

Pharmacists in general practice: recommendations resulting from team-based collaborative care

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Abstract. The Western Sydney Primary Health Network (PHN), WentWest, has been working to improve patient and health system outcomes by commissioning projects that enhance patient-focussed, team-based care. One such project is the WentWest General Practice Pharmacist Project, involving the integration of pharmacists within general practice sites. The aim of this study is to describe, classify and analyse recommendations made by pharmacists to GPs, resulting from patient consultations between pharmacists and patients in a general practice setting. This study was a multi-centre prospective observational study (April 2017–September 2017) investigating recommendations made by pharmacists integrated in a general practice setting. Thirteen general practice sites located in Western Sydney, NSW, Australia were involved in the study. The main outcome measures of this study include the classification of pharmacist recommendations and the percentage of those recommendations accepted by GPs. The pharmacists recorded the results from 618 patient consultations. These consultations resulted in 1601 recommendations of which 1404 (88%) were recorded as accepted. This study demonstrated that the recommendations made by pharmacists in general practice are well accepted by GPs and may lead to improvements in medication management and patient care.

Additional keywords: drug-related problems, integrated care, medication review, primary care.

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Introduction

It is predicted that by 2050, the proportion of the Australian population aged 65–84 years will double and that the proportion of people aged over 85 years will quadruple (Australian Government Treasury 2010). With this increase in age, there is also an increase in chronic medical conditions and associated medication use (Britt *et al.* 2008).

As the number of medications patients are taking increases, there is a corresponding increase in drug-related problems (DRPs) (Gnjidic *et al.* 2012). DRPs cause a significant number of Australian hospital admissions (Caughey *et al.* 2015; Roughead *et al.* 2016). Better management of medication in the primary care setting may help reduce these admissions.

Pharmacists have extensive pharmacotherapy knowledge and expertise, and are therefore a logical addition to the general practice team to assist with medication management (Freeman *et al.* 2012; Tan *et al.* 2013). At an international level, there is evidence to support the benefits to patients with the addition of pharmacists to general practice teams (Tan *et al.* 2014b). For example, in the United Kingdom, following a successful pilot integrating 491 pharmacists in general practice sites, the National

Health Service (NHS) has invested £100 million with the aim of integrating pharmacists in 40% of all NHS general practices by 2021 (NHS England 2016).

There have been few studies examining general practice pharmacists' interventions conducted in the Australian general practice setting. These studies have included small quantitative studies examining the effect of general practice pharmacists and multiple qualitative investigations relating to stakeholders' views on collaboration with general practice pharmacists (Tan *et al.* 2013, 2014a; Freeman *et al.* 2012, 2013).

The Western Sydney Primary Health Network (PHN), WentWest, has been working to improve patient and health system outcomes by commissioning projects that enhance patient-focussed, team-based care. As a result of this focus, the WentWest General Practice Pharmacist Project was commissioned to trial the implementation of a patient-centred primary care model and to investigate the acceptability of pharmacist recommendations to GPs. This project involved the integration of four pharmacists across 13 general practice sites in Western Sydney. The project commenced in March 2016 and is ongoing.

What is known about the topic?

- There is an established need for better medication management practices to reduce drug-related problems and improve disease state management.

What does this paper add?

- Analysing the effect integrated pharmacists can make as part of the general practice team may provide evidence to support the adoption of this collaborative model of care.

The aim of this study was to describe, classify and analyse the recommendations to GPs made by pharmacists resulting from patient consultations in a general practice setting.

Methods

WentWest general practice pharmacist project processes

The WentWest project team and affiliated general practice associations (Blacktown, Hills District and Mt Druitt) were responsible for the recruitment of project pharmacists. Pharmacist 1 and 2 have been employed for the project since the commencement of the pilot phase in March 2016. Pharmacist 3 and 4 joined the project in January 2017. Pharmacist 1 works full time visiting nine general practice sites each week. Pharmacists 2, 3 and 4 work for the project part time and visit up to two general practice sites each week. All four pharmacists have been registered for over 10 years and are accredited to perform medication management reviews. Two of the four pharmacists have additional postgraduate qualifications in clinical pharmacy.

