UTS UNIVERSITY OF TECHNOLOGY SYDNEY

The integration of pharmacists in the Australian general practice setting: implementation, evaluation and development of an evidence-based training program.

PhD Thesis by compilation

Helen Shona Benson

2019

Doctor of Philosophy

Graduate School of Health, Discipline of Pharmacy: University of Technology Sydney

CERTIFICATE OF ORIGINAL AUTHORSHIP

I Helen Shona Benson declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Graduate School of Health at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

This research is supported by an Australian Government Research Training Program Scholarship.

Signature of Student: Production Note: Signature removed prior to publication.

Date: 31/5/2019

Abstract

Background

Traditionally pharmacists have predominantly worked in community and hospital pharmacy settings. A recently expanding area of pharmacist practice is the provision of services by pharmacists integrated in general practice.

General practice pharmacy is expanding worldwide with significant programs currently operating in the United Kingdom, the United States of America and Canada.

In Australia, pharmacists have been employed in the general practice setting for some time, but this has previously been on a small scale, and focused around the funded services of home medicines review.

More recently, project funding from Primary Health Networks (PHNs) has enabled the employment of larger numbers of general practice pharmacists across multiple states and regions of Australia.

One such project is the WentWest General Practice Pharmacist project, which commenced in selected general practices across Western Sydney, New South Wales in 2016.

Objectives

This thesis covers the synthesis, analysis and development of knowledge relating to the implementation of a GP pharmacist intervention in the Australian context and the development of an evidence-based education program for these pharmacists.

Methodology

Mixed methodologies were employed. A process evaluation and a further two prospective observational studies were conducted to evaluate the GP pharmacist intervention. A systematic narrative review of the literature was conducted to allow the GP pharmacist scope of practice and competency map to be defined. A Delphi validation study was used to develop an expert consensus position on GP pharmacist educational needs and finally a theoretical work was produced outlining the educational program development.

Results

Evaluation of the WentWest GP Pharmacist Project enabled identification of barriers and facilitators of the intervention. (Chapters 3-5) The lack of specific training for GP pharmacists was identified as a significant barrier to the intervention and this led to a narrowing of the research focus. The GP pharmacist scope of practice and competency map was defined. (Chapter 6) Educational needs of pharmacists wishing to practice as GP pharmacists were identified. (Chapter 7) An evidence-based educational program for GP pharmacists was developed. (Chapter 8)

Conclusion

The results from the evaluation of the WentWest GP Pharmacist Project enabled adjustment and improvements to the intervention model and have been used to inform ongoing research.

In addition, the research conducted into the GP pharmacist scope of practice and educational needs has enabled the development of the first comprehensive evidence-based education program for GP pharmacists in Australia.

Dissemination of Research

Peer Reviewed Publications

2018 Benson H, Sabater-Hernández D, Benrimoj S I, and Williams K A. 2018. 'Piloting the Integration of Non-Dispensing Pharmacists in the Australian General Practice Setting: A Process Evaluation', *International Journal of Integrated Care*, 18 (2). **doi:** 10.5334/ijic.3293

2018 Benson H, Lucas C, Kmet W, Benrimoj S I, and Williams K A 2018. 'Pharmacists in general practice: a focus on drug-related problems', *International Journal of Clinical Pharmacy*. 2018, Vol.40 (3), pp.566-572 **doi:** 10.1007/s11096-018-0617-9

2018 Benson H, Lucas C, Benrimoj S I, Kmet W, Williams K A 2018 'Pharmacists in general practice: recommendations resulting from team-based collaborative care.' *Australian Journal of Primary Health*, Vol.24 (6), p.448-454 **doi:** 10.1071/PY18022

2018 Benson H, Lucas C, Benrimoj S I, Williams K A 'The development of a role description and competency map for pharmacists in an interprofessional care setting.' *International Journal of Clinical Pharmacy,* under peer review

2018 Benson H, Lucas C, Williams K A **'**Establishing the educational needs of general practice pharmacists: a Delphi validation study.' *Currents in Pharmacy Teaching and Learning*, under peer review

2018 Benson H, Lucas C, Williams K A 'Training for team-based care: development of a novel continuing education curriculum for general practice pharmacists in Australia.' *Medical Teacher,* under peer review

Conference Presentations

2016 Benson H, Williams K A, Sabater Hernandez D, Benrimoj S I
'The WentWest Non-Dispensing Pharmacist Project: Integrating pharmacists in general practice.'
Poster Item 406 in Abstracts in Australasian Pharmaceutical Society Conference 2-6 December 2016 accessed at
http://apsaonline.org/files/2016ConferenceProceedings.pdf

2017 Benson H, Williams K A, Lucas C, Benrimoj S I 'Integrating Pharmacists in General Practice: Drug-Related Problems in the Patient Centred Medical Home.' Oral Presentation. Pharmaceutical Society of Australia 2017 Conference 28-30 July 2017:

2017 Benson H, 'Inter-professional collaboration in general practice and primary care teams.' Oral Presentation: Accredited Pharmacist Special Interest Group Pharmaceutical Society of Australia 2017 Conference 28-30 July

2018 Benson H, Williams K A, Lucas C, Benrimoj S I 'Developing an educational program for General Practice (GP) pharmacists.' FIP World Congress Glasgow 2-6 September 2018 Oral Presentation

Invited Presentations

2016 Benson H 'Allied Health in the Patient Centred Medical Home' WentWest PCMH Showcase Rosehill Racecourse 29th November 2016

2018 Benson H 'Pharmacists in General Practice' Pharmacists in General Practice National Primary Health Network meeting 21st May 2018

2018 Benson H 'Community Pharmacists in General Practice' Oral Presentation to Murrumbidgee PHN CEO and Primary Care Program Director

2018 Benson H 'Pharmacists in General Practice' Oral Presentation to Western PHN CEO and Primary Care Program Director Dubbo NSW 22nd August 2018

2018 Benson H, Williams K A, Lucas C 'Developing an education program for GP Pharmacists' WentWest GP Pharmacist Education Program Advisory Committee Presentation 18th September 2018

2018 Benson H 'Pharmacists in General Practice' Oral Presentation to Western PHN Clinical Council 18th October 2018

2018 Benson H 'Pharmacists in General Practice' Oral Presentation to Far-Western PHN Clinical Council November 7th 2018

Acknowledgements

This research was supported by an Australian Government Research Training Program (AGRTP) stipend funded by the Commonwealth Government Department of Education and Training.

The research outlined in this thesis would not have been possible without the ongoing guidance, encouragement and support of my supervisor, Professor Kylie Williams Head, Discipline of Pharmacy, Graduate School of Health, UTS and co-supervisor Dr Cherie Lucas; Lecturer, Graduate School of Health, School of Pharmacy, UTS.

In addition to my supervisors, I would like to acknowledge and thank the other wonderful colleagues with whom I have collaborated:

Professor Charlie (Shalom) Benrimoj thank you for convincing me to do a PhD and for always encouraging me.

Dr Daniel-Sabater-Hernandez thanks for getting me started and acting as my supervisor for the first year of my PhD. My first year would have been much more difficult without your help.

Ms Rachelle Cutler, I couldn't have done it without you. Having someone a few steps ahead willing to reach back and help was invaluable. Thanks so much.

To my family and especially to my wonderful husband Jon, thank you for your support and unwavering confidence in me. I can't wait to move on to the next chapter.

To the staff and pharmacists from WentWest, thank you for supporting the research, hopefully we can make a real difference.

Preface

This thesis is presented in fulfilment of doctoral degree (Doctor of Philosophy) requirements, under the graduate research school at the University of Technology Sydney.

