HMR model.

There are considerable limitations, therefore, when comparing the outcomes of international models with a HMR. This is because the key characteristics of HMRs in Australia are different to international models (Table C.2). In addition, the success or failure of complex medication management services is highly context specific. This means that a medication review model that works well in one health system may not work well in another health system. This is due to factors such as differences in the provision of primary healthcare, working relationships between health professionals, the extent of clinical training for pharmacists, medication review accreditation requirements, patient attitudes and expectations, government and organisational support, and established funding mechanisms.

Table C.1: Characteristics of types of medication review (Adapted from Clyne et al., 2008)(1)

Type of medication review	Aim	Patient present	Access to patient's notes	Medications reviewed
Type 1: Prescription review	Address technical issues relating to the prescription	No	Possibly*	Prescription medicines (may not be complete)
Type 2: Concordance and compliance review	Address issues relating to the patient's medicine-taking behaviour	Usually		All prescription, complementary and over-the-counter (OTC) medicines
Type 3: Clinical medication review	Address issues relating to the patient's use of medicines in the context of their clinical condition	Yes	Yes	

*Medication reviews conducted by community pharmacists may not have access to patient's clinical notes

From our reviews of the published and grey literature we identified no models of medication review which are equivalent to the Australian HMR model in terms of referral, eligibility and the health system context.

In Table C.2, we outline referral and eligibility criteria of medication review models in Canada, New Zealand, United States of America and United Kingdom. Medication review models in New Zealand could arguably be considered to have the greatest similarity to Australia.

Multiple models have eligibility criteria around multiple medication use and multiple chronic diseases. All programmes have core/essential criteria and other listed guidelines for identification of patients. Only medication therapy management in the United States listed high cost medications as a patient eligibility criterion.

All models involved medication review at a frequency of every 12 months, with the option of having more frequent reviews if there were significant changes in patient circumstances or medication regimen. The exception is in the United States where frequency of medication review is dependent on the health fund and pharmacy.

We could find no models that specifically excluded particular patient or disease groups.

Type 1 and 2 medication reviews are common in the community setting across Europe, with Type 3 comprehensive medications reviews being rare (3). Nationally agreed procedures for Type 3 medication review programmes are established in Denmark, Finland, the Netherlands and Spain. However, none were evaluated to be equivalent to the Australian HMR programme.

Our search of the Australian published and grey literature identified alternatively-named models of complex medication management services that have been trialled in Australia. In our review we refer to these as Medication Management Reviews (MMRs).

A summary of these studies is outlined as follows. In some studies, hospital pharmacists coordinated post-discharge MMR and liaised closely with practitioners in the community (4-9). There were reports of MMR which involved an accredited pharmacist working in a medical practice (n=4) (10-13), as part of an aged care assessment team (n=2) (14, 15), community mental health team (n=1) (16, 17), or palliative care team (n=1) (18). The MMR model involved face-to-face case-conferences between the general practitioner (GP) and pharmacist in six studies (12, 19-24). Some studies involved pharmacists who were not necessarily MMR accredited, however received additional training (n=2) (16, 25) or had several years of clinical experience (n=1) (14). The key findings of these studies are provided in Tables 2 to 4 in Review 2 (Systematic review of Home Medicines Review research in Australia: a focus on referral and eligibility parameters, patient groups who have benefited and costs).

Table C.2: Medication review services internationally

Medication review	Type	Country	Referral	Eligibility	Usual location	GP involvement	Frequency
Medicine use review (MUR)(26)	1,2	UK	Patient, pharmacist, GP or nurse	>1 medicine*, taking medicines for a long term illness, recent hospital discharge	Community pharmacy	Action plan is sent to the doctor with changes or recommendations	12 months unless: hospital discharge with changes in medication, or addition of new respiratory medicines
Medication Therapy Management (MTM)(27)	1,2	USA	Patient, pharmacist, GP, other health professional	Multiple chronic diseases*, multiple (Part D)(28) medicines*, likely to incur costs above a predetermined level*	Community pharmacy, other patient care settings or via phone	Documentation provided may include patient's personal medication record (PMR), SOAP note and care plan	Frequency depends on health fund
MedsCheck(29)	1,2	Canada	Patient, pharmacist, GP, other health professional	>3 medicines for a chronic condition*	Community pharmacy, home, long-term care home	Not mandatory – summaries provided if GP-referred or if pharmacist has identified that it is beneficial to do so	12 months unless: recently discharged from hospital within previous 2 weeks, significant changes to medications or addition of new medicine, non-compliance, patient has changed their place of residence and transferred their prescriptions to a different pharmacy, referral from GP or nurse practitioner (NP) or a planned hospital admission
Medicine use review (MUR)(30)	1,2	NZ	Patient, pharmacist, GP, other health professional	Dependent on individual district health board (DHB)	Community pharmacy or home	Report sent to GP (encouraged but not essential)	12 months unless there are extenuating circumstances e.g. hospitalisation resulting in significant medication/circumstance changes or time delay
Medicines Therapy Assessment (MTA)(30)	1,2,3	NZ	Usually pharmacist or GP	No specific criteria	Setting appropriate to the service user (usually home)	Pharmaceutical care plan to be provided to the GP	Not defined
Comprehensive Medicines Management (CMM)(30)	1,2,3	NZ	Not defined	Not defined	Not defined	Not defined	Not defined

Research Issue Number 2: Identify and document the characteristics of patients who are demonstrated to have benefitted most from a HMR or equivalent model

We identified no robust research directly comparing the benefits of HMR or equivalent models in different patient groups. We identified a considerable body of evidence on which patient groups benefit from HMR in Australia, but no evidence that allows a clear ranking of which patient groups benefit most.

Comparison between studies is challenging due to different contexts in which the studies were conducted and the different methods used to categorise pharmacists' findings and recommendations. It cannot be assumed that because HMR have not been widely studied in a specific patient group that this patient group does not benefit. Indeed, some patient groups who are vulnerable to medication-related harms and potentially stand to derive great benefit from a HMR (e.g. those with cognitive impairment, mental illness, culturally and linguistically diverse [CALD] groups) may have been excluded from research studies. Furthermore, should a robust piece of research be undertaken in any of these groups, we would anticipate positive results given the high prevalence of medication related problems in these groups.

In our overview of systematic reviews of pharmacist-led medication reviews in community settings, we found that patients benefited in a range of different outcomes (see Table C.3). It is important to note that not all research designs were included in these systematic reviews. Most systematic reviews excluded observational research and original research studies in which there was no parallel control group.

It should be noted that all studies reviewed relating to mental health and mortality were significantly underpowered i.e. there were too few participants, to be able to detect a clinically or statistically significant difference.

Table C.3: Outcomes reported in studies within the international systematic reviews

Outcomes	No. of primary studies reporting the outcome	No. of systematic reviews including these primary studies	No. of primary studies reporting significant* outcomes (%)
Clinical			
Adherence	47#	16	33 (70)
Anticoagulation management	4	2	4 (100)
Asthma/COPD	5	2	5 (100)
Blood pressure control	30	12	25 (83)
Cholesterol	37	11	37 (100)
Cardiovascular outcomes	9	6	6 (67)
Diabetes control	57	10	50 (88)
Healthcare utilisation	33	16	12 (36)
Medication management	75#	22	66 (88)
Mental health	3	4	0 (0)
Mortality	17	5	3 (18)
Other[1]	4	4	2 (50)
Humanistic			
Quality of Life	37#	17	17 (46)
Satisfaction	13	10	8 (62)
Knowledge	14#	6	9 (64)
Economic			
Medication/healthcare costs[2]	26#	13	15 (58)

* Statistically significant ($p<0.05$), # Consists of pooled data

1 Other = urinary incontinence, falls, opportunistic infection, metabolic syndrome

2 8 studies reported medicine and healthcare costs individually

In our second systematic review of published and grey Australian HMR literature we included all types of study designs. This was because different research methodologies were suited to answering different questions related to the HMR programme.

Two investigators then independently assessed the quality of all 57 studies included using a recognised quality assessment tool.

Patient groups found to benefit include those at risk of medication misadventure, including older people and those with polypharmacy. Patients with mental health diagnoses, chronic heart failure, diabetes and those taking high-risk medications such as anticoagulants were also found to benefit.

Qualitative research suggested Indigenous and CALD populations, and consumers receiving palliative care, with poor medication adherence, recently discharged from hospital, and living in rural and remote areas were under served in terms of receiving HMR (31, 32). Other population groups identified as likely to benefit from a HMR included older males and younger people with long-term and persistent disease or other serious health problems (32).

There was insufficient evidence in the literature to rank which patient groups benefit most from HMR.

Research Issue Number 3: Identify and document the characteristics of the most cost-effective HMR or equivalent model.

Based on the available evidence it is not possible to conclusively document the characteristics of cost-effective HMR or equivalent models.

In our overview of systematic reviews, half of the systematic reviews (n=13) described changes in the health care costs and/or medication costs associated with pharmacist-led medication reviews. One-quarter of the original research studies reported significant cost reductions. However, these were not true cost-effectiveness studies, but rather simple cost assessments of the programme. Additionally, it is important to consider differences in health care systems between regions and countries when interpreting these results.

In our systematic review of published and grey Australian HMR literature published since 2000, eight studies performed economic evaluations of the HMR programme (12, 15, 19, 23, 33-36). Two studies compared the cost and effectiveness of the HMR programme (33, 35), and the remaining studies only evaluated the cost of the programme (12, 15, 19, 23, 34, 36).

Of the two cost-effectiveness studies performed, both reported mixed results (33, 35). In a randomised controlled trial (RCT) by Sorensen et al., the HMR service was cost-effective due to a reduction in adverse events and improvement in clinical outcomes (35). In the VALMER study, a subgroup analysis was performed on 60 HMRs to determine the factors associated with their cost-effectiveness. HMR were cost-effective in a subset of high-risk and high-cost patients due to reductions in medication costs and health resource utilisation (33). However, no association was found between use of any medication or medication class and HMR cost-effectiveness (37).

Pharmacists who performed cost-effective HMRs had completed a higher total number of HMRs and more hours of continuing education compared to pharmacists who did not perform cost-effective HMRs (37). Additionally, HMR referrals that contained recent and relevant pathology/ laboratory data resulted in cost-effective HMRs compared to referrals that did not (37). The VALMER study concluded that targeting HMRs towards high-risk and high-cost consumers may also improve cost-effectiveness of the programme. However, the specific determinants of cost-effective HMRs remain unknown (33)

Regarding other economic studies, reductions in medication and/or health services costs were found in four studies (12, 19, 23, 36). No significant reductions in medication or health service costs were found in two studies (15, 34). On the basis of these studies, it was not possible to determine which HMR model was most cost-effective.

Rigorous health economic analyses are urgently required to determine which characteristics of the current HMR programme have the largest impact on economic outcomes.

Conclusions

In our literature search we identified no alternatively-named international models of medication review that are entirely consistent with the current Australian HMR model. We could find no models that specifically excluded particular patient or disease groups.

We identified no robust research directly comparing the benefits of HMR or equivalent models in different patient groups. We identified a considerable body of evidence on which patient groups benefit from a HMR in Australia, but no evidence that allows a clear ranking of who benefits most.

Based on the available evidence it is not possible to conclusively document the characteristics of cost-effective HMR or equivalent models. Rigorous health economic analyses are urgently required to determine which characteristics of the current HMR programme have the largest impact on economic outcomes.

Abbreviations

Abbreviation	Description
CALD	Culturally and linguistically diverse
CMM	Comprehensive medicines management
HMA	Healthcare management Advisors
HMR	Home medicine review
GP	General practitioner
MMR	Medication management review
MTA	Medication therapy assessment
MUR	Medicine use review
NP	Nurse practitioner
NZ	New Zealand
OTC	Over the counter
PMR	Personal medication record
UK	United Kingdom
USA	United States of America
RCT	Randomised controlled trial

References

References
Clyne W, Blenkinsopp A, Seal R. A Guide to Medication Review2008 5 June 2014. Available from: http://www.npc.nhs.uk/review_medicines/intro/resources/agtmr_web1.pdf
Hatah E, Braund R, Tordoff J, Duffull SB. A systematic review and meta-analysis of pharmacist-led fee-for-services medication review. Br J Clin Pharmacol. 2014 Jan;77(1):102-15. PubMed PMID: 23594037. Pubmed Central PMCID: PMC3895351. eng.
Bulajeva A, Labberton L, Leikola S, Pohjanoksa-Mantyla M, Geurts MM, de Gier JJ, et al. Medication review practices in European countries. Res Social Adm Pharm. 2014 Feb 24. PubMed PMID: 24661800. Epub 2014/03/26. Eng
Barker A, Barlis P, Berlowitz D, Page K, Jackson B, Lim WK. Pharmacist directed home medication reviews in patients with chronic heart failure: a randomised clinical trial. International Journal of Cardiology. 2012;159(2):139-43.
Bollella G, Angley MT, Pink JA, Caird CJ, Goldsworthy SJ. Optimal Level of Liaison Pharmacist Intervention to Facilitate a Post-discharge Home Medicines Review. Journal of Pharmacy Practice and Research. 2008 Jun 2008;38(2):107-10.
Angley M, Ponniah AP, Spurling LK, Sheridan L, Colley D, Nooney VB, et al. Feasibility and timeliness of alternatives to post-discharge home medicines reviews for high-risk patients. Journal of Pharmacy Practice and Research. 2011;41(1):27-32.
Lovgren S, Clark RA, Angley M, Ponniah AP, Colley D, Shakib S. Timeliness and clinical impact of hospital-initiated medication reviews. Journal of Pharmacy Practice and Research. 2009;39(4):269-73.
Ponniah A, Shakib S, Doecke CJ, Boyce M, Angley M. Post-discharge medication reviews for patients with heart failure: a pilot study. Pharmacy World & Science. 2008 Dec;30(6):810-5.
Naunton M, Peterson GM. Evaluation of home-based follow-up of high-risk elderly patients discharged from hospital. Journal of Pharmacy Practice and Research. 2003;33(3):176-82.
Freeman C, Cottrell WN, Kyle G, Williams I, Nissen L. Does a primary care practice pharmacist improve the timeliness and completion of medication management reviews? Int J Pharm Pract. 2012 Dec;20(6):395-401.
Freeman CR, Cottrell WN, Kyle G, Williams ID, Nissen L. An evaluation of medication review reports across different settings. Int J Clin Pharm. 2013 Feb;35(1):5-13.
Bonner CJ, Watson PG. Therapeutic housekeeping. A case study involving collaboration between a medical practitioner and a clinical pharmacist in a medication management programme for elderly patients. Journal of Social and Administrative Pharmacy. 2001;18(3):97-102.
Tan EC, Stewart K, Elliott RA, George J. Pharmacist consultations in general practice clinics: the Pharmacists in Practice Study (PIPS). Res Social Adm Pharm. 2013 Oct 1
Elliott RA, Martinac G, Campbell S, Thorn J, Woodward MC. Pharmacist-led medication review to identify medication-related problems in older people referred to an aged care assessment team. Drugs & Aging. 2012;29(7):593-605.
Harris A, Gospodarevskaya E, Callaghan J, Story I. The cost effectiveness of a pharmacist reviewing medication among the elderly in the community. Australasian Journal on Ageing. 2001;20(4):179-86.
Gisev N, Bell JS, O'Reilly CL, Rosen A, Chen TF. An expert panel assessment of comprehensive medication reviews for clients of community mental health teams. Soc Psychiatry Psychiatr Epidemiol. 2010 Nov;45(11):1071-9.
Bell JS, Rosen A, Aslani P, Whitehead P, Chen TF. Developing the role of pharmacists as members of community mental health teams: perspectives of pharmacists and mental health professionals. Res Social Adm Pharm. 2007 Dec;3(4):392-409.
Hussainy SY, Box M, Scholes S. Piloting the role of a pharmacist in a community palliative care multidisciplinary team: an Australian experience. BMC Palliative Care. 2011;10.
Bennett A, Smith C, Chen TF, Johnsen S, Hurst R. A comparative study of two collaborative models for the provision of domiciliary medication review: St George Canterbury Medico/Pharmacy Project Final Report. Faculty of Pharmacy, University of Sydney and St George Division of General Practice, 2000

Chen TF, Crampton M, Krass I, Benrimoj SI. Collaboration between community pharmacists and GPs - impact on interprofessional communication. Journal of Social and Administrative Pharmacy. 2001;18(3):83-90.

Graffen M, Kennedy D, Simpson M. Quality use of medicines in the rural ambulant elderly: a pilot study. Rural and Remote Health. 2004 (3).

Gilbert AL, Roughead EE, Beilby J, Mott K, Barratt JD. Collaborative medication management services: improving patient care. Med J Aust. 2002 Aug 19;177(4):189-92.

Krass I, Smith C. Impact of medication regimen reviews performed by community pharmacists for ambulatory patients through liaison with general medical practitioners. Int J Pharm Pract. 2000;8(2):111-20.

Bell JS, Aslani P, McLachlan AJ, Whitehead P, Chen TF. Mental health case conferences in primary care: content and treatment decision making. Res Social Adm Pharm. 2007 Mar;3(1):86-103.

Krass I, Taylor SJ, Smith C, Armour CL. Impact on medication use and adherence of Australian pharmacists' diabetes care services. Journal of the American Pharmacists Association: JAPhA. 2005 Jan-Feb;45(1):33-40.

Community pharmacy medicines use review (MUR) service: guidance for conducting MURs2013 5 June 2014. Available from: http://www.hscbusiness.hscni.net/pdf/Guidance_for_conducting_MURs_v1r2.pdf.

Medication therapy management in pharmacy practice: core elements of an MTM service model. Version 2.0. J Am Pharm Assoc (2003). 2008 May-Jun;48(3):341-53. PubMed PMID: 18595820. Epub 2008/07/04. eng.

Medicare prescription drug benefit manual. Chapter 6 - Part D drugs and formulary requirements. Rev. 102010 5 June 2014. Available from: https://www.cms.gov/Medicare/Prescription-Drug-Coverage/PrescriptionDrugCovContra/downloads/Chapter6.pdf

The MedsCheck programme guidebook. 2nd ed.2008 5 June 2014. Available from: http://www.health.gov.on.ca/english/providers/pub/drugs/meds_check/pdf/meds_guide_20080725.pdf.

Group DPA. New Zealand national pharmacist services framework. Version 12007.

Campbell Research & Consulting. Home Medicines Review Program, Qualitative Research Project2008 25 Feb 2014. Available from: http://www.health.gov.au/internet/main/publishing.nsf/Content/D341DA146481106ACA257BF00020A7CD/$File/HMR%20Final%20Report.pdf

Urbis Keys Young. Evaluation of the Home Medicines Review Program - Pharmacy Component2005 25 Feb 2014. Available from: http://beta.guild.org.au/uploadedfiles/Medication_Management_Reviews/Overview/Urbis%20Keys%20Young%20evaluation.pdf

Stafford A, Tenni P, Peterson G, Doran C, Kelly W. VALMER (the Economic Value of Home Medicines Review)2009 25 Feb 2014. Available from: http://guild.org.au/docs/default-source/public-documents/services-and-programs/research-and-development/Fourth-Agreement-R-and-D/IIG-021/final-report.pdf?sfvrsn=0.

Sorensen L, King MA, Peck R, Roberts MS. In-home medication reviews for war veterans: early experience in Australia. Journal of Pharmacy Practice and Research. 2004;34(2):122-4.

Sorensen L, Stokes JA, Purdie DM, Woodward M, Elliott R, Roberts MS. Medication reviews in the community: results of a randomized, controlled effectiveness trial. British Journal of Clinical Pharmacology. 2004;58(6):648-64.

Quality use of medicines in the community implementation trial. Report to the Department of Health and Aged Care. University of South Australia and University of Adelaide, 2000.

Stafford A. A clinical and economic evaluation of medication reviews conducted by pharmacists for community-dwelling Australians [PhD Thesis]: University of Tasmania; 2012.

Appendix D: Pharmacist-led medication review in community settings: an overview of systematic reviews

Abstract

Objective: To critically evaluate published systematic reviews relevant to pharmacist-led medication reviews in community settings.

Design: MEDLINE, EMBASE, International Pharmaceutical Abstracts (IPA), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and the Cochrane Database of Systematic Reviews (CDSR) were searched between 1995 and November 2013. Systematic reviews of all study designs and outcomes were considered. The quality of relevant systematic reviews was assessed using the 11-item Assessment of Multiple Systematic Reviews (AMSTAR) tool. Systematic reviews of moderate or high quality (AMSTAR ≥4) were included in the data synthesis. Data extraction was performed independently by two reviewers.

Setting: Pharmacist-led medication reviews in community settings.

Results: The search identified 32 systematic reviews related to pharmacist-led medication reviews in community settings. Of these, 22 were of moderate and 6 of high quality and included in the data synthesis. Meta-analysis was performed in 10 systematic reviews. Multiple meta-analyses suggested positive impacts on glycosylated haemoglobin, blood pressure, cholesterol, and number and appropriateness of medications. Conflicting findings were reported in relation to hospitalisation, with two meta-analyses reporting no impact of pharmacist-led medication review on hospitalisation and another reporting reduced hospitalisation among recipients of 'clinical medication reviews' but not 'adherence reviews'. No meta-analyses reported pharmacist-led medication review was associated with reduced mortality. A single meta-analysis reported rates of recommendation implementation were associated with the number of collaborative elements in the medication review model. Another single meta-analysis highlighted the value of pharmacist interventions when pharmacists and GPs were co-located. There was insufficient evidence to draw conclusions in relation to specific referral and eligibility parameters being potentially associated with more positive review outcomes.

Conclusion: Moderate and high quality systematic reviews support the value of pharmacist-led medication review for a range of clinical outcomes. There is minimal evidence from systematic reviews in relation to the optimal eligibility and referral criteria.

Key-words: drug-related side effects and adverse reactions, medication therapy management, community pharmacy services, pharmacists, systematic review, inappropriate prescribing.

Key points

- Moderate and high quality systematic reviews suggest pharmacist-led medication review is associated with a range of improved clinical outcomes, particularly for patients with diabetes and cardiovascular disease. However, possible benefits in less extensively studied therapeutic areas cannot be excluded.
- Pharmacist-led medication reviews appear most effective when conducted in collaboration with general medical practitioners.
- There is insufficient evidence to draw conclusions in relation to specific referral and eligibility parameters being potentially associated with more positive review outcomes.

Adverse drug events (ADEs) are a leading cause of preventable morbidity and mortality. In a three month period up to 12% of the general adult population experience an ADE and six percent an effect of sub-therapeutic medication treatment.[1] Each year more than 700,000 people are admitted to United States emergency departments as a consequence of ADEs, with those aged 65 years or older nearly seven times more likely to be hospitalised than younger individuals.[2] In Australia, up to 190,000 hospitalisations each year are medication-related.[3, 4] This represents up to 30% of unplanned hospital admissions in people aged 75 years and older, and up to three-quarters of these hospitalisations are considered potentially preventable.[5]

The value of a multidisciplinary approach to preventing ADEs is widely acknowledged. Collaboration and teamwork between patients, general medical practitioners and pharmacists is important to achieving the safe and effective use of medications.[6, 7] Pharmacist-led medication review is a service in which a pharmacist assesses a patient's medication regimen to identify and suggest strategies for resolving medication-related issues. The term 'medication review' is an umbrella term used to describe a range of cognitive services of varying breadth and intensity, ranging from 'prescription review' to 'clinical medication review'.[8] Pharmacists are remunerated to conduct medication reviews in countries including Australia, New Zealand, United Kingdom and United States of America.[8-11] Models of pharmacist-led medication review in community or residential aged care settings have also been developed or are under development in several European countries.[12-14]

Although pharmacist-led medication review is a widely researched service, interpreting evidence in relation to pharmacist-led medication review is challenging. This is because medication review is a complex and multifactorial intervention provided across a range of different settings.[15] The success of medication review is also likely to be context specific. There are an increasing number of systematic reviews relevant to medication review. One approach to compare and contrast the findings of separate systematic reviews to inform clinical and policy decision making is to conduct an overview of systematic reviews.[16] This involves producing a summary of evidence from multiple systematic reviews of different interventions, outcomes and populations.

Two previous overviews of systematic reviews of pharmacist-led cognitive services have been published. Saez-Benito et al evaluated 14 systematic reviews and one meta-analysis of pharmacist-led services for older people from 1942 to 2011.[17] Melchiors et al evaluated 31 systematic reviews of pharmacist-led services from 1990 to 2009.[18] Both evaluations reported moderate quality evidence to support the benefit of pharmacist-led interventions. However, neither publication focused on medication reviews. Moreover, these overviews did not consider recent systematic reviews of pharmacist-led medication review. The objective of this overview was to critically evaluate published systematic reviews on pharmacist-led medication reviews in community settings.

Methods

Protocol

The protocol was presented and endorsed at a face-to-face meeting of representatives of health professional and consumer groups in Canberra, Australia, in November 2013. For the purpose of the overview, pharmacist-led medication reviews were defined as a 'systematic assessment of a consumer's medications and the management of those medications, with the aim of optimising consumer health outcomes and identifying potential medication-related issues within the framework of the quality use of medicines'. This definition is the Pharmaceutical Society of Australia definition of 'Home Medicines Review'(HMR),[19] and is synonymous with 'clinical medication review' in the United Kingdom.[8] Reviews were considered to be systematic if they provided an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes and study design; described data sources and search dates; and described the study selection process. This definition of a systematic review was adapted from previous research on pharmacist-led interventions.[17, 20]

Search Strategy

MEDLINE, EMBASE, International Pharmaceutical Abstracts (IPA), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and the Cochrane Database of Systematic Reviews (CDSR) were searched for studies published between 1995 and November 2013.

In MEDLINE and CDSR, Medical Subject Headings (MeSH) and truncated keywords related to pharmacy ("community pharmacy services" [MeSH] or "pharmaceutical services" [MeSH] or "pharmacist*") and medication management ("medication therapy management" [MeSH] or "drug utilization review" [MeSH] or "medication errors" [MeSH] or "drug regimen review*" or

"med* review*") were combined. To identify review articles, the truncated keywords "systematic review*" or "literature review*" or "review*" [Title] were combined with the Boolean operator 'AND' in the command-line search. In EMBASE, the Emtree subject headings "pharmacy", "pharmaceutical care" and "drug use" were used in place of "community pharmacy services", "pharmaceutical services" and "drug utilization review". The keywords "medication review" or "medicine review" or "medication management review", supplemented with pluralisation, were added instead of "med* review*" as truncation within phrases is not possible using this database. In IPA, the subject headings "drug utilization; evaluation", "community service" and "pharmaceutical care" replaced "medication therapy management", "community pharmacy services" and "pharmaceutical services". In CINAHL, the subject headings "pharmacy service", "medication management" and "drug utilization" replaced "community pharmacy services", "medication therapy management" and "drug utilization review".

The search was limited to English language only and review as a publication type in all databases. A keyword search via PubMed was conducted to identify additional articles not yet indexed into MEDLINE and reference lists of included papers were screened for relevant reviews. See Figure 1 for search strategy workflow.

Study selection

Outpatient, ambulatory and specialist clinics were defined as community settings because these clinics provide services to people who live independently in the community. Reviews were excluded if a pharmacist was not involved in the delivery of the intervention, the intervention related primarily to the provision of education or the intervention was delivered to hospital inpatients or in residential aged care settings. Systematic reviews of all study designs and outcome measures were considered.

All titles and abstracts were screened independently by two investigators and included if they met the pre-defined inclusion criteria. The full text copies of potentially relevant papers were obtained and independently reviewed by two investigators for possible inclusion. Any disagreements or uncertainties between investigators were resolved by discussion with a third investigator. Systematic reviews were eligible for inclusion if they reviewed one or more original research studies involving pharmacist-led medication reviews in community settings.

Quality assessment

Systematic reviews were independently assessed for methodological quality by two investigators using the 11-item Assessment of Multiple Systematic Reviews (AMSTAR) tool.[21] The AMSTAR tool has established reliability and validity for assessing systematic reviews of health interventions.[22] Where total AMSTAR scores differed between investigators, a total consensus score was reached by discussion. Systematic reviews of moderate (consensus AMSTAR score 4-7) and high quality (consensus AMSTAR score 8-11) were included in the subsequent data synthesis. Inter-observer agreement was assessed with weighted kappa coefficient for each item and the total AMSTAR score using MedCalc Statistical Software (Version 12.7.8).[23] The intra-class correlation coefficient (ICC) was calculated for the AMSTAR total score using Statistical Package for the Social Sciences Version 21 (SPSS, Chicago, IL).

Data extraction and synthesis

Data extraction was performed independently by two investigators using a standardised data extraction tool. The tool was pilot tested for face-validity prior to use and refined accordingly. Data extracted included the number of relevant studies, study design, setting, population, outcomes and conflicts of interest. Statistically significant (defined as $p<0.05$) clinical, humanistic and economic outcomes of relevant original studies included in each systematic review were reported over the total number of studies which evaluated that outcome. Clinical outcomes were defined as medical events that occur as a result of disease or treatment; humanistic outcomes were defined as functional status, health status or quality of life; and economic outcomes were defined as total costs of medical care associated with treatment alternatives balanced against clinical or humanistic outcomes.[24] Any discrepancies in data extraction were resolved by discussion between the two investigators. Quantitative synthesis of the extracted data was not performed due to the heterogeneity of interventions, designs and contexts of studies included in the systematic reviews. Results were informally pooled to determine the number of individual and unique studies reporting each outcome and the number of unique studies reporting significant outcomes. When a systematic review included a meta-analysis, the number of studies included in the meta-analysis that were specific to pharmacist-led medication review was extracted.

Results

The search identified 32 systematic reviews related to pharmacist-led medication reviews in community settings (Figure 1). The inter-observer agreement of the individual items within the AMSTAR scale was high with a mean kappa of 0.71 (95% CI:

0.59, 0.82) (Table 1). AMSTAR items three, seven and nine had fair to moderate inter-observer agreement at 0.37, 0.52 and 0.58 respectively. The weighted kappa coefficient for the total AMSTAR score showed substantial agreement at 0.75 (95% CI: 0.64, 0.86). The inter-observer ICC of the total score was also high (0.91 [95% CI: 0.79, 0.95]). Of the 32 systematic reviews, 6 were assessed as poor quality, 22 of moderate quality,[25-46] and six of high quality (Table 1).[47-52] The 28 moderate and high quality systematic reviews were included in the overview.

The 28 systematic reviews included a total of 719 studies of which 388 were related to pharmacist-led medication review. All 28 systematic reviews summarised the characteristics of the included studies and most (91%) used a comprehensive search strategy (Table 2). However, few systematic reviews provided evidence that the research question and inclusion criteria were established prior to conducting the review (9%), and no reviews included conflict of interest statements for individual studies within the systematic review.

All but one systematic review focused on reporting clinical and medication-related outcomes associated with pharmacist-led medication reviews (Table 3). Thirteen of the 28 systematic reviews reported favourable changes in medication and/or health care costs associated with pharmacist-led medication reviews.

When considering all 28 systematic reviews, the largest numbers of individual studies with favourable outcomes were for diabetes control (28/34 [82%], cholesterol (11/15 [73%]), medication adherence (20/32 [63%]), blood pressure control (16/27 [59%]), and medication management (29/57 [51%]) (Table 4). All five studies on anticoagulation and asthma/COPD management reported favourable outcomes (5/5 [100%]).

A meta-analysis was performed in 10 systematic reviews.[38, 41, 42, 44, 45, 47-49, 51, 52] Meta-analyses suggested positive impacts on glycosylated haemoglobin,[42, 45] blood pressure,[38, 44, 45] cholesterol,[38, 44, 45] cardiovascular risk,[45] and number and appropriateness of medications.[47, 49]

All these meta-analyses included predominantly studies of pharmacist-led medication review, with the exception of Patterson et al.[49], in which only 2/5 studies that reported changes in the number of medications were specific to medication review.

Meta-analyses reported conflicting findings in relation to hospitalisation.[38, 47, 51] One meta-analysis reported that 'clinical medication reviews' but not 'adherence reviews' reduced unplanned hospitalisations.[38] However, two other meta-analyses suggested no impact of pharmacist-led medication review on hospitalisation (11/17 medication review studies in meta-analysis;[47] 9/9 medication review studies in meta-analysis[51]). We found no meta-analysis that reported pharmacist-led medication review was associated with reduced mortality.

One meta-analysis reported rates of recommendation implementation were associated with the number of collaborative elements in the medication review model (clinical pharmacy experience, patient's own pharmacist, access to medical records, patient interview, referral by GP, case conference between GP and pharmacist, action plan and follow-up).[41] Another meta-analysis highlighted the value of pharmacist interventions when pharmacists and GPs were co-located (9/11 studies for blood pressure, 5/5 studies for HbA1c, 3/3 studies for cholesterol and 2/2 studies for cardiovascular risk were medication review studies).[45]

Discussion

To our knowledge this is the first overview of systematic reviews related to pharmacist-led medication review. The overview included 28 systematic reviews of moderate and high quality. Collectively these data suggest medication reviews are a successful strategy to improve clinical outcomes across a range of medical conditions. Most systematic reviews did not describe components of the medication review process in each of the individual studies evaluated. There is minimal evidence from systematic reviews in relation to the optimal eligibility and referral criteria.