The 10 criteria for patient selection were defined by WentWest to capture the study target population of patients requiring assistance with medication management or who are at risk of medication misadventure (Fig. 1).

The patient–pharmacist consultations comprised of a variety of activities including: medication reconciliation and review; adherence counselling; patient education on medical conditions and medications; review and ordering of laboratory tests; healthy lifestyle advice; and chronic disease management activities. Where possible, immediately after the patient–pharmacist consultation, a case conference was conducted between the patient, pharmacist and GP, to discuss the pharmacist’s recommendations.

The UTS research team were engaged to assist with data analysis and evaluation of the project.

UTS study methods

Study design

A multi-centre prospective observational study was conducted using data collected from 13 general practice sites from April 2017 to September 2017.

Ethics approval

Prior to conducting the study, the Human Research Ethics Committee at the University of Technology Sydney (ETH16–0689) granted research ethics approval.

Recommendation classification

Recommendations made by pharmacists were classified into categories and subcategories using the DOCUMENT (drug selection, over or underdose, compliance, undertreated, monitoring, education or information, not classifiable, toxicity or adverse drug reaction) classification system (Williams *et al.* 2012). The DOCUMENT classification system was chosen as it has been validated for reliability and used to describe pharmacists’ recommendations in other studies based in a team care environment (Kwint *et al.* 2011; Gheewala *et al.* 2014). Three of the 19 categories of the DOCUMENT system (medication not dispensed, refer to prescriber, refer to hospital)

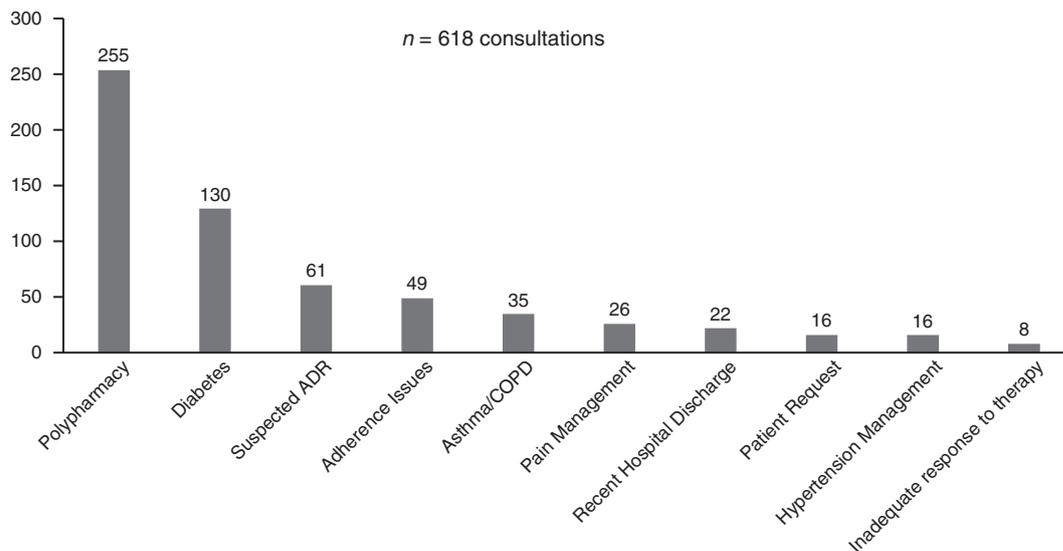


Fig. 1. Reason for patient selection into the project by a pharmacist or referral to a pharmacist by GP.

were related to community pharmacy and were therefore excluded (Freeman *et al.* 2013; Gheewala *et al.* 2014).

Data collection and analysis

Drug classes relating to pharmacists' recommendations were coded using the Anatomical Therapeutic Chemical (ATC) system, an international standard for drug utilisation studies developed by the World Health Organization Collaborating Centre for Drug Statistics Methodology (2017).

