

# Resources for disease state management—what do health professionals want?

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## Abstract

**Objectives:** Many medication management resources aim to improve the quality of prescribing, but simple resources naively do not address potential interactions when there are many diseases and many medications, while complex ones seem impractical to use during consultations. Limited work has explored health professional preferences regarding information resources for complex patients. This study aimed to explore the requirements for an information resource that HPs can use to assist in disease state management that takes into account all complexities of patient care, or at the very least, old age and multi-morbidity.

**Methods:** Purposive convenience sampling was used to recruit geriatricians, general practitioners and accredited pharmacists for one hour, individual, semi-structured interviews through August 2011 to April 2012. Recruitment continued until data saturation. Nine geriatricians, one GP and five accredited pharmacists from the Melbourne metropolitan area were interviewed. Thematic analysis was conducted using NVivo9 software.

**Results:** Study participants reported current resources do not assist with complex patient prescribing and lack relevance to the Australian setting. Difficulty in timely access to appropriate information and with contextualising vast amounts of new health information were identified hurdles in healthcare delivery, as were incomplete health care records. Key features which make resources useful include clear formatting, simplicity, use of peer-reviewed evidence-based recommendations, and ready access via an easy to use electronic interface.

**Conclusion:** Current resources do not meet health professionals' needs when they seek practical assistance when prescribing to complex patients. Future resources need to address identified hurdles to providing optimal care and incorporate desired features.

**Keywords:** Decision Support; Resource; Information; Health Professional; eHealth; Aged Care

## 1 Introduction

The plethora of medical studies published leaves many health professionals (HPs) overwhelmed. To assist HPs, information from research has been summarised and presented in a practice ready fashion through disease specific guidelines, drug monographs, and up-date newsletters. These information resources primarily aim to inform HPs on the most appropriate way to manage patient disease states. However, these resources may not be sufficient to meet HPs needs as many fail to take into

account patients with multi-morbidity, drug therapy individualisation, and end of life care. [1-4] The aged are affected by these shortcomings. A recent large descriptive study of patients in General Practices in Scotland across all age groups showed that approximately one quarter of all patients had more than one health care condition, and the proportion of people with more than one health condition increased with increasing age.[5] Indeed multi-morbidity amongst older people is the norm, rather than the exception.[5-8]

Disease state management is multifaceted, usually

requiring both pharmacological (i.e.: medications) and non-pharmacological treatments. Pharmacological therapy can cure diseases, decrease symptoms of disease and improve quality of life, or help prevent undesired end-points such as heart attack or stroke; not using proven pharmacological therapy could be considered unethical medical practice. However, of increasing concern is inappropriate medication use,[9] whether the medication is not indicated, given at an inappropriate dose, or the medication itself may be inappropriate for the patient due to past allergies, adverse drug events or potential for drug or disease interactions. Inappropriate medication use leads to avoidable adverse drug events, to which the aged are especially vulnerable, leading to unnecessary medication use, general practitioner (GP) visits, hospitalisations, residential care admission, and even death.[10] Inappropriate medication use also leads to increase medical costs arising from provision of additional health care and drug use, both to treat adverse outcomes and expenditure on inappropriate medications themselves[11]. The 2009 National Prescribing Service literature review of medication safety in the community suggested that up to 30.4% of hospital admissions in the aged were attributable to adverse drug events, almost 70% of which were potentially preventable.[7]

Health services are increasingly challenged by the needs of complex patients, those who have complex medical needs, including those with multiple conditions and that are aged. New initiatives that communicate best practice to clinicians that take into account complex patient needs are required, but how to design these is not clear. Qualitative studies of General Practitioners' (GPs') and pharmacists' experiences of managing multi-morbidity show that guidance when managing complex aged patients is lacking.[12, 13] Explicit criteria, expert consensus lists of appropriate and inappropriate medications in the aged, are cited as time efficient tools but lack transparency regarding the creation of recommendations, of final evaluation, and many do not address the question of multi-morbidity, limiting their use.[14]

Few studies have examined HP preferences regarding prescribing guidelines [15], or computerised decision support tools.[16, 17] Despite many post-hoc evaluations of information resources,[18] to our knowledge, none have explored HP preferences regarding prescribing resources for aged and/or multi-morbid patients, nor have they explored how best to deliver prescribing resources in general.