The thesis is structured as a PhD thesis by compilation comprising a combination of chapters and published/publishable works.

This basis for this research originally stemmed from my passion for helping patients, and my belief that pharmacists are capable of contributing to patient care in a larger and more meaningful way. By training the pharmacists of the future to perform clinical roles, we are paving the way for the advancement of the profession.

TABLE OF CONTENTS

List of Figures

List of Tables

Abbreviations

CPPE Centre for Pharmacy Postgraduate Education

DRP Drug-related problem

FIP Federation Internationale Pharmaceutique (International Pharmaceutical Federation)

GbCF Global Competency Framework

GP General Practice

HEE Health Education England

NCSFPA National Competency Standards Framework for Pharmacists in Australia

NHS National Health Service

NSW New South Wales

PCMH Patient Centred Medical Home

PHN Primary Health Network

PSA Pharmaceutical Society of Australia

RACGP Royal Australian College of General Practitioners

RPS Royal Pharmaceutical Society

UTS University of Technology Sydney

USA United States of America

UK United Kingdom

WentWest Western Sydney Primary Health Network

Chapter 1

Synopsis

Rationale

Pharmacists have traditionally practiced in community pharmacies or in the hospital pharmacy setting. Recently there has been an increase in the number of Australian pharmacists contributing as part of general practice (GP) teams.

To date there have been a limited number of studies published evaluating the activities of GP pharmacists in Australia.

Pharmacists working in general practice conduct a wide variety of professional activities, some of which are not currently included in traditional pharmacy pre-registration training courses.

There is currently no scope of practice defined for GP pharmacists in Australia.

This thesis has three aims

1. To evaluate the implementation of an integrated pharmacist project.
2. To develop a comprehensive role description and competency map for GP pharmacists.
3. To describe the development of an evidence-based education program for GP pharmacists.

Objectives

This thesis covers the synthesis, analysis and development of knowledge relating to the implementation of a GP pharmacist intervention in the Australian context and the development of an evidence-based education program for these pharmacists.

Specific objectives

- To evaluate the implementation of a GP pharmacist project currently operating in the Australian environment.
- To identify the activities performed by GP pharmacists internationally to enable the development of a comprehensive role description.
- To map the identified GP pharmacist activities to two relevant competency frameworks.
- To investigate the educational needs of GP pharmacists.
- To develop an evidence-based curriculum to equip GP pharmacists with the skills and knowledge required to perform the GP pharmacist role.

Research Overview

Chapters 1 and 2: Synopsis and Background

Chapter 1 provides a summary description of each chapter in the thesis and describes how each chapter relates to the thesis objective. Chapter 2 provides relevant background to place the research into context.

The subsequent chapters present a series of works informing specific elements of the implementation assessment and educational program design.

Chapters 3 through to Chapter 5 relate to the first thesis objective of evaluating the implementation of a GP pharmacist project currently operating in the Australian environment.

Chapter 3: WentWest GP Pharmacist Project: Pilot Phase Process Evaluation

This chapter is an article published in the *International Journal of Integrated Care* describing a mixed methods process evaluation of the pilot phase (March 2016-June 2016) of the WentWest GP Pharmacist Project.

Quantitative data collected by GP pharmacists as part of their intervention was used to inform the evaluation. In addition, qualitative data collected from semi-structured interviews of GP pharmacists and general practitioners (GPs) was used to evaluate barriers and facilitators to the intervention.

There was a high level of variability in the quantitative data collected by individual GP pharmacists and a wide variation in the acceptance of pharmacist recommendations by GPs. This variability demonstrated that there was a requirement for the development of a standardised model of GP pharmacist care to improve consistency and GP acceptance of the intervention.

A lack of training was raised as a barrier to the intervention by both pharmacists and GPs, highlighting the requirement for the development of an evidence-based training program.

Chapter 4: WentWest GP Pharmacist Project: DRP study

This chapter describes an article published in the *International Journal of Clinical Pharmacy* detailing a multi-centre prospective observational study. The study analyses the activities of

GP pharmacists from the WentWest GP Pharmacist Project (October 2016-March 2017) in relation to the detection and resolution of drug related problems (DRPs).

GP pharmacists were found to be effective at identifying DRPs and making recommendations for their resolution however, the lack of data collected by pharmacists around the agents involved and the results of their recommendations limited the conclusions that could be drawn from the study results.

This article again highlighted a large variability in acceptance rates of individual pharmacists and variability across individual general practice sites; and demonstrated the requirement for standardisation of data collection processes and training for GP pharmacists in research methods. This study also allowed the research team to gain insight into the activities being performed by the GP pharmacists in the project.

Chapter 5: WentWest GP Pharmacist Project: Pharmacist Recommendation Study

This chapter is an article published in the *Australian Journal of Primary Health* describing the analysis of the recommendations made by pharmacists participating in the WentWest GP Pharmacist project (from April 2017-October 2017).

This study allowed for detailed analysis of the activities performed and recommendations made by GP pharmacists.

This study showed an improvement of the acceptance of GP pharmacist recommendations in comparison with the two previous studies, demonstrating that the success of the intervention improves over time and perhaps with an increase in the experience level of the pharmacist practitioners.

The three evaluation studies conducted in relation to the WentWest GP Pharmacist Project highlighted the need for the development of a defined scope of practice and a comprehensive education program for GP Pharmacists in Australia and this led to a narrowing of the thesis research focus.

In order to develop an evidence-based education program, the research team identified the need to define the role performed by GP pharmacists, map the competencies required to perform those roles and establish the educational needs of GP pharmacists.

Chapter 6: Literature review

This chapter is a comprehensive review of the literature (currently under peer review in the *International Journal of Clinical Pharmacy*) describing the range of roles performed by GP pharmacists and mapping them to associated global pharmacist competencies.

Chapter 6 aims to address the thesis objective relating to the identification of the activities performed by GP pharmacists. In addition, this chapter describes mapping the identified GP pharmacist activities to two internationally recognised competency frameworks. The competency frameworks used were the International Pharmaceutical Federation (FIP) Global Competency Framework (FIP GbCF) and the 2016 National Competency Standards Framework for Pharmacists in Australia (NCSFPA). (Federation International Pharmaceutique 2012; Pharmaceutical Society of Australia, 2016b)

Chapters 7 and 8 relate to the fourth and fifth thesis objectives, the investigation of GP pharmacist educational needs and the development of an evidence-based curriculum to equip GP pharmacists with the skills, knowledge and appropriate training required to perform the GP pharmacist role.

Chapter 7: Establishment of GP pharmacist education needs

This chapter describes a Delphi validation study (currently under peer review in *Currents in Pharmacy Teaching and Learning*) aimed at establishing a consensus position on the educational needs of GP pharmacists.

The educational needs established as a result of this study were used to inform the educational program design.