As part of their practice, the pharmacists participating in the project collected quantitative data using a data collection spreadsheet (in Microsoft Excel; Microsoft Corporation, Redmond, WA, USA) that was developed by WentWest to support the recording of the patient consultation. Data collected included identification of the pharmacist and general practice, patient demographic information and data relating to recommendations made by pharmacists (Appendix 1). The data were then entered into the Statistical Package for Social Sciences (SPSS) for Windows (version 24.0; IBM, New York, NY, USA) for analysis. Review of data by two researchers was performed to ensure accuracy of data classification and detect any discrepancies. The data were then analysed using standard descriptive statistics. Chi-Square tests were performed to examine the relationship between individual pharmacists and the percentage of recommendations accepted. Statistical significance was set at $P < 0.05$.

Results

The 13 participating general practice sites consisted of a wide spectrum of practice designs and with between 2 and 27 full-time GPs employed at each site. The scope of services provided at each practice also differed, with some practices providing a wide variety of speciality services and including multiple allied health practitioners, while others had a more traditional GP only or GP and practice nurse only design. The practice sites were situated in three general practice districts servicing populations representing a full spectrum of socioeconomic demographics.

Over the 6-month period, 618 pharmacist–patient consultations were conducted. These consultations took an average of 35.2 ± 14.7 min. The average patient age was 69.2 years (± 12.7). Patients on average had 5.4 co-morbidities (± 3.6) and took 10.4 medications (± 4.6), which included both prescription and non-prescription medications. Pharmacists made 1601 recommendations for 618 patients, with 1404 (88%) accepted by GPs.

Figure 1 describes the primary reason patients were selected for a pharmacist's consultation by the WentWest project pharmacists and GPs.

Figure 2 outlines the differences between individual pharmacists and the number of recommendations made and accepted.

There was a statistically significant difference in the proportion of recommendations accepted by GPs between Pharmacist 1 and the remaining three pharmacists, with the largest difference in acceptance rate between Pharmacist 1 and Pharmacist 2 ($\chi^2 = 105.3$, $P < 0.05$). There was also a significant difference between Pharmacist 2 and Pharmacist 3 ($\chi^2 = 32.4$, $P < 0.05$) and Pharmacist 2 and Pharmacist 4 ($\chi^2 = 30.0$, $P < 0.05$). There was not a statistically significant difference in acceptance rate between Pharmacist 3 and Pharmacist 4 ($\chi^2 = 0.1$, $P = 0.71$).

No recommendations were recorded in five of the DOCUMENT subcategories, including drug brand change, other changes to therapy, written summary of medications, other written information and no recommendation necessary.

The most commonly requested laboratory tests were for glycosylated haemoglobin, vitamin D and ferritin levels. Non-laboratory monitoring recommendations included pharmacists' requests for blood pressure monitoring and spirometry.

Education counselling sessions included activities such as inhaler technique checks, the development of diuretic action plans for heart failure patients and disease state education for diabetes, asthma, chronic obstructive pulmonary disease (COPD) and hypertension. In addition, pharmacists also provided smoking cessation advice, adherence counselling,