We wish to create an information resource that HPs can use to assist them in appropriate management of disease states that takes into account all complexities of patient care, or at the very least, old age and multi-morbidity. This study was undertaken to explore the

requirements of such an information resource.

## 2 Methods

Face to face semi-structured interviews were conducted with geriatricians, GPs and accredited pharmacists, as it was postulated that these HPs would have the greatest insight to geriatric specific resources available for medication management. Interviews lasted for up to one hour, were audio recorded, and transcribed verbatim. Ethics approval was granted by the Monash University Human Research Ethics Committee. Geriatrician interviews were conducted first; GP and pharmacist interviews were used to validate the insights gained from the geriatrician interviews. Purposive convenience sampling was used to recruit geriatricians and was planned for the GPs and pharmacists, but, as there was no remuneration to participants, difficulties were experienced when recruiting GPs and accredited pharmacists. Accordingly, a snowballing technique was used where GPs and accredited pharmacists who took part were asked to pass on study information to colleagues inviting them to participate in the study. This method helped recruit pharmacists, but only one GP was able to be recruited for this study. The interview schedule had three parts:

1. Exploration of what HPs do when they manage a geriatric patient, to:
  - a) Explore what matters they take into account when making therapeutic decisions; and
  - b) Provide insights into the hurdles to providing optimal care.
2. Exploration of what resources HPs use to assist them in therapeutic decision making, to:
  - a) Explore why they use or do not use particular resources so that features which make a resource useful (or not) could be identified; and
  - b) Provide insight into hurdles to providing optimal care that stem from currently available resources.
3. Exploration of features desired in a medication management resource to help therapeutic decision-making for older people.

Data were analysed using NVivo 9®[19] with both deductive and inductive approaches. Anticipated nodes were based on interview questions and new nodes were added as the data were analysed. Interviews with geriatricians were conducted until data saturation.

### 3 Results

Nine geriatricians, one GP and five accredited pharmacists from the Melbourne metropolitan area were interviewed between August 2011 and April 2012 (see Table 1). Data were analysed and grouped into three major themes: features which influence geriatric medication management choice, hurdles to providing optimal care in the aged, and desired features of a medication management resource.

#### 3.1 Features which Influence Geriatric Medication Management Choices

The primary principle to choosing drug therapy identified in this study was goal of care. Participants based goal of care on factors such as trading off quantity versus quality of life, their patients' or their patients' family's wishes, the stage of disease, and the ability of patients to tolerate recommended disease management strategies. Choice of therapy was also based on the available evidence for efficacy and lack of harm – the Hippocratic Oath's "do no harm" was often quoted.

*"Whether that's end of life care, whether that's preventative medicine or whether it's symptomatic care. Because I think that then flows on and it's the major crux behind any prescribing in an older person." G4*

*"Okay. I think the other thing that's really important is the quality of life of the person. So what are their goals in life? Do they want a prolonged life ... and / or do they want a quality of life. Not that they are exclusive, they can have both." P3*

Medical, functional and social characteristics also influenced choice. Medical characteristics considered included co-morbidities, medication history including failed therapies, allergies, and stage of disease. Functional characteristics such as the ability to swallow, to administer medication, to remember to take medications as prescribed, etc. ... were taken into account when making therapeutic choices. Social characteristics considered included continuity of care when discharged from hospital to community, as well as support to manage aspects of therapy such as administration and recognition of possible adverse effects. Social support in the community was seen as being of utmost importance for those with cognitive impairment, physical disability or those considered frail.

*"The other big issue apart from the medication itself to me would be is this person going to take it? And how?" G6*

*"Flag the potential for non-compliance, and difficulty with compliance, not so much non-compliance, and what are the things to look for, vision, dexterity, swallowing tablets." P5*

*"The social support and social network of the patients who could provide the medications on a regular basis and ensure that there is no intolerance of side effects of the medication" G3*

Finally, HPs weighed the financial burden and risks of additional pharmacotherapy to patients against potential benefits before making therapeutic decisions.