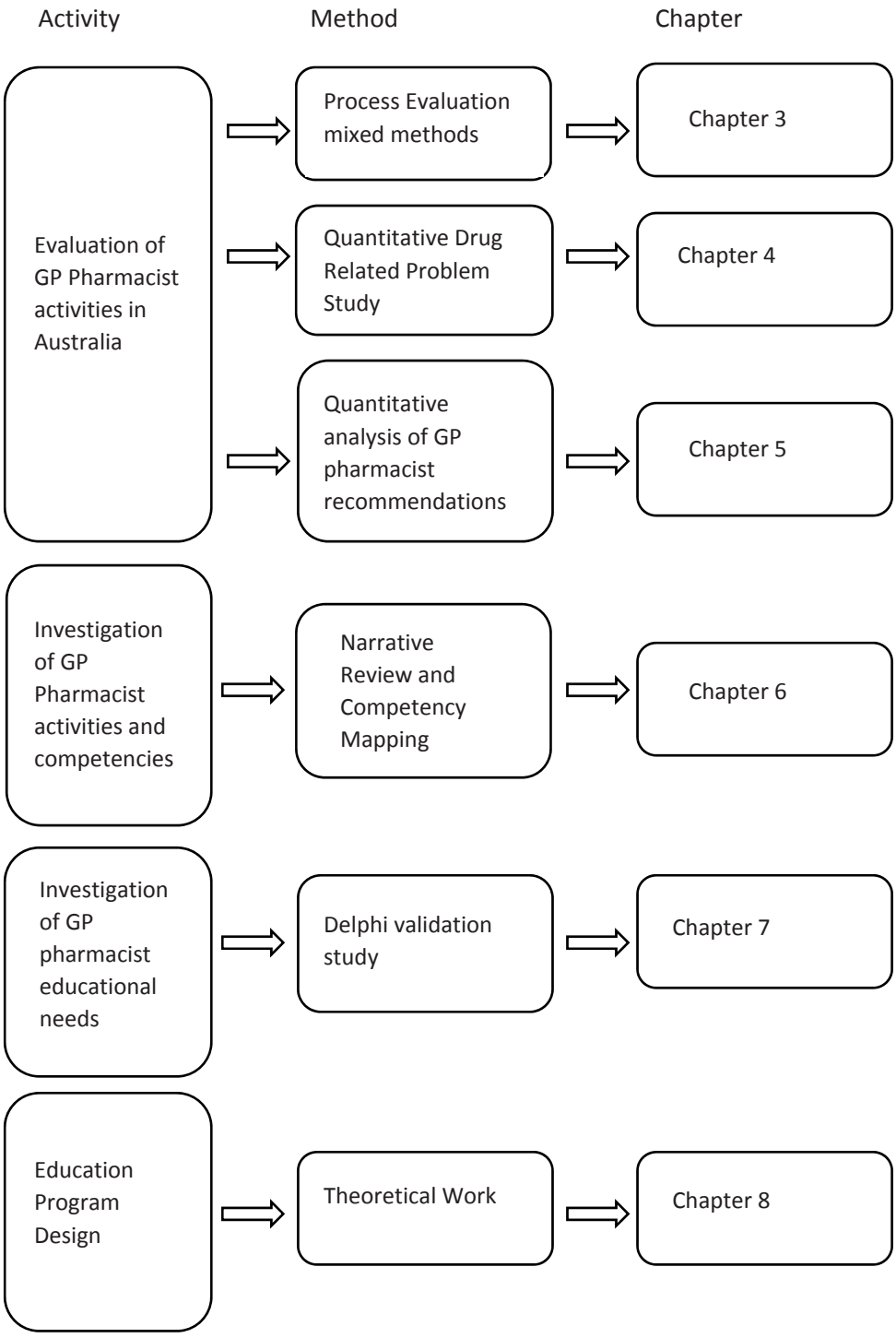
Chapter 8: GP Pharmacist education program design

This chapter describes the curriculum design process (article under peer review in *Medical Teacher*) and demonstrates the alignment of established GP pharmacist educational needs to graduate attributes, learning outcomes and course outlines. This chapter also outlines the structure of the proposed GP pharmacist education course and describes its methods of delivery.

Chapter 9: Discussion and Conclusion

The thesis is discussed and concluded in Chapter 9.

Figure 1: Research Overview



Chapter 2

Background

Interprofessional models of primary care have been proposed as a means of addressing the increasingly complex needs of the patient population. (Supper 2015)

By incorporating the skills of multiple practitioners, care can be tailored to meet the individual patient needs. This collaboration improves patient access to services, allows for seamless transitions of care and provides comprehensive co-ordinated delivery of care aimed at producing improved patient outcomes. (Samuelson 2011; Molyneux 2001)

A systematic review by Supper *et al* examining barriers and facilitators to interprofessional collaboration found that barriers included: a perceived hierarchy that discouraged team work, a lack of understanding regarding different healthcare professional roles and a fracturing of care due to a lack of provider continuity. Facilitators to collaboration included positive attitudes towards collaboration and perceived professional benefits from enhancing clinical activities. Shared facilities including communication tools and supportive organisational structures were also classed as facilitators. (Supper 2015)

Bardet *et al* conducted a systematic review of collaborative models of care involving community pharmacists and physicians and found that there were common factors affecting the success of collaboration amongst all models of interprofessional working. These included the development of trust, interdependence, individual health care provider skills, role definition and communication. (Bardet 2015)

Pharmacists have been integrated in collaborative GP teams since the 1970s and there are instances of this model of care in multiple countries including the United States of America (USA), Canada, United Kingdom (UK), Netherlands and Australia. (Dolovich 2012; Carter 2015; Stone 2015; Hazen 2018a. ; Tan 2012; Tan 2014a)

In 2013 Jorgenson *et al* reviewed international literature assessing barriers and facilitators to the integration of pharmacists in primary care in Canada. As a result of this review, the authors developed guidelines for pharmacists wishing to integrate into family health teams (the Canadian equivalent of general practice teams). Ten key actions for pharmacists wishing to integrate into existing primary care teams were identified. (Jorgenson 2013)

These included: (1) determining the needs and priorities of both the team and its patients, (2) developing a clear job description for the pharmacist, (3) educating the team about the

pharmacist's role, (4) the pharmacist educating themselves about the other team members' roles, (5) ensuring that the clinic infrastructure supports the pharmacist's role, (6) ensuring that the pharmacist is highly visible and accessible to the team, (7) ensuring that the pharmacist's skills are strong and up to date, (8) providing proactive care and take responsibility for patient outcomes, (9) regularly seeking feedback from the team and (10) developing and maintaining professional relationships with other team members.

One of the interesting recommendations made by Jorgenson *et al* was the need for the development of a clear role description and scope of practice for pharmacists in primary care. In Australia, the Pharmaceutical Society of Australia has proposed a sample scope of practice for GP pharmacists but this document does not comprehensively encompass the full potential range of activities GP pharmacists are performing internationally. (Pharmaceutical Society of Australia 2016a)

A systematic review by Tan *et al* analysing the results from 38 randomised controlled trials provided evidence that the integration of a non-dispensing pharmacist in a general practice setting was associated with improvements in patient clinical outcomes. (Tan 2014b) Nine of the included studies recruited patients at risk of medication misadventure while the remaining 29 recruited patients with specific medical conditions including cardiovascular disease (15 studies), diabetes (nine studies) and asthma (four studies). Positive effects on primary outcomes were reported in 19 studies, mixed effects were reported in six studies and no effect was observed in 13 studies. These clinical outcome improvements observed included the resolution of drug related problems (DRPs), improvements in HbA1c% in diabetic patients, achievement of blood pressure (BP) targets in hypertensive patients and an improvement in low density lipoprotein (LDL) levels in patients with hypercholesterolaemia.