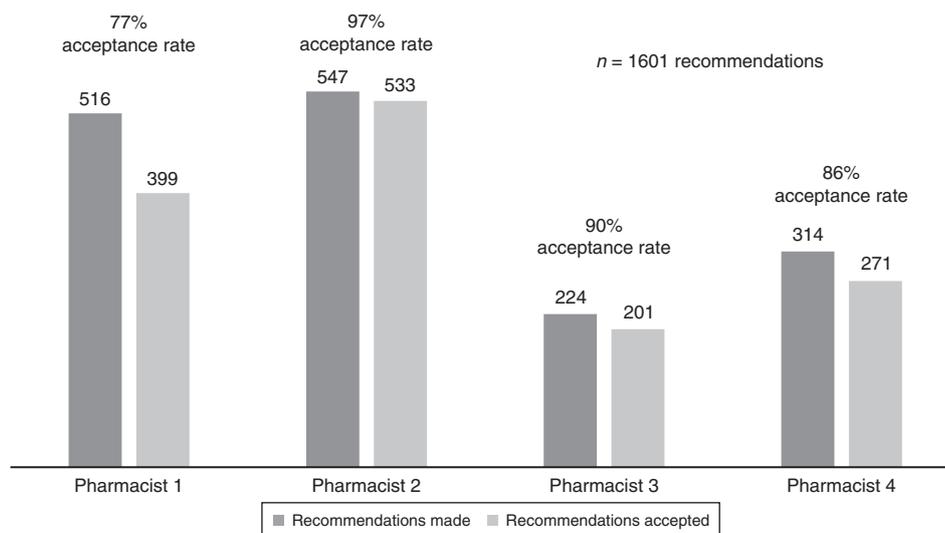


Fig. 2. Number of pharmacist recommendations and GP acceptance rate.

warfarin counselling, weight management, dietary advice and sleep hygiene counselling.

Table 1 categorises the pharmacists' recommendations to GPs using the DOCUMENT system and also indicates the proportion of recommendations accepted by GPs.

The DOCUMENT categories of dose reduction, dose increase and drug change (medication cessation and initiation) accounted for the majority (98%) of change in therapy recommendations made by pharmacists. The top four ATC classifications associated with each of these recommendation types are outlined in Table 2.

Discussion

This study outlines the recommendations made by general practice pharmacists working as part of the general practice team. The multi-site, multiple practitioner design demonstrates the potential for this intervention to be replicated and implemented on a wider scale.

The majority (73%) of pharmacists' recommendations related to changes in therapy, demonstrating the expertise of pharmacists in ensuring that patients receive optimal therapy for their diagnosed conditions. Two of the three most common pharmacotherapy recommendations in this evaluation were

Table 1. Categorisation of recommendations and acceptance by GPs

Recommendation	<i>n</i>	% accepted	Subcategory	Definition	<i>n</i>	% accepted
Change in therapy	1169	84	Dose increase	Pharmacist recommends the daily dose of medication is increased. e.g. <i>Increase gliclazide dose.</i> (Pharmacist 1)	174	89
			Dose decrease	Pharmacist recommends the daily dose of medication is decreased. e.g. <i>Decrease omeprazole dose.</i> (Pharmacist 2)	259	82
			Drug change	Pharmacist recommends a change in current medications such as initiating or ceasing a medication. e.g. <i>Cease analgesics, oxycodone/naloxone and paracetamol.</i> (Pharmacist 4)	708	83
			Drug formulation change	Pharmacist recommends a change in formulation that does not alter the drug or the total daily dose. e.g. <i>Change regular metformin to metformin extended release.</i> (Pharmacist 1)	16	100
			Dose frequency/schedule change	Pharmacist suggests a change in the number of times per day or timing of the doses, without changing the total daily dose. e.g. <i>Change moclobemide dosage time to morning, to aid compliance.</i> (Pharmacist 2)	12	91
Referral required	36	97	Refer for medication review	Pharmacist recommends patient has a home medicines review (HMR). e.g. <i>Refer for HMR.</i> (Pharmacist 3)	1	100
			Other referral required	Pharmacist refers patient to another health professional such as a dentist, podiatrist, specialist physician, etc. e.g. <i>GP agreed to refer patient to a neurologist.</i> (Pharmacist 1)	35	97
Provision of information	206	98	Education counselling session	Pharmacist provides a detailed counselling or education session to the patient. e.g. <i>Patient education to increase adherence.</i> (Pharmacist 2)	191	98
			Commence dose administration aid	Pharmacist suggests that the patient starts using a dose administration aid such as a blister pack or dosette box. e.g. <i>Commence dose administration aid, GP agreed.</i> (Pharmacist 2)	15	93
Monitoring	190	97	Monitoring laboratory	Pharmacist suggests that prescriber undertakes some laboratory monitoring. e.g. <i>Review ferritin level.</i> (Pharmacist 4)	138	97
			Monitoring non-laboratory	Pharmacist suggests that prescriber undertakes non-laboratory monitoring. e.g. <i>Conduct spirometry.</i> (Pharmacist 4)	52	98
Total	1601	88				

Table 2. Anatomical Therapeutic Chemical (ATC) categories associated with pharmacist recommendations