*"We do have to consider the economics as well for our patients in terms of can they afford it" G1*

*"Even though they may have a fairly benign side effect profile they potentially are just adding to the burden of polypharmacy and can have side effects." G6*

#### 3.2 Identified Hurdles to Providing Optimal Care in the Aged

Two major hurdles in providing optimal care were identified: 1) patient information relevant to making therapeutic choices was commonly missing from health records, and 2) literature that claimed to provide information about medication use in the aged was commonly inadequate or difficult to access in a timely manner. Good health records ensure critical patient characteristics are not missed when choosing an appropriate therapy. Some HPs found that patient information was often not adequately communicated from one HP to another, which not only translated to inappropriate medication choice in some cases, but also a waste of time and money for all stake holders – medical practitioners, patients, and funding bodies. Medical practitioners may need time to clarify information from other HPs, or may need to spend time conducting repeat examinations. Patients may need to spend time and money on unnecessary medical visits, medications, and examinations. Funding bodies are also affected; for example, each home

HP Type and Number	Gender	Age	HP experience (yrs)	Years of specialist practice
G1	F	40-49	17	7
G2	M	30-39	10	1.5
G3	M	40-49	20	6
G4	M	30-39	12	3.5
G5	M	30-39	12	5
G6	F	40-49	25	18
G7	F	40-49	19	11
G8	M	40-49	22	13
G9	F	50-59	33	22
GP1	M	60-69	40	37
P1	F	50-59	32	3
P2	F	60-69	40	11
P3	F	50-59	33	14.5
P4	M	40-49	27	14
P5	F	60-69	40	12

Table 1: Demographic Data; Key: G = Geriatrician; GP=General Practitioner; P = Accredited Pharmacist

medication review (HMR) conducted by an accredited pharmacist costs the Australian government \$194.07; if accredited pharmacists do not have all the appropriate patient information they cannot conduct an effective review.[20] Money spent on such HMRs may be considered wasted. Additionally, inappropriate therapy choices stemming from incomplete medical records can lead to additional GP visits, hospital and residential care admissions.

*“They give you terrible scribble that’s often unreadable... Abbreviations are a real problem, because whoever wrote it might know what they mean, but often between the nine GPs in my practice we can’t figure out what they mean, so I have to ring them up.” GP1*

*“If I don’t have all the information it’s a huge hindrance... I get very superficial information from most doctors... To give... a good comprehensive review... with the outcome to improve quality of life, you need as much information as possible... Then I... get feedback from the doctor; they say well you know, we tried this and they ended up in hospital because of this. And I wasn’t told that. I don’t know why you chose this unusual drug... I didn’t know that you had tried this. I haven’t been given an insight.” P5*

According to the study participants, a major hurdle to providing optimal care is the paucity of aged-specific

information and even less information that is applicable to the complex and frail patients commonly encountered in practice. Participants found it time consuming to identify available information. Some reported foregoing any searches due to time constraints. Indeed, a wide variety of resources was used to find answers to clinical questions, including peer experience, soft (electronic) and hard copy text books, decision-support software, and information retrieved by medical and general search engines, including guidelines and criteria published in the primary literature, hospital databases or by other reputable groups.

*“Now as far as going online and researching and reading the product information I honestly don’t have time. And I can’t dissect it” G6*

When apparently appropriate primary literature was found, some HPs commented that they felt they did not have the skills to put the identified information into the clinical context, especially if there were competing results or opinions.

*“The choice of drug therapy has to be guided by evidence and we have to extrapolate evidence from research that has occurred mainly in an adult average age population rather than looking at evidence to support the use or safety of a drug in the older population... It’s a bit of guess work I guess.” P3*



Finally, community based HPs were concerned about the cost of access to resources. Subscriptions available to HPs in large institutions are too expensive for small practices or for individuals, thus limiting access to relevant information.

*"I mean it just costs too much, we can't afford to buy multiple copies, [the references are] not cheap, see that's an issue, cost is an issue"*  
GP1

*"Actually the primary literature is limited for independent pharmacists because you can't always access the ... full study. So you are at the mercy of abstracts which is a really poor way to practice ... But we are just battling and flying in the dark now because we just don't have that access. You can't be subscribing to all the primary journals."* P3

### 3.3 Desired Features of a Medication Management Resource

Participants were asked what features they felt were "positive" or "useful" in a resource, what features they felt were "negative", and what features they thought were important to include in a medication management resource. Two general themes were identified:

#### 3.3.1 Information Quality

HPs felt that answers to *simple* clinical questions were readily available from many current resources; however, they felt a medication management resource that can give answers to complex clinical questions is lacking. They felt the ideal resource would link both disease state and drug information to assist in therapy individualisation.