One model of GP pharmacist collaboration that has been increasingly adopted worldwide is the inclusion of pharmacists in the Patient Centred Medical Home (PCMH) model of care. The PCMH model is designed to focus on patient needs, improve access to care, reduce cost and improve safety, equity and efficiency. The PCMH was first proposed in the 1960s by the American Academy of Paediatrics but has recently been updated and delineated by the

patient centered primary care collaborative, a coalition of USA primary care organisations. (Patient Centered Primary Care Collaborative 2017)There is evidence to support the PCMH model in relation to improved patient outcomes and also in reductions in the cost of care. (Alexander 2012)

In the United States of America (USA) ambulatory care and Patient-Centred Medical Home (PCMH) models of collaborative care have included the incorporation of pharmacists as part of the primary care team since the late 1990s. (Chisholm-Burns 2010) Projects including pharmacists as part of the primary care team have resulted in statistically significant improvements in clinical outcomes such as glycosylated haemoglobin (HbA1c%), blood pressure(BP), cholesterol and body mass index (BMI). (Patterson 2015; Weber 2015; McConaha 2015; Majumdar 2015; Nigro 2012; Chisholm-Burns 2010)

In Canada, the PCMH model was adapted to include primary care pharmacists as part of Family Health Teams (FHTs). The Seniors Medication Assessment Research Trial (*SMART*), a cluster randomised controlled trial conducted in 2003, demonstrated that integrated pharmacists could make recommendations to resolve drug-related problems and that these were well accepted by collaborating GPs. (Sellors 2003; Lau 2007; Austin 2005) A large scale project, the Integrating Family Medicine and Pharmacy to Advance Primary Care Therapeutics (*IMPACT*) incorporating pharmacists in FHTs in Ontario was conducted from 2004 to 2006 with the aim of improving drug therapy. (Dolovich 2008; Dolovich 2012; Farrell 2008)

These projects assisted to demonstrate the positives of including pharmacists as part of the primary care team, and led to an increase in the recognised scope of practice for Canadian pharmacists working in primary care settings. Canadian pharmacists (in certain provinces) now have the ability to prescribe certain medications, adjust doses and issue repeat prescriptions. They are also authorised to administer a variety of vaccinations and to order and interpret laboratory results. (Canadian Pharmacists Association 2016)

In the United Kingdom (UK), a large-scale pragmatic cluster controlled trial, (*PINCER*-pharmacist-led information technology intervention for medication errors) demonstrated

that involving a pharmacist in general practice was cost-effective in reducing drug related errors. (Elliott 2013)

In 2015 a large National Health Service (NHS) project, the Clinical Pharmacists in General Practice Trial commenced. This project involved the integration of over 490 pharmacists across NHS general practice sites. Initial results of the pilot have been promising, and the program has been expanded, with a further £100 million pounds invested and an aim of allowing an additional 1500 pharmacists to be integrated into general practices by 2021. (Bush 2017; Mann 2018; Stone 2015)

In the Netherlands, the **P**harmacotherapy **O**ptimisation through **I**ntegration of a **N**on-dispensing pharmacist in a primary care team **T**rial (*POINT*) was commissioned to establish the effect of three different models of pharmaceutical care with varying degrees of pharmacist integration into general practice with results yet to be published.(Hazen 2015) A further systematic review conducted by Hazen *et al* outlined that to obtain maximum benefits from clinical pharmacy services full integration of pharmacists as part of the primary care team should be promoted. (Hazen 2018a)

A 2014 health workforce survey indicated that 63% of Australian registered (licensed) pharmacists worked in a community pharmacy setting with a further 18% working in a hospital pharmacy environment. In addition to community and hospital settings, pharmacists have previously been employed in universities, government departments of health, professional bodies and pharmaceutical industry. (Health Workforce Australia 2014) As of 2012 2% of Australian pharmacists indicated that they worked in a medical centre setting. (Health Workforce Australia 2014)

Research relating to the integration of pharmacists in general practice in Australia has been ongoing in Australia since 2010. This research has included several qualitative studies investigating the views of stakeholder in relation to the intervention and several small intervention studies. (Tan 2012; Tan 2014a; Freeman 2012; Freeman 2013)

Tan *et al* conducted a prospective, before-after intervention study investigating the impact of a general practice pharmacist at two GP clinics in Melbourne, Australia, between

December 2011 and January 2013. (Tan 2014c) Eighty-two patients were recruited and 62 (75.6%) completed the study. The median number of Drug Related Problems (DRPs) per patient identified by the practice pharmacist was 2 (interquartile range [IQR] 1, 4). The proportion of patients who were adherent to their medications improved significantly over the 6 month study period. Patients were highly satisfied with the pharmacist consultations.

A qualitative study investigating views related to integrating a pharmacist in general practice was conducted in South East Queensland in 2011. The study involved 58 participants including GPs, pharmacists and consumers. The participants attended five focus groups and gave 18 semi-structured interviews. GP pharmacist roles that were supported included conducting medication reviews and prescribing. Interviewees did not support practice pharmacists diagnosing conditions or dispensing medication. A lack of funding for GP pharmacists was identified as a significant barrier to integration. The importance of ensuring practice pharmacists were adequately trained was highlighted as a facilitator to the intervention. (Freeman 2012)

A 2012 study by Freeman *et al* examining medication review reports across different settings concluded that having a GP pharmacist significantly increased the acceptance of medication review recommendations by GPs in comparison to recommendations made by an external pharmacist 71% vs 53% $p<0.0001$. (Freeman 2013) A proposed reason for this was that the GP pharmacist was able to access the complete medical record of the patient and was therefore able to provide more targeted recommendations to the GP.

In 2015, the Australian Medical Association submitted a proposal to the Commonwealth Government of Australia that suggested funding the integration of non-dispensing pharmacists into general practice with the aim of reducing hospitalisations due to medication misadventure; and reducing utilisation of medication. (Australian Medical Association 2015) This proposal highlighted the results of a Deloitte Access Economics Report which outlined that the use of non-dispensing pharmacists would result in a cost benefit ratio of 1.56, that is for every $1 invested in the program it would generate $1.56 in savings to the Australian health system.(Deloitte Access Economics 2015)

In 2016 the Royal Australian College of General Practitioners (RACGP) developed a guideline for GPs in Australia wishing to adopt a PCMH model. This guideline emphasised the

importance of patient centred, co-ordinated, comprehensive care.(Royal Australian College of General Practitioners 2016) Standard 2.5 relates to medication management and recommends GP practices can meet this standard by including a pharmacist as a member of the practice team to conduct regular medication reviews for their patients.(Royal Australian College of General Practitioners 2016)

Despite this recommendation, no national funding is currently available to support this growing area of practice. In response to this funding gap and due to the increasing focus on the incorporation of pharmacists in team based care, Primary Health Networks (PHNs) have begun funding projects integrating pharmacists in Australian general practice sites. (Benson 2018a; Benson 2018b; Benson 2018c Develin 2017; Foot 2017)

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

A research team from the Discipline of Pharmacy at the University of Technology Sydney (UTS) was engaged to evaluate the project and provide feedback to improve the implementation of the intervention.

Chapter 3

WentWest General Practice Pharmacist Project: Process Evaluation

Piloting the Integration of Non-Dispensing Pharmacists in the Australian General Practice Setting: A Process Evaluation. *International Journal of Integrated Care. 2018;18(2*).

Benson H, Sabater-Hernández D, Benrimoj SI, Williams KA.

Chapter Overview

This chapter addresses the thesis aim of evaluating the implementation of an integrated pharmacist project in the Australian setting. The evaluation of the pilot phase of the WentWest General Practice Pharmacist Project (March-June 2016) was designed to give a comprehensive understanding of the components of the integrated pharmacist intervention model, the processes and procedures conducted by the GP pharmacists and insight into important barriers and facilitators to the success of the intervention's implementation.