Most of the included reviews were of moderate quality (AMSTAR scores 4-7). This finding was consistent with both Saez-Benito et al,[17] and Melchiors et al.[18] Contrary to our expectations, the methodological quality of systematic reviews did not increase over time. The reviews with the highest AMSTAR ratings (AMSTAR scores 8-11) were Nkansah et al 2010,[48] Patterson et al 2010,[49] and Smith et al 2012.[50] These reviews were all Cochrane reviews. Overall, the most frequent methodological shortcomings were (i) rarely providing a list or link to the excluded studies, (ii) infrequently assessing the likelihood of publication bias, and (iii) not providing evidence that the research question and inclusion criteria were established prior to conducting the review. Protocols for Cochrane reviews are registered, peer-reviewed and published in advance, but this remains rare when publishing systematic reviews in other journals.[53] This meant that the first criterion of the AMSTAR scale was rarely met. Conflict of interest statements were often provided for the overall systematic review but not for each of the individual studies included in the systematic review.

The findings of our overview were consistent with those of Saez-Benito et al. who reported that there is evidence for pharmacists' interventions being associated with improvements in medication management.[17] As reported in Saez-Benito et al, we found conflicting evidence for an effect on hospitalisation. Interestingly, in Hatah et al. 'clinical medication review' (which was synonymous with HMR in Australia) was associated with reduced hospitalisation whereas adherence review (a less intensive form of medication review) was not.[38] Epidemiological analyses conducted using Australian Government Department of Veterans' Affairs administrative claims data demonstrate that HMR is associated with significantly reduced rates of hospitalisation for people with heart failure and taking warfarin.[54, 55] It is likely that most individual studies included in the systematic reviews were inadequately powered to detect an effect on mortality. However, inclusion of these studies in meta-analyses also demonstrated no effect on mortality. It must be recognised that a pharmacist-led medication review is only one component of a multi-faceted patient care system and consequently demonstrating impacts on mortality are challenging even in the context of effective interventions.

Impacts on cardiovascular disease and diabetes were the most frequently reported clinical outcomes. Pharmacist services in these therapeutic areas may be particularly valuable because warfarin, insulin, oral antiplatelets and oral hypoglycemics are implicated in up to two-thirds of hospitalisations linked to ADEs.[56] This focus may reflect the contribution of these chronic conditions to the overall burden of disease, the relative ease of assessing these surrogate outcomes (i.e. HbA1c, blood pressure), the targeting of medication review services to these conditions, and interest of pharmacist researchers in these therapeutic areas.

It cannot be excluded that there is considerable benefit in other therapeutic areas which have been less extensively studied. All studies included in the systematic reviews that reported the possible benefits of pharmacist-led medication review for anticoagulation and asthma/COPD reported significant benefits, although relatively few studies were conducted in this therapeutic area.[31, 36, 38, 48] By interpolation, patient groups with a high prevalence of medication-related problems should benefit from pharmacist-led medication reviews. The number of medication-related problems identified by pharmacists is highest when reviews are targeted to those prone to medication-related problems, including those with mental illness and cardiovascular disease.[57] Although medication management issues are highly prevalent among people with cognitive impairment,[58] intellectual disabilities,[59] and mental illness,[60] people with these conditions are frequently excluded from participation in clinical studies. There remains relatively little research on pharmacist-led medication management initiatives for people with these conditions. There is evidence to support the value of pharmacists' services for people with mental illness in inpatient settings.[61] However, it is unclear to what extent this evidence is generalisable to pharmacist-led medication review in community settings.

Few systematic reviews addressed issues specific to the medication review process itself. Kwint et al. reported that collaborative elements of the medication review process, which included a case conference, action plan and follow-up, were associated with higher rates of recommendation implementation.[41] This is an important finding because key early Australian controlled trials that demonstrated the value of HMR included these elements.[62, 63] A Dutch study highlighted the benefits of face-to-face 'case conference' communication between pharmacists and GPs as part of medication reviews, although suggested case conferences may be reserved for complex patient cases.[64] Another systematic review highlighted the value of pharmacist interventions when pharmacists and GPs were co-located, although no comparison was made to interventions when pharmacists were not co-located.[45] Process aspects were partially addressed in Hatah et al. who extracted information regarding pharmacists' access to clinical notes and the setting in which the medication reviews were conducted.[38] However, there remains a paucity of evidence in relation to which elements of medication review processes are central to achieving optimal health outcomes. Authors of future systematic reviews may choose to include alternative study designs in addition to controlled studies (e.g. qualitative and survey research). It has been acknowledged that evaluation of complex health interventions requires both quantitative and qualitative evidence.[15]

Half of the systematic reviews (n=13) described changes in the health care costs and/or medication costs. One-quarter of original research studies reported significant cost reductions. It is important to consider differences in health care systems between regions and countries when interpreting these results. More rigorous cost analyses are needed to determine the impact of medication review on economic outcomes.

Strengths and limitations

We undertook a comprehensive overview of systematic reviews relevant to pharmacist-led medication review. The overview was not limited to specific outcome measures. The quality of systematic reviews was evaluated using the AMSTAR tool. The AMSTAR items were rated independently by two investigators. The fair-to-moderate kappa coefficient for items 3, 7 and 9 may reflect some ambiguity in the wording of these items. The authors of the AMSTAR tool have acknowledged that

subjective judgment is necessary when assessing whether or not the quality of included studies was adequately assessed.[22] Some but not all systematic reviews we overviewed assessed the quality of studies used validated quality assessment tools. It is also possible that the importance of specific items within the AMSTAR tool is dependent on the subject material being reviewed. For example, the inclusion of a conflict of interest statement for each individual study may be particularly important for pharmaceutical company sponsored clinical trials. Authors' conflicts of interest in health services research have attracted less attention.

The systematic reviews described medication review interventions performed in a range of settings and countries. It proved challenging to compare outcomes given the heterogeneity of interventions, designs and contexts. It is likely that the success of the medication review process is partly dependent on contextual factors that were either very briefly or not reported in each of the individual studies. While all reviews included in our overview addressed pharmacist-led medication review, less than half of the reviews were specifically focused on pharmacist-led medication review. We have noted in our results section when meta-analyses included both medication review and non-medication review studies.

We assessed whether or not authors of the systematic reviews considered publication bias, although we did not assess whether there was a bias related to the publication of the systematic reviews themselves. There is some evidence that published systematic reviews may be biased towards inclusion of 'positive findings'.[53, 65]

Conclusion

Moderate and high quality systematic reviews support the value of pharmacist-led medication review for a range of clinical outcomes. There is minimal evidence from systematic reviews in relation to the optimal eligibility and referral criteria.

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Conflict of interests

All authors are pharmacists employed at academic institutions or public hospitals. No author has a direct financial interest in the delivery of Home Medicines Review in Australia.

References

1. Hakkarainen KM, Gyllensten H, Jönsson AK, et al. Prevalence, nature and potential preventability of adverse drug events - A population-based medical record study of 4970 adults. British Journal of Clinical Pharmacology 2013; Epub ahead of print Dec 25: DOI 10.1111/bcp.12314.
2. Budnitz DS, Pollock DA, Weidenbach KN, et al. National surveillance of emergency department visits for outpatient adverse drug events. JAMA 2006; 296: 1858-1866.
3. Roughead EE, Semple SJ. Medication safety in acute care in Australia: Where are we now? Part 1: A review of the extent and causes of medication problems 2002-2008. Australia and New Zealand Health Policy 2009; 6: 18.
4. Kalisch LM, Caughey GE, Barratt JD, et al. Prevalence of preventable medication-related hospitalizations in Australia: an opportunity to reduce harm. International Journal for Quality in Health Care 2012; 24: 239-249.
5. Runciman WB, Roughead EE, Semple SJ, et al. Adverse drug events and medication errors in Australia. International Journal for Quality in Health Care 2003; 15(Suppl1): i49-59.
6. Rigby D. Collaboration between doctors and pharmacists in the community. Australian Prescriber 2010; 33: 191-193.
7. Francis C. PriceWaterhouseCoopers. Professional Collaboration. Available from: <http://www.5cpa.com.au/initiatives-programs/research-and-development/fifth-agreement/rft2010-11-05-professional-collaboration> Accessed February 3, 2014
8. Blenkinsopp A, Bond C, Raynor DK. Medication reviews. British Journal of Clinical Pharmacology 2012; 74: 573-580.
9. Lee E, Braund R, Tordoff J. Examining the first year of Medicines Use Review services provided by pharmacists in New Zealand. New Zealand Medical Journal 2008; 122: 3566.
10. Ramalho de Oliveira D, Brummel AR, Miller DB. Medication therapy management: 10 years of experience in a large integrated health care system. Journal of Managed Care Pharmacy 2010; 16: 185-195.
11. Benrimoj SI, Roberts AS. Providing patient care in community pharmacies in Australia. Annals of Pharmacotherapy 2005; 39: 1911-1917.
12. Leikola S, Tuomainen L, Peura S, et al. Comprehensive medication review: Development of a collaborative procedure. International Journal of Clinical Pharmacy 2012; 34: 510-514.
13. Granas AG, Berg C, Hjellvik V, et al. Evaluating categorisation and clinical relevance of drug-related problems in medication reviews. Pharmacy World & Science 2010; 32: 394-403.
14. Verrue C, Mehuys E, Boussery K, et al. A pharmacist-conducted medication review in nursing home residents: impact on the appropriateness of prescribing. Acta Clinica Belgica 2012; 67: 423-429.
15. Campbell M, Fitzpatrick R, Haines A, et al. Framework for design and evaluation of complex interventions to improve health. British Medical Journal 2000; 321: 694-696.
16. Smith V, Devane D, Begley CM, et al. Methodology in conducting a systematic review of systematic reviews of healthcare interventions. BMC Medical Research Methodology 2011; 11: 15.
17. Saez-Benito L, Fernandez-Llimos F, Feletto E, et al. Evidence of the clinical effectiveness of cognitive pharmaceutical services for aged patients. Age & Ageing 2013; 42: 442-449.
18. Melchiors AC, Correr CJ, Venson R, et al. An analysis of quality of systematic reviews on pharmacist health interventions. International Journal of Clinical Pharmacy 2012; 34: 32-42.
19. Pharmaceutical Society of Australia. Professional Practice Standards. Version 4. Available from: <https://www.psa.org.au/download/standards/professional-practice-standards-v4.pdf> Accessed November 11, 2013
20. Moher D, Liberati A, Tetzlaff J, et al. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. BMJ 2009; 339: b2535.
21. Shea BJ, Grimshaw JM, Wells GA, et al. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. BMC Medical Research Methodology 2007; 7: 10.
22. Shea BJ, Hamel C, Wells GA, et al. AMSTAR is a reliable and valid measurement tool to assess the methodological quality of systematic reviews. Journal of Clinical Epidemiology 2009; 62: 1013-1020.
23. Gisev N, Bell JS, Chen TF. Interrater agreement and interrater reliability: key concepts, approaches, and applications. Research In Social & Administrative Pharmacy 2013; 9: 330-338.
24. Kozma CM, Reeder CE, Schulz RM. Economic, clinical, and humanistic outcomes: a planning model for pharmacoeconomic research. Clinical Therapeutics 1993; 15: 1121-1132.

25. Altowaijri A, Phillips CJ, Fitzsimmons D. A Systematic Review of the Clinical and Economic Effectiveness of Clinical Pharmacist Intervention in Secondary Prevention of Cardiovascular Disease. Journal of Managed Care Pharmacy 2013; 19: 408-416.
26. Bayoumi I, Howard M, Holbrook AM, et al. Interventions to improve medication reconciliation in primary care. Annals of Pharmacotherapy 2009; 43: 1667-1675.
27. Bell S, McLachlan AJ, Aslani P, et al. Community pharmacy services to optimise the use of medications for mental illness: A systematic review. Australia and New Zealand Health Policy 2005; 2: 29.
28. Blenkinsopp A, Hassey A. Effectiveness and acceptability of community pharmacy-based interventions in type 2 diabetes: a critical review of intervention design, pharmacist and patient perspectives. International Journal of Pharmacy Practice 2005: 231-240.
29. Cai H, Dai H, Hu Y, et al. Pharmacist care and the management of coronary heart disease: a systematic review of randomized controlled trials. BMC Health Services Research 2013; 13: 461.
30. Castelino RL, Bajorek BV, Chen TF. Targeting Suboptimal Prescribing in the Elderly: A Review of the Impact of Pharmacy Services. Annals of Pharmacotherapy 2009; 43: 1096-1106.
31. Costello I, Wong ICK, Nunn AJ. A literature review to identify interventions to improve the use of medicines in children. Child: Care, Health & Development 2004; 30: 647-665.
32. Ellitt GR, Brien JA, Aslani P, et al. Quality patient care and pharmacists' role in its continuity - a systematic review. Annals of Pharmacotherapy 2009; 43: 677-691.
33. Evans CD, Watson E, Eurich DT, et al. Diabetes and Cardiovascular Disease Interventions by Community Pharmacists: A Systematic Review. Annals of Pharmacotherapy 2011; 45: 615-628.
34. Fish A, Watson MC, Bond CM. Practice-based pharmaceutical services: A systematic review. International Journal of Pharmacy Practice 2002; 10: 225-233.
35. George J, Elliott RA, Stewart DC. A systematic review of interventions to improve medication taking in elderly patients prescribed multiple medications. Drugs & Aging 2008; 25: 307-324.
36. Geurts MM, Talsma J, Brouwers JR, et al. Medication review and reconciliation with cooperation between pharmacist and general practitioner and the benefit for the patient: a systematic review. British Journal of Clinical Pharmacology 2012; 74: 16-33.
37. Hanlon JT, Lindblad CI, Gray SL. Can clinical pharmacy services have a positive impact on drug-related problems and health outcomes in community-based older adults? American Journal Geriatric Pharmacotherapy 2004; 2: 3-13.
38. Hatah E, Braund R, Tordoff J, et al. A systematic review and meta-analysis of pharmacist-led fee-for-services medication review. Br J Clin Pharmacol 2014; 77: 102-115.
39. Kaur S, Mitchell G, Vitetta L, et al. Interventions that can Reduce Inappropriate Prescribing in the Elderly A Systematic Review. Drugs & Aging 2009; 26: 1013-1028.
40. Kucukarslan SN, Hagan AM, Shimp LA, et al. Integrating medication therapy management in the primary care medical home: A review of randomized controlled trials. American Journal of Health-System Pharmacy 2011; 68: 335-345.
41. Kwint HF, Bermingham L, Faber A, et al. The relationship between the extent of collaboration of general practitioners and pharmacists and the implementation of recommendations arising from medication review: A systematic review. Drugs & Aging 2013; 30: 91-102.
42. Machado M, Bajcar J, Guzzo GC, et al. Sensitivity of patient outcomes to pharmacist interventions. Part 1: Systematic review and meta-analysis in diabetes management. Annals of Pharmacotherapy 2007; 41: 1569-1582.
43. Rollason V, Vogt N. Reduction of polypharmacy in the elderly - A systematic review of the role of the pharmacist. Drugs & Aging 2003; 20: 817-832.
44. Santschi V, Chiolero A, Burnand B, et al. Impact of Pharmacist Care in the Management of Cardiovascular Disease Risk Factors A Systematic Review and Meta-analysis of Randomized Trials. Archives of Internal Medicine 2011; 171: 1441-1453.
45. Tan EC, Stewart K, Elliott RA, et al. Pharmacist services provided in general practice clinics: A systematic review and meta-analysis. Research In Social & Administrative Pharmacy 2013; Epub ahead of print Oct 22: DOI 10.1016/j.sapharm.2013.1008.1006.
46. Tjia J, Velten SJ, Parsons C, et al. Studies to reduce unnecessary medication use in frail older adults: a systematic review. Drugs & Aging 2013; 30: 285-307.

47. Holland R, Desborough J, Goodyer L, et al. Does pharmacist-led medication review help to reduce hospital admissions and deaths in older people? A systematic review and meta-analysis. British Journal of Clinical Pharmacology 2008; 65: 303-316.
48. Nkansah N, Mostovetsky O, Yu C, et al. Effect of outpatient pharmacists' non-dispensing roles on patient outcomes and prescribing patterns. Cochrane Database of Systematic Reviews 2010; 7: CD000336.
49. Patterson SM, Hughes C, Kerse N, et al. Interventions to improve the appropriate use of polypharmacy for older people. Cochrane Database of Systematic Reviews 2012; 5: CD008165.
50. Smith SM, Soubhi H, Fortin M, et al. Interventions for improving outcomes in patients with multimorbidity in primary care and community settings. Cochrane Database of Systematic Reviews 2012; 4: CD006560.
51. Thomas R, Huntley AL, Mann M, et al. Pharmacist-led interventions to reduce unplanned admissions for older people: a systematic review and meta-analysis of randomised controlled trials. Age & Ageing 2013; Nov 5 Epub ahead of print: DOI 10.1093/ageing/aft1169.
52. Royal S, Smeaton L, Avery AJ, et al. Interventions in primary care to reduce medication related adverse events and hospital admissions: systematic review and meta-analysis. Quality & Safety in Health Care 2006; 15: 23-31.
53. PLoS Medicine Editors. Best practice in systematic reviews: the importance of protocols and registration. PLoS Medicine 2011; 8(2): e1001009.
54. Roughead EE, Barratt JD, Ramsay E, et al. Collaborative home medicines review delays time to next hospitalization for warfarin associated bleeding in Australian war veterans. Journal of Clinical Pharmacy and Therapeutics 2012; 36: 27-32.
55. Roughead EE, Barratt JD, Ramsay E, et al. The effectiveness of collaborative medicine reviews in delaying time to next hospitalization for patients with heart failure in the practice setting: results of a cohort study. Circulation Heart Failure 2009; 2: 424-428.
56. Budnitz DS, Lovegrove MC, Shehab N, et al. Emergency hospitalizations for adverse drug events in older Americans. New England Journal of Medicine 2011; 365: 2002-2012.
57. Kaur S, Roberts JA, Roberts MS. Evaluation of medication-related problems in medication reviews: a comparative perspective. Annals of Pharmacotherapy 2012; 46: 972-982.
58. Maidment ID, Fox C, Boustani M, et al. Medication management - the missing link in dementia interventions. International Journal of Geriatric Psychiatry 2012; 27: 439-442.
59. Scheifes A, de Jong D, Stolker JJ, et al. Prevalence and characteristics of psychotropic drug use in institutionalized children and adolescents with mild intellectual disability. Research in Developmental Disabilities 2013; 34: 3159-3167.
60. Bell JS, Whitehead P, Aslani P, et al. Drug-related problems in the community setting: pharmacists' findings and recommendations for people with mental illnesses. Clinical Drug Investigation 2006; 26: 415-425.
61. Richardson TE ORC, Chen TF. A comprehensive review of the impact of clinical pharmacy services on patient outcomes in mental health. International Journal of Clinical Pharmacy 2013; Epub ahead of print Dec 4: DOI 10.1007/s11096-11013-19900-y.
62. Gilbert AL, Roughead EE, Beilby J, et al. Collaborative medication management services: improving patient care. Medical Journal of Australia 2002; 177: 189-192.
63. Krass I, Smith C. Impact of medication regimen reviews performed by community pharmacists for ambulatory patients through liaison with general medical practitioners. International Journal of Pharmacy Practice 2000; 8: 111-120.
64. Denneboom W, Dautzenberg MG, Grol R, et al. Comparison of two methods for performing treatment reviews by pharmacists and general practitioners for home-dwelling elderly people. Journal of Evaluation in Clinical Practice 2008; 14: 446-452.
65. Silagy CA, Middleton P, Hopewell S. Publishing protocols of systematic reviews: comparing what was done to what was planned. JAMA 2002; 287: 2831-2834.

Figure 1: Overview of selection of systematic reviews

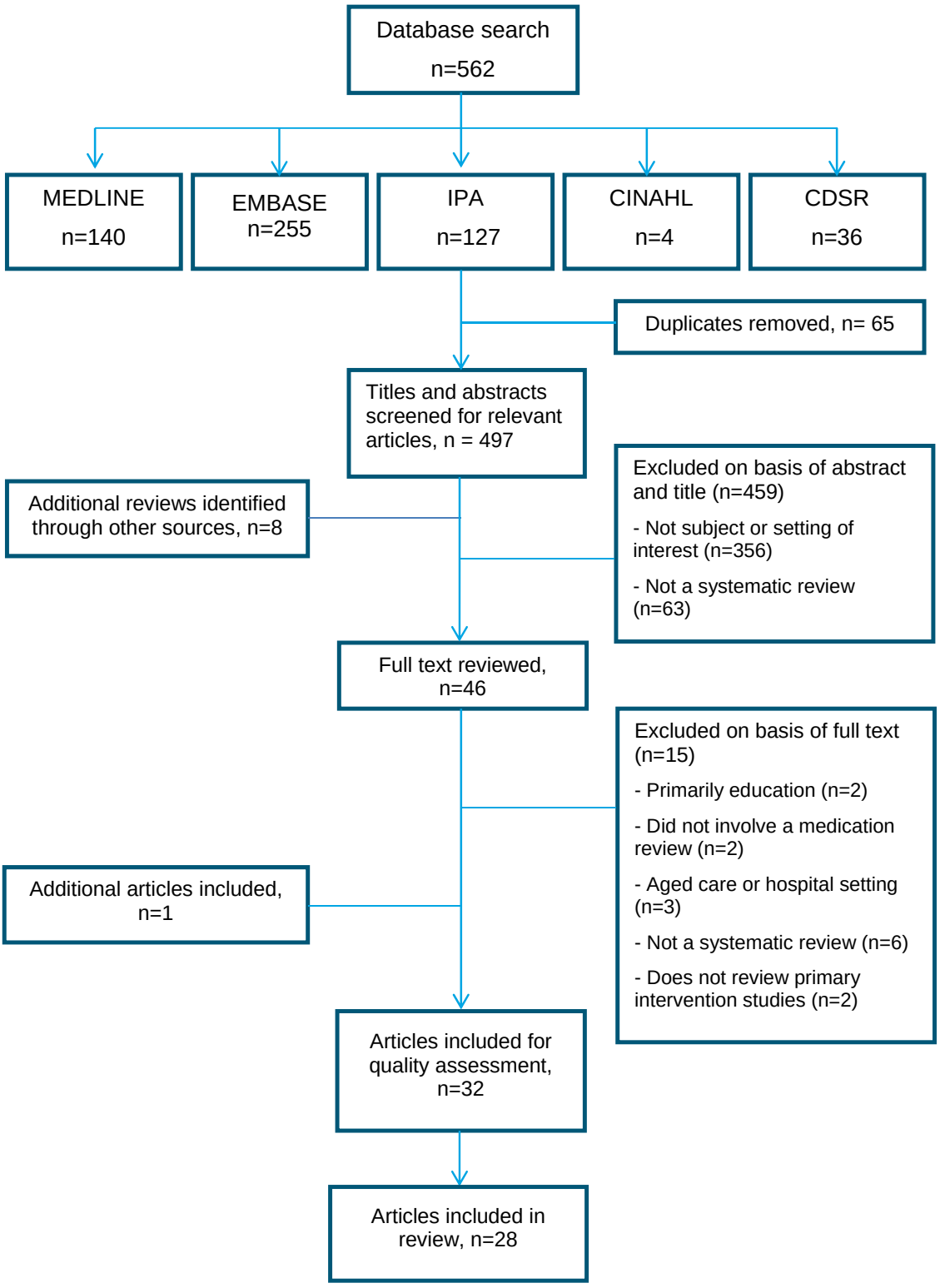

Table 1: Quality assessment of systematic reviews relevant to pharmacist-led medication review															
Author, Year	**Reviewer**	**Items**											**AMSTAR score**		
		1	2	3	4	5	6	7	8	9	10	11	Reviewer 1	Reviewer 2	Consensus
Altowaijri *et al,* 2013	1	×	✓	✓	×	×	×	✓	✓	×	×	×	4	5	5
	2	×	✓	✓	×	×	✓	✓	✓	×	×	×			
Bayoumi *et al*, 2009	1	×	✓	✓	✓	×	✓	✓	✓	✓	×	×	7	7	7
	2	×	✓	✓	✓	✓	✓	✓	✓	×	×	×			
Bell *et al*, 2005	1	×	×	✓	✓	×	✓	✓	✓	×	×	×	5	4	5
	2	×	×	✓	×	×	✓	✓	✓	×	×	×			
Blenkinsopp *et al,* 2005	1	×	×	✓	✓	×	✓	✓	✓	✓	×	×	6	5	6
	2	×	×	✓	✓	×	✓	✓	✓	×	×	×			
Cai *et al*, 2013	1	×	✓	✓	✓	×	✓	✓	×	×	×	×	5	5	5
	2	×	✓	✓	✓	×	✓	✓	×	×	×	×			
Castelino *et al*, 2009	1	×	×	✓	×	✓	✓	✓	✓	×	×	×	5	5	5
	2	×	×	✓	×	✓	✓	✓	✓	×	×	×			
Cheng *et al*, 2013	1	×	×	✓	×	×	✓	×	×	×	×	×	2	2	2
	2	×	×	✓	×	×	✓	×	×	×	×	×			
Chisholm-Burns *et al*, 2010	1	×	✓	✓	×	×	✓	×	×	×	×	×	3	5	3
	2	×	✓	✓	×	×	✓	✓	✓	×	×	×			
Costello *et al*, 2004	1	×	×	✓	✓	×	✓	×	×	✓	×	×	4	3	4
	2	×	×	✓	✓	×	✓	×	×	×	×	×			
Ellitt *et al*, 2009	1	×	×	✓	✓	✓	✓	✓	×	✓	×	×	6	6	6
	2	×	×	✓	✓	✓	✓	✓	×	✓	×	×			
Evans *et al*, 2011	1	×	✓	✓	✓	×	✓	✓	✓	×	×	×	6	6	6
	2	×	✓	✓	✓	×	✓	✓	✓	×	×	×			

Table 1 continued: Quality assessment of systematic reviews relevant to pharmacist-led medication review

Author, Year	Reviewer	Items											AMSTAR score		
		1	2	3	4	5	6	7	8	9	10	11	Reviewer 1	Reviewer 2	Consensus
Fish *et al*, 2002	1	×	×	✓	✓	×	✓	✓	✓	✓	×	×	6	6	6
	2	×	×	✓	✓	×	✓	✓	✓	✓	×	×			
Garcia, 2006	1	×	×	×	×	×	×	✓	×	×	×	×	1	1	1
	2	×	×	✓	×	×	×	×	×	×	×	×			
George *et al*, 2008	1	×	✓	✓	×	✓	✓	✓	✓	✓	×	×	7	7	7
	2	✓	✓	✓	×	✓	✓	✓	✓	×	×	×			
Geurts *et al*, 2012	1	×	✓	✓	×	×	✓	✓	×	×	×	×	4	4	4
	2	×	✓	✓	×	×	✓	✓	×	×	×	×			
Hanlon *et al*, 2004	1	×	×	✓	×	✓	✓	✓	✓	✓	×	×	6	4	6
	2	×	×	✓	×	✓	✓	×	×	✓	×	×			
Hatah *et al*, 2013	1	×	✓	×	×	×	✓	✓	✓	✓	✓	×	6	7	7
	2	×	✓	✓	×	×	✓	✓	✓	✓	✓	×			
Holland *et al*, 2008	1	×	✓	✓	✓	×	✓	✓	✓	✓	✓	×	8	8	8
	2	×	✓	✓	✓	×	✓	✓	✓	✓	✓	×			
Kaur *et al*, 2009	1	×	×	✓	×	×	✓	✓	✓	✓	×	×	5	4	5
	2	×	×	✓	×	×	✓	✓	✓	×	×	×			
Kucukarslan *et al*, 2011	1	×	×	✓	×	×	✓	✓	×	×	×	×	3	4	4
	2	×	×	✓	×	×	✓	✓	✓	×	×	×			
Kwint *et al*, 2013	1	×	✓	×	×	×	✓	✓	✓	✓	×	×	5	5	5
	2	×	✓	✓	×	×	✓	✓	✓	×	×	×			
Machado *et al*, 2007	1	×	✓	✓	×	×	✓	✓	✓	✓	✓	×	7	7	7
	2	×	✓	✓	×	×	✓	✓	✓	✓	✓	×			

Table 1 continued: Quality assessment of systematic reviews relevant to pharmacist-led medication review

Author, Year	Reviewer	Items											AMSTAR score		
		1	2	3	4	5	6	7	8	9	10	11	Reviewer 1	Reviewer 2	Consensus
Nkansah *et al*, 2010	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	9	8	9
	2	✓	✓	✓	✓	×	✓	✓	✓	×	✓	×			
Patterson *et al*, 2012	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	10	9	10
	2	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	×			
Rollason *et al*, 2003	1	×	×	✓	×	×	✓	✓	✓	✓	×	×	5	5	5
	2	×	×	✓	×	×	✓	✓	✓	✓	×	×			
Royal *et al*, 2006	1	×	✓	✓	✓	×	✓	✓	✓	✓	✓	×	8	8	8
	2	×	✓	✓	✓	×	✓	✓	✓	✓	✓	×			
Santschi *et al*, 2011	1	×	✓	✓	×	×	✓	✓	✓	✓	✓	×	7	7	7
	2	×	✓	✓	×	×	✓	✓	✓	✓	✓	×			
Smith *et al*, 2012	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	10	8	10
	2	✓	✓	✓	×	×	✓	✓	✓	✓	✓	×			
Spinewine *et al*, 2012	1	×	×	×	×	×	✓	✓	✓	×	×	×	3	2	3
	2	×	×	×	×	×	✓	✓	×	×	×	×			
Tan *et al*, 2013	1	×	✓	✓	×	×	✓	✓	✓	✓	×	×	6	7	6
	2	✓	✓	✓	×	×	✓	✓	✓	✓	×	×			
Thomas *et al*, 2013	1	×	✓	✓	✓	×	✓	✓	✓	✓	×	×	7	8	8
	2	×	✓	✓	✓	×	✓	✓	✓	✓	✓	×			
Tjia *et al*, 2013	1	×	✓	✓	×	×	✓	✓	✓	✓	×	×	6	7	6
	2	×	✓	✓	×	×	✓	✓	✓	✓	✓	×			

Table 2: Quality characteristics of the included systematic reviews			
Items		**Met criteria (%)**	**Kappa (95% CI)**
1.	Was an 'a priori' design provided?	3 (9)	0.62 (0.24, 1.00)
2.	Was there duplicate study selection and data extraction?	19 (59)	1.00 (1.00, 1.00)
3.	Was a comprehensive literature search performed?	29 (91%)	0.37 (0.16, 0.90)
4.	Was the status of publication used as an inclusion criterion?	14 (44)	0.81 (0.60, 1.00)
5.	Was a list of studies (included and excluded) provided?	7 (22)	0.71 (0.41, 1.00)
6.	Were the characteristics of the included studies provided?	32 (100)	0.65 (0.02, 1.00)
7.	Was the scientific quality of the included studies assessed and documented?	29 (91)	0.52 (0.05, 1.00)
8.	Was the scientific quality of the included studies used appropriately in formulating conclusions?	25 (78)	0.67 (0.37, 0.97)
9.	Were the methods used to combine the findings of studies appropriate?	21 (66)	0.58 (0.33, 0.83)
10.	Was the likelihood of publication bias assessed?	8 (25)	0.83 (0.62, 1.00)
11.	Was the conflict of interest included?	0 (0)	1.00 (1.00, 1.00)
Total			0.75 (0.64, 0.86)

Table 3: Characteristics of included studies and outcomes

Author, Year	No. of studies		Characteristics of relevant studies							Conflict of Interest	AMSTAR score
	Total	Related to MR	Study design	Country	Setting	Population	Clinical outcomes (n*/no. of studies)	Humanistic outcomes (n*/no. of studies)	Economic outcomes (n*/no. of studies)		
Altowaijri *et al*, 2013	59	40	RCT (36), Non-RCT (4)	USA (24), Australia (4), UK (3), Canada (2), Other (7)	OP/Specialist clinic (17), Medical practice (9), CP (12), Home (2)	Diabetes and hypertension	Diabetes control (11/14) BP control (15/19) Cholesterol (12/18) CV outcomes (2/2) Adherence (3/6) Healthcare utilisation (2/6) Mortality (1/3) Medication management (3/6)	QoL (5/12) Satisfaction (3/4) Knowledge (0/2)	Drug costs (1/3) Healthcare costs (3/4)	None declared	5
Bayoumi *et al*, 2009	4	1	RCT (1)	Other (1)	Hospital/Home (1)		Medication management (1/1)			None declared	7
Bell *et al*, 2005	22	2	RCT (2)	USA (2)	Medical practice (1), OP/Specialist clinic (1)	Mental Health	Medication management (1/2) Mental health (0/1)	QoL (0/2) Satisfaction (0/1)	Drug costs (1/1) Healthcare costs (0/1)	Funding from Australian Govt. Dept. of Health & Ageing	5

							Healthcare utilisation (0/1) Urinary incontinence (1/1) Falls (0/1)				
Blenkinsopp *et al*, 2005	17	4	Non-RCT (4)	USA (2), UK (1), Australia (1)	CP (4)	Diabetes	Diabetes control (1/2) Adherence (1/1) Medication management (0/1)	Satisfaction (0/1)	Healthcare costs (0/1)	Funding from Keele University & Fisher Medical Centre Research Unit	6
Cai *et al*, 2013	5	5	RCT (5)	USA (4), UK (1)	CP (1), Medical practice (1), OP/Specialist clinic (2), Hospital/CP(1)	CHD	Adherence (3/5) Cholesterol (2/3) BP control (1/2)			Funded by Zhejiang Pharmaceutical Society, China research fund	5
Castelino *et al*, 2009	12	6	RCT (6)	USA (4), Canada (1), Other (1)	Home (3), OP/Specialist clinic (2), Hospital/OP (1)	>65 years	Medication management (4/6)			Not declared	5
Costello *et al*, 2004	31	5	RCT (2), Non-RCT (3)	USA(1), UK (2), Other (2)	Home(1), Medical practice (3), CP (2)	Adults and children	Healthcare utilisation (0/1) Medication management (1/3) Asthma/COPD (2/2)	QoL (1/1)	Healthcare costs (0/1)	Funded by the UK Dept. of Health	4