*"The problem with the guidelines is that they are not individualised for elderly patients. So we need to then ... try and individualise them."* P3

*"I think all the references they use are just based on the drugs. But... when I write up my report I consider a drug disease interactions quite a bit. I would like to have both [drug and disease focus]"* P5

The HPs interviewed felt recommendations made by resources should be based on peer-reviewed evidence that puts primary information into a context with accompanying rationale. The level of evidence should be described and primary sources or references provided for transparency. The recommendations should also be relevant to local practice, wherever that practice is located.

*"Level of evidence is very important. Two points: firstly... there is still some level of evidence from trials conducted in the elderly... Secondly the recommendations should be formulated by a panel of experts ... It is very important to have both."* G3

*"[Having] references... That's very important... Because I want to be able to have a look at that myself... why is this particular book recommending it? I want to go back to the source"* P5

When asked about international literature, some felt that it was applicable, while others felt that international resources are not always appropriate due to differences in practice, drug availability and costs.

*"Yeah, the American ones are fairly translatable, and the philosophy seems to be the same."* G2

*"I think there's a need more Australian based [guidelines]... what is appropriate for America, or third world countries, may not be appropriate for Australia."* G8

Finally, HPs were generally more likely to use resources in which they had confidence. To be used resources should be up-to-date and produced or endorsed by a reputable organisation.

*"I think it's important that you... have confidence in the guideline... A reputable creator or a reputable source"* G5

#### 3.3.2 Format

Simple suggestions such as attention to font, smart use of colours, and clear layout were at the heart of making a resource useful. The right balance between simplicity

and detail needs to be found; too much text can be difficult to read, but oversimplifying is to be avoided.

*“Sensible use of colour, font, formatting so that it’s readable. . . . If it’s not absolutely readable the likelihood is that you won’t bother using it. . . .” G5*

*“I like [the AMH] because it’s always got the little section points to consider. . . and it’s in dot form and it just mentions the relevant things in a nutshell that you might need to consider” P1*

All but one participant (P1) suggested that the easiest resources to use are electronic, as they are generally more time efficient to use, and easy to update.

*“Well certainly the electronic guidelines are really easy to use because just text word searching is fantastic rather than just flicking through a book. . . it does save time. . .” P3*

*“So you have got to be able to update it frequently because it is changing all the time. . . [Referring to electronic resources] it’s the only way to update things.” P2*

## 4 Discussion

This study was undertaken to explore the requirements for an information resource that HPs can use to assist in appropriate management of disease states that takes into account all complexities of patient care, or at the very least, old age and multi-morbidity. Hurdles to providing appropriate care and positive or negative features of medication information resources were noted.

### 4.1 Summary of findings

Hurdles to providing optimal patient care included poor communication among HPs resulting in inadequate knowledge of all relevant patient information, and issues with finding best-practice information. Poor communication of relevant patient information has been identified in other research looking at experiences of primary HPs when caring for multi-morbid patients.[12, 13] Difficulties in finding clinical information resources stem

from the huge volume of potentially relevant materials, their wide dispersion, and lack of time to perform extensive searches needed to identify appropriate information. HPs not part of large institutions faced an additional hurdle, namely financial constraints, meaning that they were unable to pay for subscriptions and memberships that provided access to some resources. Finally, some HPs struggled to apply the available information to their patients especially with competing information or opinions. Sometimes the retrieved information lacked relevance to their patients or to local practice. Desirable features of an information resource reflected the identified hurdles and the need to fit in with the “usual care” process. Ideally information within resources would use up-to-date, patient-group-specific, peer-reviewed evidence, that is relevant to local practice, that provides patient-centric answers to complex clinical questions. The ideal resource would provide concise answers to complex questions in a time efficient manner, with the option of providing in-depth information regarding the rationale and references behind any recommendations. Preferably, the resource would be electronic.