Background: WentWest GP Pharmacist Project Pilot

In March 2016, WentWest the Western Sydney Primary Health Network commissioned the WentWest General Practice Pharmacist Project by making funds available to the Hills, Blacktown and Mt Druitt Doctors associations to implement a twelve week pilot project integrating non-dispensing pharmacists in general practice sites.

In addition, WentWest provided funding and manpower to assist in conducting consultation, commissioning and project management. Eleven general practice sites agreed to participate. The general practice sites were located in the Western Sydney suburbs of Castle Hill, Quakers Hill, Seven Hills, Blacktown, Riverstone, Glenwood, Mt Druitt and Rooty Hill. WentWest, together with the Western Sydney divisions of General Practice recruited five pharmacists, however one left during the pilot phase of the project. Pharmacist employment hours varied from full-time (one pharmacist) to four hours per week. The pharmacist activities were determined at the practice level and activities varied between practices and patients.

The project development team at WentWest, proposed that patients with multiple conditions, those taking five or more medications, those recently discharged from hospital and any patients who had a significant change in their medication regimen should be targeted for the GP pharmacist intervention.

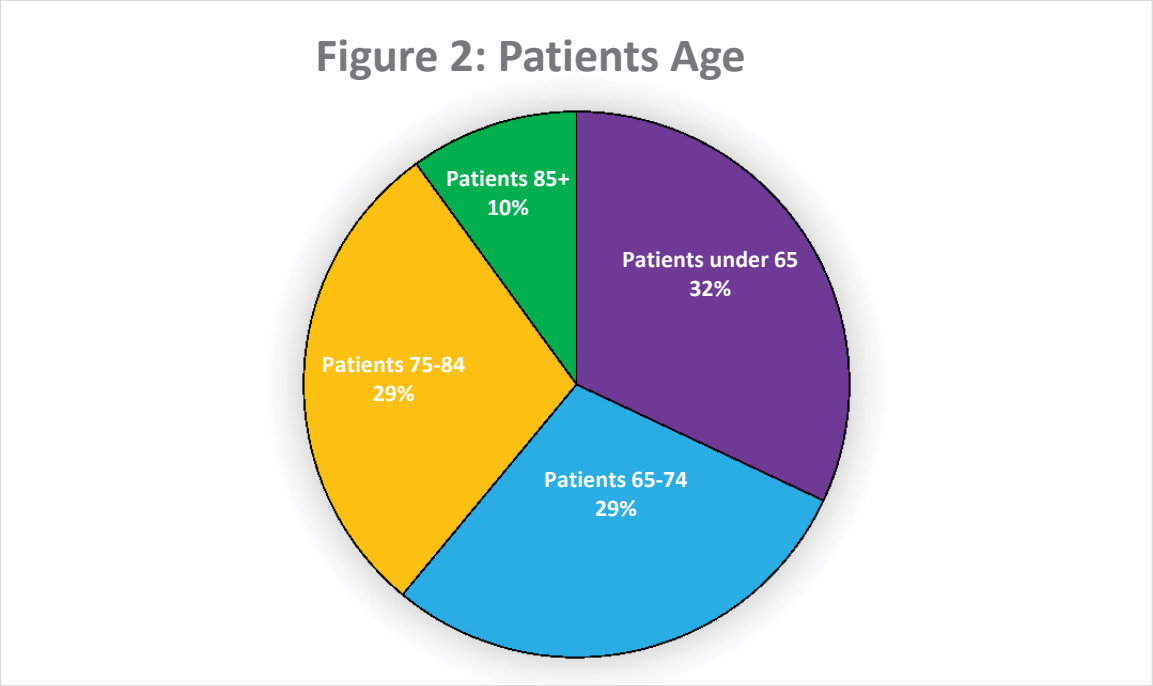
A research team from the Discipline of Pharmacy at the University of Technology Sydney, Graduate School of Health assessed the outcomes of the project pilot using both qualitative and quantitative methods. In evaluating the pilot, the initial objective was to gather relevant

data to investigate the activities of general practice pharmacists and to understand barriers and facilitators to the intervention. The evaluation included qualitative data from semi-structured interviews of pharmacists, GPs and practice staff and quantitative data collected by the project pharmacists.

Pilot Phase Results

Patient Demographic Data

299 patient consultations were conducted between March 2016 and June 2016.
The average patient age was 69.5 (± 12.1) years (Figure 2).



The average number of medications (both prescription and non-prescription) per patient was 9.6 (± 4.0).

For the 111 patients who had comorbidities recorded, the average number of patient comorbidities was 6.9 (±2.6).

Patients were selected for pharmacist consultation for a number of reasons (Table 1), with the majority being identified due to polypharmacy.

Table 1. Criteria for patient selection

Criteria	Number	%
>5 medications	171	57
Asthma/COPD management	25	8
Adherence	23	8
Diabetes management	20	7
Suspected ADR	21	7
Pain management	14	5
Inadequate response to treatment	12	4
Patient request	6	2
Recent hospital discharge	4	1
New patient to surgery	2	1
Patient education	1	0
For a diuretic action plan	1	0
Total	299	100

The pharmacists made a total of 807 recommendations [mean: 2.7 (± 1.9) per patient] of which 354 (44%) were recorded as actioned by the GP (Table 2).

One pharmacist did not consistently record the number of their recommendations accepted by the GP so this reduced the overall percentage.

In contrast, the four pharmacists who recorded the number of their recommendations accepted had an overall acceptance rate of 90%.

Table 2: Recommendations recorded by pharmacist (n=807)

Pharmacist	Hours/week	Patients	Recommendations			
			Made (n)	Average (SD)	Accepted (n)	Accepted (%)
P1	9	39	103	2.6 (2.0)	97	94
P2	34	188	415	2.2 (1.8)	Not recorded	Not recorded
P3	8	39	168	3.6 (1.4)	121	91
P4	2	12	43	4.3 (1.4)	39	72
P5*	4	21	78	3.7 (1.6)	72	92
Total	57	299	807	2.7 (1.9)	354	44

P= Pharmacist Average = Average recommendations made/patient
*P5 did not complete the full 12 week trial period

A wide variability in the number and type of dose adjustment recommendations and the number of medication discrepancies detected per patient between pharmacists was observed.

Table 3: Pharmacist interventions (n=745)

Pharmacist	Difference between number of medications on patient clinical record and number actually taken by patients	Medication Cessation Recommendation	Dose Reduction Recommendation.	Dose Increase Recommendation
P1	73	25	22	8
P2	126	80	104	55
P3	41	36	8	8
P4	86	27	8	4
P5*	20	5	5	5
Pharmacist 5 did not complete the full 12 week trial period				

The majority of pharmacist interventions related to identifying medication record discrepancies, de-prescribing, change in medication dose and the identification of potential adverse drug reactions.

Process evaluation

The research team decided to use a process evaluation to assess the project pilot phase due to the benefits of this form of analysis in gathering information on all aspects of complex interventions. (Moore 2015) Process evaluations allow information regarding how an intervention works, what is actually occurring in the processes of the intervention and the outcomes of the intervention to be evaluated.

Conducting a process evaluation in an intervention's pilot phase is particularly relevant, as this is the stage where adjustments to processes and procedures may help to avoid future intervention failure. (Craig 2008)

The integration of pharmacists in general practice is a relatively new model of care in Australia and there is little known about the activities performed by these pharmacists and the barriers they face in this collaborative form of practice.

Using a process evaluation enables the model of care to be recorded and the factors affecting the intervention implementation to be fully investigated. The multi-site, multi-practitioner project design increased the evaluation learnings by enabling insight into the situational context of the intervention to be gained. The differences between individual pharmacists, individual general practitioners and general practice sites added to the depth of information gathered and further informed the analysis.