							Adherence (0/1)				
Ellitt *et al*, 2009	21	5	RCT (5)	USA (3), Canada (1), Australia (1)	OP/Specialist Clinic (3), CP (1), Home (1)		Diabetes control (1/1) Medication management (1/3) Adherence (1/1) Healthcare utilisation (0/3) Mental health (0/1)	Satisfaction (1/2) QoL (0/3)	Healthcare cost (0/2)	Not declared	6
Evans *et al*, 2011	40	26[1]	RCT (6), non-RCT (20)	USA (13), UK (2), Canada (4), Australia (2), Other (5)	CP (26)	Diabetes and CVD	Diabetes control (4/8) Cholesterol (4/4) BP control (6/8) Medication management (1/3) CV outcomes (0/1) Adherence (1/2)			Funding from Saskatchewan Health and Merck-Frosst Scgering	6
Fish *et al*, 2002	16	8	RCT (8)	UK (2), USA (6)	OP/Specialist clinic (2), Medical practice (6)		Cholesterol (1/1) BP control (3/3)	Satisfaction (0/1) QoL (0/1)	Drug costs (1/3)	None declared	6

							Medication management (2/3) Adherence (1/2) Healthcare utilisation (1/1)				
George *et al*, 2008	8	5	RCT (5)	Canada (1), USA (2), UK (1), Other (1)	CP (3), Home (1), Medical practice (1)	>55 years and >3 long-term medications	Adherence (2/5)			None declared	7
Guerts *et al*, 2012	83	50	RCT (19), Non-RCT (31)	Australia (11), UK (17), USA (9), Other (8), Canada (5)	Home (18), Medical practice (20),Medical practice/Home (2), CP (9), OP/Specialist clinic (1)		Medication management (9/24) Mental health (0/1) Adherence (4/5) BP control (3/3) Healthcare utilisation (0/7) CV outcomes (1/2) Anticoagulation management (2/2)	QoL (2/8) Satisfaction (1/2) Knowledge (1/2)	Drug cost (3/7)	None declared	4

							Cholesterol (1/2) Diabetes control (1/1)				
Hanlon *et al*, 2004	14	8	RCT (8)	USA(5), UK(1), Other (2)	Home (3), Medical practice (3), OP/Specialist clinic (1), CP (1)		Medication management (5/6) Healthcare utilisation (1/5) Adherence (0/2) CV outcomes (1/1)	Knowledge (0/3) QoL (0/3) Satisfaction (0/1)	Drug costs (1/1) Healthcare costs (0/1)	Funding from Veterans of Foreign Wars Endowed Chair in Pharmacotherapy for the elderly; grant from National Institute on Ageing	6
Hatah *et al*, 2013	36	28	RCT (12), Non-RCT (16)	USA (13), UK (4), Australia (4), Canada (3), Other (4)	CP (18), Home (1), Home/CP (4), Medical practice (5)		Adherence (9/14) BP control (4/7) Cholesterol (2/4) Asthma/COPD (3/3) Healthcare utilisation (3/6) Mortality (1/1) Opportunistic infection (0/1)	QoL (5/12)	Healthcare/Drug costs (2/9)	Funding from University of Otago	7
Holland *et al*, 2008	32	22	RCT (22)	UK (9), USA (6), Australi	Home (7), OP/specialist clinic (1), Medical	Mean >60 years	Healthcare utilisation (2/11)	QoL (0/12)[#] Knowledge (6/11)[#]	Healthcare cost/Drug cost (4/14)[#]	Author is on the Editorial Board of the BJCP, but had no	8

				a (3), Canada (3), Other (1)	practice (11), CP (3)		Mortality (0/15) Medication management (12/23)[#] Adherence (7/14)[#]	Satisfaction (2/4)[#]		involvement in handling and review process	
Kaur *et al*, 2009	24	3	RCT (3)	USA (2), Other (1)	Medical practice (2), Hospital/Home (1)	>65 years	Medication management (3/3)	QoL (0/1)		None declared	5
Kucukarslan *et al*, 2011	8	6	RCT (6)	USA (4), UK (1), Other (1)	Medical practice (5), CP (1)		BP control (2/2) Cholesterol (0/1) Diabetes control (1/1) Healthcare utilisation (0/2) Medication management (0/2)	QoL (0/3) Satisfaction (1/1)	Drug costs (0/2) Healthcare costs (0/1)	None declared	4
Kwint *et al*, 2013	12	12	RCT (12)	Canada (1), Other (3), UK (3), USA (4), Australia (1)	Home (6), CP (3), Medical practice (2), OP/Specialist clinic (1)	Mean >70 years	Medication management (5/11) Adherence (0/2) Healthcare utilisation (0/5)	QoL (0/6) Knowledge (0/1)		None declared	5

Machado *et al*, 2007	36	28[2]	RCT (13), Non-RCT (15)	USA (24), Australia (3), Other (1)	CP (4), Medical practice (13), Medical practice/CP(3), OP/Specialist clinic (7), CP/OP/specialist clinic (1)	Diabetes	Diabetes control (23/26) BP control (5/11) Cholesterol (5/9) Adherence (0/3)	QoL (1/3) Knowledge (2/4)		Funded by The Ontario Ministry of Health	7
Nkansah *et al*, 2010	43	26	RCT (26)	USA (19), UK (1), Australia (3), Canada (1), Other (2)	OP/Specialist clinic (13), Medical practice (7), Home (3), CP (2), CP/Medical practice (1)		BP control (8/9) Cholesterol (3/4) Diabetes control (4/6) Mortality (1/2) CV outcomes (2/2) Mental health (0/2) Medication management (3/4) Anticoagulation management (2/2)	QoL (3/6)		Author is involved in a study that could be eligible for inclusion in a future update to this review.	9
Patterson *et al*, 2012	10	3	RCT (3)	Canada (1), USA (2)	OP/Specialist clinic (1), Medical practice (2)	>65 years	Healthcare utilisation (1/1) Medication management (1/3) Adherence (0/1)	QoL (0/1)		None declared	10

Rollason *et al*, 2003	14	7	RCT (6), non-RCT (1)	Canada (1), USA (4), UK (1), unknown (1)	Home (4), OP/Specialist clinic (1), Medical practice (2)	>60 years	Medication management (3/7)			None declared	5
Royal *et al*, 2006	38	14	RCT (11), Other (3)	USA (8), UK (3), Other (3)	Medical practice (5), CP (7), OP/Specialist clinic (2)		Medication management (1/3) Healthcare utilisation (0/13)			Funding from BUPA foundation	8
Santschi *et al*, 2011	30	23	RCT (23)	USA (15), Australia (1), Canada (1), Other (6)	OP/Specialist clinic (15), CP (5), OP/Specialist Clinic/Medical practice (1), Home (1), CP/Medical practice (1),	CVD	Cholesterol (5/8) BP control (12/15)			None declared	7
Smith *et al*, 2012	10	2	RCT (2)	Canada (1), UK (1)	Home (1), Medical practice (1)	Multimorbidity	Medication management (2/2) BP control (0/1) Diabetes (0/1) Healthcare utilisation (0/1)	QoL (0/1)	Drug costs (0/1)	None declared	10

Tan *et al*, 2013	38	33	RCT (33)	USA (15), UK (7), Canada (5), Other (6)	Medical practice (33)		Medication management (7/8) BP control (8/9) Diabetes (4/7) Cholesterol (2/4) CV outcomes (1/2) Healthcare utilisation (0/2) Mortality (0/1) Adherence (1/2) Metabolic syndrome (1/1)	Satisfaction (0/1) QoL (0/2)	Healthcare/Drug costs (0/2)	None declared	6
Thomas *et al*, 2013	20	13	RCT (13)	USA (2), UK (6), Australia (2), Canada (1), Other (3)	Hospital/Home (4), CP (2), Home (3), Medical practice (4)	>60 years	Healthcare utilisation (2/13)			Funding from National institute for Health Research (NIHR)	8
Tjia *et al*, 2013	36	3	RCT (1), non-RCT (2)	Canada (1), USA (2)	Home (3)	>65 years	Medication management (1/3)			Author received funds from Novartis	6

* Statistically significant (p<0.05)

[#] Pooled results

[1] 'MD-DRP' (identification and reporting of drug-related problems and subsequent recommendations made to the physician) considered as a medication review

[2] 'Medication management' considered as a medication review

BP = blood pressure; CP = community pharmacy; CV = cardiovascular; CVD = cardiovascular disease; CHD = coronary heart disease; MR = medication review; OP = outpatient; QoL = Quality of Life

Study design: Non-RCT = audit, cohort, cluster randomised trial, randomised or controlled trial, uncontrolled trial

Country: Other = Brazil, Chile, China, Denmark, Germany, Ireland, Jordon, Malta, Netherlands, Nigeria, NZ, Portugal, Scotland, Spain, Sweden, Switzerland, Turkey, UAE

Outcome subgroups: Adherence = improved compliance to medications and treatment plan; Anticoagulation management = optimisation and management of INR and associated outcomes; Asthma/COPD control = improved symptom control and lung function; BP control = improved target systolic &/or diastolic BP; Cholesterol = improved target cholesterol targets; CV outcomes = reduction in CV events and risk assessments; Diabetes control = reduction in HbA1c, improved blood glucose control; Drug costs = reduction in costs to patient or provider; Falls = Reduction in falls; Healthcare costs = reduction in healthcare spending; Healthcare utilisation = reduction in hospital, GP and other healthcare professional visits; Knowledge = improved patient knowledge of medications and disease management; Medication management = optimisation and management of medications, identification and resolution of drug-related problems including adverse drug reactions; Mental health = improved management of depression; Metabolic syndrome = Improvement in symptoms and risk factors; Mortality = reduction in deaths; Satisfaction = improved patient satisfaction; Opportunistic infection = reduction in risk; Urinary incontinence = improvement in urinary symptoms

Table 4: Outcomes reported within the systematic reviews			
Outcomes	**No. of individual studies reporting the outcome**	**No. of unique studies reporting the outcome**	**No. of unique studies reporting significant outcomes (%)***
Clinical			
Adherence	66[#]	32[#]	20 (63)
Anticoagulation management	4	3	3 (100)
Asthma/COPD	5	5	5 (100)
Blood pressure control	89	27	16 (59)
Cholesterol	58	15	11 (73)
Cardiovascular outcomes	10	4	3 (75)
Diabetes control	67	34	28 (82)
Healthcare utilisation	78	23	3 (13)
Medication management	124[#]	57[#]	29 (51)
Mental health	5	0	0 (0)
Mortality	22	7	2 (29)
Other[1]	4	4	2 (50)
Humanistic			
Quality of Life	77[#]	40[#]	7 (18)
Satisfaction	18	6	2 (33)
Knowledge	23[#]	17[#]	8 (47)
Economic			
Medication/healthcare costs[2]	54[#]	36[#]	7 (19)

* Statistically significant ($p<0.05$), [#] Consists of pooled data

[1] Other = urinary incontinence, falls, opportunistic infection, metabolic syndrome

[2] 8 studies reported drug and healthcare costs individually

Appendix E: Systematic review of Home Medicines Review research in Australia

Abstract

Objective: To review the process, impacts and outcomes of Home Medicines Review (HMR) in Australia with a focus on referral and eligibility parameters, patient groups who have benefited and costs.

Methods: MEDLINE, EMBASE, International Pharmaceutical Abstracts (IPA), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Library and the grey literature were searched from 2000 to December 2013. Studies were eligible for inclusion if they reported processes, impacts or outcomes of medication management review (MMR). All study designs were considered. Data extraction and quality assessment were performed independently by two investigators.

Results: Nine controlled studies, 34 observational and uncontrolled studies, and 14 qualitative and survey studies were included. All 49 quantitative studies defined outcomes appropriately and the eight qualitative studies had good congruity between the methodology and the research question, data collection, analysis and interpretation. MMR resulted in identification of medication-related problems (MRPs) (n=15, mean 3.6 MPRs per MMR) and improved adherence (n=3). Reductions in numbers of medications (n=3), hospitalisations (n=3), potentially inappropriate prescribing (n=3) and costs (n=6) were demonstrated. Evidence supports additional models that promote interprofessional collaboration and timely referral following hospital discharge. Qualitative research identified low awareness of HMR among eligible non-recipients, while benefits were perceived to outweigh barriers to implementation. Underserved populations include indigenous and culturally and linguistically diverse people, recipients of palliative care, those recently discharged from hospital, people with poor medication adherence, those in rural and remote areas, older males, and younger people with long-term, persistent or serious health problems.

Conclusion: The current HMR model is well accepted among consumers and beneficial in improving the quality use of medications and health outcomes. Addressing access gaps for underserved populations, implementing additional referral pathways, and facilitating greater collaboration between the health professionals represent opportunities for further improvement.

Keywords: drug-related side effects and adverse reactions, medication therapy management, community pharmacy services, pharmacists, systematic review, inappropriate prescribing.

Synopsis

Medication management reviews are one strategy used to identify and resolve medication-related problems (MRPs) in the community. A systematic review of Home Medicines Review (HMR) research in Australia suggests HMR is a valuable strategy to identify MRPs, improve medication adherence, and reduce hospitalisations and use of potentially inappropriate medications. Qualitative research suggests widespread acceptance of the HMR program with benefits perceived to outweigh barriers to implementation. However, there is still a low awareness of the HMR program among eligible non-recipients. Implementing additional referral pathways and initiatives to facilitate greater collaboration between general practitioners and pharmacists represent opportunities for improvement.

Introduction

Strategies to prevent adverse drug events (ADEs) have attracted much research, policy and practice interest in Australia over the past 20 years.[1, 2] One strategy to identify and resolve medication-related problems is medication management review (MMR). MMR is a structured and collaborative service provided by pharmacists and general medical practitioners (GPs).[3] Pharmacists are presently remunerated to conduct MMRs in countries including Australia, New Zealand, United Kingdom and United States of America.[4, 5]

Pharmacists and GPs were initially remunerated to conduct MMR in Australian aged care facilities in 1995. The availability of this service, referred to as Residential Medication Management Review (RMMR), became mandated for all permanent residents of aged care facilities.[6] Funding for pharmacists to conduct Home Medicines Review (HMR) was subsequently announced as part of the Third Community Pharmacy Agreement in 2000. An HMR is a service provided by an accredited pharmacist, upon referral of a GP, to people living independently in the community. Specific referral criteria have not been mandated, but referral guidelines suggest the service be targeted to those who, due to the complexity of their medication regimen, age or social circumstances are at high risk of medication misadventure (Table E.1).

Since its inception the HMR model has involved a GP referring an HMR recipient to their preferred community pharmacy. The preferred community pharmacy has then been responsible for organising an accredited pharmacist to conduct the review, either a salaried staff member or a pharmacist specifically contracted to conduct the HMR. In October 2011 an additional referral pathway became available. This pathway enabled GPs to refer an HMR recipient directly to an accredited pharmacist.

Recently practitioners and researchers have explored alternatively-named models of delivering MMR. This has included through co-location of GPs and pharmacists,[7, 8] and a hospital-based referral pathway to facilitate HMR following hospital discharge.[9] There has also been research into perceived barriers to implementing HMRs,[10, 11] and initiatives to promote greater uptake among those at high risk of ADEs.[12] While the development and implementation of HMR has continued to be the subject of research, there has been no previous systematic review of Australian HMR research. The objective of this paper was to review the process, impacts and outcomes of HMR in Australia with a focus on referral and eligibility parameters, patient groups who have benefited and costs.

Methods

Search Strategy

MEDLINE, EMBASE, International Pharmaceutical Abstracts (IPA), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and the Cochrane Library were searched to locate relevant studies published between 2000 and December 2013.

In MEDLINE and the Cochrane Library, Medical Subject Headings (MeSH) and truncated keywords related to pharmacy ("community pharmacy services" [MeSH] OR "pharmaceutical services" [MeSH] OR "pharmacist*") AND medication management ("medication therapy management" [MeSH] OR "drug utilization review" [MeSH] OR "medication errors" [MeSH] OR "drug regimen review*" OR "med* review*") were combined. In EMBASE, the Emtree subject headings "pharmacy", "pharmaceutical care" and "drug use" were used in place of "community pharmacy services", "pharmaceutical services" and "drug utilization review". The keywords "medication review" or "medicine review" or "medication management review", supplemented with pluralisation, were added instead of "med* review*" as truncation within phrases is not possible using this database. In IPA, the subject headings "drug utilization; evaluation", "community service" and "pharmaceutical care" were used. In CINAHL, the subject headings "pharmacy service", "medication management" and "drug utilization" were used. To identify Australian publications, "Australia*" was combined with the Boolean operator 'AND' in the command-line search in each database. The search was limited to the English language and Australia as the location of subject (if available).

A manual search of the Journal of Pharmacy Practice and Research (JPPR), published by The Society of Hospital Pharmacists of Australia (SHPA), was undertaken from January 2000 to September 2013. A manual search of Australian Pharmacist, published by the Pharmaceutical Society of Australia (PSA), was also undertaken from January 2000 to January 2014. Additionally, a search of the grey literature was performed. This included a manual search of abstracts from poster and oral presentations at the 2012 and 2013 SHPA National Conference, a keyword search of the Australian Quality Use of Medicine (QUM) project database, known as the QUMmap, a search of unpublished doctoral theses, and the Australian Government and Pharmacy Guild of Australia websites. If a potentially relevant conference abstract was identified then a specific author and title search was performed using the above databases to identify whether a full paper had been published. A keyword search via PubMed

was conducted to identify any additional articles not yet indexed into MEDLINE and reference lists of included papers were screened for relevant studies.

Study selection

Potentially relevant articles were imported into EndNote and a duplicate scan run to identify any duplicated entries. The titles and abstracts were screened independently by two investigators and included if they met the pre-defined inclusion and exclusion criteria. The full text copies of the potentially relevant papers were obtained and independently reviewed by two investigators for possible inclusion. Any disagreements or uncertainties were resolved by discussion with a third investigator.

Primary research studies were eligible for inclusion if they reported processes, impacts or outcomes of MMR in Australia. For the purpose of the review, MMR was defined as 'a systematic assessment of a consumer's medications and the management of those medications, with the aim of optimising consumer health outcomes and identifying potential medication-related issues within the framework of the quality use of medicines'.[13] This is the PSA definition of MMR. All study designs were considered. Papers were included if the intervention was consistent with the above definition, even if the MMR investigated was not eligible for remuneration under existing HMR funding regulations (e.g. hospital-initiated, referral by a nurse rather than a GP). Papers were excluded if the MMR was delivered in hospital or residential aged care settings or did not sufficiently describe the medication review processes, eligibility or referral criteria. Where similar data were presented in both a peer-reviewed journal article and in a grant report published online, preference was given to the peer-reviewed journal article. Conference abstracts for which no full paper could be identified were excluded.

Data extraction and synthesis

Data extraction was performed independently by two investigators using a standardised data extraction tool. Three different data extraction tools were developed; one each for controlled trials, observational studies, and qualitative and survey studies. Each data extraction tool was pilot tested for face-validity prior to use and refined accordingly. Data extracted across all study designs included key processes, eligibility and referral criteria (participant inclusion criteria), outcomes and funding source. Meta-analysis was not possible due to the heterogeneity of studies.

Quality assessment

The risk of bias in quantitative studies was independently assessed by two investigators using a quality assessment tool by the Agency for Healthcare Research and Quality (AHRQ), adapted from the Cochrane Collaboration's tool for assessing risk of bias.[14] The methodological quality of qualitative studies was assessed using the Joanna Briggs Institute Qualitative Assessment and Review Instrument (JBI-QARI).[15] Any differences or uncertainties between investigators were resolved by discussion with a third investigator.

Results

A total of 1813 studies were identified, of which 57 satisfied our criteria for inclusion in the review (see Figure 1). Data were extracted from nine controlled studies (Table E. 2),[16-24] 34 observational or uncontrolled studies with a focus on medication-related problems (MRPs) (Table E.3),[25-39] and other clinical, humanistic and economic outcomes (Table E.4),[40-58] and 14 qualitative and survey research studies (Table E.5).[8, 10, 59-70]

Methodological quality of studies

The quality assessment of qualitative and quantitative studies are summarised in Tables E.6,E. 7, E.8 and E.9. All quantitative studies (n = 49) defined their outcomes using valid and reliable measures and reported pre-specified outcomes while almost all (96%) defined the intervention using valid and reliable measures. It was unclear whether fidelity to the intervention protocol was maintained in most studies (98%), with only one study referring to a published protocol in the methodology.[38] Adequate allocation sequence generation was described in over half of the randomised controlled trials (RCTs) (n = 4),[18, 19, 22, 23] while it was not clear if treatment allocation was adequately concealed in five.[17, 19, 20, 22, 23] It was not explicitly stated if outcome assessors were blinded in 89% (n = 8)[16-18, 20-24] of controlled studies and this quality criterion was unmet in one study.[19]

All qualitative studies (n = 8)[8, 10, 59, 61, 64, 68-70] had good congruity between the research methodology and their research question, data collection, data analysis and interpretation of results. The position of the researcher or their influence on study results was not explicitly stated in six studies.[8, 10, 61, 68-70]

Main Findings

Study eligibility criteria

The majority of studies included community-dwelling, general practice patients deemed at risk of medication misadventure (n=17).[17, 23, 25, 29, 30, 33, 36, 38, 39, 42-46, 50, 55, 56] Some studies investigated HMR in particular demographic groups including older people (≥65 years, n=10)[20, 27, 41-44, 47, 51-53] and war veterans, widows and dependents (n=5).[48, 51-54] Patients with specific medical conditions were also targeted, including mental health (n=2),[26, 31] chronic heart failure (n=4),[16, 22, 49, 52] chronic obstructive pulmonary disease (COPD) (n=1),[22] diabetes (n=2),[21, 22] and patients receiving palliative care (n=1).[32] Patients admitted to or recently discharged from hospital were also targeted (n=12).[16, 18, 22, 24, 28, 34, 35, 37, 40, 49, 51, 57] Polypharmacy was a common eligibility criteria (n=6),[16, 19-22, 54] with eligibility criteria ranging from current use of two medications to greater than 20 subsidised prescriptions in the previous six months. The impact of HMR in patients taking specific medications was investigated, including those on warfarin (n=3),[24, 37, 53] antidiabetic medications (n=2),[21, 22] and other high-risk medications (n=1).[20]

Aside from these target populations, stakeholder consultation identified additional population groups that would benefit from HMR services, including indigenous, culturally and linguistically diverse (CALD), older men, younger people with chronic disease and those with medication non-adherence.[61, 68]

Referral

The majority of studies followed standard HMR referral guidelines (i.e. identification and referral of patients to the HMR program by the GP). Nevertheless, a range of alternatively-named models of MMR were evaluated. This included MMRs which involved pharmacist coordinated referrals, especially in hospital (n=6),[16, 18, 22, 34, 40, 49] and as part of an aged care assessment team (n=2).[19, 47] Dedicated hospital or aged care liaison pharmacists often undertook this role.[18, 40, 49] Findings of qualitative work also supported the value of additional referral pathways, with stakeholders highlighting the use of pharmacists, nursing staff and other health providers as sources for MMR referral.[59, 60]

Key processes

The majority of studies assessed processes consistent with HMR, namely the patient interview being conducted by an accredited pharmacist in the patient's home. However, alternatively-named models of MMR included those undertaken by an accredited pharmacist working in a medical practice,[29, 38, 41, 46] or as part of an aged care assessment team (ACAT) (n=2),[19, 47] community mental health team (n=1),[31, 59] or palliative care team (n=1).[32] Six studies involved face-to-face case-conferences between the GP and pharmacist after the review.[17, 20, 30, 33, 41, 45, 71] Some studies involved pharmacists who were not necessarily accredited, but received additional training (n=2)[21, 31] or had several years of clinical experience (n=1).[19]

Clinical and humanistic outcomes

MMRs were deemed to impact on a range of outcomes across a variety of patient populations, and there was no specific evidence that certain patient groups did not benefit from MMR. A large number of MMRs resulted in positive clinical outcomes, especially with regards to the identification of MRPs. Of the 15 studies specifically assessing MRPs, [25-39] there was an overall mean of 3.6 MRPs identified per MMR. This ranged from a mean of 1.3 MRPs identified among standard HMR recipients in a rural community setting,[25] to 5.6 MRPs among HMR recipients discharged from a hospital cardiology ward.[28] Three studies were excluded from this calculation due to insufficient information.[33-35] One study reported a mean of 7.2 'issues' per HMR for people with a mental illness, although some 'issues' were prescriber or patient-related rather than medication-related.[26]

MMRs also resulted in reductions in number of medications (n=3),[17, 21, 41] hospitalisations (n=3),[22, 52, 53] and potentially inappropriate prescribing (n=3).[42-44] Humanistic outcomes, including adherence (n=3) also improved.[21, 22, 24] Process outcomes improved when MMRs were undertaken in certain settings. MMRs conducted by medical practice-based pharmacists and post-hospital discharge were found to be more timely,[40, 46] and had higher rates of recommendation uptake,[18] than standard HMRs.

Awareness of the HMR service was low among non-recipients.[61, 62, 69] Perceived benefits of HMRs among consumers included increased knowledge and confidence to manage their own medication regimen and reduced medication-related concerns.[10] Fears of upsetting the GP, privacy and safety concerns and a lack of awareness of the service were described as barriers to uptake of HMRs.[10, 69] Outcome expectancies including receipt of medication information and reduced medication-related concerns were associated with willingness to use HMR among consumers and carers, but these expectancies were generally low among eligible non-recipients.[63-66]

Economic outcomes

Eight studies performed economic evaluations of the HMR program.[17, 23, 33, 41, 47, 54, 56, 58] Two studies compared the cost and effectiveness of the HMR program[23, 56] and the remaining studies only evaluated the cost of the program.[17, 33, 41, 47, 54, 58] In a RCT by Sorensen et al., the effectiveness of HMR was measured as the reduction in adverse events and improvement in clinical

outcomes.[23] The HMR service was deemed cost-effective with an incremental cost-effectiveness ratio (ICER) of AUD $69.[23] In a retrospective study by Stafford et al., the VALMER study, the effectiveness of HMR was measured as quality adjusted life years (QALYs) gained through reduction of MRPs.[56] The estimated ICER was AUD $64,949 per QALY gained.

The HMR program resulted in medication and health resource cost savings. Additionally, in the upper quartile of HMRs (based on savings), the average predicted saving per HMR was sufficient to offset the cost of the program, implying that HMRs are cost-effective in a subset of high-risk and high-cost patients. Based on probable clinical outcomes, the authors of the VALMER study concluded that each HMR resulted in cost-savings due to medication costs and health resource utilisation of HMR AUD $128 over 12-months.[56] In a sub-analysis of 60 HMRs from the VALMER study, there was no association between use of any medication or medication class and HMR cost-effectiveness.[72] However, pharmacists who performed cost-effective HMRs had a completed a higher total number of HMRs (600 vs. 250 HMRs, p=0.041) and had more hours continuation education in previous year (99 vs. 50 hours, p=0.006) compared to pharmacists who did not perform cost-effective HMRs.[72]

Bennett et al. compared the medication costs before and after the implementation of a MMR program which also involved a GP clinical audit.[17] The service resulted in a 9.1% reduction in overall medication costs (from AUD $79,450 to $66,430 per year).[17] In another study, Bonner et al. estimated that AUD $4471 in medication costs would be saved each year if a clinical pharmacist was integrated into a medical practice to perform medication reviews.[41] A study by Gilbert et al. found a net saving to the health system of AUD $120 per person after overheads were accounted for.[58] Krass et al. found a significant reduction in the number of medications per patient with subsequent reductions in average annual costs of AUD $240 per patient.[33] In contrast, Harris et al. (which assessed HMR provided by a pharmacist associated with ACAT) and Sorensen et al. (which assessed standard HMR provided to veterans) reported no significant reductions in medication or health service costs following implementation of the HMR program.[47, 54] On the basis of these studies, it was not possible to determine which HMR model was most cost-effective.

Discussion

This is the first systematic review of research related to the HMR program in Australia focusing on referral and eligibility parameters, patient groups who have benefited and costs. Findings from this review highlight the benefits of HMR across different patient groups. Quantitative and qualitative research supports existing and additional referral pathways. Evidence also supports medication review models that involve interprofessional collaboration. Ensuring ongoing consumer access to HMR is likely to provide important benefits.

This review found that a diverse range of general practice patients benefit from HMRs, especially older people with multiple comorbidities and polypharmacy. This finding is consistent with reviews of the international literature.[4] Population groups that benefit include those with mental health diagnoses, chronic heart failure, diabetes and those taking high-risk medications such as anticoagulants. However, other population groups at risk of medication misadventure may remain underserved. Past reports commissioned by the Australian Government have identified several access gaps among indigenous and CALD populations.[61, 68] Consumers receiving palliative care, with poor medication adherence, recently discharged from hospital, and those living in rural and remote areas were also considered underserved.[61, 68] Other population groups identified as likely to benefit from HMR include older males and younger people with long-term and persistent disease or other serious health problems.[68] Given the awareness of the HMR program among eligible non-recipients is low,[63] these groups may benefit from targeted initiatives to increase uptake of the HMR service. Initiatives to target HMRs to underserved groups at high risk of medication misadventure is a strategy is supported by other systematic reviews of the international literature.[73] This review highlights the overall benefits of HMR in a range of patient populations, and there was no evidence that particular groups do not benefit from this service.

Two cost-effectiveness studies reported mixed results, with the HMR program being judged cost-effective in certain settings.[23, 56] The authors of the VALMER study highlighted a range of methodological issues that may explain differences in cost savings.[56, 72] These included differences in perspective taken for the measurement of drug costs, the proportion of MRPs required to achieve drug cost savings and the methods of expert assessment.[56, 72] A study published by Krass et al.[74] in 1999 reported overall savings per HMR of AUD $400 but, unlike studies included in our review,[17, 23, 33, 41, 54, 56, 58] this included costs to both the Pharmaceutical Benefits Scheme (PBS) and costs to patients for non-PBS items. The specific determinants of cost-effective HMRs remain unknown.[56]

Several alternatively-named models for delivery of MMR have been trialled including post-discharge MMR, the use of a hospital liaison pharmacists and direct referrals by a pharmacist as part of an ACAT. These approaches increased referral rates and the timeliness of reviews, and these findings are reflected in international studies.[75] Direct MMR referral to an accredited

pharmacist within 10 days of hospital discharge is a model that has been widely supported by Australian stakeholders,[61] and has been successfully trialled in a number of studies.[22, 24, 34, 40] It has also been suggested that aside from GPs, other health care providers such as Aboriginal Health Workers,[76] community nurses,[70, 76] mental health case managers[59] and psychiatrists[59] should be able to identify and refer eligible patients.

The current key processes and components of conducting HMRs in Australia have been shown to be effective for the identification and resolution of MRPs. However, this review suggests that possible additional elements of the MMR process involving collaboration between GPs and pharmacists may be beneficial. Integration of a pharmacist into a medical practice was trialled in three studies.[38, 41, 46] Co-location of pharmacists and GPs significantly reduced the time to complete MMRs,[46] effectively identified and resolved MRPs,[38, 41] and improved interprofessional communication and collaboration.[8] Despite the apparent benefits, these studies involved a small number of participating pharmacists and general practices therefore the generalisability remains unknown.[77] However, other reviews have highlighted the benefits of co-location and the importance of collaboration between pharmacists, GPs and other staff, as well as patient involvement at all steps of the medication review process.[4, 5, 78] Many early Australian studies that demonstrated the value of MMR included a follow-up case-conference between the pharmacist and GP.[20, 30, 33, 41, 45]

This review found that HMRs are effective in optimising a range of clinical outcomes, including disease-specific endpoints and hospitalisations. A systematic review by Hatah et al.[4] supported these findings by demonstrating significantly improved patient outcomes for blood pressure and hospitalisation when clinical medication reviews (with access to the patient and clinical notes) were performed. No detectable impact was observed with the less intensive adherence reviews.[4] Our review found that accredited pharmacists, and those who are a part of a health care team, were able to identify clinically meaningful MRPs and make evidence-based recommendations.[27] These findings are consistent with the literature which highlights the need for specialised training, clinical experience and collaborative delivery of care.[31, 79]

The uptake of HMRs continues to be low, especially in vulnerable populations. In a study by Kalisch et al., the overall rate of uptake among veterans taking medications was 3.6%.[48] The uptake in 'at-risk' groups among veterans such as those with dementia (3.6%), heart failure (20%), reactive airways disease (34%) and diabetes (19%) was higher but still relatively low compared to the number of patients who potentially stood to benefit.[48] The HMRs were deemed to be appropriately targeted because they were received by patients who had characteristics that placed them at risk of MRPs.[48] Internationally, accreditation costs, insufficient remuneration, lack of consumer awareness, time constraints and rural locations were found to be significant barriers to the delivery of clinical pharmacy services.[78] On-going remuneration, increased numbers of accredited pharmacists, uptake, consumer and GP awareness, funding for interpreter services and direct-referral pathways have been identified as mechanisms to ensure continued implementation and development of the program.[17, 61, 68]

The methodological quality of the included quantitative studies was generally good. Methodological shortcomings were similar across most studies. Methods to account for confounding in the design or analysis such as stratification or multivariable analyses were reported in only a quarter of studies, although this was not necessarily applicable in all studies. Only one study published a study protocol in advance allowing for fidelity to be established thus the risk of performance bias in all other studies remains unclear. Future studies should address these methodological issues.