### 4.2 How do our findings fit in with current literature?

Others have had similar findings regarding information resources for HPs. Hayward et al conducted a survey looking at “preferences [of internists] for how guidelines are presented”.[15] Aspects deemed “important”[15] largely match the observations of our research, including peer and organisation endorsement, use of algorithms, concise summaries of recommendations and supporting evidence. In contrast to our study, computer based systems were not deemed useful except for those who commonly used online resources; however, the study by Hayward was conducted in 1992, when computer support systems were not commonplace in health care. Ahearn and Kerr[16] conducted 3 focus groups with Australian GPs in 2003 looking at their perceptions of decision support tools within prescribing software. They reported similar characteristics that made decision support easy to use, such as providing concise and relevant information to the patient being treated with the option of expanding on that information, the marriage of drug and disease information, and use of evidence-based guidelines to provide recommendations within the software. [16] A 2010 Australian study used a modified Delphi technique to examine desired features of electronic prescribing software, including decision support features and their impact across four domains – patient safety, quality of care, utility to clinicians and utility to patients.[17] Decision support features deemed

to have high impact on patient safety and quality of care matched those found in our study, including use of up-to-date, evidence-based information relevant to local practice, and display of only that information relevant to particular patients.[17] Up-to-date, simple and easy to read information that is relevant to the patient in question are repeated themes across HP and resource medium type.

The major limitation of this study is the sampling method. Resources were not available to provide remuneration to participants, which limited the sampling method to using medical practitioners and pharmacists known to the investigators, augmented by snowballing. This sampling method risks recruiting like-minded study participants and potentially results in narrow views that are not in accord with the views of the wider population. Further, there was only one GP. Although data saturation was reached when all HPs were analysed as a group, interviewing more GPs may have uncovered new themes. However, the validity of our results is bolstered by the fact that they mirror other studies with GPs, both regarding requirements for information resources and hurdles identified to providing optimal care to aged or multi-morbid patients.[12, 13, 16, 17] Although we set out to define what resource health professionals want when treating aged or complex patients specifically, our findings indicate that the basic requirements for an information resource will remain the same irrespective of the population group they are targeting or the health professionals that use them.

### 4.3 Author recommendations

The following are recommendations by the authors for how to meet the requirements for disease management information resources for HP use. Our results suggest that HPs want an electronic information sources in the form of decision support software.

#### 4.3.1 Providing the Patient Context

Information provided to users (i.e.: HPs) needs to be put into patient context. This requires comprehensive, up-to-date disease state management information and complete patient health records. Both need to be addressed simultaneously. One solution to proving complete patient health records is the electronic health records (EHRs). A number of countries have or are developing patient EHRs that store patient information in a central database and can be accessed by all treating HPs.[21] We believe that patient EHRs need to be integrated with intelligent decision support software. Information resources could list every possible scenario

where a recommendation may or may not be appropriate in given patients – e.g.: listing *all* drug-drug interactions, *all* drug-disease interactions, *all* patient groups which may not be able to tolerate recommended drugs (for example, metformin is the drug of choice in most type 2 diabetes patients, but is not recommended in those with marked renal dysfunction) – but this solution would not be practical at the point of care. Instead, we recommend that information resources use data available in patient EMRs and only display information relevant to the patient in question. This means that EMR developers need to be able to capture all patient information relevant in clinical decision making, such as swallowing and dexterity difficulties, life expectancy, social status, etc... in addition to simple medical records, and information resource developers need to be able to utilise this information.

#### 4.3.2 Providing Up-To-Date and Relevant Information

Our study suggests that HPs not only find it difficult to search through information resources such a primary literature due to time and financial constraints, but they also find it difficult to put what little available relevant literature there is into context. Developers should use “local” experts in a given medical field to update the data within the information resource. Experts are equipped with skills that allow them review the primary literature and translate it to practice ready recommendations for disease state management. To update information within the resource, developers should provide an easy to use template that integrates any new information with existing information.

#### 4.3.3 Design

Our results suggest that the most user friendly resources use sensible colours, fonts, and layout, and do not provide too much information at any one time. We did not gather details on what is considered “sensible colours, fonts, and layout” as there has been considerable research in this area:[22, 23] however, it is interesting to note that design impacted interviewed HPs willingness to use an information resource and so must be considered carefully by developers. Provision of succinct information, without over simplification can be achieved by giving brief recommendations, with links to further detail. Future research should elicit exactly how much detail should be given so that HPs are able to use the information provided without the need for further clarification on most occasions. The authors are in the final stages of developing a working prototype of

an information resource with these recommendations – MedManAGE. Issues such as missing patient information, abundance of different information resources and formats, lack of skills interpreting evidence, lack of time to find appropriate information, and cost of resources are expected to be improved by use of MedManAGE.

## 5 Conclusion

HPs struggle under the pressure of keeping up to date with the latest medical literature while managing increasingly more complex patients. Despite the proliferation of medical literature limited information resources specifically address complex patients. New approaches that communicate relevant information to HPs in a timely and user-friendly fashion are needed. Results from this study have begun to define the requirements of such a resource.