Recommendation	ATC category	Number of recommendations	% accepted
Dose reduction (n = 259)	Drugs for peptic ulcer and gastrointestinal disease e.g. <i>Reduce omeprazole to when required use.</i> (Pharmacist 4)	70	74
	Blood glucose-lowering agents excluding insulin e.g. <i>Reduce sitagliptin dose, reduced renal function.</i> (Pharmacist 1)	21	86
	Drugs for obstructive airways disease e.g. <i>Decrease inhaled corticosteroid dose.</i> (Pharmacist 1)	20	75
	Lipid modifying agents e.g. <i>Decrease fenofibrate dose.</i> (Pharmacist 1)	15	80
Dose increase (n = 174)	Blood glucose-lowering medications excluding insulin e.g. <i>Increase gliclazide dose.</i> (Pharmacist 2)	22	77
	Drugs for obstructive airways disease e.g. <i>Increase inhaled corticosteroid/long acting β agonist dose.</i> (Pharmacist 2)	22	91
	Other analgesics and anti-pyretics e.g. <i>Increase paracetamol to maximum daily dose.</i> (Pharmacist 3)	24	92
	Blood glucose-lowering medications - insulin. e.g. <i>Increase insulin dose.</i> (Pharmacist 3)	20	100
Drug change Medication cessation (n = 405)	Blood glucose-lowering medications excluding insulin e.g. <i>Cease sulfonylurea.</i> (Pharmacist 1)	39	56
	Anti-thrombotic agents e.g. <i>Cease aspirin (patient taking apixaban).</i> (Pharmacist 2)	25	72
	Supplements e.g. <i>Cease glucosamine as it is ineffective for patients.</i> (Pharmacist 4)	25	96
	Lipid modifying agents e.g. <i>Cease pravastatin.</i> (Pharmacist 3)	19	53
Drug change Initiation of new therapy (n = 303)	Blood glucose-lowering agents excluding insulin e.g. <i>Add metformin.</i> (Pharmacist 1)	48	92
	Lipid modifying agents e.g. <i>Add statin to improve lipid control.</i> (Pharmacist 2)	33	72
	Psycho-analeptics e.g. <i>Add SSRI (e.g. sertraline).</i> (Pharmacist 3)	23	96
	Angiotensin-converting enzyme (ACE) inhibitors plain. e.g. <i>Add ACEI inhibitor (e.g. enalapril).</i> (Pharmacist 4)	16	88

drug change recommendations relating to medication cessation and dose reduction recommendations. This confirms that pharmacists are able to make recommendations to reduce the risks associated with taking a high number of medications.

Pharmacist recommendations were associated with a large variety of ATC drug classes. The high numbers of recommendations associated with diabetes, cardiovascular, respiratory and acid-lowering medications highlights the potential role of pharmacists in optimising medication for chronic disease treatment. It is interesting to note that recommendations for cessation of lipid-lowering medications and blood glucose-lowering medications were the least likely to be accepted by GPs, with 53 and 56% respective acceptance rates. It could be speculated that GPs are willing to reduce doses of these medications but do not feel comfortable with cessation, which may potentially be perceived as a more extreme measure and associated with a greater possible risk to the patient.

Pharmacists have not historically been included in multidisciplinary general practice teams in Australia, and it would therefore be logical to expect that it would take some time for true collaboration to develop. Despite these concerns, the 88% acceptance of pharmacists' recommendations by

participating GPs demonstrates that GPs are willing to collaborate with pharmacists as part of the integrated care team. A process evaluation was conducted at the pilot phase of the WentWest General Practice pharmacist project, which enabled adjustment to project processes and procedures to improve collaboration between pharmacists and GPs (Benson *et al.* 2018).

Pharmacists conducted educational activities not just related to medication management, but also related to disease state management, healthy lifestyle advice and smoking cessation counselling. These educational activities indicate the ability of pharmacists to support GPs in providing holistic patient-focussed care.