Strengths and Limitations

A comprehensive search of the Australian research relevant to HMR, including the grey literature, was undertaken to capture both published and unpublished sources, although the possibility that relevant studies may still have been missed cannot be excluded. Quality assessment was performed on all studies by two independent reviewers. The review included both quantitative and qualitative research and this is considered important for evaluating complex multifactorial interventions.[80]

Of the 57 included studies, 19 were retrospective. A limitation of these retrospective studies was that data pertaining to the actual processes followed by pharmacists performing these reviews were often not available to researchers. It was assumed, therefore, that because HMRs evaluated in these retrospective studies were remunerated under the HMR program then the standard HMR program guidelines were followed. Conversely, there was no Hawthorne effect in these studies and the reported benefits were likely to reflect actual benefits of the HMR program achieved in 'real world' settings. Importantly, this included reduced rates of hospitalisation for people taking warfarin and those with heart failure.[52, 53] The mean number of MRPs identified per MMR in studies specifically reporting this outcome ranged from 1.3 to 5.6. However, the mean number of MRPs may partly reflect both the report writing style of the reviewing pharmacists and system used to classify MRPs.[81]

Data regarding the key processes, eligibility and referral criteria were typically described in prospective studies. Some RCTs involved MMRs undertaken in a single hospital or community setting and were performed by a single pharmacist. These studies had limited external validity and the generalisability of the results to the wider population is unknown. The potential for contamination and the Hawthorne effect cannot be excluded.

Implications of these findings

The findings of this review have implications for practitioners and policy makers regarding the delivery of MMRs in community settings. Efforts should be made to ensure ongoing and expanded access to the program among those at high risk of medication misadventure, including population groups identified as being underserved by the current HMR program. We identified a considerable body of evidence on which patient groups have benefited from HMR in Australia, but no evidence that allows a clear ranking of which patient groups have benefited most. Policy makers should ensure adequate remuneration, training and support is made available. Additional referral pathways and models of collaborative practice between pharmacists and GPs should be explored. Overall, the results of this review support the benefits of the existing HMR model for Australians at risk of medication misadventure, and may help inform local policy and debate on this topic. Future studies should compare the outcomes of MMRs performed in different settings.

Conclusion

Quantitative and qualitative evidence suggests that the current processes, eligibility and referral criteria for HMR in Australia are well accepted among consumers and beneficial in improving the quality use of medications and health outcomes. Given the considerable morbidity associated with ADEs the HMR program is likely to provide important public health benefits. Addressing access gaps for underserved populations, implementing additional referral pathways, and facilitating greater collaboration between the health professionals represent opportunities for further improvement.

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Conflict of interests

All authors are pharmacists employed at academic institutions or public hospitals. No author has a direct financial interest in the delivery of Home Medicines Review in Australia.

References

1. Roughead EE, Semple SJ. Medication safety in acute care in Australia: where are we now? Part 1: a review of the extent and causes of medication problems 2002-2008. Aust New Zealand Health Policy. 2009;6:18
2. Sansom L. The Australian National Medicinal Drug Policy. J Qual Clin Pract. 1999;19:31-35
3. Chen TF, Crampton M, Krass I, Benrimoj SI. Collaboration between community pharmacists and GPs - The medication review process. J Soc Adm Pharm. 1999;16:145-156
4. Hatah E, Braund R, Tordoff J, Duffull SB. A systematic review and meta-analysis of pharmacist-led fee-for-services medication review. Br J Clin Pharmacol. 2014;77:102-115
5. Blenkinsopp A, Bond C, Raynor DK. Medication reviews. Br J Clin Pharmacol. 2012;74:573-580
6. Roughead EE, Semple SJ, Gilbert AL. Quality use of medicines in aged-care facilities in Australia. Drugs Aging. 2003;20:643-653
7. Freeman C, Cottrell WN, Kyle G, Williams I, Nissen L. Does a primary care practice pharmacist improve the timeliness and completion of medication management reviews? Int J Pharm Pract. 2012;20:395-401
8. Tan ECK, Stewart K, Elliott RA, George J. Stakeholder experiences with general practice pharmacist services: a qualitative study. BMJ Open. 2013;3:e003214 doi: 10.1136/bmjopen-2013-003214.
9. Angley M, Ponniah A, Bong J, Padhye V, Shakib S, L. S. Implementing and evaluating a parallel post-discharge Home Medicines Review (HMR) model. 2010. Available at: https://beta.guild.org.au/uploadedfiles/Research_and_Development_Grants_Program/Funded_Projects/Fourth_Community_Pharamcy_Agreement/IIG011%20Full%20Final%20Report.pdf (accessed 25 feb 2014).
10. White L, Klinner C, Carter S. Consumer perspectives of the Australian Home Medicines Review program: benefits and barriers. Res Social Adm Pharm. 2012;8:4-16
11. Lee CY, George J, Elliott RA, Stewart K. Exploring stakeholder perspectives on medication review services for older residents in retirement villages. Int J Pharm Pract. 2012;20:249-258
12. Lee CY, George J, Elliott RA, Stewart K. A pharmacist-led intervention for increasing the uptake of Home Medicines Review (HMR) among residents of retirement villages (PHARMER): protocol for a cluster randomised controlled trial. BMC Health Serv. Res. 2011;11:292
13. Pharmaceutical Society of Australia. Guidelines for pharmacists providing Home Medicines Review (HMR) services. 2011. Available at: https://www.psa.org.au/download/practice-guidelines/home-medicines-review-services.pdf (accessed 7 Feb 2014).
14. Viswanathan M, Ansari MT, Berkman ND, et al. Assessing the Risk of Bias of Individual Studies in Systematic Reviews of Health Care Interventions. Methods Guide for Effectiveness and Comparative Effectiveness Reviews. 2008. Available at: http://www.ncbi.nlm.nih.gov/books/NBK91433/pdf/cerguidebias.pdf (accessed 25 Feb 2014).
15. Pearson A. Balancing the evidence: incorporating the synthesis of qualitative data into systematic reviews. JBI Reports. 2004;2:45-64
16. Barker A, Barlis P, Berlowitz D, Page K, Jackson B, Lim WK. Pharmacist directed home medication reviews in patients with chronic heart failure: a randomised clinical trial. Int J Cardiol. 2012;159:139-143
17. Bennett A, Smith C, Chen TF, Johnsen S, Hurst R. A comparative study of two collaborative models for the provision of domiciliary medication review: St George Canterbury Medico/Pharmacy Project Faculty of Pharmacy, University of Sydney and St George Division of General Practice, 2000.
18. Bollella G, Angley MT, Pink JA, Caird CJ, Goldsworthy SJ. Optimal Level of Liaison Pharmacist Intervention to Facilitate a Post-discharge Home Medicines Review. J Pharm Pract Res. 2008;38:107-110
19. Elliott RA, Martinac G, Campbell S, Thorn J, Woodward MC. Pharmacist-led medication review to identify medication-related problems in older people referred to an aged care assessment team. Drugs Aging. 2012;29:593-605
20. Graffen M, Kennedy D, Simpson M. Quality use of medicines in the rural ambulant elderly: a pilot study. Rural Remote Health. 2004;4:184
21. Krass I, Taylor SJ, Smith C, Armour CL. Impact on medication use and adherence of Australian pharmacists' diabetes care services. J Am Pharm Assoc (2003). 2005;45:33-40
22. Naunton M, Peterson GM. Evaluation of home-based follow-up of high-risk elderly patients discharged from hospital. J Pharm Pract Res. 2003;33:176-182

23. Sorensen L, Stokes JA, Purdie DM, Woodward M, Elliott R, Roberts MS. Medication reviews in the community: results of a randomized, controlled effectiveness trial. Br J Clin Pharmacol. 2004;58:648-664
24. Stafford L, Peterson GM, Bereznicki LRE, et al. Clinical outcomes of a collaborative, home-based postdischarge warfarin management service. Ann Pharmacother. 2011;45:325-334
25. Alderman CP, Kong L, Kildea L. Medication-related problems identified in home medicines reviews conducted in an Australian rural setting. Consult Pharm. 2013;28:432-442
26. Bell JS, Whitehead P, Aslani P, McLachlan AJ, Chen TF. Drug-related problems in the community setting: pharmacists' findings and recommendations for people with mental illnesses. Clin Drug Invest. 2006;26:415-425
27. Castelino RL, Bajorek BV, Chen TF. Are interventions recommended by pharmacists during Home Medicines Review evidence-based? J Eval Clin Pract. 2011;17:104-110
28. Ellitt GR, Engblom E, Aslani P, Westerlund T, Chen TF. Drug related problems after discharge from an Australian teaching hospital. Pharm World Sci. 2010;32:622-630
29. Freeman CR, Cottrell WN, Kyle G, Williams ID, Nissen L. An evaluation of medication review reports across different settings. Int J Clin Pharm. 2013;35:5-13
30. Gilbert AL, Roughead EE, Beilby J, Mott K, Barratt JD. Collaborative medication management services: improving patient care. Med J Aust. 2002;177:189-192
31. Gisev N, Bell JS, O'Reilly CL, Rosen A, Chen TF. An expert panel assessment of comprehensive medication reviews for clients of community mental health teams. Soc Psychiatry Psychiatr Epidemiol. 2010;45:1071-1079
32. Hussainy SY, Box M, Scholes S. Piloting the role of a pharmacist in a community palliative care multidisciplinary team: an Australian experience. BMC Palliative Care. 2011;10:16
33. Krass I, Smith C. Impact of medication regimen reviews performed by community pharmacists for ambulatory patients through liaison with general medical practitioners. Int J Pharm Pract. 2000;8:111-120
34. Lovgren S, Clark RA, Angley M, Ponniah AP, Colley D, Shakib S. Timeliness and clinical impact of hospital-initiated medication reviews. J Pharm Pract Res. 2009;39:269-273
35. Nguyen A, Yu K, Shakib S, et al. Classification of findings in the home medicines reviews of post-discharge patients at risk of medication misadventure. J Pharm Pract Res. 2007;37:111-114
36. Stafford AC, Tenni PC, Peterson GM, et al. Drug-related problems identified in medication reviews by Australian pharmacists. Pharm World Sci. 2009;31:216-223
37. Stafford L, Stafford A, Hughes J, Angley M, Bereznicki L, Peterson G. Drug-related problems identified in post-discharge medication reviews for patients taking warfarin. Int J Clin Pharm. 2011;33:621-626
38. Tan EC, Stewart K, Elliott RA, George J. Pharmacist consultations in general practice clinics: the Pharmacists in Practice Study (PIPS). Res Social Adm Pharm. 2013;10:623-632
39. Tenni P, Stafford A, Peterson G, Jackson S. A comparison of drug related problems identified in RMMRs and HMRs. Aust Pharm. 2007;26:306-307
40. Angley M, Ponniah AP, Spurling LK, et al. Feasibility and timeliness of alternatives to post-discharge home medicines reviews for high-risk patients. J Pharm Pract Res. 2011;41:27-32
41. Bonner CJ, Watson PG. Therapeutic housekeeping. A case study involving collaboration between a medical practitioner and a clinical pharmacist in a medication management program for elderly patients. J Soc Adm Pharm. 2001;18:97-102
42. Castelino RL, Chen TF, Guddattu V, Bajorek BV. Use of evidence-based therapy for the prevention of cardiovascular events among older people. Eval Health Prof. 2010;33:276-301
43. Castelino RL, Bajorek BV, Chen TF. Retrospective evaluation of home medicines review by pharmacists in older Australian patients using the medication appropriateness index. Ann Pharmacother. 2010;44:1922-1929
44. Castelino RL, Hilmer SN, Bajorek BV, Nishtala P, Chen TF. Drug burden index and potentially inappropriate medications in community-dwelling older people: the impact of home medicines review. Drugs Aging. 2010;27:135-148
45. Chen TF, Crampton M, Krass I, Benrimoj SI. Collaboration between community pharmacists and GPs - impact on interprofessional communication. J Soc Adm Pharm. 2001;18:83-90
46. Freeman C, Cottrell WN, Kyle G, Williams I, Nissen L. Does a primary care practice pharmacist improve the timeliness and completion of medication management reviews? Int J Pharm Pract. 2012;20:395-401
47. Harris A, Gospodarevskaya E, Callaghan J, Story I. The cost effectiveness of a pharmacist reviewing medication among the elderly in the community. Australas J Ageing. 2001;20:179-186

48. Kalisch Ellett LM, Ramsay EN, Barratt JD, Gilbert AL, Roughead EE. Home medicines reviews: Extent of uptake by high-risk veterans. J Pharm Pract Res. 2013;43:182-186
49. Ponniah A, Shakib S, Doecke CJ, Boyce M, Angley M. Post-discharge medication reviews for patients with heart failure: a pilot study. Pharm World Sci. 2008;30:810-815
50. Quirke J, Wheatland B, Gilles M, Howden A, Larson A. Home medicines reviews - do they change prescribing and patient/pharmacist acceptance? Aust Fam Physician. 2006;35:266-267
51. Roughead EE, Kalisch LM, Ramsay EN, Ryan P, Gilbert AL. Continuity of care: when do patients visit community healthcare providers after leaving hospital? Intern Med J. 2011;41:662-667
52. Roughead EE, Barratt JD, Ramsay E, et al. The effectiveness of collaborative medicine reviews in delaying time to next hospitalization for patients with heart failure in the practice setting: results of a cohort study. Circ Heart Fail. 2009;2:424-428
53. Roughead EE, Barratt JD, Ramsay E, et al. Collaborative home medicines review delays time to next hospitalization for warfarin associated bleeding in Australian war veterans. J Clin Pharm Ther. 2011;36:27-32
54. Sorensen L, King MA, Peck R, Roberts MS. In-home medication reviews for war veterans: early experience in Australia. J Pharm Pract Res. 2004;34:122-124
55. Sorensen L, Stokes JA, Purdie DM, Woodward M, Roberts MS. Medication management at home: medication-related risk factors associated with poor health outcomes. Age Ageing. 2005;34:626-632
56. Stafford A, Tenni P, Peterson G, Doran C, Kelly W. VALMER (the Economic Value of Home Medicines Review). 2009. Available at: http://guild.org.au/docs/default-source/public-documents/services-and-programs/research-and-development/Fourth-Agreement-R-and-D/IIG-021/final-report.pdf?sfvrsn=0 (accessed 25 Feb 2014).
57. Yu K, Nguyen A, Shakib S, et al. Enhancing continuity of care in therapeutics: development of a post-discharge home medicines review model. J Pharm Pract Res. 2007;37:22-26
58. Quality use of medicines in the community implementation trial. Report to the Department of Health and Aged Care: University of South Australia and University of Adelaide, 2000.
59. Bell JS, Rosen A, Aslani P, Whitehead P, Chen TF. Developing the role of pharmacists as members of community mental health teams: perspectives of pharmacists and mental health professionals. Res Social Adm Pharm. 2007;3:392-409
60. Blennerhassett JD, Cusack BM, Smith CD, Green L, Tribe KL. A novel medicines management pathway. J Pharm Pract Res. 2006;36:175-179
61. Campbell Research & Consulting. Home Medicines Review Program, Qualitative Research Project. 2008. Available at: http://www.health.gov.au/internet/main/publishing.nsf/Content/D341DA146481106ACA257BF00020A7CD/$File/HMR%20Final%20Report.pdf (accessed 25 Feb 2014).
62. Carter SR, Chen TF, White L. Home medicines reviews: a quantitative study of the views of recipients and eligible non-recipients. Int J Pharm Pract. 2012;20:209-217
63. Carter SR, Moles R, White L, Chen TF. Patients' willingness to use a pharmacist-provided medication management service: the influence of outcome expectancies and communication efficacy. Res Social Adm Pharm. 2012;8:487-498
64. Carter SR, Moles R, White L, Chen TF. Exploring patients' motivation to participate in Australia's Home Medicines Review program. Int J Clin Pharm. 2012;34:658-666
65. Carter SR, Moles R, White L, Chen TF. The willingness of informal caregivers to assist their care-recipient to use Home Medicines Review. Health Expect. 2013 doi: 10.1111/hex.12092 Epub Jun 6 2013.
66. Carter SR, Moles RJ, White L, Chen TF. Consumers' willingness to use a medication management service: the effect of medication-related worry and the social influence of the general practitioner. Res Social Adm Pharm. 2013;9:431-445
67. Roberts A, Benrimoj S, Chen T, Williams K, Aslani P. Implementation of Home Medicines Review (HMR) in community pharmacy. Aust Pharm. 2005;24:808-813
68. Urbis Keys Young. Evaluation of the Home Medicines Review Program - Pharmacy Component. 2005. Available at: http://beta.guild.org.au/uploadedfiles/Medication_Management_Reviews/Overview/Urbis%20Keys%20Young%20evaluation.pdf (accessed 25 Feb 2014).
69. White L, Klinner C. Medicine use of elderly Chinese and Vietnamese immigrants and attitudes to home medicines review. Aust J Prim Health. 2012;18:50-55
70. Kyle G, L N. A community nurse referral system for HMRs – can it work? Aust Pharm. 2006;25:326-332
71. Bell JS, Aslani P, McLachlan AJ, Whitehead P, Chen TF. Mental health case conferences in primary care: content and treatment decision making. Res Social Adm Pharm. 2007;3:86-103

72. Stafford A. A clinical and economic evaluation of medication reviews conducted by pharmacists for community-dwelling Australians [PhD Thesis]. University of Tasmania, 2012.
73. Imberg AJ, Swanoski MT, Renier CM, Sorensen TD. Maximizing medication therapy management services through a referral initiative. Am J Health Syst Pharm. 2012;69:1234-1239
74. Krass I, Smith C. Cost analysis of medication management reviews (MMR) performed by community pharmacists for ambulatory patients through liaison with local general medical practitioners: Pharmacy Department, University of Sydney, 1999.
75. Kucukarslan SN, Hagan AM, Shimp LA, Gaither CA, Lewis NJ. Integrating medication therapy management in the primary care medical home: a review of randomized controlled trials. Am J Health Syst Pharm. 2011;68:335-345
76. Swain L. Strategies to Increase Uptake of Home Medicines Reviews in Aboriginal and Torres Strait Islander Communities 2010. Available at: http://pandemicprepared.org.au/uploadedfiles/Rural_Pharmacy/Grants_and_Scholarships/Final%20Report%20Swain%202009%2004.pdf (accessed 25 Feb 2014).
77. Turner JP, Bell JS. Implementation of pharmacist-led medication reviews in general practice. Int J Clin Pharm. 2013;35:3-4
78. Chan P, Grindrod KA, Bougher D, et al. A systematic review of remuneration systems for clinical pharmacy care services. Can Pharm J. 2008;141:102-112
79. Kwint HF, Faber A, Gussekloo J, Bouvy ML. Completeness of medication reviews provided by community pharmacists. J Clin Pharm Ther. 2014;39:248-252
80. Campbell M, Fitzpatrick R, Haines A, et al. Framework for design and evaluation of complex interventions to improve health. BMJ. 2000;321:694-696
81. van Mil JW, Westerlund LO, Hersberger KE, Schaefer MA. Drug-related problem classification systems. Ann Pharmacother. 2004;38:859-867

Figure E.1. Flowchart of the literature search and study selection

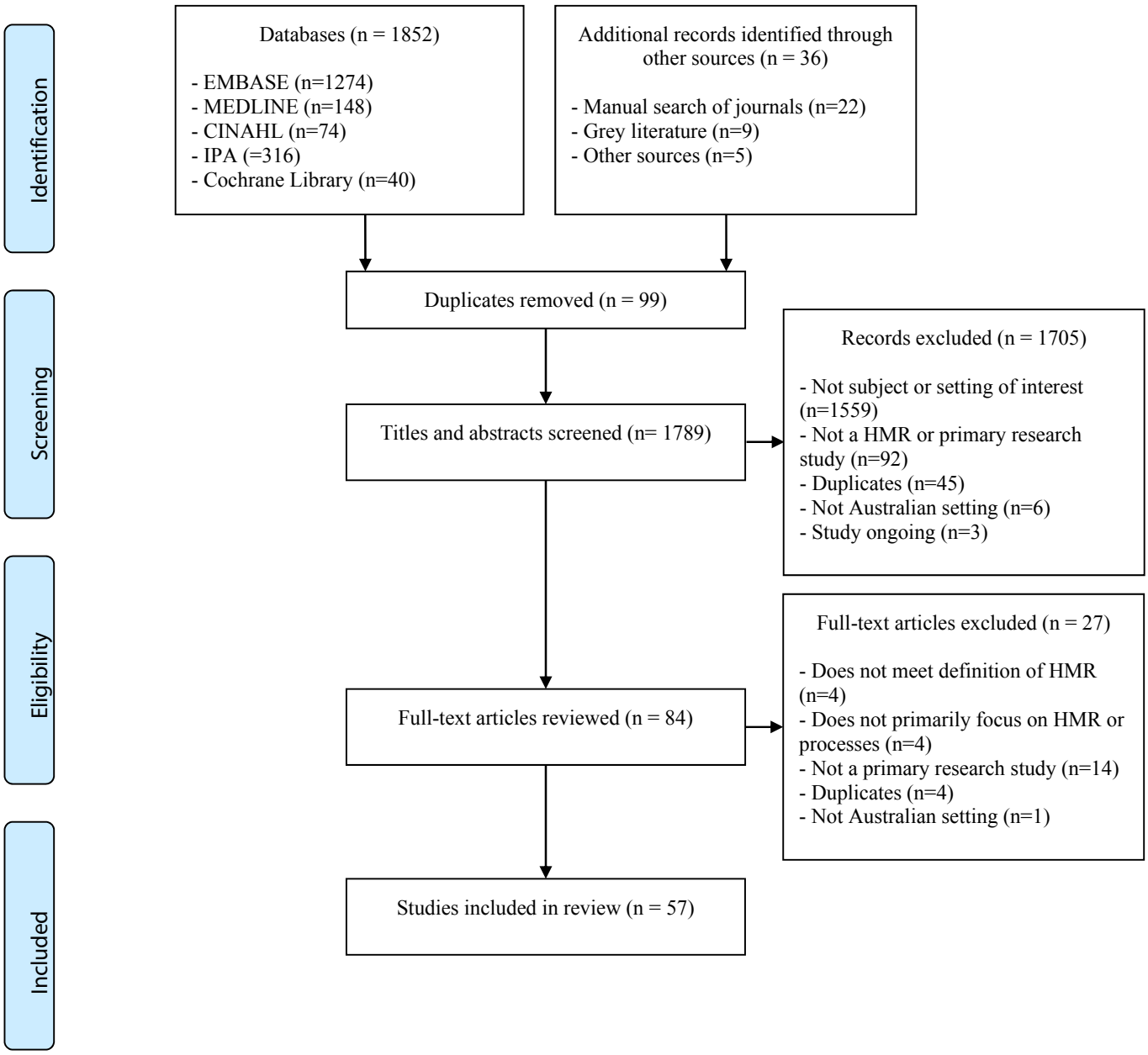


Table E.1: Eligibility criteria and referral guidelines for HMR[13]

Eligibility criteria
– Medicare/Department of Veterans' Affairs cardholder – Living in the community setting – Identifiable clinical need and the patient determined to benefit
Referral guidelines[a]
– 5 or more medicines a day – More than 12 doses of medicine a day – 3 or more concurrent medical conditions – Discharged from hospital in the past 4 weeks – Significant changes to medicine regimen in the past 3 months – Taking medicine with a narrow therapeutic index or requiring therapeutic drug monitoring – Symptoms suggestive of an adverse drug reaction – Sub-therapeutic response to therapy – Suspected non-compliance or problems with managing medicine-related devices – Self-managing own medicine and are at risk due to literacy or language difficulties, dexterity problems, impaired vision or cognitive deterioration – Attending a number of different doctors, both GPs and specialists – Increasing fragility – Changes in health status

[a] Considered at risk of or experiencing medication misadventure, risk factors to be used as a guide

Table E.2: Controlled studies reporting key processes, eligibility and referral criteria

Author, Year	Study design	No. of patients (mean age +/- SD)		Eligibility[a]	Referral[a]	Process[b]	Key findings	Funding source
		Intervention	Control					
Barker et al, 2012[16]	RCT	64 (73.02+/-10.11)	56 (72.02+/-10.12)	- Hospital stay ≥ 48 hours - CHF - ≥4 medications	Hospital pharmacist-directed HMR	HMR within 96 hours of discharge	No effect on healthcare utilization, mortality, QoL	Australian Government
Bennett et al, 2000[17]	RCT	184 (73.2)	178 (70.4)	Standard HMR	- Standard HMR - Referral to patients preferred pharmacy	- Model 1: Standard HMR - Model 2: GP conducted clinical audit followed by standard HMR - Pharmacists undertook Part 1 of AACP accreditation - GP-pharmacist case conference to discuss HMR	- 70% HMR at home, 20% in pharmacy, 5% by phone, 5% at GP - 56.9% of patients used their preferred pharmacy - Significant reduction in mean no. of medicines (10.71 vs 9.22) and monthly cost of medicines (AUD 201.80 vs AUD $183.51) from baseline to 3 month follow-up - 9.1% reduction in overall and mean medicine costs at 3 month follow up - Improved GP-pharmacist communication and relationship - Increased no. of accredited pharmacists, funding for interpreter services and on-going professional remuneration for GPs and pharmacists	Australian Government

							required for sustainability of the model	
Bollella et al, 2008[18]	RCT	15 (74.1 +/- 9.7)	15 (76.5 +/- 11.5)	- Admission to hospital - At risk of medication misadventure	Hospital liaison pharmacist recommended HMR to CP and GP	Standard HMR	Significantly increased rates of HMR referral (53% vs 7%) when the liaison pharmacist had greater involvement in the post-discharge period	None
Elliott et al, 2012[19]	RCT	40 (85.5)	40 (83.0)	- Referral to ACAT - ≥2 medications	- Group A: Aged care clinical pharmacist referred to GP (standard HMR) - Group B: Direct referral to ACAT-associated pharmacist (APHMR)	- ACAT-associated pharmacist was not accredited but had >5 years clinical pharmacy experience in aged care and hospital outreach - Standard HMR	- 90% received HMR within 28 days via APHMR vs 17.5% when GP-initiated - Pharmacist involvement improved detection of MRPs (addition of 79 MRPs identified via APHMR)	Partially funded by Jack Brockhoff Foundation
Graffen et al, 2004[20]	RCT	202 (Combined intervention & control: 77.7 +/- 6.6)	200	- ≥ 65 years old - Rural community - ≥ 5 medications - 1 of: anticholinergic, anticonvulsant, antipsychotic, narcotic, benzodiazepine, medication with narrow therapeutic index, ≥12 doses a day, ≥6 diagnoses, BMI<22	Referral by GP to the project pharmacist	- Medication review by project pharmacist (unclear training) - GP-pharmacist case conference	- Pharmacist made recommendations for 687 medications - 35% of recommendations taken up by GPs - No significant changes in QoL or hospitalisation	Not declared
Krass et al, 2005[21]	Controlled trial	106 (64 +/- 9)	82 (65+/- 10)	- Type 2 diabetes - 18 to 85 years old - ≥ 3 medications	Pharmacist-directed medicine review	- Pharmacists received training by a clinical	- Significantly improved adherence and medication regimen changes	Support from Australian Government

				- ≥ 1 anti-diabetic medication		pharmacist during a 2-day program - Medicine review in CP or diabetes clinic	- Significant reduction in mean no. of medications prescribed on follow up	
Naunton et al, 2003[22]	RCT	57 (74)	64 (77)	- Hospital admission - ≥ 60 years old - 2 chronic medical conditions requiring medication with at least 1 of HF, COPD or diabetes - ≥ 4 medications	Pharmacist-directed medicine review	- Study pharmacist (unclear training) completed a comprehensive medication review at home 5 days post-discharge and follow up at 90 days - Standard HMR then followed	- Significant reduction in unplanned hospital admissions and MRPs identified - Significant increase in adherence - GPs implemented 79% of pharmacist recommendations	Funding by Abbott Australasia Pharmacy Research Grant via SHPA
Sorensen et al, 2004[23]	RCT	176 (72.3)	216 (71.4)	Standard HMR	Standard HMR	Standard HMR	- Successful implementation of a multidisciplinary service model with high levels (>90%) of satisfaction among GPs and pharmacists - Positive trends in clinical outcomes and costs over 6 months	Australian Government
Stafford et al, 2011[24]	Controlled cohort study	129 (67.7)	139 (66.2)	- ≥ 18 years old - Recent hospital discharge	Standard HMR	Standard HMR conducted 8 to 10 days post-discharge	- Significant reduction in combined major and minor haemorrhagic	Australian Government

				- Newly initiated on warfarin or continuing preadmission therapy with an indication necessitating at least 3 months therapy			events at 90 days post-discharge - Significantly improved persistence in taking warfarin post-discharge	Conflict of interest: Roche Diagnostics Australia, Sanofi-Aventis and Boehringer-Ingelheim

[a] Refer to Table E.1 for Standard HMR eligibility and referral criteria

[b] Refer to text for Standard HMR process

AACP = The Australian Association of Consultant Pharmacy; ACAT = Aged Care Assessment Team; CHF = chronic heart failure; COPD = chronic obstructive pulmonary disease; CP = community pharmacy; GP = general medical practitioner; HF = heart failure; HMR = Home Medicine Review; MRP = medication-related problem; QoL = quality of life; SD = standard deviation; SHPA = The Society of Hospital Pharmacists of Australia

Table E.3:. Studies reporting medication-related problems identified in Home Medicines Reviews

Author, Year	Study design	N	Age, mean (SD) range	Sample characteristics[a]	Context[b]	MRP classification	MRPs identified	Funding source
Alderman et al, 2013[25]	Retrospective analysis	100	78.57 (8.84) 50-99	- Standard HMR - Rural community setting	Standard HMR	Strand et al.	- 130 MRPs - 73 patients had ≥1 MRP - Mean 1.3 MRPs (SD 1.2)/patient	None
Bell et al, 2006[26]	Prospective descriptive study	56	66 21-87	- Mental illness - Community dwelling	Standard HMR	Clinical Pharmacy Activity Classification System	- 403 'issues' (249 medication-related, 134 patient-related, 20 prescriber-related) - Mean 2.1 suspected or potential ADRs/patient	Australian Government via Pharmacy Guild of Australia
Castelino et al, 2011[27]	Retrospective analysis	224	74.6 (7.1)	- ≥65 years old - Community dwelling	Standard HMR	"adaptation of previously employed criteria" (Cipolle, Gilbert, Pit)	- 1110 MRPs - 98% patients had ≥1 MRP - Mean 4.9 MRPs (SD 2.9)/patient	Not reported
Ellitt et al, 2010[28]	Retrospective analysis	76	66.0 (13.2) 32-88	Patients discharged from cardiology unit of hospital	Standard HMR post discharge	Westerlund System	- 398 MRPs - 71 patients had ≥1 MRP - Mean 5.6 MRPs (SD 4.3)/patient	Australian Government via Pharmacy Guild of Australia
Freeman et al, 2013[29]	Retrospective analysis	- External pharmacist phase: 70 - Practice pharmacist phase: 314	- External pharmacist phase: 81(median) 56-93 - Practice pharmacist phase: 81(median) 9-91	Standard HMR	- External pharmacist phase: Standard HMR - Practice pharmacist phase: pharmacist integrated in medical practice	"adapted version of St George Canterbury Medico/Pharmacy Project coding system"	- External pharmacist: 5.4 MRPs/patient (range 0-15) - Practice pharmacist: 3.6 MRPs/patient (range 1-11)	None

Gilbert et al, 2002[30]	Participatory action research	1000	- Male: 72 (median) 1-100 - Female: 74 (median) 8-100	Standard HMR	Pre & post review case conference with GP, prior to official launch of HMR program	"previously employed criteria" (March, Krass, Cipolle)	- 2764 MRPs, - Mean 2.5 MPRs/patient	Australian Government via Pharmacy Guild of Australia
Gisev et al, 2010[31]	Retrospective analysis	48	46.8 (15.1)	- Mental illness - Clients of CMHT	- Pharmacists contracted with CMHT - Access to medical record - Not GP referred	Gilbert et al. framework	- 209 findings - Mean 4.4 MRPs (SD 2.0)/patient	Pharmacy Research Trust of New South Wales
Hussainy et al, 2011[32]	Prospective descriptive study	46	Not reported	- Palliative care - Clients of community palliative care team	Pharmacists working with palliative care team	Adapted from D.O.C.U.M.E.N.T.	113 MRPs	Australian Government via National Palliative Care Program
Krass et al, 2000[33]	Prospective descriptive study	Stage 1: 105 Stage 2: 170	- Stage 1: Not reported - Stage 2: 71 (16)	Standard HMR	Medication review and case conference, prior to official launch of HMR program	Categories developed through content analysis	- Stage 1: 811 findings - Stage 2: 1654 findings	Australian Government Pharmacy Agreement
Lövgren et al, 2009[34]	Prospective descriptive study	36	75.3 (9.9)	Patients discharged from hospital at risk of medication misadventure	Hospital pharmacist-directed medication review	'Issues' categorised as intervention/action, information given or recommendation	1442 'issues' in 36 medication review reports (40 issues per report)	Not reported
Nguyen et al, 2007[35]	Prospective descriptive study	21	74.9 (8.8)	Patients discharged from hospital at risk of medication misadventure	Standard HMR post discharge	'issues' categorised as intervention or information given	- 98 'issues' in 21 HMR reports (25 intervention, 73 information given) - Mean 4.7 'issues' (SD 2.2)/patient	Not reported