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## Conflicts of Interest

No conflicts of interest declared.

## References

1. Gokula M, Holmes HM. Tools to reduce polypharmacy. *Clinics in Geriatric Medicine*. 2012. 28(2): 323-41.
2. O'Mahony D, O'Connor M. Pharmacotherapy at the end-of-life. *Age and Ageing*. 2011. 40(4): 419-22.
3. Hughes LD, McMurdo MET, Guthrie B. Guidelines for people not for diseases: The challenges of applying UK clinical guidelines to people with multimorbidity. *Age and Ageing*. 2013. 42(1): 62-9.
4. Boyd CM, Darer J, Boult C, Fried LP, Boult L, Wu AW. Clinical practice guidelines and quality care for older patients with multiple comorbid diseases: Implications for pay for performance. *Journal of the American Medical Association*. 2005. 294(6): 716-24.
5. Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. Epidemiology of multimorbidity and implications for health care, research, and medical education: A cross-sectional study. *Lancet*. 2012. 380(9836): 37-48.
6. Australian Institute of Health and Welfare. Older Australians at a glance: 4th edition, Department of Health and Ageing, Ed. 2007; AIWH: Canberra.
7. Easton K, Morgan T, Williamson M. Medication safety in the community: A review of the literature, National Prescribing Service, Ed. 2009: Sydney.
8. Salisbury C. Multimorbidity: Redesigning health care for people who use it. *Lancet*. 2012. 380(9836): 7-9.
9. Hanlon JT, Schmader KE, Ruby CM, Weinberger M. Suboptimal prescribing in older inpatients and outpatients. *Journal of the American Geriatrics Society*. 2001. 49(2): 200-9.
10. Department of Health and Ageing. The national strategy for quality use of medicines: Executive summary. 2002; Commonwealth of Australia: Canberra.
11. Rochon PA, Gurwitz JH. Optimising drug treatment for elderly people: The prescribing cascade. *British Medical Journal*. 1997. 315(7115): 1096-9.
12. Smith SM, O'Kelly S, O'Dowd T. GPs' and pharmacists experiences of managing multimorbidity: A 'pandora's box'. *British Journal of General Practice*. 2010. 60(576): e285-e94.
13. Luijckx HD, Loeffen MJ, Largo-Janssen AL, Van Weel C, Lucassen PL, Schermer TR. GPs' considerations in multimorbidity management: A qualitative study. *British Journal of General Practice*. 2012. 62(600): e503-e10.
14. Marriott J, Stehlik P. A critical analysis of the methods used to develop explicit clinical criteria for use in older people. *Age and Ageing*. 2012. 41(4): 441-50.
15. Hayward RSA, Wilson MC, Tunis SR, Guyatt GH, Moore K-A, Bass EB. Practice guidelines: What are internists looking for? *Journal of General Internal Medicine*. 1996. 11(3): 176-8.
16. Ahearn MD, Kerr SJ. General practitioners' perceptions of the pharmaceutical decision-support tools in their prescribing software. *Medical Journal of Australia*. 2003. 179(1): 34-7.



17. Sweidan M, Williamson M, Reeve J, Harvey K, O'Neill JA, Schattner P, Snowdon T. Identification of features of electronic prescribing systems to support quality and safety in primary care using a modified delphi process. *BMC Medical Informatics and Decision Making*. 2010. 10(21).
18. Kawamoto K, Houlihan CA, Balas EA, Lobach DF. Improving clinical practice using clinical decision support systems: A systematic review of the trials to identify features critical to success. *British Medical Journal*. 2005. 330(7494): 765-8.
19. Nvivo9. 2010; QSR International.
20. Medicare. Home medicines review (HMR). 2013 Available from: <http://www.medicareaustralia.gov.au/provider/pbs/fourth-agreement/hmr.jsp#N100BA>.
21. Boonstra A, Broekhuis M. Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions. *BMC Health Services Research*. 2010. 10(231).
22. Slee A, Lewis K. Design for patient safety: Guidelines for the safe on-screen display of medication information. 2010; National Patient Safety Agency.
23. Yu KH, Sweidan M, Williamson M, Fraser A. Drug interaction alerts in software - what do general practitioners and pharmacists want? *Medical Journal of Australia*. 2012. 195(11): 676-80.

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