Implications of research

By gaining insight into what general practice pharmacists were doing, and what helped to make the intervention work the process evaluation results enabled the research team to provide advice and insights to the WentWest project team. This resulted in the standardisation of the interventional model including:

- patient selection and recruitment procedures,
- activities to be conducted during the patient consultation,
- how best to communicate the recommendations from the consultation,
- data collection and recording processes, and
- additional training provision for project participants.

After the pilot- phase of the project, WentWest provided further funding to allow the project to be extended. Once the interventional model was standardised and further training was provided to GP pharmacists in relation to both the intervention procedures and data collection, the next phase of the implementation research was to conduct further quantitative analysis of GP pharmacist data from the implementation phase of the project.

International Journal of Integrated Care

Benson, H, et al. Piloting the Integration of Non-Dispensing Pharmacists in the Australian General Practice Setting: A Process Evaluation. *International Journal of Integrated Care*, 2018; 18(2): 4, 1–10. DOI: https://doi.org/10.5334/ijic.3293

INTEGRATED CARE CASE

Piloting the Integration of Non-Dispensing Pharmacists in the Australian General Practice Setting: A Process Evaluation

Helen Benson[*], Daniel Sabater-Hernández[*,†], Shalom I. Benrimoj[*] and Kylie A. Williams[*]

Introduction: This process evaluation examined the circumstances affecting implementation, intervention design and situational context of the twelve week pilot phase of a project integrating five pharmacists into twelve general practice sites in Western Sydney.

Description of Care Practice: This study used a mixed method study design using qualitative data obtained from semi-structured interviews and quantitative data collected by project pharmacists to analyse the process of the integrating pharmacists is general practice. Framework analysis of the interview transcripts was used to align the results with the key process evaluation themes of implementation, mechanism of impact and context. Preliminary quantitative data was used to provide implementation feedback and to support the qualitative findings.

Results: The interventional design included three phases, patient recruitment and selection, the pharmacist consultation and the communication and recording of recommendations. A number of barriers and facilitators affecting implementation were identified. Insight into the situational context of the intervention was gained from examining the differences between individual pharmacists and between practice sites.

Conclusion: Conducting a process evaluation in the pilot phase of an integrated care project can allow adjustments to be made to the project procedures to improve the effectiveness and reproducibility of the intervention going forward.

Keywords: process evaluation; pharmacist; integration; general practice; primary care, collaborative care

Introduction

Traditionally phamacists in Australia have practiced in the hospital or community pharmacy setting. The integration of pharmacists in general practice is an example of an inter-professional collaborative intervention that has previously been demonstrated to improve both health and economic outcomes [1, 2]. This emerging area of professional practice provides a novel opportunity for pharmacists to demonstrate their cognitive pharmacotherapy skills and utilise team-based care. The proposed role of the general practice pharmacist includes not only providing direct medication management services to patients but may also include review of general practice prescribing and disease state management [3].

Previous studies [4–6] have identified factors that can affect the implementation of inter-professional interventions involving general practice pharmacists including the importance of pharmacists being co-located with the general practice team, pharmacists demonstrating positive characteristics including adaptability and proactivity and pharmacists ensuring that they avoid negatively viewed roles such as diagnosing and dispensing.

There have been limited studies describing the components of interventions used by pharmacists integrated in general practice [7, 8]. These studies did not evaluate or compare different aspects of the intervention components and there is subsequently no established best practice model for the integration of pharmacists in general practice.

In response to this evidence, and also to a perceived need for patient centred collaborative care, a Primary Health Network (administrative health region) in Western Sydney NSW, WentWest, has commissioned a project involving the integration of five pharmacists across twelve general practice sites with the pilot phase of the project beginning in March 2016. The target population of the project was patients at risk of medication misadventure with a focus on patients with complex medication regimens and/or multiple co-morbidities.

* Graduate School of Health, University of Technology Sydney, AU

† Academic Centre in Pharmaceutical Care, University of Granada, ES

Corresponding author: Helen Benson, BPharm, PhD candidate (helen.benson@uts.edu.au)

Healthcare interventions involving inter-professional collaboration are complex interventions. This is due to the involvement of multiple professional groups, the fact that the interventions involve many interacting components and also because they pose numerous implementation challenges. A systematic review by Supper et al. [9] demonstrated that inter-professional collaborative interventions have previously been associated with improvements in patient care across multiple contexts and professions. In contrast, a further systematic review by Schepman et al. [10] examined the common characteristics and outcomes of inter-professional collaborative interventions in primary health care and found that not all interventions were associated with positive health or economic outcomes.

Traditionally the evaluation of complex interventions has relied on reviewing study outcomes. This approach may lead to overlooking important implementation elements that may have contributed to how, or why, an intervention was successful and the influence of situational context on the intervention. More recently the use of process evaluation is being increasingly recognised as a valid technique for analysing complex interventions [12, 13]. Conducting a process evaluation in an intervention's pilot phase may help to identify potential issues and allow the adjustment of the interventional design to avoid future intervention outcome failure.

According to the Medical Research Council guidance, a process evaluation combines qualitative and quantitative methods to provide valuable insights into complex interventions. This is achieved by investigating (1) the mechanisms of impact used to achieve the intervention outcomes (2) the circumstances affecting how an intervention was implemented, and (3) how the situational context of the intervention affected its implementation and potential reproducibility [11]. This analysis provides important insight on the feasibility, appropriateness and acceptability of the intervention. These insights can then be used to assist future implementation planning and to improve reliability and reproducibility of outcomes by considering situational context and its impact.

When analysing the implementation of healthcare interventions, the Tailored Implementation for Chronic Diseases (TICD) checklist provides a framework for classifying barriers and facilitators to implementation. This checklist includes seven domains of factors affecting implementation. These include guideline factors, individual health professional factors, patient factors, professional interactions, incentives and resources, capacity for organisational change and social, political and legal factors [14].

The aim of this study was to conduct a preliminary process evaluation to inform the adaptation of the integrated pharmacist intervention.

Description of care practice

Methods

A mixed methods study was conducted to evaluate the process of integrating pharmacists in the Australian general practice setting, using a combination of semi-structured interviews with pharmacists and general practitioners (i.e., qualitative data) and an *ad-hoc* dataset created for the delivery of the project (i.e., quantitative data).

Qualitative data was collected using one-on-one semi-structured interviews conducted either by telephone or face to face. All five pharmacists and a convenience sample of general practitioners selected by WentWest were approached by the WentWest head office and asked to participate in an interview with a member of the UTS research team between May and July 2016. Participants who consented to be interviewed were then contacted by the UTS researcher to arrange the interview. According to the Medical Research Council (UK) framework for conducting process evaluations [1] interview questions were designed to elicit information to:

(1) describe the interventional model used and its application in practice.
(2) inform about circumstances that may have affected the implementation of the intervention; and,
(3) understand the situational context of the practice site.

Table 1 details the interview questions and links these to the MRC (UK) themes.

As part of their usual practice, the pharmacists participating in the study collected quantitative patient data using a data collection spreadsheet (in Microsoft Excel 2010©) that was developed to support the delivery of the intervention by the WentWest project team. This data was used to provide further insight into the three aspects encompassed by a process evaluation (**Table 2**).

Research ethics approval was obtained from the Human Research Ethics Committee at the University of Technology Sydney (ETH16-0689).

Data analysis: Qualitative data was analysed using framework analysis. Data was coded according to the MRC-UK process evaluation key components of description of interventional model/mechanisms of impact, circumstances affecting implementation and situational context. This coding was reviewed by two researchers and a consensus on categorisation of the qualitative data was reached.