Stafford et al, 2009[c,36]	Retrospective analysis	138	73.9 (10.6)	Standard HMR	Standard HMR submitted to AACP	D.O.C.U.M.E.N.T.	- Mean 4.8 MRPs (SD 2.3)/patient - Range 0-25	None
Stafford et al, 2011[37]	Retrospective analysis	109	Not reported	Patients discharged from hospital taking warfarin	Post-discharge warfarin management service	D.O.C.U.M.E.N.T.	- 157 warfarin-associated MRPs for 109 patients - Mean 1.4 MRPs/patient	Australian Government via Pharmacy Guild of Australia
Tan et al, 2013[38]	Prospective descriptive study	82	71.7 (11.2)	Standard HMR	Pharmacist integrated in medical practice	Strand et al.	251 MRPs at study baseline	Windermere Foundation
Tenni et al, 2007[39]	Retrospective analysis	138	73.9 (10.6)	Standard HMR	Standard HMR	D.O.C.U.M.E.N.T.	- Mean 4.9 MRPs (SD 2.0)/patient - Range 0-25	Not reported

[a] Refer to Table E.1 for Standard HMR eligibility and referral criteria
[b] Refer to text for Standard HMR process
[c] Same data as Tenni PC et al 2007.
AACP = The Australian Association of Consultant Pharmacy; ADR = adverse drug reaction; CMHT=community mental health team; GP=general medical practitioner; HMR = Home Medicines Review; MRP=medication-related problem; SD=standard deviation

Table E.4:. Studies reporting other clinical, humanistic and economic outcomes identified in Home Medicines Reviews

Author, Year	Study design	N	Age, mean (SD) range	Sample characteristics[a]	Context[b]	Key findings	Funding source
Angley et al, 2011[40]	Implementation study[c]	- HIMR: 52 - HMR: 18	- HIMR: 77(14) - HMR: 73(9.5)	- At risk of medication misadventure - Discharged from hospital	- HMR: hospital liaison pharmacist identifies at-risk patients and asks GP to organise HMR - HIMR: hospital liaison pharmacist assists HMR referral by hospital doctor	HIMR pathways were significantly more timely than HMRs organised in community (6.5(4.7) vs 11(7.4) days, p=0.02)	Australian Government via Pharmacy Guild of Australia
Bonner et al, 2001[41]	Prospective cohort	95	Not reported	- ≥65 years old - Rural community	- Based in medical practice, pharmacist reviewed patient health summaries without patient interview - Face-to-face educational detailing with GP to discuss issues	- 155 MRPs in 95 patients - 74 changes made by GP in 52 patients - Average number of drugs reduced from 5.5 to 5 per patient - Annual saving AUD $4471 in medication costs - Cost of intervention AUD $1020	Southern Queensland Rural Division of General Practice
Castelino et al, 2010[42]	Retrospective cross-sectional audit	608	75.6(7.5)	- Standard HMR - Community-dwelling - ≥65 years old	Standard HMR	- HMR significantly associated with prescribing of evidence-based therapies in CVD (antithrombotic therapy, statins, angiotensin therapy & β-blockers)	None
Castelino et al, 2010[43]	Retrospective analysis	270	75.3(7.4)	- Standard HMR - Community-dwelling - ≥65 years old	Standard HMR	- 267 (99%) patients had ≥1 inappropriate rating - Mean MAI score decreased significantly from baseline to after HMR (18.6[11.3] vs 9.3[7.5])	Not reported

Castelino et al, 2010[44]	Retrospective analysis	372	76.1(7.8)	- Standard HMR - Community-dwelling - ≥65 years old	Standard HMR	- Significant reduction in sum total of DBI scores after pharmacists' recommendations (206.9 vs 157.3, p<0.001) - Reduction in number of patients with PIMs from 39.8% to 28.2%	None
Chen et al, 2001[45]	Multiple baseline time-lagged control design	- 38 CPs - 61 GPs - 120 HMRs	Not reported	Standard HMR	- Community pharmacists received process-based training in HMR - GP-pharmacist meetings to discuss HMRs	- No significant difference in frequency, nature, initiator or duration of telephone contacts post-test vs pre-test	Australian Government
Freeman et al, 2012[46]	Retrospective analysis	- Pre-intervention: 70 - Post-intervention: 314	- Pre-intervention: 80 - Post-intervention: 78	Standard HMR	Pharmacist integrated into inner-city suburb GP medical centre	- Time to complete HMR process reduced significantly from median 56 days to 20 days - Failure to bill for HMR services decreased from 52% to 6%	None
Gilbert et al, 2000[58]	Uncontrolled cohort study and cost analysis	- 119 GPs - 64 pharmacists - 1020 HMRs	Patients: 74 (median)	Standard HMR (48% in rural and remote settings)	Pre & post review case conference with GP, prior to official launch of HMR program	- Mean 3 MRPs/patient - The program was well accepted by consumers, GPs and pharmacists - Standard HMR criteria was successful in identifying people at risk of medication misadventure - Net saving to the health system of $120 per person after costs were accounted for	Australian Government
Harris et al, 2001[47]	Cost-effectiveness analysis	- Melbourne (C): 215 - Melbourne (I): 175 - Ballarat (C): 205 - Ballarat (I): 164	- Melbourne (C): 79.3(9.2) - Melbourne (I): 79.1(8.5) - Ballarat (C): 79.5(11.2) - Ballarat (I): 79.8(9.3)	Elderly patients referred to ACAT	Pharmacist was a member of ACAT team	No significant changes in QOL, drug use or cost	Commonwealth Government Pharmacy Agreement

Kalisch et al, 2013[48]	Retrospective analysis	- HMR: 6236 - No HMR: 69336	- HMR: 84 81-87 - No HMR:83 74-86	- Veterans - Community-dwelling	Standard HMR	- The likelihood of having an HMR increased with age, number of medicines, number of GP visits, hospitalisations, and previous HMR. - Uptake of HMRs was appropriate in study population	Not reported
Ponniah et al, 2008[49]	Pilot study	59	79.4(9.31)	Patients with HF, admitted to general medical team	Post-discharge HMR, organised by liaison hospital pharmacist with GP and community pharmacist	- 56 GPs agreed to order a HMR - 41 patients received a HMR post-discharge - Barriers to implementation: patient withdrawal, low GP awareness of HMR process and timeliness of conducting HMR	Sansom Institute, University of South Australia and the Royal Adelaide Hospital
Quirke et al, 2006[50]	Retrospective audit and semi-structured interviews	49	63 (median)	- Standard HMR - Regional centre	Standard HMR	- 84% patients had ≥1 medication change after HMR - Pharmacists said they needed more time, funding, accreditation and locum support to sustain HMR	Not reported
Roughead et al, 2009[52]	Retrospective cohort	- HMR: 273 - No HMR: 5444	81.6(4.8) (Both groups)	- Veterans - ≥65 years old - HF	Standard HMR	- Adjusted results: 45% reduction in hospitalisation rate for heart failure at any time (HR, 0.55; 95% CI, 0.39 to 0.77) for those receiving HMR cf. not receiving HMR	Australian Government
Roughead et al, 2011[51]	Retrospective analysis	109 860	80.3(9)	Veterans hospitalised in 2006	Standard HMR	- 0.2% of veterans received HMR within 30 days of hospital discharge - (71% saw GP, 86% had medicines dispensed from CP, 44% saw specialist)	Australian Government (Veterans' MATES project)
Roughead et al, 2011[53]	Retrospective cohort	- HMR: 816 - No HMR: 16320	- HMR: 81.6(4.2) - No HMR: 81.4(4.6)	- Veterans, war widows & dependents - ≥65 years old - Dispensed warfarin	Standard HMR	- Adjusted results: 79% reduction in likelihood of hospitalisation for bleeding between 2 & 6 months (HR, 0.21 95% CI, 0.05-0.87) for those receiving HMR cf. not receiving HMR	Australian Government

						- No effect seen 0-2 months or >6 months after HMR - Recommend 6 monthly HMR for those on warfarin	
Sorensen et al, 2004[54]	Retrospective 'before after'	92	77.5 35-96	- Veterans - ≥20 prescription medicines dispensed during previous 6 months or doctor identified at risk of MRPs	Standard HMR	- No significant changes in number of medicines, health service costs or inappropriate medicines use (Beers criteria). - Higher number of drugs initiated and ceased than continued	Not reported
Sorensen et al, 2005[d,55]	Prospective cross-sectional	204	72.4 (10.3) 37-99	- Standard HMR living at home - At risk of medication-related poor health outcomes	Standard HMR	- Greater numbers of medications found at home associated with medication-related risk factors and greater severity of illness - Number of medications taken by the patient is a poorer indicator of medication-related risk factors	Australian Government
Stafford et al, 2009[56]	Retrospective cohort	180 HMR reports	76 (10.4) 30-98	Standard HMR	Standard HMR	- 2323 MRPs; 3.5 per HMR - 2727 recommendations by pharmacist - HMRs would result in significantly reduced healthcare utilisation costs, improved QoL - Potential savings 12 months post HMR varied; on average predicted savings are insufficient to offset costs but are sufficient for upper quartile of HMRs - Measures to improve targeting of HMRs to patients most likely to result in economic benefits	Australian Government via Pharmacy Guild of Australia

Yu et al, 2007[57]	Pilot study (Cohort/ "qualitative")	- Standard HMR: 21 - Hospital-funded HMR: 3	73.2(9.7)	- Patients admitted to medical team - At risk of medication misadventure	- Post-discharge HMR organised by hospital liaison pharmacist	- Barriers to uptake: low awareness of HMR by patients and GPs, community pharmacist reluctance, and time taken to perform HMRs	Not reported

[a] Refer to Table E.1 for Standard HMR eligibility and referral criteria
[b] Refer to text for Standard HMR process
[c] Methodology obtained from pilot study by Ponniah et al, 2008
[d] Same data as RCT by Sorensen et al, 2004
ACAT = Aged Care Assessment Team; C = control group; CP = community pharmacy; CVD = Cardiovascular disease; DBI = Drug Burden Index; GP = general medical practitioner; HF= heart failure; HMR = Home Medicines Review; I = intervention group; MAI = medication appropriateness index; MRP: medication-related problem; PIM: potentially inappropriate medication; QoL = quality of life; SD = standard deviation

Table E.5: Summary of qualitative and survey research related to Home Medicines Review

Author, Year	Study design	Participants/ respondents	Key findings relevant to key processes, eligibility and referral	Funding source
Bell et al, 2007[59]	- Focus groups - Interviews - Pharmacists' diaries	26 pharmacists and community mental health centre staff	- Medicine review pharmacists acted as liaison between medicine prescribers and dispensers in primary and secondary care settings - Consumers receiving case management through community mental health centres, many of whom may have difficulty accessing routine GP care, may benefit from HMR through additional referral pathways	Australian Government via Pharmacy Guild of Australia
Blennerhassett et al, 2006[60]	Survey	- 69 consumers - 44 GPs - 28 community pharmacists - 11 accredited pharmacists	- Community liaison pharmacist and medication review facilitator reported to improve links between hospital and community and HMR implementation	Not declared
Campbell Research and Consulting, 2008[61]	- Interviews - Focus groups	- Interviews with 109 health professionals (GP, community pharmacy owners, managers, accredited pharmacists) and 28 HMR consumers - Focus groups with 100 HMR eligible consumers	- Most GPs, CP owners/managers were ambivalent towards HMRs with GPs favouring more selective referral criteria and remuneration a concern for community pharmacies - Gaps in HMR access identified; post-hospital discharge, indigenous, CALD, palliative care and non-adherent consumers - Consumers who received a HMR were positive about the experience - Low to non-existent levels of HMR awareness amongst eligible consumers - Most eligible consumers felt they did not require HMRs and were independent in managing their medications	Australian Government
Carter et al, 2012[62]	Survey	- HMR recipients: 595 - Eligible non-recipients: 293	- 91% of HMR recipients satisfied with service - 23% of eligible non-recipients aware of HMR - Prior experience and (to a lesser extent) awareness of HMR associated with willingness to use HMR	Australian Government via Pharmacy Guild of Australia
Carter et al, 2012[63]	Survey	- 286 HMR eligible consumers - ≥5 medicines or ≥12 doses per day	- Expectancies (increased knowledge, improved medicine management capability and reduced concerns) associated with willingness to use HMR - Low expectations represent an opportunity for increasing consumer demand - Consumer-directed promotion should highlight that HMR involves provision of medicine information	Australian Government via Pharmacy Guild of Australia

Carter et al, 2012[64]	Focus groups	80 consumers at risk of medicine-related problems	- Outcome expectancy of HMR as an medicine information source - Worry about medicines key factor in motivating information seeking - Older people less likely to worry about medicines and, therefore, participate in medication management services	Australian Government via Pharmacy Guild of Australia
Carter et al, 2013[65]	Postal survey	324 members of Carers NSW	The higher the level of stress experienced while dealing with care recipients' medicines, the more likely they are to perceive HMRs to be a helpful information source and be willing to use it	Australian Government via Pharmacy Guild of Australia
Carter et al, 2013[66]	Postal survey	- 390 HMR eligible consumers - ≥5 medicines or ≥12 doses per day	- Low to neutral positive outcome expectancy (consumers' expectation that HMR would increase knowledge, improve medicine management capability and reduce concerns) - Medicine related worry higher in people with regimen change in past 3 months - Consumers worried about medicines had greater willingness to receive HMR	Australian Government via Pharmacy Guild of Australia
Kyle and Nissen, 2006[70]	Focus groups	- 1 group of nurses and GPs - 1 group of pharmacists	- All professions agreed HMR had benefits and supported community registered nurse-initiated HMR requests - Overall completion of HMRs was unnecessarily prolonged by process issues - Patient resistance to HMR identified as a barrier	Queensland Pharmacy Practice Research Trust
Roberts et al, 2005[67]	- Postal survey - In-depth interviews	- Survey responses from 735 pharmacies - Interviews with 36 pharmacists and pharmacy staff	- 76% pharmacies 2 or fewer HMRs per month - 42% pharmacies have accredited pharmacist on staff - Relationship with GPs, remuneration, pharmacy layout, patient expectation or need, communication and teamwork, staff and external support or assistance associated with HMR implementation	Australian Government via Pharmacy Guild of Australia
Urbis Keys Young, 2005[68]	- Focus groups - Interviews - Surveys - Economic cost benefit analysis	- Focus groups with 22 pharmacists - 1702 survey responses from pharmacists - Phone interviews with 25 pharmacists - 26 MMR facilitators and 50 consumers - 9 HMR case studies	- Low uptake and implementation; GPs and pharmacists need support (e.g. MMR facilitators), and greater consumer awareness - High overall consumer satisfaction with HMR - Average of 7% of HMRs conducted outside the home - Pharmacists received an average of 14 referrals in past year - Accredited pharmacists completed a mean of 31 HMRs in previous year - Contact with referring GP following HMR report uncommon - Low number of accredited pharmacists with accreditation timely and costly - Pharmacists regarded HMR as professionally satisfying and of benefit to consumers, GP relationships and the health system	Australian Government via Pharmacy Guild of Australia

CALD = culturally and linguistically diverse; CP = community pharmacy; GP = general medical practitioner; HMR = Home Medicine Review; MMR = medication management review

			- Certain groups underserved; CALD, indigenous, isolated communities. Older men and younger people with chronic disease likely to benefit	
Tan et al, 2013[8]	- Focus groups - Interviews - Narrative reports	- 18 consumers - 9 GPs - 4 practice nurses - 1 practice manager - 2 practice pharmacists	- Participants reported co-location of pharmacists and GPs and corresponding interdisciplinary environment enabled better communication and collaboration compared to traditional CP and consultant pharmacist services - Pharmacists needed to be personable and proactive for successful model	None
White et al, 2012[10]	Focus groups	87 HMR eligible consumers and carers	- Potential benefits perceived to outweigh potential barriers - Perceived benefits: receipt of medicine information, reassurance, feeling valued and cared for and pharmacist advocacy for regimen changes to GP - Perceived barriers: fear of upsetting GP, pride and independence, lack of confidence with an unknown pharmacist, privacy and safety concerns in relation to pharmacist home visit and insufficient information about the program	Australian Government via Pharmacy Guild of Australia
White et al, 2012[69]	Focus groups	17 Chinese and Vietnamese immigrants HMR eligible but non-recipients	- Widespread confusion about medicines but no prior awareness of HMR program - Perceived lack of support from GPs in relation to medicines among Chinese participants, would prefer HMR without GP involvement - Would prefer health care providers who spoke their own language	Australian Government via Pharmacy Guild of Australia

Table E.6: Summary of quality assessment for controlled studies

Author, Year, Study design	Selection bias						Performance bias		Detection bias					Attrition bias	Reporting bias
	Adequate allocation sequence	Adequate concealment of treatment allocation	Analyzed within original groups	Criteria applied uniformly	Same recruitment strategy	Confounding accounted for	Concurrent intervention or unintended exposure excluded	True to protocol	Same follow up length between groups	Outcome assessors blinded	Valid/reliable measures used to assess			Missing data handled appropriately	Prespecified outcomes reported
											Interventions/ exposures	Outcomes	Confounders		
Barker et al, 2012, RCT[16]	Unclear	Met	Met	N/A	N/A	Unclear	Met	Unclear	Met	Unclear	Met	Met	N/A	Met	Met
Bennett et al, 2000, RCT[17]	Unclear	Unclear	Unclear	N/A	N/A	Unclear	Unclear	Unclear	Met	Unclear	Met	Met	N/A	Met	Met
Bollella et al, 2008, RCT[18]	Met	Met	Met	N/A	N/A	Unclear	Met	Unclear	Met	Unclear	Met	Met	N/A	Unclear	Met
Elliott et al, 2012, RCT[19]	Met	Unclear	Met	N/A	N/A	Unclear	Met	Unclear	Met	Unmet	Met	Met	N/A	Met	Met
Graffen et al, 2004, RCT[20]	Unclear	Unclear	Unclear	N/A	N/A	Unclear	Met	Unclear	Met	Unclear	Met	Met	N/A	Met	Met
Krass et al, 2005, Controlled trial[21]	N/A	N/A	Met	Met	Met	Unclear	Met	Unclear	Met	Unclear	Met	Met	Unclear	Met	Met
Naunton et al, 2003, RCT[22]	Met	Unclear	Met	N/A	N/A	Unclear	Met	Unclear	Met	Unclear	Met	Met	N/A	Met	Met
Sorensen et al, 2004, RCT[23]	Met	Unclear	Met	N/A	N/A	Met	Met	Unclear	Met	Unclear	Met	Met	N/A	Met	Met
Stafford et al, 2011, RCT[24]	N/A	N/A	Met	Met	Met	Met	Met	Unclear	Met	Unclear	Met	Met	Unclear	Met	Met

Table E.7: Summary of quality assessment for observational studies

Author, Year, Study design	Selection bias						Performance bias		Detection bias					Attrition bias	Reporting bias
	Adequate allocation sequence	Adequate concealment of treatment allocation	Analyzed within original groups	Criteria applied uniformly	Same recruitment strategy	Confounding accounted for	Concurrent intervention or unintended exposure excluded	True to protocol	Same follow up length between groups	Outcome assessors blinded	Valid/reliable measures used to assess			Missing data handled appropriately	Prespecified outcomes reported
											Interventions/ exposures	Outcomes	Confounders		
Alderman et al, 2013, Retrospective analysis[25]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	N/A	Met
Angley et al, 2011, Implementation study[40]	N/A	N/A	Met	Met	Met	Met	Unclear	Unclear	Met	Unclear	Met	Met	Unclear	Met	Met
Bell et al, 2006, prospective descriptive study[26]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	Met	Met
Bonner et al, 2001, Prospective cohort[41]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	Met	Met
Castelino, 2011, Retrospective analysis[27]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	N/A	Met
Castelino et al, 2010, Retrospective	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Met	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	N/A	Met

cross-sectional audit[42]															
Castelino et al, 2010, retrospective analysis[43]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	N/A	Met
Castelino et al, 2010, Retrospective analysis[44]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A*	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	N/A	Met
Chen et al, 2001, Multiple baseline time-lagged control design[45]	N/A	N/A	Met	Met	Met	Met	Unclear	Unclear	Unmet	Unclear	Met	Met	Unclear	Met	Met
Ellitt et al, 2010, Retrospective analysis[28]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A*	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	N/A	Met
Freeman et al, 2012, Retrospective analysis[46]	N/A	N/A	Met	Met	Met	Unclear	Unclear	Unclear	N/A	Unclear	Met	Met	Unclear	N/A	Met
Freeman et al, 2013, Retrospective analysis[29]	N/A	N/A	Met	Unclear	Met	Unclear	Unclear	Unclear	N/A	Unclear	Met	Met	Unclear	N/A	Met
Gilbert et al, 2000, Uncontrolled cohort study[58]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	Unclear	Met
Gilbert et al, 2002,	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	Met	Met

Participatory action research[30]															
Gisev et al, 2010,Retrospective analysis[31]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	Met	Met
Harris et al, 2001, cost-effectiveness analysis[47]	N/A	N/A	Met	Met	Met	Unclear	Unclear	Unclear	Met	Unclear	Met	Met	Unclear	Unclear	Met
Hussainy et al, 2011, Prospective descriptive study[32]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	Unclear	Met
Kalisch et al, 2013, Retrospective analysis[48]	N/A	N/A	Met	Met	Met	Met	Unclear	Unclear	N/A	Unclear	Met	Met	Unclear	N/A	Met
Krass et al ,2000, Prospective descriptive study[33]	N/A	N/A	Met	Met	Met	Unclear	Unclear	Unclear	Met	Unclear	Met	Met	Unclear	Met	Met
Lövgren et al, 2009, Prospective descriptive study[34]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A*	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	Unclear	Met
Nguyen et al, 2007, Prospective descriptive study[35]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	Unclear	Met

Ponniah et al, 2008, Pilot study[49]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	Met	Met
Quirke et al, 2006, Retrospective audit[50]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Unclear	Met	Unclear	N/A	Met
Roughead et al, 2009, Retrospective cohort[52]	N/A	N/A	Met	Met	Met	Met	Unclear	Unclear	N/A	Unclear	Met	Met	Met	N/A	Met
Roughead et al, 2011, Retrospective analysis[51]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Met	N/A*	Unclear	N/A[a]	N/A[a]	Met	Met	Met	N/A	Met
Roughead et al, 2011, Retrospective cohort[53]	N/A	N/A	Met	Met	Met	Met	Unclear	Unclear	N/A	Unclear	Met	Met	Met	N/A	Met
Sorensen et al, 2004, Retrospective 'before & after'[54]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	N/A	Met
Sorensen et al, 2005, Prospective cross-sectional[55]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Met	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Met	Met	Met
Stafford et al, 2009, Retrospective cohort[56]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	N/A	Met

Stafford et al, 2009, Retrospective cohort[36]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Met	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Met	N/A	Met
Stafford et al, 2011, Retrospective cohort[37]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	N/A	Met
Tan et al, 2013, Prospective descriptive study[38]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Met	N/A[a]	N/A[a]	Met	Met	Unclear	Unclear	Met
Tenni et al, 2007, Retrospective analysis[39]	N/A	N/A	Met	Met	Met	Met	Unclear	Unclear	N/A	Unclear	Met	Met	Met	N/A	Met
Yu et al, 2007, Pilot study[57]	N/A	N/A	N/A[a]	N/A[a]	N/A[a]	Unclear	N/A[a]	Unclear	N/A[a]	N/A[a]	Met	Met	Unclear	Met	Met

[a] Single group

Table E.8: Summary of quality assessment for survey research studies

Author, Year, Study design	Selection bias						Performance bias		Detection bias					Attrition bias	Reporting bias
	Adequate allocation sequence	Adequate concealment of treatment allocation	Analyzed within original groups	Criteria applied uniformly	Same recruitment strategy	Confounding accounted for	Concurrent intervention or unintended exposure excluded	True to protocol	Same follow up length between groups	Outcome assessors blinded	Valid/reliable measures used to assess			Missing data handled appropriately	Prespecified outcomes reported
											Interventions/ exposures	Outcomes	Confounders		
Blennerhassett et al, 2006, Survey[60]	N/A	N/A	N/A	Unclear	N/A	Unclear	Unclear	N/A	N/A	Unclear	Met	Met	Unclear	Unclear	Met
Carter et al, 2012, Survey[63]	N/A	N/A	N/A[a]	N/A[a]	N/A	Unclear	N/A[a]	N/A	N/A[a]	N/A[a]	Met	Met	Unclear	Met	Met
Carter et al, 2012, Survey[62]	N/A	N/A	N/A	Met	N/A	Unclear	Met	N/A	N/A	Unclear	Met	Met	Unclear	Unclear	Met
Carter et al, 2013, Survey[66]	N/A	N/A	N/A[a]	N/A[a]	N/A	Met	N/A[a]	N/A	N/A[a] *	N/A[a]	Met	Met	Met	Met	Met
Carter et al, 2013, Survey[65]	N/A	N/A	N/A[a]	N/A[a]	N/A	Met	N/A[a]	N/A	N/A*	N/A[a]	Met	Met	Met	Met	Met
Roberts et al, 2005, Questionnaire[67]	N/A	N/A	N/A[a]	N/A[a]	N/A	Unclear	N/A[a]	N/A	N/A[a]	N/A[a]	Unclear	Met	Unclear	Unclear	Met

[a] Single group

Table E.9: Summary of quality assessment for qualitative studies

Author, Year	Study Design	Congruity between stated perspective and research methodology	Congruity between research methodology				Statement locating the researcher culturally or theoretically	Influence of the researcher on research, & vice-versa, addressed	Participants, & their voices, adequately represented	Research ethical according to current criteria/ethics approval by appropriate body	Conclusions drawn flow from the analysis/interpretation of data
			Research question/objective	Methods used to collect data	Representation and analysis of data	Interpretation of results					
Bell et al, 2007[59]	Focus groups, interviews, pharmacist diaries	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Campbell Research and Consulting, 2008[61]	Interviews, focus groups	Unclear	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Carter et al, 2012[64]	Focus groups	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kyle and Nissen, 2006[70]	Focus groups	Unclear	Yes	Yes	Yes	Unclear	No	No	No	Yes	Yes
Urbis Keys Young, 2005[68]	Focus groups, interviews, surveys	Unclear	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Tan et al, 2013[8]	Interviews, focus groups	Unclear	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
White et al, 2012[69]	Focus groups	Unclear	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
White et al, 2012[10]	Focus groups	Unclear	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

Search questions

The search questions will be consistent with those described in the original tender document and agreed at the Advisory Panel meeting on November 18. These were to:

- Identify alternatively-named models of complex medication management services that meet the criteria of HMR (e.g. Medication Review Service, Pharmacist-led Medication Review, etc.) and document their referral and eligibility parameters
- Identify and document the characteristics of patients who are demonstrated to have benefitted most from a HMR or equivalent model
- Identify and document characteristics of effective HMR models to assist in determining which HMR or equivalent model is likely to be cost-effective.

The search and review of the literature will be undertaken using a phased approach as recommended by the Advisory Panel.

Phase 1: Pharmacist-led medication management review in community settings: an overview - scoping review of systematic reviews

This phase will involve identifying existing systematic reviews on pharmacist-led medication management services and assess these reviews for quality and applicability.

Inclusion and exclusion criteria

The overview will include systematic reviews published from 1995 to present. Reviews of all types of quantitative study designs will be eligible for inclusion. For the purpose of the review, pharmacist-led medication services will be defined in accordance with the Professional Practice Standards as a 'systematic assessment of a consumer's medications and the management of those medications, with the aim of optimising consumer health outcomes and identifying potential medication-related issues within the framework of the quality use of medicines' [1]. The overview of systematic reviews will not be limited to reviews reporting pre-defined benefits or outcome measures. Instead, all outcomes described by the authors of the reviews will be considered in the data synthesis.

Systematic reviews will be excluded if they relate primarily to medication management services provided in residential aged care or hospital settings. Systematic reviews will also be excluded if they relate primarily to the provision of education rather than the delivery patient-specific interventions to assess and manage medication regimens.

Literature search strategy

MEDLINE, EMBASE, International Pharmaceutical Abstracts (IPA), Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Cochrane Database of Systematic Reviews (CDSR) will be searched using Medical Subject Heading (MeSH) terms, EMTREE terms and text words related to pharmacy. These terms will include 'medication therapy management', 'drug utilization review', 'community pharmacy services', 'pharmaceutical care', 'medication review', 'home medicines review', 'medicines use review', 'drug regimen review', 'domiciliary medication management review', 'medication related problem' and 'drug-related problem'. These search terms will be combined with publication format 'review' and the search terms 'systematic review', and 'literature review'. Searches will be limited to the English language. Reference lists of included reviews will be screened to identify additional systematic reviews that meet the inclusion criteria. Two pharmacist investigators will independently determine eligibility for inclusion in the overview of systematic reviews, with any differences of opinion later resolved by discussion until consensus is reached.

Quality assessment

The systematic reviews identified using the search strategy described above will be independently assessed by two pharmacist investigators using the Assessment of Multiple Systematic Reviews (AMSTAR) tool [2]. The 11-item AMSTAR tool was specifically developed to assess the methodological quality of systematic reviews. It has established reliability and validity for assessing systematic reviews of health interventions [3]. We will calculate the inter-rater agreement for total score and each of the 11-items. An AMSTAR score of 8 or more will be considered indicative of high quality. The AMSTAR tool is different

to the QUORUM and PRISMA Statements because these are reporting checklists for systematic reviews rather than quality assessment tools.

Data extraction and synthesis

Data from each of the systematic reviews deemed to be of high quality will be independently extracted by the two pharmacist investigators. The data extraction will be performed using a standardised data extraction tool. The data extraction tool will be pilot tested for face-validity prior to use, and be refined using an iterative process. The data extraction tool will include domains relevant to the each of the three primary research questions. It is anticipated that there will be a high degree of variability between each of the systematic reviews in terms of interventions, designs and contexts. For this reason the results of the systematic reviews will be summarised narratively rather than statistically.

Phase 2: Pharmacist-led medication management review in community settings: a systematic review of key processes, eligibility and referral criteria

Based on our preliminary reading of the literature it is anticipated that the current 'gap' relates to better understanding the key processes, eligibility and referral criteria rather than the corresponding clinical outcomes. A number of recent high quality systematic reviews have already addressed outcomes of pharmacist-led medication reviews (for example, [4, 5]). For this reason, we envisage conducting a systematic review of processes rather than outcome measures. These processes will include whether or not medication reviews were general practitioner referred, whether or not pharmacists performing the reviews had undergone additional training or accreditation, and the location in which the patient interview took place.

In addition to using bibliographic databases described previously, it is envisaged that this review will include an extensive search of the Australian 'grey literature', particularly that relevant to the current model of Home Medicines Review in Australia. The review will include searching QUMMAP – a database of quality use of medicines projects conducted in Australia. The review will also involve manually searching key Australian pharmacy journals (e.g. Journal of Pharmacy Practice and Research published by The Society of Hospital Pharmacists of Australia [SHPA], and Australian Pharmacist published by the Pharmaceutical Society of Australia). The search of the grey literature may include manually reviewing the past three years of abstracts from the SHPA National Conference.

References

(1) Pharmaceutical Society of Australia. Professional Practice Standards. Version 4. 2010 Available at http://www.psa.org.au/download/standards/professional-practice-standards-v4.pdf Accesed 11 November, 2013

(2) Shea BJ, Grimshaw JM, Wells GA, et al. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. BMC Medical Research Methodology 2007; 7: 10.

(3) Shea BJ, Hamel C, Wells GA, et al. AMSTAR is a reliable and valid measurement tool to assess the methodological quality of systematic reviews. Journal of Clinical Epidemiology 2009; 62: 1013-20.

(4) Hatah E, Braund R, Tordoff J, Duffull SB. A systematic review and meta-analysis of pharmacist-led fee-for-services medication review. British Journal of Clinical Pharmacology 2013; Epub ahead of print Apr 18 DOI: 10.1111/bcp.12140.

(5) Geurts MM, Talsma J, Brouwers JR, de Gier JJ. Medication review and reconciliation with cooperation between pharmacist and general practitioner and the benefit for the patient: a systematic review. British Journal of Clinical Pharmacology 2012; 74: 16-33.