Previous international studies have described the activities of integrated pharmacists; however, it is difficult to directly compare our findings with these study results due to the variety of settings and study designs (Berdine and Skomo 2012; Geurts *et al.* 2012; Howard *et al.* 2014; Lenander *et al.* 2014) In the Pincer trial (a pharmacist-led information technology intervention for medication errors) for example, pharmacists' interventions were specifically targeted to the resolution of hazardous medicines management in patients taking specific medications and with specified medical conditions; this differs

from our study, which targeted a broader general patient population. The majority of Pincer pharmacists' recommendations were reducing hazardous medication management, addressing prescribing contraindications and resolving monitoring problems, as opposed to recommendations aimed at optimising medication use. This contrasts with our study where 73% of the pharmacists' recommendations related to changes in therapy (Howard *et al.* 2014).

In this study, GP acceptance rates varied between individual pharmacists and practice sites. Previous studies examining barriers and facilitators to the acceptance of pharmacists in general practice have shown that multiple factors can influence the success and extent of pharmacists' integration. These factors include: the development of trust and respect between collaborating parties; ensuring GPs have a clear understanding of the pharmacists' role and competencies; supporting and orienting the pharmacists in the general practice setting; and considering the characteristics of the pharmacists' individual personality and experience (Farrell *et al.* 2008; Jorgenson *et al.* 2014).

Pharmacist 2 had a significantly higher acceptance rate compared with the other three pharmacists. Pharmacist 2 has been with the project for over 12 months and visits the same two general practice sites every week, allowing the development of rapport and close collaborative professional relationships with GPs at each practice. This contrasts with Pharmacist 3 and 4, who both joined the project 3 months before the study and with Pharmacist 1 who visited nine separate general practices weekly.

Limitations of this study included its observational nature and lack of a control group. As a result, the research team is unable to draw conclusions regarding the potential clinical effect of the pharmacists' recommendations. In addition, information was not collected relating to the reasons behind GP non-acceptance of recommendations. The GPs that volunteered to participate in the project were likely to be proactive and motivated, and this may limit the generalisability of the results. Despite this, the study conducted at the pilot phase of the project demonstrated there was variation between individual GP attitudes towards collaboration and improvements in the relationship between GPs and GP pharmacists that developed over time (Benson *et al.* 2018). Further larger-scale controlled studies are planned to examine clinical, humanistic and economic outcomes associated with the integration of pharmacists in team-based care.

Conclusion

This study demonstrates that pharmacists acting as part of the general practice team are effective at making recommendations to improve patients' pharmacotherapy and conducting activities to support patient education and disease state management. GPs are willing to accept a high proportion of these pharmacist recommendations.

General practice pharmacists can play an integral role in reducing medication burden by facilitating dose reduction and cessation of medications. By making recommendations to optimise therapy in patients with chronic disease, pharmacists have demonstrated their ability to support GPs in the complex treatment of patients taking multiple medications.

Conflicts of interest

The authors declare no conflicts of interest.

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Appendix 1. WentWest General Practice Pharmacist Project data collection fields

Date		
Pharmacist ID		
General Practice ID		
Unique Patient ID		
Length of Consult		
Criterion for Referral (Dropdown list)	<ol style="list-style-type: none"> 1. Polypharmacy (>5 medications) 2. Diabetes 3. Suspected adverse drug reaction 4. Adherence Issues 5. Asthma/chronic obstructive pulmonary disease (COPD) 6. Pain management 7. Recent hospital discharge 8. Patient request 9. Hypertension management 10. Inadequate response to therapy 	
Patient age		
Number of current comorbidities (please ensure this is recorded - if not recorded put not recorded (NR) in field not 0)		
Number of current medicines (prescription and non-prescription)		
Recommendations		
Dose increase recommended	Agent	Accepted (Y/N)
Dose decrease recommended	Agent	Accepted (Y/N)
New medication added	Agent	Accepted (Y/N)
Medication ceased	Agent	Accepted (Y/N)
Laboratory test recommended	Test ordered	Accepted (Y/N)
Change of medication	Change from	Change to Accepted (Y/N)
Other recommendations	Description	Accepted (Y/N)
Total number of recommendations		
Total number of recommendations accepted		