To describe processes relating to the interventional model the research team allocated the qualitative data to three different components reflecting the journey for patients with the integrated pharmacist service. These components allowed for modification and adjustment of data in the data analysis process. These categories were (i) patient selection and recruitment, (ii) the pharmacist consultation and (iii) communication and recording of the pharmacist recommendations.

To describe factors affecting implementation, elements that could hinder (i.e., barriers) or enable (i.e., facilitators) the implementation of the service were identified (**Table 3**). The identified elements were distributed into five relevant domains identified using the comprehensive, integrated checklist of determinants of practice (TICD) developed by Flottorp et al. [14] including:

Table 1: Semi-structured interview questions.

Questions to pharmacists (MRC-UK themes)
· Please outline the process used to identify and book patients to see the clinical pharmacist at the surgeries you service. (Description of Interventional Model)
· Does the process differ between patients or surgeries? (If so, please describe how.)
· What is the procedure you use when conducting patient consultations? (Description of Interventional Model)
· Does this procedure vary for different medical conditions or different surgeries? (If so, please describe how.) (Situational Context)
How are the results of the consultation recorded? (Description of Interventional Model)
Please outline the procedure used for communicating the results of the patient/pharmacist consultation to the general practitioner: (Description of Interventional Model)
· Does this procedure differ at different surgeries? (If so, please describe how.) (Situational Context)
What barriers have you experienced that reduced your effectiveness in integrating with the practice? (Circumstances affecting implementation) What facilitators have you observed that have assisted your integration into the practice? (Circumstances affecting implementation).
Questions to general practitioners
· What are your overall impressions of the clinical pharmacist project? (Circumstances affecting implementation, Situational context)What activities would you like the clinical pharmacists to perform during their time at the surgery? (Description of Interventional Model)
· What is the preferred method for the clinical pharmacist to communicate their recommendations to you? (Description of Interventional Model) What barriers have your observed that may reduce the effectiveness of the project? (Circumstances affecting implementation)What issues do you think may reduce the ability of the clinical pharmacist to improve patient outcomes? (Circumstances affecting implementation)What facilitators have you observed related to the project? (Circumstances affecting implementation) What can you suggest that may improve the effectiveness of the clinical pharmacist project? (Circumstances affecting implementation)

a) guideline factors (information relating to clinical practice guideline characteristics, intervention characteristics, and innovation characteristics),
b) individual health professional factors (information relating to knowledge, attributes and behavior of health practitioners),
c) patient factors (information relating to patient barriers, needs, experience, knowledge, skills, attitude and compliance),
d) professional interactions (information relating to healthcare inter-professional barriers, network communications and culture, system characteristics and environmental and social factors including social influences and context), and
e) incentives and resources (information relating to financial support, resources and incentives).

Two domains from the original checklist by Flottorp et al. [14] were excluded after data analysis due to a lack of relevant data for evaluation of the domains these were:

f) capacity for organisational change and
g) social, political and legal factors.

Finally data relating to contextual factors and processes shaping how the intervention works were allocated to situational context.

Quantitative data collected from the pharmacists was then entered into the Statistical Package for Social Sciences (SPSS) for Windows Version 24.0 (IBM, New York, USA.) for analysis of descriptive statistics [15]. Means and standard deviations were calculated to summarise quantitative variables where relevant.

Results

Qualititative data was collected from four pharmacists as one pharmacist had left the project.

Five of twenty participating general practitioners agreed to be interviewed. These general practitioners came from four separate practice sites.

(1) Adaptation of interventional model by project practices.

Figure 1 depicts a summary of findings relating to the interventional model design adapted by each practice and includes three components:

i) Patient Selection and recruitment.
Patients were targeted for recruitment if they were taking more than five medications, were suspected of having an adverse reaction or medication adherence issues or required chronic disease management.

Both pharmacists (n = 3) and general practitioners (n = 2) mentioned that the recruitment process worked best when the patients were identified by and booked in by the pharmacist. The reasons for this included that the pharmacist was motivated to recruit patients in contrast with other practice staff who saw this task as burdensome, that the pharmacist was most able to clearly articulate their role and identify potential benefits of the service for the patient and

Table 2: Quantitative data fields used to inform the process evaluation.

Variable*	Process Evaluation Theme(s)	Description
Number of current medicines (prescription and non- prescription)	Interventional Model	These variables were used to provide information on patient demographics to allow evaluation of the selection and recruitment process and to establish if the recruited patients reflected the project target population.
Number of current comorbidities	Interventional Model	
Age	Interventional Model	
Number of medication cessation recommendations	Interventional Model	These variables informed the researchers of the activities conducted during the patient consultation and provided insight into the impact of the intervention.
Number of addition of new medication recommendations	Interventional Model	
Number of recommendations for dose reduction	Interventional Model	
Number of suspected ADR identified	Interventional Model	
Number of suspected drug interactions detected	Interventional Model	
Number of recommendations for dose increase	Interventional Model	
Number of recommendations actioned by GP	Circumstances affecting implementation Situational Context	This variable provided insight into the effectiveness of the intervention and the level of collaboration between different practitioners. It was also used to demonstrate the differences in acceptance of the intervention at different sites to inform the situational context.
Number of recommendations by pharmacist	Circumstances affecting implementation Situational Context	This variable provided information on the ability of the pharmacist to implement the intervention. Differences in this variable were used to demonstrate the differences between pharmacist practitioners in conducting the intervention.
Practice ID	Situational Context	This variable allowed the researchers to consider the data from different practice sites to inform the situational context.
Pharmacist ID	Situational Context	This variable allowed the researchers to identify different pharmacist practitioners to inform the situational context.

* This table describes selected variables that were used to inform the process evaluation and is not a comprehensive list of the variables collected.

Table 3: Consultation data March–June 2016 (n = 299 consultations).

Demographics	Average patient age (years)	69.5 ±12.1
	Average number of patient co-morbidities	7.1 ± 2.4
	Average number of medications per patient (prescription and non-prescription)	9.6 ± 4.0
Pharmacist recommendations	Total number	807
	Number recorded as accepted	329*
	Medication dose reduction	147
	Medication Cessation	173
	Medication dose increase	47
	New medication added	85
	Suspected adverse drug reaction	85
	Potential drug interaction	78
	Other recommendations	192
Other actions	Detection and resolution of discrepancies in patient record	349

* Pharmacist 2 did not record the number of recommendations accepted.

that the pharmacist was easily able to identify patients who would most benefit from the service.

ii) Pharmacist consultation.
A total of 12 actions were undertaken as part of the patient consultation (**Figure 1**). All pharmacists performed medication review, medication reconciliation and a review of relevant lab results. Three of the four pharmacists conducted general practitioner education, chronic disease management, clinical assessment and organised follow up. Only one of the four pharmacists conducted group education, support groups and participated in patient telephone consultations.

This data provided evidence for the role of the pharmacist in conducting medication reconciliation and review and the identification of medication related problems as part of the patient consultation process.

iii) Communication and recording of recommendations.

All pharmacists had access to patient records and were able to document their recommendations in the patient record. Qualitative data collected in response to interview questions relating to communication of recommendations indicated that all pharmacists and general practitioners agreed that having a face to face interview was best. Ideally this would be a three way interview with the patient, pharmacist and general practitioner to agree on an action plan relating to the pharmacist's recommendations. This was not always the practice implemented due to a lack of general practitioner availability.