Appendix F: List of peak body stakeholders consulted

Industry peak bodies:

- The Australian Association of Consultant Pharmacy
- Pharmaceutical Society of Australia
- The Royal Australian College of General Practitioners
- The Society of Hospital Pharmacists Australia
- The Pharmacy Guild of Australia

Consumer organisation peak bodies:

- Action of Disability within Ethnic Communities
- Aged and Community Services Australia
- Alzheimer's Australia
- Arthritis Australia
- The Consumers Health Forum of Australia
- Council of the Ageing
- Heart Foundation
- Homelessness Australia
- Physical Disability Australia
- National Aboriginal Community Controlled Health Organisation
- National Association of People with HIV Australia
- National Council of Intellectual Disability
- National Rural Health Alliance

Appendix G: Local level consultations - consultation frameworks

Accredited and community pharmacist's discussion guide

Your experience

(1) **Please describe your current involvement in the HMR program? For example the number of HMRs completed per week /year and the main referral sources.**

Some patients lack medical stability in their condition

(2) **Which of the following groups of patients *who may have instability in their medical conditions* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Patients with significant changes to their medicine regimen in the last three months
- Patients taking medicine with a narrow therapeutic index or requiring therapeutic monitoring
- Patients with symptoms suggestive of an adverse drug reaction
- Patients who have a sub-therapeutic response to therapy
- Patients who have had a change in medical condition or abilities
- Patients who have impaired renal or hepatic function
- Patients who have been discharged within the last four weeks from a health service (including discharge from hospitals, outpatients or rehabilitation services)
- Patients who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital
- Patients who have had multiple unplanned admissions, presentations and/ or representations in the past twelve months
- Other, please specify

Some patients lack the capacity to manage their own conditions

(3) **Which of the following groups of patients *who may lack the capacity to manage their own conditions* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Patients having difficulty managing their own medicines because of literacy or language difficulties (e.g. dysphasia)
- Patients at risk of, or unable to manage or continue managing their own medicines due to confusion, dementia and/or other cognitive difficulties
- Patients who are at risk of, or unable to manage or continue managing their own medicines due to dexterity limitations and/or impaired vision
- Patients who are suspected or known to be non-compliant with their medicine regime
- Patients who require a medication delivery device e.g. asthma inhaler
- Patients who require an adherence aid e.g. dosette box
- Patients who have difficulties managing an adherence aid
- Patients aged 65years and over
- Other – please specify

Some patients lack appropriate support to manage their own medications

(4) **Which of the following groups of patients *who may lack appropriate support to manage their own medication* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Lives alone with minimal supports and has limited capacity to manage on their own

- Lives with another person who is unable to give adequate support
- Recent bereavement or life event impacting on patient's ability to manage
- Other – please specify

Some patients with particular diseases or conditions may lack the knowledge and skills to manage their own medications at home

(5) **Which of the following groups of patients *with particular diseases or conditions* are likely to benefit most from an HMR. Are any sufficient on their own to justify a clinical need for a HMR?**

- Severe or unstable Ischaemic Heart Disease (IHD)
- Newly diagnosed Atrial Fibrillation (AF)
- Recent Acute Myocardial Infarction (AMI) or Acute Coronary Syndrome (ACS)
- Other cardiovascular conditions
- People who have had a significant fall or recurrent falls
- Stroke
- Fractured neck of femur
- Post amputation
- Mental illness
- Diabetes
- HIV
- Rheumatological disease
- Cancer
- Palliative care
- Arthritis
- Respiratory disease
- Other – please specify

Patient or medication complexity

(6) **There are a number of factors that could be seen to contribute to the complexity associated with patients' medicine's use and risk of medication misadventure.**

Which of the following groups of patients *with complex medication management regimens and/or risk of medication misadventure* are likely to benefit most from an HMR. Are any sufficient on their own to justify a clinical need for a HMR?

- Currently taking five or more regular medicines
- Taking more than 12 doses of medicine per day
- Taking medicine with a narrow therapeutic index or requiring therapeutic monitoring
- Attending a number of different doctors, both general practitioners and specialists
- Number of comorbidities
- Other – please specify

Tell Us About the Relative Importance Across Different Domains of Need for a HMR

The previous questions (Q2-6) considered the potential benefit of HMR to patients within five broad domains. The following question asks you to comment on the potential benefit to patients *between* these domains.

(7) **Please comment which of the following five broad patient domains you believe is most important in contributing to the need for a HMR.**

- Instability in patient medical condition(s)
- Patient difficulty managing their medical condition(s)
- Insufficient support for patient to manage their medication(s)
- Particular disease(s) or condition(s) that are difficult to manage

- Factors that add additional complexity to the management of their medication(s) (e.g. number or type of medicines, diseases or conditions)

Outcomes

(8) **What are the most common recommendations you make to the general practitioner after undertaking an HMR?**

- Increase in dose of one or more medicines
- Reduction in dose of one or more medicines
- Change of one or more medicines to a different medicines
- Cessation of one or more medicines
- Other – please specify

(9) **Are you able to provide us with an example of the positive changes for patients that have occurred as result of patients having an HMR?**

Other medication management services

(10) **To what extent are you aware of, or are you involved in providing other medication management programs? These may include:**

- **Dose Administration Aids**, assisting patients who are non-intentionally non-adherent with their medication regimen
- **Clinical Interventions by pharmacists**, supporting patients to identify, manage, and resolve drug-related problems that are identified through patient attendance at a pharmacy
- **MedsChecks**, in-pharmacy review of consumer medicines aiming to enhance the quality use of medicines by educating community based patients about their medicines, including how medicines affect medical conditions; interactions between medicines, and identifying any problems patients may be experiencing with their medicines
- **Diabetes MedsCheck**, in-pharmacy review of medications with focus on Type 2 diabetes medicines management, monitoring devices, education and self management
- **Primary Health Care services** offered within a community pharmacy, which may include medication support around diabetes, respiratory and other chronic diseases and complex clinical conditions
- **Community Services Support activities** within community pharmacy such as return of unwanted medicines, and
- **Working with other health professional groups** which provide support to community pharmacies to work with a wider range of primary care providers and health professionals

(11) **How do you believe the eligibility criteria for an HMR should differ from the above medicine management programs, if at all?**

(12) **Do you think that GPs are inappropriately referring patients for an HMR when they should be referring to other medicine management services as outlined above? If 'yes', what other medication management services would be more appropriate?**

Additional HMR Reviews

Currently the *Program Specific Guidelines: Home Medicines Review* states that HMRs should not be triggered on a 12 month referral cycle. An additional review should only be provided when there has been a significant change to the patients' condition or medication regimen.

(13) **Is there a need for different eligibility criteria between initial and additional reviews? If 'yes', how do you consider the eligibility criteria should differ?**

Other

(14) **Do you have any other comments on the eligibility criteria for the HMR program?**

Consumer Organisation's Discussion Guides

The Home Medicines Review Program

The Home Medicines Review (HMR) program has been operating since 2001. HMR involves the patient, their general practitioner (GP), an accredited pharmacist and regular community pharmacy. In some cases other relevant members of the healthcare team, such as nurses in community practice or carers, are included.

The GP refers patients whom they believe would benefit from a review of medicine use in their home to the pharmacist. The accredited pharmacist visits the patient at their home, reviews their medicine routine and provides their GP with a report. The GP and patient then agree on a medication management plan.

The HMR program aims to increase quality use of medicines and reduce adverse medicine events.

Project background

In March 2013, the Hon. Tanya Plibersek, MP, the then Minister for Health, announced that research would be undertaken to ensure the targeting of HMRs is appropriate. As a result, under the Fifth Community Pharmacy Agreement, Research and Development Program, Healthcare Management Advisors (HMA) was engaged to:

> *Collate and assess evidence of the benefits of Home Medicines Reviews to different cohorts of patients in order to draft a set of recommendations detailing appropriately targeted criteria for HMR patient eligibility.*

Consultation approach

As part of the project, HMA is conducting consultations with:

- Pharmacy industry association bodies
- Medical peak bodies
- Consumer peak bodies
- Peak bodies of population groups that would benefit from an HMR
- Experienced health professionals including community pharmacists, hospital pharmacists, accredited pharmacists, general practitioners and hospital physicians
- Focus groups with consumers and carers who are likely to benefit from an HMR

Consultations with consumer organisations

Consultations with consumer organisations are focussed on identifying how the eligibility requirements for HMRs should be refined to strengthen access to those who are most likely to benefit from an HMR.

Note that the experience and views of consumers themselves are being sought through a series of focus groups with consumers. Consumers involved in these focus groups represent those who may benefit most from an HMR according to the literature review conducted as part of this project.

Medication management

(1) **Amongst the consumers your organisation supports, are you aware of any issues individuals face managing their own medications? What are these? These may include medical, physical, cognitive, social, medicines-related and/or other issues.**

(2) **How do you believe a home medication review could potentially help with these issues or does help with medication management (if known)?**

(3) **Are you able to provide us with an example of positive changes for patients or groups of patients that are occurring as a result of having an HMR?**

Who is likely to benefit most

(4) **In your opinion, which of the following four broad groups do you believe are most likely to benefit most from an HMR?**

- Patients with instability in their medication(s) or medical condition(s)
- Patients who have difficulty managing their medication(s)
- Patients with particular disease(s) or condition(s) and associated medication issues
- Patients impacted by factors that add to the complexity to managing their medication(s)

(5) **Are there any other groups/people who you believe are most likely to benefit from an HMR?**

(6) **How do patient eligibility requirements need to be refined to ensure HMRs are targeted to those most likely to benefit from an HMR? (*Current eligibility guidelines presented at the end of the document*).**

Other medication management services

(7) **To what extent *are you aware* of the following medication management programs provided by community pharmacists?**

- **Dose Administration Aids**, assisting patients who are non-intentionally non-adherent with their medication regimen
- **Clinical interventions by pharmacists**, supporting patients to identify, manage, and resolve drug-related problems that are identified through patient attendance at a pharmacy
- **MedsChecks**, in-pharmacy review of consumer medicines aiming to enhance the quality use of medicines by educating community based patients about their medicines, including how medicines affect medical conditions; interactions between medicines, and identifying any problems patients may be experiencing with their medicines
- **Diabetes MedsCheck**, in-pharmacy review of medications with focus on Type 2 diabetes medicines management, monitoring devices, education and self management
- **Primary Health Care services** offered within a community pharmacy, which may include medication support around diabetes, respiratory and other chronic diseases and complex clinical conditions
- **Community Services Support activities** within community pharmacy such as return of unwanted medicines
- **Working with other health professional groups** which provide support to community pharmacies to work with a wider range of primary care providers and health professionals

(8) **If familiar with other programs, do you believe that any of these other medication management services could be better used instead of an HMR for some groups of patients? If yes, what groups of patients?**

Additional HMR Reviews

(9) **The timeframe between repeat/additional HMRs is now 24 months for a single patient. Do you think there is a need for different eligibility criteria between initial and repeat reviews at the 24 month period? If yes, what difference in eligibility criteria required?**

Other

(10) **Do you have any other comments on the eligibility criteria for the HMR program?**

Eligibility Criteria

A GP must determine if a patient is eligible for a HMR. GPs must assess whether they need to review the patient's medicines to make sure medicine is being used properly to achieve the best outcome for the patient. Patients could be eligible for a HMR if they:

- Take more than 12 doses of medicine per day
- Have difficulty managing their own medicines because of literacy or language difficulties, or impaired sight
- Attend a number of different doctors, both general practitioners and specialists
- Have been discharged from hospital in the previous four weeks
- Have had a significant change to their medicine regimen in the past three months
- Have experienced a change in their medical condition or abilities. This could include falls, cognition, physical function
- Use prescription medicine with a narrow therapeutic index or medicine that needs therapeutic monitoring
- Have symptoms of an adverse drug reaction
- Have a sub-therapeutic response to therapy
- Have problems managing medication devices, such as dose administration aids, or
- Are at risk of, or can't manage their own medicine due to, changes in dexterity, confusion or impaired vision.

Source: https://www.medicareaustralia.gov.au/provider/pbs/fifth-agreement/home-medicines-review.jsp

General practitioner's discussion guide

Your experience

(1) **Please describe your current involvement in the HMR program? For example the number of referrals for HMRs per week /year and the main places you refer.**

Some patients have instability in their medical condition

(2) **Which of the following groups of patients *who may have instability in their medical conditions* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Patients with significant changes to their medicine regimen in the last three months
- Patients taking medicine with a narrow therapeutic index or requiring therapeutic monitoring
- Patients with symptoms suggestive of an adverse drug reaction
- Patients who have a sub-therapeutic response to therapy
- Patients who have had a change in medical condition or abilities
- Patients who have impaired renal or hepatic function
- Patients who have been discharged within the last four weeks from a health service (including discharge from hospital, outpatients or rehabilitation services)
- Patients who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital
- Patients who have had multiple unplanned admissions, presentations and/ or representations in the past twelve months
- Other – please specify

Some patients lack the capacity to manage their own conditions

(3) **Which of the following groups of patients *who may lack the capacity to manage their own conditions* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Patients having difficulty managing their own medicines because of literacy or language difficulties (e.g. dysphasia)
- Patients at risk of, or unable to manage or continue managing their own medicines due to confusion, dementia and/or other cognitive difficulties
- Patients who are at risk of, or unable to manage or continue managing their own medicines due to dexterity limitations and/or impaired vision
- Patients who are suspected or known to be non-compliant with their medicine regime
- Patients who require a medication delivery device e.g. asthma inhaler
- Patients who require an adherence aid e.g. dosette box
- Patients who have difficulties managing an adherence aid
- Patients aged 65years and over
- Other – please specify

Some patients lack appropriate support to manage their own medications

(4) **Which of the following groups of patients *who may lack appropriate support to manage their own medication* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Lives alone with minimal supports and has limited capacity to manage on their own

- Lives with another person who is unable to give adequate support
- Recent bereavement or life event impacting on patient's ability to manage
- Other – please specify

Some patients with particular diseases or conditions may lack the knowledge and skills to manage their own medications at home

(5) **Which of the following groups of patients *with particular diseases or conditions* are likely to benefit most from an HMR. Are any sufficient on their own to justify a clinical need for a HMR?**

- Severe or unstable Ischaemic Heart Disease (IHD)
- Newly diagnosed Atrial Fibrillation (AF)
- Recent Acute Myocardial Infarction (AMI) or Acute Coronary Syndrome (ACS)
- Other cardiovascular conditions
- People who have had a significant fall or recurrent falls
- Cerebrovascular Accident (CVA)
- Fractured Neck of Femur
- Post amputation
- Mental illness
- Diabetes
- HIV
- Rheumatological disease
- Cancer
- Palliative care
- Arthritis
- Respiratory disease
- Other – please specify

Patient or medication complexity

(6) **There are a number of factors that could be seen to contribute to the complexity associated with patients' medicine's use and risk of medication misadventure.**

Which of the following groups of patients *with complex medication management regimens and/or risk of medication misadventure* are likely to benefit most from an HMR. Are any sufficient on their own to justify a clinical need for a HMR?

- Currently taking five or more regular medicines
- Taking more than 12 doses of medicine per day
- Taking medicine with a narrow therapeutic index or requiring therapeutic monitoring
- Attending a number of different doctors, both general practitioners and specialists
- Number of comorbidities
- Other – please specify

Tell Us About the Relative Importance Across Different Domains of Need for a HMR

The previous questions (Q2-6) considered the potential benefit of HMR to patients within five broad domains. The following question asks you to comment on the potential benefit to patients *between* these domains.

(7) **Please comment on which of the following five broad patient domains you believe is most important in contributing to the need for a HMR.**

- Instability in patient medical condition(s)
- Patient difficulty managing their medical condition(s)
- Insufficient support for patient to manage their medication(s)
- Particular disease(s) or condition(s) that are difficult to manage

- Factors that add additional complexity to the management of their medication(s) (e.g. number or type of medicines, diseases or conditions)

Outcomes

(8) **What are the most common recommendations you receive from the accredited pharmacists who undertake HMRs?**

- Increase in dose of one or more medicines
- Reduction in dose of one or more medicines
- Change of one or more medicines to a different medicines
- Cessation of one or more medicines
- Other – please specify

(9) **Are you able to provide us with an example of the positive changes for patients that have occurred as result of patients having an HMR?**

Other medication management services

(10) **To what extent are you aware of, or are you involved in providing other medication management programs? These may include:**

- **Dose Administration Aids**, assisting patients who are non-intentionally non-adherent with their medication regimen
- **Clinical Interventions by pharmacists**, supporting patients to identify, manage, and resolve drug-related problems that are identified through patient attendance at a pharmacy
- **MedsChecks**, in-pharmacy review of consumer medicines aiming to enhance the quality use of medicines by educating community based patients about their medicines, including how medicines affect medical conditions; interactions between medicines, and identifying any problems patients may be experiencing with their medicines
- **Diabetes MedsCheck**, in-pharmacy review of medications with focus on Type 2 diabetes medicines management, monitoring devices, education and self management
- **Primary Health Care services** offered within a community pharmacy, which may include medication support around diabetes, respiratory and other chronic diseases and complex clinical conditions
- **Community Services Support activities** within community pharmacy such as return of unwanted medicines
- **Working with other health professional groups** which provide support to community pharmacies to work with a wider range of primary care providers and health professionals

(11) **How do you believe the eligibility criteria for an HMR differ from the above medicine management programs, if at all?**

(12) **How should other medication management services be better used instead of HMR, if at all?**

Additional HMR Reviews

Currently the *Program Specific Guidelines: Home Medicines Review* states that HMRs should not be triggered on a 12 month referral cycle. An additional review should only be provided when there has been a significant change to the patients' condition or medication regimen.

(13) **Is there a need for different eligibility criteria between initial and additional reviews? If 'yes', how do you consider the eligibility criteria should differ?**

Other

(14) **Do you have any other comments on the eligibility criteria for the HMR program?**

Hospital pharmacist's discussion guide

Your experience

(1) **Please describe your current involvement or awareness of the HMR program? (For example, are you an accredited pharmacist/thinking of becoming accredited or are aware of the HMR program but not involved).**

Some patients have instability in their medical condition

(2) **Which of the following groups of patients *who may have instability in their medical conditions* would benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Patients with significant changes to their medicine regimen in the last three months
- Patients taking medicine with a narrow therapeutic index or requiring therapeutic monitoring
- Patients with symptoms suggestive of an adverse drug reaction
- Patients who have a sub-therapeutic response to therapy
- Patients who have had a change in medical condition or abilities
- Patients who have impaired renal or hepatic function
- Patients who have been discharged within the last four weeks from a health service (including discharge from hospital, outpatients or rehabilitation services)
- Patients who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital
- Patients who have had multiple unplanned admissions, presentations and/ or representations in the past twelve months
- Other – please specify

Some patients lack the capacity to manage their own conditions

(3) **Which of the following groups of patients *who may lack the capacity to manage their own conditions* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Patients having difficulty managing their own medicines because of literacy or language difficulties (e.g. dysphasia)
- Patients at risk of, or unable to manage or continue managing their own medicines due to confusion, dementia and/or other cognitive difficulties
- Patients who are at risk of, or unable to manage or continue managing their own medicines due to dexterity limitations and/or impaired vision
- Patients who are suspected or known to be non-compliant with their medicine regime
- Patients who require a medication delivery device e.g. asthma inhaler
- Patients who require an adherence aid e.g. dosette box
- Patients who have difficulties managing an adherence aid
- Patients aged 65years and over
- Other – please specify

Some patients lack appropriate support to manage their own medications

(4) **Which of the following groups of patients *who may lack appropriate support to manage their own medication* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Lives alone with minimal supports and has limited capacity to manage on their own

- Lives with another person who is unable to give adequate support
- Recent bereavement or life event impacting on patient's ability to manage
- Other – please specify

Some patients with particular diseases or conditions may lack the knowledge and skills to manage their own medications at home

(5) **Which of the following groups of patients *with particular diseases or conditions* are likely to benefit most from an HMR. Are any sufficient on their own to justify a clinical need for a HMR?**

- Severe or unstable Ischaemic Heart Disease (IHD)
- Newly diagnosed Atrial Fibrillation (AF)
- Recent Acute Myocardial Infarction (AMI) or Acute Coronary Syndrome (ACS)
- Other cardiovascular conditions
- People who have had a significant fall or recurrent falls
- Stroke
- Fractured Neck of Femur
- Post amputation
- Mental illness
- Diabetes
- HIV
- Rheumatological disease
- Cancer
- Palliative care
- Arthritis
- Respiratory disease
- Other – please specify

Patient or medication complexity

(6) **There are a number of factors that could be seen to contribute to the complexity associated with patients' medicine's use and risk of medication misadventure.**

Which of the following groups of patients *with complex medication management regimens and/or risk of patient misadventure* are likely to benefit most from an HMR. Are any sufficient on their own to justify a clinical need for a HMR?

- Currently taking five or more regular medicines
- Taking more than 12 doses of medicine per day
- Taking medicine with a narrow therapeutic index or requiring therapeutic monitoring
- Attending a number of different doctors, both general practitioners and specialists
- Number of comorbidities
- Other – please specify

Tell Us About the Relative Importance Across Different Domains of Need for a HMR

The previous questions (Q2-6) considered the potential benefit of HMR to patients within five broad domains. The following question asks you to comment on the potential benefit to patients *between* these domains.

(7) **Please comment which of the following five broad patient domains do you believe is most important in contributing to the need for a HMR.**

- Instability in patient medical condition(s)
- Patient difficulty managing their medical condition(s)
- Insufficient support for patient to manage their medication(s)
- Particular disease(s) or condition(s) that are difficult to manage

- Factors that add additional complexity to the management of their medication(s) (e.g. number or type of medicines, diseases or conditions)

Other medication management services

(8) **To what extent are you aware of, or are you involved in providing other medication management programs? These may include:**

- **Dose Administration Aids**, assisting patients who are non-intentionally non-adherent with their medication regimen
- **Clinical Interventions by pharmacists**, supporting patients to identify, manage, and resolve drug-related problems that are identified through patient attendance at a pharmacy
- **MedsChecks**, in-pharmacy review of consumer medicines aiming to enhance the quality use of medicines by educating community based patients about their medicines, including how medicines affect medical conditions; interactions between medicines, and identifying any problems patients may be experiencing with their medicine
- **Diabetes MedsCheck**, in-pharmacy review of medications with focus on Type 2 diabetes medicines management, monitoring devices, education and self management
- **Primary Health Care services** offered within a community pharmacy, which may include medication support around diabetes, respiratory and other chronic diseases and complex clinical conditions
- **Community Services Support activities** within community pharmacy such as return of unwanted medicines
- **Working with other health professional groups** which provide support to community pharmacies to work with a wider range of primary care providers and health professionals

(9) **How do you believe the eligibility criteria for an HMR should differ from the above medicine management programs, if at all?**

(10) **Do you think that GPs are inappropriately referring patients for an HMR when they should be referring to other medicine management services as outlined above? If 'yes', what other medication management services would be more appropriate?**

Additional HMR Reviews

Currently the *Program Specific Guidelines: Home Medicines Review* states that HMRs should not be triggered on a 12 month referral cycle. An additional review should only be provided when there has been a significant change to the patients' condition or medication regimen.

(11) **Is there a need for different eligibility criteria between initial and additional reviews? If 'yes', how do you consider the eligibility criteria should differ?**

Other

(12) **Do you have any other comments on the eligibility criteria for the HMR program?**

Hospital physician's discussion guide

Your experience

(1) **Please describe your current involvement or awareness of the HMR program?**

Some patients have instability in their medical condition

(2) **Which of the following groups of patients *who may have instability in their medical conditions* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Patients with significant changes to their medicine regimen in the last three months
- Patients taking medicine with a narrow therapeutic index or requiring therapeutic monitoring
- Patients with symptoms suggestive of an adverse drug reaction
- Patients who have a sub-therapeutic response to therapy
- Patients who have had a change in medical condition or abilities
- Patients who have impaired renal or hepatic function
- Patients who have been discharged within the last four weeks from a health service (including discharge from hospital, outpatients or rehabilitation services)
- Patients who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital
- Patients who have had multiple unplanned admissions, presentations and/ or representations in the past twelve months
- Other – please specify

Some patients lack the capacity to manage their own conditions

(3) **Which of the following groups of patients *who may lack the capacity to manage their own conditions* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Patients having difficulty managing their own medicines because of literacy or language difficulties (e.g. dysphasia)
- Patients at risk of, or unable to manage or continue managing their own medicines due to confusion, dementia and/or other cognitive difficulties
- Patients who are at risk of, or unable to manage or continue managing their own medicines due to dexterity limitations and/or impaired vision
- Patients who are suspected or known to be non-compliant with their medicine regime
- Patients who require a medication delivery device e.g. asthma inhaler
- Patients who require an adherence aid e.g. dosette box
- Patients who have difficulties managing an adherence aid
- Patients aged 65years and over
- Other – please specify

Some patients lack appropriate support to manage their own medications

(4) **Which of the following groups of patients *who may lack appropriate support to manage their own medication* are likely to benefit most from an HMR? Are any sufficient on their own to justify a clinical need for a HMR?**

- Lives alone with minimal supports and has limited capacity to manage on their own

- Lives with another person who is unable to give adequate support
- Recent bereavement or life event impacting on patient's ability to manage
- Other – please specify

Some patients with particular diseases or conditions may lack the knowledge and skills to manage their own medications at home

(5) **Which of the following groups of patients *with particular diseases or conditions* are likely to benefit most from an HMR. Are any sufficient on their own to justify a clinical need for a HMR?**

- Severe or unstable Ischaemic Heart Disease (IHD)
- Newly diagnosed Atrial Fibrillation (AF)
- Recent Acute Myocardial Infarction (AMI) or Acute Coronary Syndrome (ACS)
- Other cardiovascular conditions
- People who have had a significant fall or recurrent falls
- Cerebrovascular Accident (CVA)
- Fractured Neck of Femur
- Post amputation
- Mental illness
- Diabetes
- HIV
- Rheumatological disease
- Cancer
- Palliative care
- Arthritis
- Respiratory disease
- Other – please specify

Patient or medication complexity

(6) **There are a number of factors that could be seen to contribute to the complexity associated with patients' medicine's use and risk of medication misadventure.**

Which of the following groups of patients *with complex medication management regimens and/or risk of patient misadventure* are likely to benefit most from an HMR. Are any sufficient on their own to justify a clinical need for a HMR?

- Currently taking five or more regular medicines
- Taking more than 12 doses of medicine per day
- Taking medicine with a narrow therapeutic index or requiring therapeutic monitoring
- Attending a number of different doctors, both general practitioners and specialists
- Number of comorbidities
- Other – please specify

Tell Us About the Relative Importance Across Different Domains of Need for a HMR

The previous questions (Q2-6) considered the potential benefit of HMR to patients within five broad domains. The following question asks you to comment on the potential benefit to patients *between* these domains.

(7) **Please comment which of the following five broad patient domains you believe is most important in contributing to the need for a HMR.**

- Lack of patient capacity to manage their own condition and medications
- Actual or potential instability in patient's medical condition
- Lack of appropriate supports for patients to manage their own medications at home
- Patients with particular diseases or conditions who lack the knowledge to manage their own medications
- Complexity associated with patient's medicines use

Other medication management services

(8) **To what extent are you aware of, or are you involved in providing other medication management programs? Such as:**

- **Dose Administration Aids**, assisting patients who are non-intentionally non-adherent with their medication regimen
- **Clinical Interventions by pharmacists**, supporting patients to identify, manage, and resolve drug-related problems that are identified through patient attendance at a pharmacy?
- **MedsChecks**, in-pharmacy review of consumer medicines aiming to enhance the quality use of medicines by educating community based patients about their medicines, including how medicines affect medical conditions; interactions between medicines, and identifying any problems patients may be experiencing with their medicines
- **Diabetes MedsCheck**, in-pharmacy review of medications with focus on Type 2 diabetes medicines management, monitoring devices, education and self management
- **Primary Health Care services** offered within a community pharmacy, which may include medication support around diabetes, respiratory and other chronic diseases and complex clinical conditions
- **Community Services Support activities** within community pharmacy such as return of unwanted medicines
- **Working with other health professional groups** which provides support to community pharmacies to work with a wider range of primary care providers and health professionals

(9) **How do you believe the eligibility criteria for an HMR should differ from the above medicine management programs, if at all?**

(10) **Do you think that GPs are inappropriately referring patients for an HMR when they should be referring to other medicine management services as outlined above? If 'yes', what other medication management services would be more appropriate?**

Additional HMR Reviews

Currently the *Program Specific Guidelines: Home Medicines Review* states that HMRs should not be triggered on a 12 month referral cycle. An additional review should only be provided when there has been a significant change to the patients' condition or medication regimen.

(11) **Is there a need for different eligibility criteria between initial and additional reviews? If 'yes', how do you consider the eligibility criteria should differ?**

Other

(12) **Do you have any other comments on the eligibility criteria for the HMR program?**

Medical Association Discussion Guide

Consultations with Medical Associations are focussed on identifying how the eligibility requirements for HMRs should be refined to strengthen access to those who are most likely to benefit from an HMR (noting that the clinical views of pharmacists and GPs are being sought through local consultations and electronic surveys).

From a review of the literature and speaking with experienced clinicians, HMA identified a range of patient groups that are likely to benefit from HMRs. We grouped these into four broad domains of need, relating to patients who have:

- Instability in their medication(s) or medical condition(s)
- Difficulty managing their medication(s)
- Particular disease(s) or condition(s) with associated medication issues
- Factors that add additional complexity to the management of their medication(s)

Who is likely to benefit most

(1) **Which of the following four broad patient groups do you believe are most likely to benefit most from an HMR?**

- Patients with instability in their medication(s) or medical condition(s)
- Patients who have difficulty managing their medication(s)
- Patients with particular disease(s) or condition(s) and associated medication issues
- Patients impacted by factors that add to the complexity of managing their medication(s)

(2) **How do patient eligibility requirements need to be refined to ensure HMRs are targeted to those most likely to benefit from an HMR?**

Outcomes

(3) **Are you able to provide us with an example of positive changes for patients or groups of patients that are occurring as a result of having an HMR?**

Other medication management services

(4) **To what extent are you aware of the following medication management programs provided by community pharmacists?**

- **Dose Administration Aids**, assisting patients who are non-intentionally non-adherent with their medication regimen
- **Clinical interventions by pharmacists**, supporting patients to identify, manage, and resolve drug-related problems that are identified through patient attendance at a pharmacy
- **MedsChecks**, in-pharmacy review of consumer medicines aiming to enhance the quality use of medicines by educating community based patients about their medicines, including how medicines affect medical conditions; interactions between medicines, and identifying any problems patients may be experiencing with their medicines
- **Diabetes MedsCheck**, in-pharmacy review of medications with focus on Type 2 diabetes medicines management, monitoring devices, education and self management
- **Primary Health Care services** offered within a community pharmacy, which may include medication support around diabetes, respiratory and other chronic diseases and complex clinical conditions
- **Community Services Support activities** within community pharmacy such as return of unwanted medicines
- **Working with other health professional groups** which provide support to community pharmacies to work with a wider range of primary care providers and health professionals

(5) **How do you believe the eligibility criteria for an HMR should differ from the above medicine management programs?**

(6) **Could these other medication management services be better used instead of an HMR for some groups of patients? If yes, what groups of patients?**

Additional HMR Reviews

Until recently, the *Program Specific Guidelines: Home Medicines Review* stated that HMRs should not be triggered on a 12 month referral cycle and an additional review should only be provided when there has been a significant change to the patients' condition or medication regimen.

(7) **Do you think there is a need for different eligibility criteria between initial and additional reviews? If 'yes', how do you consider the eligibility criteria should differ?**

(8) **Last week under an Agreement between the Australian Government and The Guild the timeframe between repeat/additional HMRs was extended to 24 months for a single patient. Given this change in timeframe, do you think there is still a need for different eligibility criteria between initial and repeat reviews at the 24 month period? If yes, what difference in eligibility criteria required?**

Other

(9) **Do you have any other comments on the eligibility criteria for the HMR program?**

Pharmacy Association Discussion Guides

Consultations with Pharmacy Associations are focussed on identifying how the eligibility requirements for HMRs should be refined to strengthen access to those who are most likely to benefit from an HMR (noting that the clinical views of pharmacists and GPs are being sought through local consultations and electronic surveys).

From a review of the literature and speaking with experienced clinicians, HMA identified a range of patient groups that are likely to benefit from HMRs. We grouped these into four broad domains of need, relating to patients who have:

- Instability in their medication(s) or medical condition(s)
- Difficulty managing their medication(s)
- Particular disease(s) or condition(s) with associated medication issues
- Factors that add additional complexity to the management of their medication(s)

Who is likely to benefit most

(1) **Which of the following four broad patient groups do you believe are most likely to benefit most from an HMR?**

- Patients with instability in their medication(s) or medical condition(s)
- Patients who have difficulty managing their medication(s)
- Patients with particular disease(s) or condition(s) and associated medication issues
- Patients impacted by factors that add to the complexity to managing their medication(s)

(2) **How do patient eligibility requirements need to be refined to ensure HMRs are targeted to those most likely to benefit from an HMR?**

Outcomes

(3) **Are you able to provide us with an example of positive changes for patients or groups of patients that are occurring as a result of having an HMR?**

Other medication management services

(4) **To what extent are you aware of the following medication management programs provided by community pharmacists?**

- **Dose Administration Aids**, assisting patients who are non-intentionally non-adherent with their medication regimen
- **Clinical interventions by pharmacists**, supporting patients to identify, manage, and resolve drug-related problems that are identified through patient attendance at a pharmacy
- **MedsChecks**, in-pharmacy review of consumer medicines aiming to enhance the quality use of medicines by educating community based patients about their medicines, including how medicines affect medical conditions; interactions between medicines, and identifying any problems patients may be experiencing with their medicines
- **Diabetes MedsCheck**, in-pharmacy review of medications with focus on Type 2 diabetes medicines management, monitoring devices, education and self management
- **Primary Health Care services** offered within a community pharmacy, which may include medication support around diabetes, respiratory and other chronic diseases and complex clinical conditions
- **Community Services Support activities** within community pharmacy such as return of unwanted medicines
- **Working with other health professional groups** which provide support to community pharmacies to work with a wider range of primary care providers and health professionals

(5) **How do you believe the eligibility criteria for an HMR should differ from the above medicine management programs?**

(6) **Could these other medication management services be better used instead of an HMR for some groups of patients? If yes, what groups of patients?**

Additional HMR Reviews

Until recently, the *Program Specific Guidelines: Home Medicines Review* stated that HMRs should not be triggered on a 12 month referral cycle and an additional review should only be provided when there has been a significant change to the patients' condition or medication regimen.

(7) **Do you think there is a need for different eligibility criteria between initial and additional reviews? If 'yes', how do you consider the eligibility criteria should differ?**

(8) **Last week under an Agreement between the Australian Government and The Guild the timeframe between repeat/additional HMRs was extended to 24 months for a single patient. Given this change in timeframe, do you think there is still a need for different eligibility criteria between initial and repeat reviews at the 24 month period? If yes, what difference in eligibility criteria required?**

Other

(9) **Do you have any other comments on the eligibility criteria for the HMR program?**

Appendix H: National survey tools

There were two survey tools: a *Pharmacist Survey* used by community pharmacy owners, community pharmacists and accredited pharmacists; and a *GP survey*. These were made available online from the 25th of August 2014 to the 3rd of September 2014. Both tools are provided in this appendix.

Pharmacist survey

Healthcare Management Advisors (HMA) has been engaged under the Fifth Community Pharmacy Agreement to undertake research to assist with better targeting of Home Medicines Reviews (HMRs) and refinement of the HMR patient eligibility criteria. This survey seeks feedback from community pharmacy owners, community pharmacists and accredited pharmacists about the eligibility criteria.

The survey will take around 15 -20 minutes to complete.

Please contact Hannah Hogarth at HMA on (03) 9998 1946 or hannahhogarth@hma.com.au if you require any assistance in completing the survey.

Tell us about your involvement in the HMR program

This series of questions seeks to gain an understanding of your involvement in HMRs. Some respondents may have multiple roles.

(1) **How would you rate your familiarity with the HMR program?**

- Excellent
- Very good
- Good
- Average
- Poor
- Very poor
- I don't know about HMR's

(2) **Are you an accredited pharmacist?**

An accredited pharmacist is a registered pharmacist who has current accreditation through The Australian Association of Consultant Pharmacy (AACP) or The Society of Hospital Pharmacists of Australia (SHPA) to conduct medication management reviews.

- Yes
- No [Go to Q(6)]

(3) **As an accredited pharmacist which of the following options best describes your involvement in the HMR program? Tick as many as apply.**

- I work as an accredited pharmacist taking referrals for HMRs that come to the community pharmacy that I own
- I work as an accredited pharmacist taking referrals for HMRs that come to the community pharmacy where I work
- I work as an accredited pharmacist as a contractor for community pharmacies which receive referrals for HMRs
- I work as an accredited pharmacist taking direct referrals for HMRs from general practitioners
- I am an accredited pharmacist and own a business other than a community pharmacy and take referrals for HMRs
- I am employed/contracted as an accredited pharmacist by a business other than a community pharmacy that is approved to provide and accept referrals for HMRs
- I do not currently undertake HMRs [Go to Q(6)]

(4) **How many HMRs would you have completed in the past year? Please respond with a specific number that represents your best estimate, for example 75. Please do NOT use a range like 70-80.**

- [INSERT TEXT BOX]

(5) **What is the postcode of the primary area where you conduct HMRs?**

We appreciate some people will undertake HMRs across a wide range of areas. We will be using the Pharmacy Accessibility and Remoteness Index for Australia scale to analyse the data. Please use a postcode that is characteristic of where you undertake the majority of HMRs.

- [Postcode]

(6) **Are you a community pharmacy owner?**

- Yes
- No [Go to Q(8)]

(7) **Have you been granted approval to provide HMR services in the pharmacies you own?**

- Yes [Go to Q(9)]
- No [Go to Q(9)]
- Only some/ or one of the community pharmacies I own has been granted approval to provide HMR services [Go to Q(9)]

(8) **Are you practising as a pharmacist in a community pharmacy? (A community pharmacy is a pharmacy approved to dispense medicines pharmaceutical benefits as defined in Section 90 of the National Health Act, 1953).**

- Yes
- No [Go to Q(10)]

(9) **What is the postcode of the pharmacy you do most of your work or in?**

We appreciate some people may own or work for more than one pharmacy. If this is the case, please use a postcode that is characteristic of the geographic area the pharmacies are located in. Please note we will be using the Pharmacy Accessibility and Remoteness Index for Australia scale to analyse the data.

- [Postcode]

(10) **Are you practising as a hospital pharmacist?**

- Yes
- No [Go to Q(12)]

(11) **What is the postcode of the primary hospital pharmacy that you work in? If you work at more than one, please put the postcode of the hospital pharmacy where spend the majority of your time.**

- [Postcode]

(12) **Where do you spend most of your working week? Please number in order of time spent in each setting, with 1 being your main workplace [Participants can assign a rank of 1-4 for up to 4 workplaces].**

- Community pharmacy (as owner)
- Community pharmacy (as employee)
- Hospital pharmacy
- Other [Include Text Box]

Tell us about the potential benefits of HMRs *within* different domains of need

From our review of the literature and in speaking with experienced clinicians, we identified a range of patient groups that are likely to benefit from an HMR. We then grouped these into four broad domains of need, that relate to patients who have:

- Instability in their medication(s)and/ or medical condition(s)
- Difficulty managing their medication(s)

- Particular disease(s) or condition(s) with associated medication issues
- Factors that may add complexity to the management of medication(s)

For each of the four broad domains of need, we ask you to rate the extent to which groups of patients are likely to benefit from an HMR. The scale ranges from *extremely beneficial* to *no benefit*. If you are not sure please indicate *I don't know.*

Patients with *instability in their medication(s) and/or medical condition(s)*

(13) **Based on your clinical knowledge and experience please rate how beneficial an HMR is likely to be for the following groups of patients (If you are not sure please indicate *I don't know*).**

- Patients with significant changes to their medicine regimen/ medical condition in the last three months

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with symptoms suggestive of an adverse drug reaction

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients who have been discharged within the last four weeks from a health service (includes discharge from a hospital, outpatient or rehabilitation service)

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients who have had multiple unplanned admissions, presentations and/ or representations in the past twelve months

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

(14) **Do you have any comments about the patient groups included in the domain patients with *instability in their medication(s) or medical condition(s)?***

- [INSERT TEXT BOX]

Patients with *difficulty managing their medication(s)*

(15) **Based on your clinical knowledge and experience please rate how beneficial an HMR is likely to be for the following groups of patients. (If you are not sure please indicate *I don't know*).**

- Patients having difficulty managing their medication(s) because of literacy or language difficulties (e.g. dysphasia)

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients at risk of, or unable to manage or continue managing their medication(s) due to confusion, dementia and/or other cognitive difficulties

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients at risk of, or unable to manage or continue managing their medication(s) due to dexterity limitations and/or impaired vision

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients who are suspected or known to be non-adherent with their medication regimen

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients who are socially isolated or lacking social support

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

(16) **Do you have any comments about the patient groups included in the domain patients with *difficulty managing their medication(s)?***

- [INSERT TEXT BOX]

Patients with *particular disease(s) or condition(s) with associated medication issues*

The literature has identified a range of diseases and conditions where patients often have medication issues and have been found to benefit from an HMR. Whilst a disease itself does not intrinsically create problems, the effects of the disease and the medicines prescribed to treat conditions can create health problems (e.g. disability).

(17) **Based on your clinical knowledge and experience please rate how beneficial an HMR is likely to be for the following groups of patients. (If you are not sure please indicate *I don't know*).**

- Patients who have severe or unstable Ischaemic Heart Disease (IHD)

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with newly diagnosed Atrial Fibrillation (AF)

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with recent Acute Myocardial Infarction or Acute Coronary Syndrome

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with other cardiovascular conditions

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients who have had a significant fall or recurrent falls

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with mental health problems

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with diabetes

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with asthma

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with Chronic Obstructive Pulmonary Disease

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

(18) **Do you have any comments about the patient groups included in the domain patients with *particular disease(s) or condition(s) with associated medication issues?***

- [INSERT TEXT BOX]

Patients with *factors that may add complexity to the management of medication(s)*

(19) **Based on your clinical knowledge and experience please rate how beneficial an HMR is likely to be for the following groups of patients. (If you are not sure please indicate *I don't know*).**

- Patients taking five or more medicines regularly

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients taking more than 12 doses of medicine per day

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients attending a number of different doctors, both general practitioners and specialists

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with multiple chronic conditions

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients taking medicine with a narrow therapeutic index or requiring therapeutic monitoring

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients taking or suspected to be taking alternative or complementary medicines

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

(20) **Do you have any comments about the patient groups included in the domain patients with *factors that may add complexity to the management of medication(s)?***

- [INSERT TEXT BOX]

(21) **Should the number of medicines a person regularly takes be an eligibility criterion on which referral for an HMR is based?**

- Yes
- No
- Please indicate any suggestions you may have on the number of medicines a person would need to be regularly taking to be eligible. [INSERT TEXT BOX]

(22) **Should the number of doses of medicines a person takes per day be an eligibility criterion on which referral for an HMR is based?**

- Yes
- No
- Please indicate any suggestions for the number of doses a person would need to be taking in a day to be eligible. [INSERT TEXT BOX]

(23) **Do you think the number of chronic conditions a person has should be an eligibility criterion on which referral for an HMR is based?**

- Yes
- No
- Please indicate any suggestions for the number of chronic conditions a person would need to be diagnosed with to be eligible. [INSERT TEXT BOX]

(24) **Should the age of a patient form part of the eligibility criterion on which an HMR is based?**

- Yes
- No
- Please indicate any suggestions of an appropriate age that could form the basis of an eligibility criterion, eg. 75. [INSERT TEXT BOX]

Relative importance for an HMR across domains of need

In the following questions we ask you to provide a rating of the potential benefit of HMRs to patients <u>across</u> the four broad *domains of need for an HMR* discussed in previous questions.

(25) **Four broad domains of patient need were specified in previous questions. Please rate how important you consider each of the broad domains are in contributing to the need for an HMR. The scale ranges from extremely important to not important. (If you are not sure please indicate I don't know).**

- Instability in their medication(s) and/ or medical condition(s)

extremely important ☐ very important ☐ somewhat important ☐ of small importance ☐ not important ☐ I don't know ☐

- Difficulty managing their medication(s)

extremely important ☐ very important ☐ somewhat important ☐ of small importance ☐ not important ☐ I don't know ☐

- Particular disease(s) or condition(s) with associated medication issues

extremely important ☐ very important ☐ somewhat important ☐ of small importance ☐ not important ☐ I don't know ☐

- Factors that may add complexity to the management of medication(s)

extremely important ☐ very important ☐ somewhat important ☐ of small importance ☐ not important ☐ I don't know ☐

Other medication management services

(26) **Do you think that some patients referred for HMRs could be adequately "supported" with Dose Administration Aids, MedsCheck, or Diabetes MedsCheck?**

- Yes
- No

If *yes*, please describe the characteristics of patients that could be appropriately "supported" and the relevant medication management service appropriate for this group of patients. [INSERT TEXT BOX]

Additional comments

(27) **Do you have any comments on the HMR eligibility criteria?**

- [INSERT TEXT BOX]

Thank you

Thank you for completing this survey.

GP survey

Healthcare Management Advisors (HMA) has been engaged under the Fifth Community Pharmacy Agreement to undertake research to assist with better targeting of Home Medicines Reviews (HMRs) and refinement of the HMR patient eligibility criteria. This survey seeks feedback from General Practitioners about the eligibility criteria.

The survey will take around 15 -20 minutes to complete.

Please contact Hannah Hogarth at HMA on (03) 9998 1946 or hannahhogarth@hma.com.au if you require any assistance in completing the survey.

Tell us about your involvement in the HMR program

This series of questions seeks to gain an understanding of your involvement in HMRs. Some respondents may have multiple roles.

(1) **How many MBS Item 900 Domiciliary Medication Management Reviews (DMMR) have you claimed for in the last year? Please respond with a specific number that represents your best estimate, for example 75. Please do NOT use a range like 70-80.**

- [INSERT TEXT BOX]

(2) **What is the postcode of the primary area in which you work as a GP?**

- [Postcode]

Tell us about the potential benefits of HMRs *within* different domains of need

From our review of the literature and in speaking with experienced clinicians, we identified a range of patient groups that are likely to benefit from an HMR. We then grouped these into four broad domains of need, that relate to patients who have:

- Instability in their medication(s) and/or medical condition(s)
- Difficulty managing their medication(s)
- Particular disease(s) or condition(s) with associated medication issues, and
- Factors that may add complexity to the management of medication(s)

For each of the four broad domains of need, we ask you to rate the extent to which groups of patients are likely to benefit from an HMR. The scale ranges from *extremely beneficial* to *no benefit*. If you are not sure please indicate *I don't know*.

Patients with *instability in their medication(s) and/or medical condition(s)*

(3) **Based on your clinical knowledge and experience please rate how beneficial an HMR is likely to be for the following groups of patients (If you are not sure please indicate *I don't know*).**

- Patients with significant changes to their medicine regimen/ medical condition in the last three months

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients with symptoms suggestive of an adverse drug reaction

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients who have been discharged within the last four weeks from a health service (includes discharge from a hospital, outpatient or rehabilitation service)

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☒ no benefit ☐ I don't know ☐

- Patients who have had multiple unplanned admissions, presentations and/ or representations in the past twelve months

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

(4) **Do you have any comments about the patient groups included in the domain patients with *instability in their medication(s) or medical condition(s)?***

- [INSERT TEXT BOX]

Patients with *difficulty managing their medication(s)*

(5) **Based on your clinical knowledge and experience please rate how beneficial an HMR is likely to be for the following groups of patients. (If you are not sure please indicate *I don't know*).**

- Patients having difficulty managing their medication(s) because of literacy or language difficulties (e.g. dysphasia)

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients at risk of, or unable to manage or continue managing their medication(s) due to confusion, dementia and/or other cognitive difficulties

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients at risk of, or unable to manage or continue managing their medication(s) due to dexterity limitations and/or impaired vision

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients who are suspected or known to be non-adherent with their medication regimen

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients who are socially isolated or lacking social support

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

(6) **Do you have any comments about the patient groups included in the domain patients with *difficulty managing their medication(s)?***

- [INSERT TEXT BOX]

Patients with *particular disease(s) or condition(s) with associated medication issues*

The literature has identified a range of diseases and conditions where patients often have medication issues and have been found to benefit from an HMR. Whilst a disease itself does not intrinsically create problems, the effects of the disease and the medicines prescribed to treat conditions can create health problems (e.g. disability).

(7) **Based on your clinical knowledge and experience please rate how beneficial an HMR is likely to be for the following groups of patients. (If you are not sure please indicate *I don't know*).**

- Patients who have severe or unstable Ischaemic Heart Disease (IHD)

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with newly diagnosed Atrial Fibrillation (AF)

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with recent Acute Myocardial Infarction or Acute Coronary Syndrome

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with other cardiovascular condition

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients who have had a significant fall or recurrent falls

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with mental health problems

extremely beneficial ☐very beneficial ☐moderately beneficial ☐small benefit ☐no benefit ☐I don't know ☐

- Patients with diabetes

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients with asthma

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients with Chronic Obstructive Pulmonary Disease

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

(8) **Do you have any comments about the patient groups included in the domain patients with *particular disease(s) or condition(s) with associated medication issues?***

- [INSERT TEXT BOX]

Patients with *factors that may add complexity to the management of medication(s)*

(9) **Based on your clinical knowledge and experience please rate how beneficial an HMR is likely to be for the following groups of patients. (If you are not sure please indicate *I don't know*).**

- Patients taking five or more medicines regularly

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients taking more than 12 doses of medicine per day

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients attending a number of different doctors, both general practitioners and specialists

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients with multiple chronic conditions

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients taking medicine with a narrow therapeutic index or requiring therapeutic monitoring

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

- Patients taking or suspected to be taking alternative or complementary medicines

extremely beneficial ☐ very beneficial ☐ moderately beneficial ☐ small benefit ☐ no benefit ☐ I don't know ☐

(10) **Do you have any comments about the patient groups included in the domain patients with *factors that may add complexity to the management of medication(s)?***

- [INSERT TEXT BOX]

(11) **Should the number of medicines a person regularly takes be an eligibility criterion on which referral for an HMR is based?**

- Yes
- No
- Please indicate any suggestions you may have on the number of medicines a person would need to be regularly taking to be eligible. [INSERT TEXT BOX]

(12) **Should the number of doses of medicines a person takes per day be an eligibility criterion on which referral for an HMR is based?**

- Yes
- No
- Please indicate any suggestions for the number of doses a person would need to be taking in a day to be eligible. [INSERT TEXT BOX]

(13) **Do you think the number of chronic conditions a person has should be an eligibility criterion on which referral for an HMR is based?**

- Yes
- No
- Please indicate any suggestions for the number of chronic conditions a person would need to be diagnosed with to be eligible. [INSERT TEXT BOX]

(14) **Should the age of a patient form part of the eligibility criterion on which an HMR is based?**

- Yes
- No
- Please indicate any suggestions of an appropriate age that could form the basis of an eligibility criterion, eg. 75. [INSERT TEXT BOX]

Relative importance for an HMR across domains of need

In the following questions we ask you to provide a rating of the potential benefit of HMRs to patients across the four broad *domains of need for an HMR* discussed in previous questions.

(15) **Four broad domains of patient need were specified in previous questions. Please rate how important you consider each of the broad domains are in contributing to the need for an HMR. The scale ranges from *extremely important* to *not important*. (If you are not sure please indicate *I don't know*).**

- Instability in their medication(s)and/ or medical condition(s)

extremely important ☐ very important ☐ somewhat important ☐ of small importance ☐ not important ☐ I don't know ☐

- Difficulty managing their medication(s)

extremely important ☐ very important ☐ somewhat important ☐ of small importance ☐ not important ☐ I don't know ☐

- Particular disease(s) or condition(s) with associated medication issues

extremely important ☐ very important ☐ somewhat important ☐ of small importance ☐ not important ☐ I don't know ☐

- Factors that may add complexity to the management of medication(s)

extremely important ☐ very important ☐ somewhat important ☐ of small importance ☐ not important ☐ I don't know ☐

Other medication management services

(16) **To what extent are you aware of the following medication management programs available to support patients:**

- **Dose Administration Aids**, which may assist patients who are non-intentionally non-adherent with their medication regimen?

I have requested this service ☐ I was aware of this service but have not requested ☐ I was not aware of this service ☐

- **MedsChecks** which aims to enhance the quality use of medicines by educating community based patients about their medicines, including how medicines affect medical conditions; identifying any problems they may be experiencing with their medications; and understanding interactions between?

I have requested this service ☐ I was aware of this service but have not requested ☐ I was not aware of this service ☐

- Diabetes MedsChecks which aims to enhance effective use of medicine through improving understanding of, and compliance with, their diabetes medication therapy. The service provides an in-pharmacy review of medications with a focus on the consumer's type 2 diabetes medicines management, monitoring devices, education and self-management?

I have requested this service ☐ I was aware of this service but have not requested ☐ I was not aware of this service ☐

(17) **Do you think that some patients referred for HMRs could be adequately "supported" with Dose Administration Aids, MedsCheck, or Diabetes MedsCheck?**

- Yes
- No

If *yes*, please describe the characteristics of patients that could be appropriately "supported" and the relevant medication management service appropriate for this group of patients. [INSERT TEXT BOX]

Additional comments

(18) **Do you have any comments on the HMR eligibility criteria?**

- [INSERT TEXT BOX]

Thank you

Thank you for completing this survey.

Appendix I: Local level consults – summary report on findings

Background

This paper presents data from consultations with clinicians in local areas over the period 30 January to 6 March 2014. In undertaking the consultations across 14 local areas HMA spoke with 54 clinicians of whom:

- 13 were accredited pharmacists
- 12 were community pharmacists
- 10 were GPs
- 10 were hospital pharmacists, and
- 6 were hospital physicians.

Scope of the local consultations

Consultations were undertaken in the areas detailed in Table L1. HMA sought to ensure there was a representative spread across the jurisdictions and metropolitan, regional and rural/remote areas in selecting the areas to be visited.

Within each Medicare Local area, HMA sought to speak with a:

- **general practitioner (GP)** (who assess patients' needs and make referrals for an HMR)
- **community pharmacist** (who may or may not be a community pharmacy owner or an accredited pharmacist)
- **an accredited pharmacist**
- **hospital physician** (who may have views about patients who should be referred patients for an HMR under the proposed HMR hospital pathway), and
- **hospital pharmacist** (who currently support patients' QUM in hospital and outpatient settings).

Representatives of The Pharmacy Guild of Australia, The Australian Association of Consultant Pharmacy (AACP), The Society of Hospital Pharmacists of Australia (SHPA) and The Royal Australian College of General Practitioners (RACGP) assisted HMA in identifying appropriate local clinicians to speak to within each of the 14 areas. Hospital CEOs were formally approached prior to HMA initiating contact with hospital physicians and pharmacists.

Table L1: Medicare Local areas where consultations occurred

	Metropolitan	Regional	Rural and Remote
New South Wales	South Eastern Sydney	Hunter	Far West NSW (Broken Hill to focus on ATSI issues))
Victoria		Grampians	Great South Coast (Hamilton)
Queensland	Greater Metro South Brisbane		Far North Queensland (Cairns)
South Australia		Country South SA (Mount Gambier)	Country North SA (Port Augusta)
Western Australia	Perth North Metro		Kimberley- Pilbara (Derby, focussing on ATSI issues)
Tasmania	Tasmania (Launceston)		
Northern Territory		Northern Territory (Darwin)	
Australian Capital Territory	Australian Capital Territory		

In the Medicare Local areas categorised as rural and remote in Table LC1, HMA sought to undertake as many consultations as possible in rural and remote areas, rather than regional settings. However, if the rural and remote area HMA visited did not have a local hospital then appointments were made to speak with the hospital pharmacist or physician in the nearest major hospital, which may have been located in a regional centre. The consultations within the Grampians region were across both Ballarat and Horsham, because HMA was unable to gain permission to consult with clinicians within the hospital in Ballarat.

Two consultations were with GPs from an Aboriginal Medical Service/ Aboriginal and Community Controlled Health Services.

Consultation questions for local consultations

From undertaking a review of the literature and speaking with experienced clinicians, HMA identified 40 different patient groups likely to benefit from an HMR.

In designing the consultation questions for clinicians in local areas, HMA grouped the categories of patients expected to benefit into five broad domains of need:

- patients with instability in their medication(s) or medical condition(s)
- patients having difficulty managing their medical condition(s)
- patients lacking support to manage medications
- patients with particular disease(s) or condition(s) with associated medication issues, and
- patients with factors that may add complexity to the management of medication(s).

Within each of the five broad domains of need, clinicians were asked to say which categories of patients they considered were likely to benefit most from an HMR and were individually sufficient on their own to justify an automatic referral for an HMR.

Having rated categories of patients within each of the domains, clinicians were then asked to identify the domain most important in contributing to the need for an HMR.

Approach to analysis of the findings from the local consultations

In analysing the responses provided for each of the patient groups within the domains, HMA used the following scale for how health professional responded in the consultations:

- *Yes* for patient group where the situation or condition was sufficient on its own to justify a referral for an HMR and patients were considered likely to benefit from an HMR
- *No* for patient groups clinicians assessed as unlikely to benefit from an HMR, and
- *Maybe* for patient groups clinicians assessed as likely to benefit from an HMR, but that were considered insufficient on their own to justify a referral.

In analysing the responses across the domains, HMA used the following scale:

- *Yes* for a domain clinicians assessed as the most important domain
- *No* for domains clinicians assessed as being not important, and
- *Maybe* for domains clinicians assessed as being important to consider, although not the most important.

Findings

Top ranking patient characteristics

Table L2 shows the top 12 and bottom 12 ranking of patient groups identified as likely to benefit from an HMR by all clinicians interviewed. For the top 12 rankings over 50% of clinicians said the patients groups were likely to benefit from an HMR and the condition or need was considered sufficient on its own to justify a referral.

Table L2: Combined responses of clinicians on the top 12 and bottom 12 categories of patients groups receiving the highest and lowest number of "yes" responses

Rank	Criteria	% "yes" (no.)	% "no" (no.)	% "maybe" (no.)	% "not applicable" (no.)
1.	Patients attending a number of different doctors, both general practitioners and specialists	67 (36)	9 (5)	20 (11)	4 (2)
2.	Patients who live alone with limited supports and has limited capacity to manage on their own	65 (35)	24 (13)	9 (5)	2 (1)
3.	Patients taking more than 12 doses of medicine per day	65 (35)	13 (7)	20 (11)	2 (1)
4.	Patients having difficulty managing their own medication(s) because of literacy or language difficulties	59 (32)	13 (7)	20 (11)	7 (4)
5.	Patients taking five or more medicines regularly	57 (31)	22 (12)	19 (10)	2 (1)
6.	Patients with significant changes to their medicine regimen in the last three months	56 (30)	19 (10)	24 (13)	2 (1)
7.	Patients who have had a significant fall or recurrent falls	56 (30)	15 (8)	28 (15)	2 (1)
8.	Patients who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital	54 (29)	15 (8)	26 (14)	6 (3)
9.	Patients at risk of, or unable to manage or continue managing their own medication(s) due to confusion, dementia and/or other cognitive difficulties	54 (29)	20 (11)	24 (13)	2 (1)
10.	Patients who are suspected or known to be non-adherent with their medication regimen	52 (28)	24 (13)	22 (12)	2 (1)
11.	Severe or unstable Ischaemic Heart Disease (IHD)	52 (28)	24 (13)	22 (12)	2 (1)
12.	Recent Acute Myocardial Infarction or ACS	52 (28)	26 (14)	20 (11)	2 (1)
29.	Patients taking medicine with a narrow therapeutic index or requiring therapeutic monitoring	22 (12)	46 (25)	30 (16)	2 (1)
30.	Patients who have difficulties managing an adherence aid	20 (11)	50 (27)	28 (15)	2 (1)
31.	Cancer	20 (11)	54 (29)	24 (13)	2 (1)
32.	Palliative care	20 (11)	48 (26)	30 (16)	2 (1)
33.	Respiratory Disease	20 (11)	43 (23)	35 (19)	2 (1)
34.	HIV	17 (9)	57 (31)	22 (12)	4 (2)
35.	Fractured neck of femur	15 (8)	69 (37)	15 (8)	2 (1)
36.	Arthritis	15 (8)	52 (28)	31 (17)	2 (1)
37.	Rheumatological disease	13 (7)	43 (23)	41 (22)	4 (2)
38.	Patients who require a medication delivery device	11 (6)	65 (35)	22 (12)	2 (1)
39.	Post amputation	7 (4)	56 (30)	33 (18)	4 (2)
40.	Patients aged 65 years and over	6 (3)	67 (36)	26 (14)	2 (1)

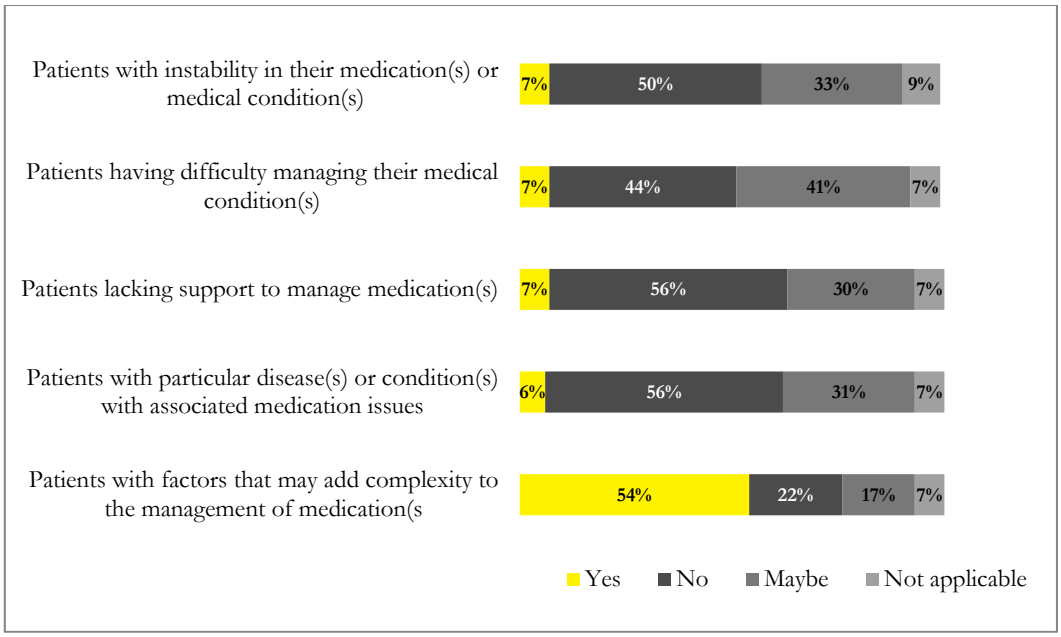
The fact we were able to rank the data from the consultations, provides evidence that clinicians are able to discriminate between patient groups to identify who is likely to benefit most from an HMR.

Further details of the numbers and percentages of responses for each patient group are contained in Appendix C.

Most important domain contributing to an HMR

Figure 1 and Table L2 show clinicians consider the most important domain contributing to the need for an HMR to be *factors that may add complexity to the management of medications* (with 54% (n=29) of all clinicians responding to the question ranking it as the most important domain).

Figure 1: Most important domain in contributing to need for an HMR



Appendix J: National survey – findings

National survey results-key findings

1. Response characteristics

1.1 Survey respondents

At the close of the GP survey (30 September 2014), there were 45 GP responses. Five of these were removed in the data cleansing process because they were incomplete responses (answering either only background information or at most responding to only one HMR domain question). Note responses that only missed one or two questions were included in the following analyses.

Thus there were a total of 40 GP responses analysed in this report.

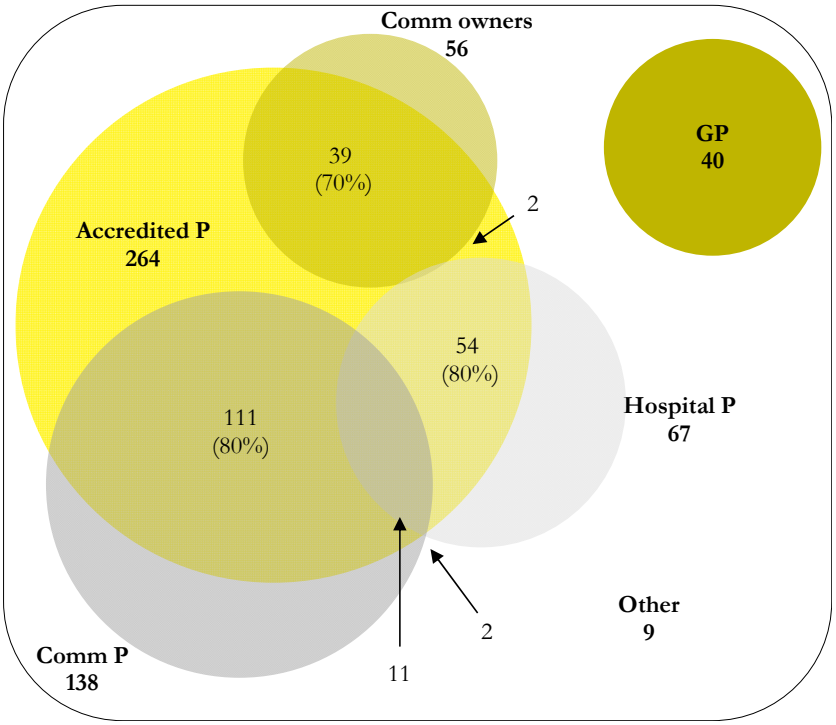
At the close of the Pharmacist survey (30 September 2014), there were 359 pharmacist responses. Thirty of these responses were removed during the data cleansing process because they were incomplete (answering either only background information or at most responding to only one HMR domain question). Note responses that only missed one or two questions were included in the following analyses.

Thus there were a total of 329 Pharmacist responses analysed in this report. The types of pharmacist respondents were as follows:

- 264 accredited pharmacists
- 56 community pharmacy owners (52 of whom had been given approval to provide HMR services in their (or one of their) pharmacies)
- 138 community pharmacists (but not a community pharmacy owner)
- 67 hospital pharmacist, and
- 11 other (e.g. aboriginal health service, consultant project pharmacist, pharmacy industry organisation, pharmacy research, Medicare Local)

(*Note, pharmacists could select more than one response, therefore numbers do not add to 329). See Figure 1.1 for further detail.

Figure 1.1: Types of respondents



1.1.1 Distribution of respondents

Postcode data of primary area of work was provided by the GP and pharmacist respondents. This data was used to map the distribution of responses across Australia.

Based on the postcode data, the majority of GP respondents worked in Capitola cities, primarily on the East Coast of Australia. However, there were also respondents working in Far North Queensland and WA. See Figure 1.2.

Figure 1.2: Distribution of GP responses

Due to the number of Pharmacist responses, the responses were grouped as follows:

- Accredited pharmacists (including accredited pharmacists who worked in community pharmacy)
- Accredited pharmacists who also owned community pharmacies
- Accredited pharmacists who also worked as hospital pharmacists
- Community pharmacy owners
- Hospital pharmacists, and
- Other (all non-accredited pharmacists).

Figure 1.3 shows the distribution of accredited pharmacists (some of whom worked in community pharmacy) who responded to the survey. As shown, the majority of responses were from the East Coast of Australia. However, there were also responses from the West Coast, Northern Australia and rural and remote areas.

Figure 1.3: Distribution of Accredited pharmacists (only)

Figure 1.4 shows the distribution of accredited pharmacists who are also community pharmacy owners (green), accredited pharmacists who are also hospital pharmacists (blue), community pharmacy owners (purple), hospital pharmacists (yellow) and other non-accredited pharmacists (red). Similarly, the majority of responses were from the East Coast of Australia. However, there were also responses from Far North Queensland, the West Coast and rural and remote areas.

Figure 1.4: Distribution of community pharmacy owners, hospital pharmacists and other pharmacist responses

The postcode data was also converted to the Pharmacy Accessibility and Remoteness Index for Australia (PhARIA) scale. The most recent (2014/15) PhARIA scale was used for the analysis.[2]

The PhARIA categories (as shown in Table 1.1) provide a comprehensive, standardised measurement of the physical and professional remoteness of pharmacies throughout Australia[2], with category 1 being highly accessible (typically major cities) and category 6 being very remote.

Table 1.1: PhARIA categories

Category	Accessibility/Remoteness
Category 1	Highly Accessible
Category 2	Accessible (Group A)
Category 3	Accessible (Group B)
Category 4	Moderately Accessible
Category 5	Remote
Category 6	Very Remote

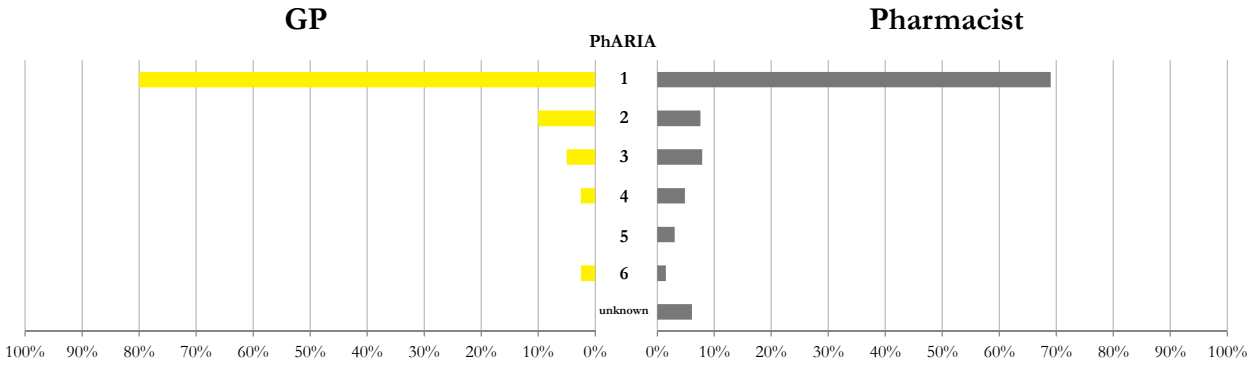
Source: Australian Population and Migration centre website, Pharmacy ARIA page: http://www.adelaide.edu.au/apmrc/research/projects/pharia/pharia-info.html

The analysis of survey responses confirmed that the majority of respondents (80% of GPs and 69% of pharmacists) worked in areas where pharmacies were highly accessible (category 1). However, responses were received from pharmacists in all other PhARIA categories, and all categories except 5 (remote) for GPs. See Figure 1.5.

There were several pharmacist responses were the PhARIA was not able to be calculated (unknown) as the postcode provided did not correspond to the postcodes included in the 2014/15 PhARIA scale, or no postcode was provided.

2 available from the Australian Population and Migration centre website, Pharmacy ARIA page: http://www.adelaide.edu.au/apmrc/research/projects/pharia/

Figure 1.5: PhARIA distribution of survey responses



1.2 Domains of need for HMR

Based on the literature review and preliminary consultations, four broad domains of need for HMRs were identified:

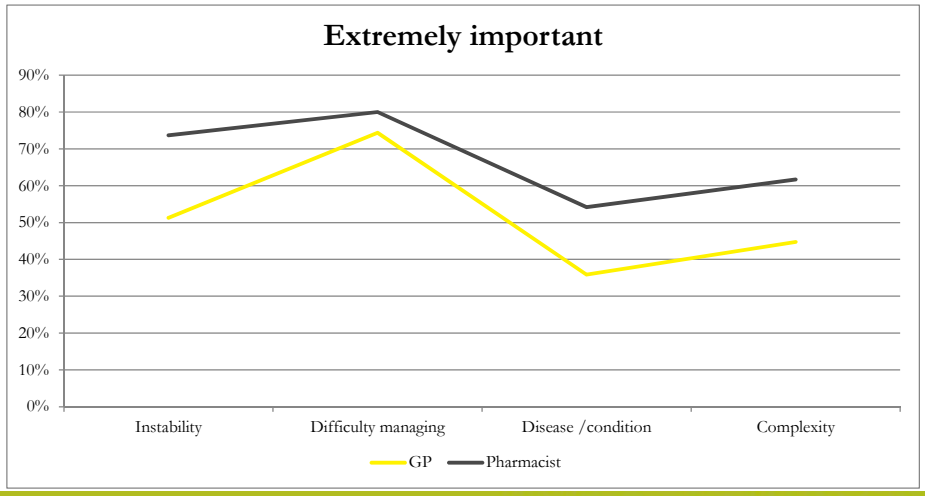
- **Instability** in medications or medical conditions
- **Difficulty managing** medications
- Particular **diseases / conditions** with associated medication issues
- Factors that may add **complexity** to the management of medications.

Pharmacists and GPs were asked to indicate how important they believed HMRs to be for patients within each of the above domains.

As shown in Figure 1.6 both GPs and pharmacist responses showed the same trend in which domains were considered of extreme *importance*. However, GPs tended to be more conservative in their responses. The highest rating domain was 'difficulty managing medications', which was rated as *extremely important* by 74% of GPs and 80% of pharmacists. This was followed by 'instability in medications or medical conditions' which was rated *extremely important* by 51% of GPs and 74% of pharmacists, and 'factors that may add complexity to the management of medications' which was rated *extremely important* by 45% of GPs and 62% of pharmacists. The domain that was rated *extremely important* the least was 'particular diseases / conditions with associated medication issues' with only 36% of GPs and 54% of pharmacists rating it as *extremely important*.

Key Finding 1: 'Difficulty managing medications' domain was rated extremely important for patients by the majority of GPs and pharmacists.

Figure 1.6: HMR domains – percentage perceived to be extremely important



1.3 Patient benefit

Survey respondents were asked how beneficial they believed HMRs to be for different types of patients within each of the four broad HMR domains of need.

Each domain was broken down into several different types of patient group, based on the evidence from the literature review and preliminary consultations. The groups were:

- **Instability** in medications or medical conditions
    - Patients with significant changes to their medicine regimen in the last three months **(sig changes)**
    - Patients with symptoms suggestive of an adverse drug reaction **(ADR)**
    - Patients who have been discharged within the last four weeks from a health service (includes discharge from a hospital, outpatient or rehabilitation service) **(hosp dish)**
    - Patients who have had a medication misadventure as the known or suspected reason for presentation, re-presentation or admission to hospital **(med misadventure)**
    - Patients who have had multiple unplanned admissions, presentations and/ or representations in the past twelve months **(mult admin)**
- **Difficulty managing** medications
    - Patients having difficulty managing their own medication(s) because of literacy or language difficulties (e.g. dysphasia) **(literacy / language)**
    - Patients who are at risk of, or unable to manage or continue managing their own medication(s) due to confusion, dementia and/or other cognitive difficulties **(dementia)**
    - Patients who are at risk of, or unable to manage or continue managing their own medication(s) due to dexterity limitations and/or impaired vision **(dexterity / vision issue)**
    - Patients who are suspected or known to be non-compliant with their medication regime **(non adherent)**
    - Patients who are socially isolated or lacking social support **(social isol)**
- Particular **diseases / conditions** with associated medication issues
    - Patients who have severe or unstable Ischaemic Heart Disease **(IHD)**
    - Patients who have a new diagnosis of Atrial Fibrillation **(AF)**
    - Patients who have had a recent Acute Myocardial Infarction or have Acute Coronary Syndrome **(AMI ACS)**
    - Patients with other cardiovascular conditions **(cardiovasc)**
    - Patients who have had a significant fall or recurrent falls **(falls)**
    - Patients with a mental illness **(MH)**
    - Patients with diabetes
    - Patients with asthma
    - Patients with Chronic Obstructive Pulmonary Disease **(COPD)**
- Factors that may add **complexity** to the management of medications
    - Patients who are currently taking five or more medicines regularly **(5+ meds)**
    - Patients taking more than 12 doses of medicine per day **(12+ doses)**
    - Patients attending a number of different doctors, both general practitioners and specialists **(mult Dr)**
    - Patients with multiple chronic conditions **(mult condition)**

- Patients taking medicine with a narrow therapeutic index or requiring therapeutic monitoring **(narrow ther index)**
- Patients taking or suspected to be taking alternative or complementary medicines **(CAM)**

Pharmacists and GPs were asked to indicate how beneficial they believed HMRs to be for patients within each of the above groups.

As shown in Figure 1.6 both GPs and pharmacist responses showed the same trend in which patient groups were considered of *extreme benefit* to patients. However, GPs tended to be more conservative in their responses.

Table 1.2 and Figure 1.6 show that the patient groups for which an HMR was considered *extremely beneficial* by over 55% of both GPs and pharmacists were:

- Patients attending a **number of different doctors**, both general practitioners and specialists
- Patients who have had **multiple unplanned admissions**, presentations and/ or representations in the past twelve months
- Patients with **multiple chronic conditions**
- Patients who have had a **medication misadventure** as the known or suspected reason for presentation, re-presentation or admission to hospital, and
- Patients taking medicine with a **narrow therapeutic index** or requiring therapeutic monitoring.

Although the following patient groups were rated lowest by GPs and pharmacists, with the group 'patients with other cardiovascular conditions' being considered of extreme benefit by only 5% of GPs (and 39% of pharmacists):

- Patients with **mental health** problems
- Patients taking or suspected to be taking **alternative or complementary medicines**
- Patients who have severe or unstable **Ischaemic Heart Disease** (IHD)
- Patients with other **cardiovascular conditions**.

Although both GPs and pharmacists indicated that the broad domain of *'difficulty managing medications'* was the most important domain, both GPs and pharmacists rated patient groups from *'instability in medications or medical conditions'* and *'factors that may add complexity to the management of medications'* domain above those listed under the *'difficulty managing medications'* domain.

Key Finding 2: People in the following patient groups were considered to benefit extremely from an HMR: patients with a number of different doctors, multiple unplanned admissions, multiple chronic diseases, known or suspected medication misadventure, or taking medicines with a narrow therapeutic index.

Key Finding 3: People in the following patients groups were less likely to be considered to benefit extremely from an HMR: people with mental health problems, taking alternative or complementary medicines, with unstable ischemic heart disease, or other cardiovascular conditions.

Figure 1.7: Perceived extreme benefit of HMRs for patient groups

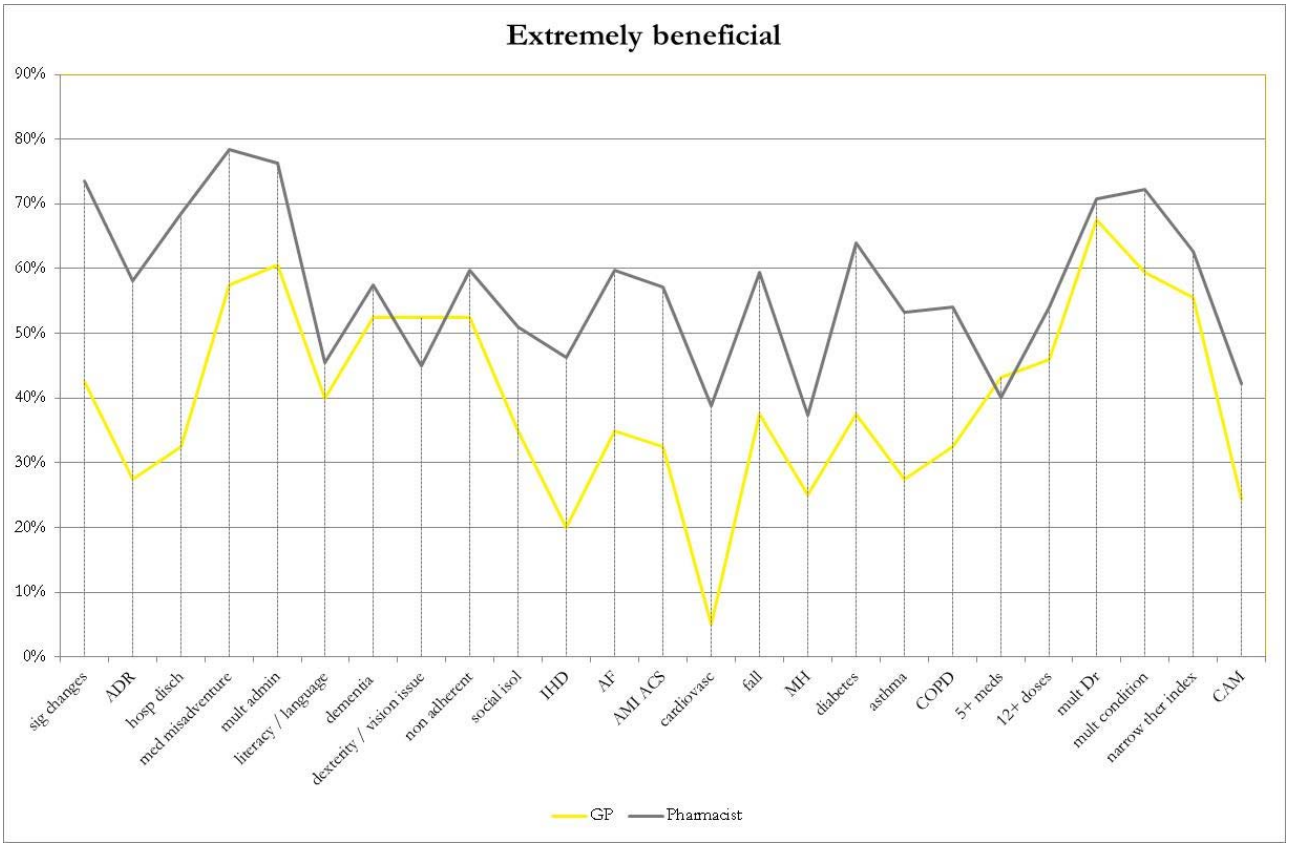


Table 1.2: Patient groups for which HMRs were considered extremely beneficial by GP and pharmacist rating

Patient group	Risk factors: MBS item (purple)	GP	Pharmacist
Patients attending a number of different doctors**, both general practitioners and specialists**		68%	71%
Patients who have had multiple unplanned admissions**, presentations and/ or representations in the past twelve months**		61%	76%
Patients with multiple chronic conditions		59%	72%
Patients who have had a medication misadventure **as the known or suspected reason for presentation, re-presentation or admission to hospital**		58%	78%
Patients taking medicine with a narrow therapeutic index **or requiring therapeutic monitoring**		56%	63%
Patients who are suspected or known to be non-adherent **with their medication regimen**		53%	60%
Patients at risk of, or unable to manage or continue managing their medication(s) due to confusion, dementia and/or other cognitive difficulties		53%	57%
Patients at risk of, or unable to manage or continue managing their medication(s) due to dexterity limitations and/or impaired vision		53%	45%
Patients taking more than 12 doses of medicine per day		46%	54%
Patients taking five or more medicines regularly		43%	40%
Patients with significant changes to their medicine regimen/ medical condition in the last three months		43%	74%
Patients having difficulty managing their medication(s) because of literacy or language difficulties **(e.g. dysphasia)**		40%	46%
Patients with diabetes		38%	64%
Patients who have had a significant fall or recurrent falls		38%	59%
Patients with newly diagnosed Atrial Fibrillation **(AF)**		35%	60%
Patients who are socially isolated or lacking social support		35%	51%
Patients who have been discharged within the last four weeks from a health service **(includes discharge from a hospital, outpatient or rehabilitation service)**		33%	69%
Patients with recent Acute Myocardial Infarction or Acute Coronary Syndrome		33%	57%
Patients with Chronic Obstructive Pulmonary Disease		33%	54%
Patients with symptoms suggestive of an adverse drug reaction		28%	58%
Patients with asthma		28%	53%
Patients with mental health problems		25%	37%
Patients taking or suspected to be taking alternative or complementary medicines		24%	42%
Patients who have severe or unstable Ischaemic Heart Disease **(IHD)**		20%	46%

Patients with other cardiovascular conditions	5%	39%

** Note: one criterion with no specific question in the survey – "sub-optimal response to treatment with medicines"*

Note: one criterion removed - " difficulty managing and adherence aid".

yellow indicates the top five (5) ranked patient groups; white indicates the bottom six (6) ranked patient groups

1.3.1 Complexity

GPs and pharmacists were asked to provide additional information on patient groups in the *factors that may add complexity to the management of medications* domain. Respondents were asked:

- Should the number of medicines a person regularly takes be an eligibility criterion on which referral for an HMR is based?
- Should the number of doses of medicines a person takes per day be an eligibility criterion on which referral for an HMR is based?
- Do you think the number of chronic conditions a person has should be an eligibility criterion on which referral for an HMR is based?, and
- Should the age of a patient form part of the eligibility criterion on which referral for an HMR is based?

As shown in Figure 1.8 the response to these questions was approximately 50-50 for both GPs and pharmacists with the exception of age, which both GPs (66%) and pharmacists (76%) indicated should not form part of a criterion on which referral for an HMR is based.

GPs and pharmacists that answered '*yes*' to these questions were asked to indicate the number of medications / doses / conditions or age that the criterion should be based on.

Whilst pharmacist responses had a greater range of values for each question compared to GPs (unsurprisingly considering there were over eight times the number of pharmacist responses compared to GP responses), the median values for both GPs and pharmacists were identical. See Table 1.3.

Both GP and pharmacist responses indicated that, if used for an HMR eligibility criterion, the following values may be appropriate:

- Number of medications – 5
- Number of does per day – 10
- Number of chronic conditions – 2, and
- Age – 70

Table 1.3: Range and median values

	GP		Pharmacist	
	Range	Median value	Range	Median value
Number of medications	4-8	5	1-10	5
Number of doses per day	5-12	10	1-20	10
Number of chronic conditions	1-5	2	1-5	2
Age	55-75	70	12-80	70

A strong theme from pharmacists' comments on this question was that a person of any age could potentially benefit from an HMR if they were confused about their medications, had one or more chronic condition or had a condition such as asthma or diabetes which may require education on instrument technique.

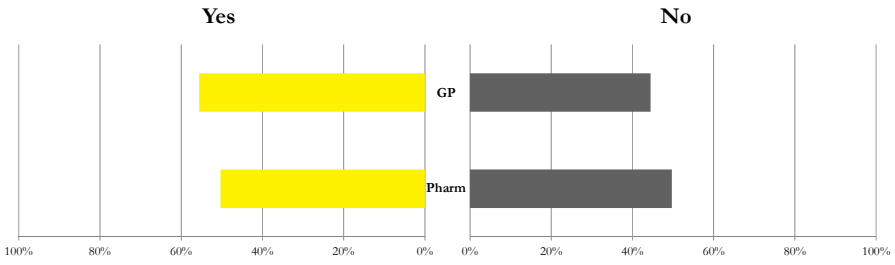
Figure 1.8: Should referral for an HMR be based on...

1.4 Other medication management services

GPs and pharmacists were asked "Do you think that some patients referred for HMRs could be adequately 'supported' with Dose Administration Aids, MedsCheck or Diabetes MedsCheck?" An opportunity to write a free text response was also provided.

Both GPs and pharmacists were split on this question with 56% of GPs and 50% of pharmacists responding 'yes' (see Figure 1.9).

Figure 1.9: Do you think that some patients referred for HMRs could be adequately 'supported' with Dose Administration Aids, MedsCheck or Diabetes MedsCheck?



However, the free text responses indicated that there was a level of ambiguity in the question. Some people interpreted the question to mean '…support *in addition* to an HMR' whilst others interpreted it as '…support *instead* of an HMR'. In addition, although three services were listed in the question, respondents could only answer *yes* or *no* to the question as a whole.

Some of the key themes from the free text responses to this question were:

- Dose administration aids are very useful for people with multiple medications / does times per day, but they are not a substitute for an HMR
- MedsChecks and Diabetes MedsCheck are useful for people who are mobile, have good health literacy and just need some education about their medications / conditions but are not a substitute for an HMR
- MedsChecks are a good way to identify people that may benefit from an HMR.
- MedsCheck are good for people who do not want someone in their home.

- MedsChecks are a good for maintenance post an HMR, and
- There is a lack of communication between the pharmacist and GP in the MedsCheck / Diabetes MedsCheck programs.

Key Finding 4: There was a level of ambiguity in response to the question on medication management services. Therefore it is not possible to draw conclusions on these services based on the response to the survey.

1.5 Free text responses

In addition to 'tick box' responses to the survey questions, GPs and pharmacists were provided several opportunities to write 'free text' responses throughout the survey.

Although free text responses were sought at the end of each question, most responses provided covered multiple aspects of the HMR referral process. Therefore, free text responses were analysed collectively in the section below.

Caution: only a sub-set of respondents provided free text comments in the survey, therefore the responses do not represent the whole survey population. In addition, several respondents made the same comment in several places, which may unduly skew the resultant themed responses. However, there was richness in the free text comments provided which may be useful to refine potential eligibility criteria.

For each question where a free text response was sought, responses were grouped into the following categories:

- General comment
- Not beneficial in this domain
- Beneficial / important for people in the domain "**instability** in medications or medical conditions"
- Beneficial / important for people in the domain "**difficulty managing** medications"
- Beneficial / important for people in the domain "particular **diseases / conditions** with associated medication issues"
- Beneficial / important for people in the domain "factors that may add **complexity** to the management of medications", and
- Other potential eligibility criteria suggested

General comments included (but not limited to):

- The most important part of the HMR was often providing education to the patient on their medications, their disease(s) / condition(s) and the importance of adherence to their regime
- Follow up is important, therefore a one off HMR sometimes has limited value
- Communication between the GP and pharmacist needs to improve
- HMRs were useful to demonstrate proper technique for medication aids such as asthma inhalers
- Frequency of HMRs should be increased (two years is too long for some patients), and
- Cap on the number of HMRs a pharmacist can perform can places pharmacists in a position of needing to prioritise referrals.

Table 1.4 shows the number of free text comments grouped to the above categories.

Additional detail on a sub-set of free text comments that were grouped to either 'general comment' or 'other potential eligibility criteria suggested' is presented in Table 1.5.

Table 1.4: Grouping of free text comments by domain

Free text grouping	Instability in medications or medical conditions	Difficulty managing medications	Particular diseases / conditions with associated medication issues	Factors that may add complexity to the management of medications	Comments on HMR eligibility criteria
GP	**Q3**	**Q5**	**Q7**	**Q9**	**Q18**
General comment	2	5	4	2	12
Not beneficial in this domain	0	0	0	0	0
Beneficial / important for people in the domain "instability in medications or medical conditions"	4	0	0	0	0
Beneficial / important for people in the domain "difficulty managing medications"	1	2	0	1	1
Beneficial / important for people in the domain "particular diseases / conditions with associated medication issues"	0	0	1	0	0
Beneficial / important for people in the domain "factors that may add complexity to the management of medications"	0	0	2	5	3
Other potential eligibility criteria suggested.	4	2	4	0	6
Total	11	9	11	8	22
Pharmacist	**Q13**	**Q15**	**Q17**	**Q19**	**Q27**
General comment	51	51	31	36	88
Not beneficial in this domain	5	4	4	5	2
Beneficial / important for people in the domain "instability in medications or medical conditions"	22	0	8	4	8
Beneficial / important for people in the domain "difficulty managing medications"	4	23	2	2	4
Beneficial / important for people in the domain "particular diseases / conditions with associated medication issues"	2	1	9	0	0
Beneficial / important for people in the domain "factors that may add complexity to the management of medications"	9	1	10	21	10
Other potential eligibility criteria suggested.	12	7	20	15	59
Total	105	87	84	83	171

Table 1.5: Additional detail on sub-set of free text comments

Free text grouping	Instability in medications or medical conditions	Difficulty managing medications	Particular diseases / conditions with associated medication issues	Factors that may add complexity to the management of medications	Comments on HMR eligibility criteria
GP	**Q3**	**Q5**	**Q7**	**Q9**	**Q18**
General comment					
• Education	1		1		
• Not age					1
Other criteria					
• At GP discretion	1	1	1		5
• Depends on individual	1	1	1		1
• ATSI	1				
• Other condition			1		
• Lack of regular GP	1				
Pharmacist	**Q13**	**Q15**	**Q17**	**Q19**	**Q27**
General comment					
• Education	1	5	7	4	
• Not number or doses of meds				8	
Other criteria					
• At GP discretion		1	1	4	20
• Depends on individual			5	2	9
• Guidelines only					5
• ATSI		2	1	2	3
• Rural / remote	1	1			
• Other condition	1		8		
• Health illiteracy	1	3		1	
• Device technique			5	1	
• Post discharge					7
• Other referrers					10

1.5.1 Instability in medications or medical conditions

Themes regarding the 'instability in medications or medical conditions' domain included:

- People would benefit from an HMR post discharge from hospital, especially if their medications changed. However, the HMR would need to be conducted within one week post discharge, and
- People on new or changed medications would benefit from an HMR.

One pharmacist commented that people at risk of an adverse drug reaction could be managed through the MedsCheck program. Another pharmacist commented that typically HMRs are not conducted timely enough for this particular domain.

Example of pharmacist comments
"This group is often the one that benefits most from HMR as problems are often nipped in the bud before becoming major. Those with new medications after discharge from hospital often reap the benefits of the education they receive via a HMR."
"People find any change to medications very confusing and need lots of reassurance and explanation. People are often informed about changes when they are acutely unwell e.g. hospitalisation, HMRs can be performed after recovery when people are more receptive to new information. A more holistic approach to medication management can be performed in people's own home where they are more comfortable and relaxed."
"In my experience, these patients are often confused about what they are taking and there is inconsistency between hospital discharge/ doctor/pharmacy records. The HMR not only clarifies and gives confidence to patients in taking their medications, but also serves to reconcile the differences in medications due to changes that may have occurred."
"People whose medication is changing regularly clearly have the most potential for confusion and tend to welcome HMR the most."
"Patients with symptoms suggestive of an adverse drug reaction are probably better managed via a MedsCheck."
"For patients with an ADR, I have found that the GP/hospital have already solved the problem by the time I conduct a HMR. Therefore, I think a HMR is more beneficial for those recently discharged and/or significant changes."

1.5.2 Difficulty managing medications

Themes regarding the 'difficulty managing medications' domain included:

- HMRs are beneficial for this group of patients, especially those with cognitive decline, language barriers (i.e. from a non-English speaking background), or using generic medicines
- People who are confused about their medication and/or medication would benefit from an HMR
- This is the group most likely to benefit from dose administration aids, and
- HMRs are useful for people who are unknowingly non-adherent. People who are willingly non-adherent are less likely to benefit from an HMR.

Example GP comments
"Given the names of different generics and the different shapes: colours and scoring. A single change can be confusing when you are taking multiple meds."
"…patients who are unable to read or speak English, elderly people without a full time carer, their eligibility for HMR should not depend on number of medications or doses they take."

Example pharmacist comments
"Generics create significant issues, as does memory issues."
"Medications can be duplicated unknowingly when hospitals dispense a product that is labelled generically and the patient is supplied with the same drug labelled with trade name."
"This group of patients is often non-adherent and suffering medication misadventure due to confusion and require a HMR urgently."

1.5.3 Particular diseases / conditions with associated medication issues

The key theme regarding the 'particular diseases / conditions with associated medication issues' domain was that anyone with a chronic condition could benefit from an HMR, but it really depends on the individual and the individual's circumstances.

Two GPs also comment that patients are well managed by in the GP practice.

Other conditions indicated by respondents were:

- Heart failure
- Palliative conditions
- Renal impairment
- Hepatic impairment
- HIV
- Hepatitis C
- Chronic pain
- Cystic Fibrosis, and
- Substance abuse

Example GP comments
"Patients with these conditions are well managed and supervised within our practice."
"Patients with asthma would, hopefully, have an Asthma Management Plan."

Example pharmacist comments
"Patients with specific diseases tend to use more than one doctor so are more likely to incur communication errors and misadventure - these patients tend to be the highest risk from my experience."
"COPD patients in particular don't have good insight to their disease to start with as they have to come to terms with the fact that it was more than likely their smoking that caused it. Once they get into a learning program, things improve but until then, HMRs are invaluable."
"Patient education regarding compliance and optimal use of inhaled devices for example has a big impact on their self-management. Patients with CVD do benefit from the time spent explaining symptoms and medication therapy requirements especially around use of anticoagulants."
"Time needs to be taken in showing medical devices e.g. for inhaled medications, DPIs, MDIs, spacers etc., and medical e.g. blood glucose machines."

1.5.4 Factors that may add complexity to the management of medications

Themes regarding the 'factors that may add complexity to the management of medications' domain included:

- Age is not a useful indicator as people of any age can benefit from an HMR
- Five or more medications and/or 12 or more doses per day should be a stand-alone trigger for an HMR. In addition, people who do not meet these criteria should not be precluded from having an HMR
- Patients with multiple doctors (including specialists) typically benefited greatly from an HMR, as there may be limited communication between doctors on the patients medication regimen, and
- Patients with multiple conditions, or newly diagnosed conditions typically benefited from an HMR and the education provided on the condition / medicine regimen.

Some GPs however, felt that the GP needs to be the central care coordinator and is best placed to do so.

Example GP comments
"Many people are not aware the complementary medicines may interact with their prescribed medication. Often really big problems when attending multiple doctors and needs a good thorough review. I have personally had the pharmacist identify prescribed medication I was not aware the patient was on."
"Multiple medications and a number of specialists (as well as the GP) benefit most by having a regular GP as their medical home for co-ordinating all there care and treatments."

Example pharmacist comments
"In my own experience over 12 years, those with multiple prescribers often benefit as their GP is kept up to date with current medication."
"Doctors don't always know what [complementary medicines] people are taking. The more medications, the more chance for confusion and medicine misadventure."
"It is not relevant to use the quantity of medication as a guide for HMR - the type of medication and the condition being treated is more relevant than the quantity."
"Multiple chronic conditions under the care of numerous medical specialists is a good indicator of need for a HMR, as is taking [complementary medicines]."
"Number of medicines and doses are only an approximation of complexity, it also depends on what they take, therapeutic index, risk associated with potential medication misadventure."

1.5.5 General comments on HMR eligibility criteria

Other comments provided on HMR eligibility criteria included:

- HMR referral should be at the discretion of the GP, as the GP understands the patient, their condition and their circumstances the best
- HMR referral really depends on the individual, and 'tick box' criteria will not be useful
- Aboriginal and Torres Strait Islander people typically benefit from an HMR. However, the current criteria that a HMR be conducted in the home can limit this for cultural reasons
- Accredited pharmacists should have access to interpreter services for cultural and linguistically diverse people, and
- People other than GPs should be able to refer for an HMR such as hospital doctors or pharmacists, community pharmacist and nurse practitioners.

Example GP comments
"GP knows when one is needed by level of complexity and concern. It cannot be described in "numbers". "
"...I would not like to see the eligibility watered down too much. It is a great service for frail elderly folk with multiple comorbidities…"
"I think the OR is a good idea. The way the questions were worded (questions 11-14 I think) it is implying that you are thinking about having AND as the eligibility criteria. Either that or trying to limit to one criteria. The current criteria captures all of my patients who benefit from an HMR."
"Needs to be requested by GP - patients should no be eligible just because of their diagnosis or types of treatments. GPs know their patients, their social and past history, and interactions with specialists to an extent that pharmacists do not. Many intelligent patients with chronic conditions would be insulted by the suggestion that they needed help with their medications."

Example pharmacist comments
"Recent discharge from hospital, regardless of the number of meds etc. should be an essential criteria for performing an HMR."
"Many people cope well with multiple medications, or drugs with a narrow therapeutic index, so these should not be a criteria on their own Those that should be included. Recent Discharge from hospital (preferably within 1-2 weeks) where there have been significant medication changes. Palliative care patients, as their medication needs may now be quite different."
"The categorisation of need using the markers you suggest is not helpful in judging the need for a HMR. A person starting on one new medicine (e.g. Warfarin or other anticoagulants) is a high risk patient and should have a HMR if the GP/pharmacist have any clinical concerns. The best markers are high risk factor meds, number of chronic conditions and patient age (>70 years)."
"There must be a process whereby hospital doctors can refer patients for HMRs post-discharge..."
"For Aboriginal patients there needs to be more flexibility - not everyone is happy to have you in their house so alternate sites must be possible and not pre-arranged with approval body. Also their meds change regularly so there needs to be a facility for more frequent referrals i.e. <2yrs. Also it is imperative an Aboriginal health worker attends as well so there needs to be funding support to allow this to occur."
"The need for HMR should be individual dependent, and not just based on eligibility criteria."
"…I feel there is one broad eligibility criteria which is missing-"the doctor feels the patient would benefit from an HMR"…"
"Clinician discretion should be allowed to enable a patient not satisfying whatever eligibility criteria is decided on. This is because there are a number of high risk groups not mentioned in the current HMR eligibility criteria e.g. economically disadvantaged, those with poor literacy, limited English proficiency, young patients with polypharmacy (CF children, young adult mental health). These patients are just as much at risk of medication misadventure than other groups. HMR conducting pharmacists should also be supported to access resources e.g. interpreters, translators to appropriately complete their work."

Bibliography

[1] Sourced from http://5cpa.com.au/programs/medication-management-initiatives/home-medicines-review/, accessed on 9 December 2014

[2] Ibid.

[3] Campbell Research & Consulting, *Home Medicines Review Program Qualitative Research Project Final Report*, Clifton Hill, Vic., December 2008.

[4] Ibid., p.3.

[5] Ibid.,p.3.

[6] Hawe, Degeling and Hall (1990) *Evaluating Health Promotion: A Health Workers Guide*. MacLennan & Petty Pty Limited.

[7] Further details of findings from the local level consults are available in the full final report.

[8] See the full final report for a list of the additions and deletions of patient characteristics requested by the Advisory Panel

[9] See Duckett, S., and Willcox, S., *The Australian Health Care System*, Oxford University Press, Sth Melbourne, 2011, p0.10-12.