Quantitative data from project pharmacists indicated that the process of recording consultation data was not consistent between pharmacists. Considerable variation in recording processes existed, for example, three of the

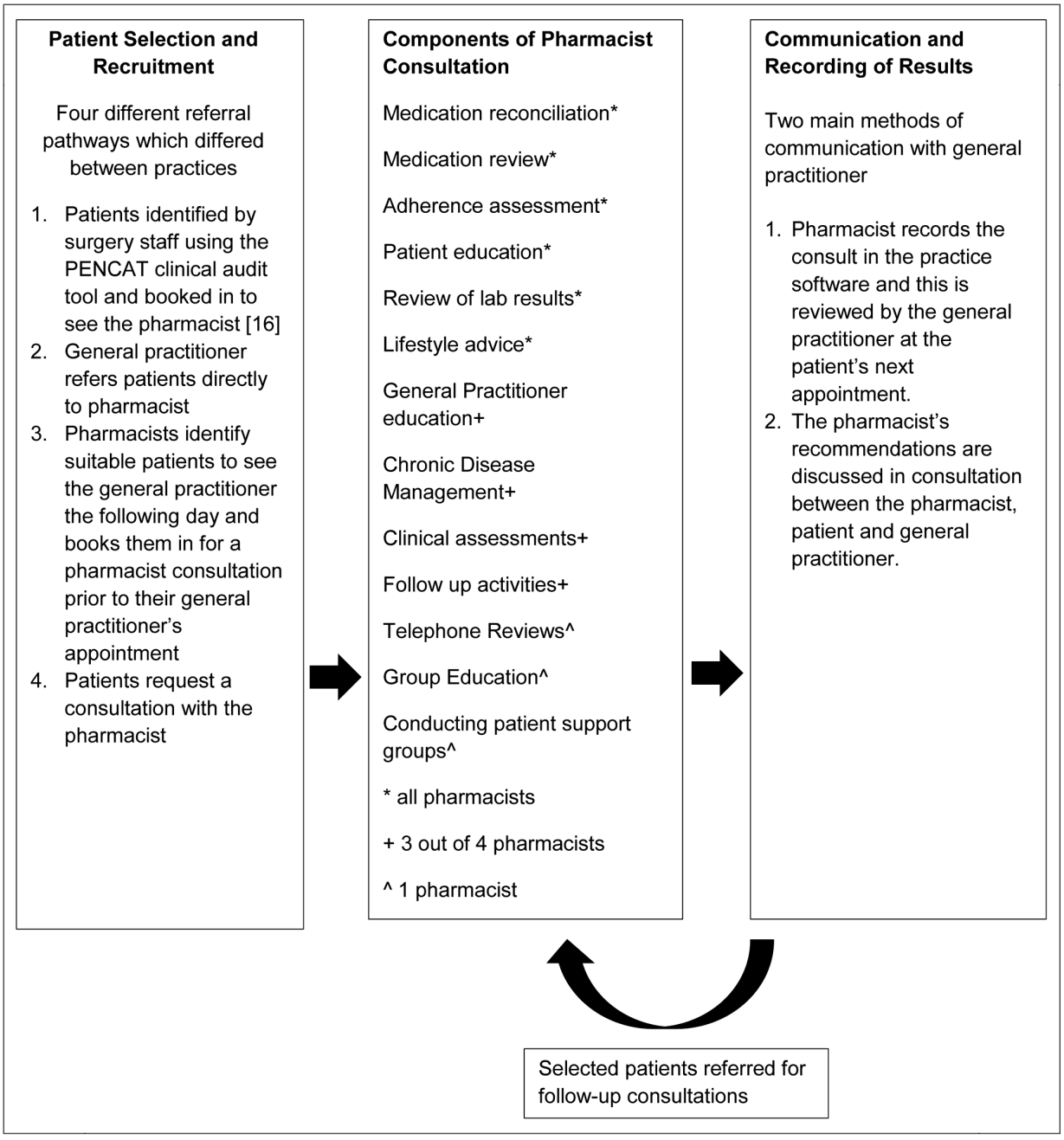


Figure 1: Intervention Model Design/Mechanisms of Impact.

five pharmacists included detailed descriptions of the recommendations made to general practitioners but two only recorded the number of recommendations made in each category without recording detail on agents involved.

Factors affecting implementation of the general practitioner-pharmacist intervention are outlined in **Table 4**.

Implementation Factors

(a) Guideline factors

The data collection sheet designed by the project team was not comprehensive. For example, the data collection sheet did not include a field for the date of the consultation, the site of the consultation (relevant when they were visiting multiple sites) or the patient's general practitioner. An additional limitation to the data collection method was that when a patient was seen more than once the data from all visits was recorded in the same line of the spreadsheet so it was not possible to determine which recommendations corresponded to which visit.

(b) Individual health professional factors

Both pharmacists and general practitioners stated that the intervention works best when general practitioners are enthusiastic and willing to collaborate. General practitioners who actively recommended the pharmacist to the patient were seen as facilitators by several pharmacists and general practitioners. Several general practitioners mentioned that they thought the pharmacist should be both clinically competent and pro-active, and effective communication skills were identified as a facilitator.

At some sites despite participating in the project a lack of general practitioner co-operation from individual practitioners was seen as a barrier.

In addition uncertainty from practice staff, general practitioners and patients regarding the role of the pharmacist was felt to reduce the effectiveness of the intervention.

One general practitioner felt that they viewed the practice pharmacist as a threat to the general practitioner's professional territory and was worried about the pharmacist's activities eroding their role. GP1 "I think GPs assume that this is the start of a slippery slope where pharmacists will try to expand their role and encroach on the GPs territory."

(c) Patient Factors

The majority of pharmacists and one general practitioner stated that they had observed patient resistance to the service and that this was suggested to be a barrier to both recruitment of patients and the effectiveness of the intervention. In addition two pharmacists stated that they had difficulty recruiting patients to the service. Two general

Table 4: TICD implementation factors.

TICD Domain	Barrier	Facilitator
Guideline factors	Lack of guidelines, training and resources. Uncertain project timelines. Data collection spreadsheet design.	
Individual health professional factors	Individual general practitioners resistant to service. Individual pharmacist characteristics- lack of confidence and/or competence. Pharmacist perceived as a threat to the general practitioner's professional territory.	General practitioners willing to collaborate. Positive professional relationship between pharmacist and general practitioner. Warm handover. Pharmacist proactive and clinically competent. Good communication between pharmacist and general practitioner.
Patient Factors	Patient resistance to service.	Improvement in patient outcomes due to ongoing follow up and review. Improved communication due to real time synchronous discussion. Doctor recommendation and introduction of the pharmacist reduced patient resistance
Professional Interactions	Lack of an established relationship between pharmacist and general practitioner and/or practice staff. Lack of general practitioner co-operation. Uncertainty regarding the role of the practice pharmacist. Resistance from community pharmacy. Pharmacist unable to establish rapport with other team members.	Team support.
Incentives and resources	Costs relating to the intervention. Lack of pharmacist remuneration and government funding for the service. Limited availability of the clinical pharmacist.	Allocation of sufficient funding. Increased pharmacist contact hours.

practitioners stated that ongoing contact with a pharmacist overcomes patient resistance to the service and improves outcomes. GP4 "Patients respond well to the accredited pharmacists manner."

(d) Professional Interactions

In the semi-structured interviews the lack of an established relationship between the individual pharmacist, general practitioner and the practice staff was raised as an initial barrier by all pharmacists and general practitioners. For example, Pharmacist 3 stated "I had no previous relationship with either of the GP's and it took several weeks of consultations to establish my credibility."

Several of the general practitioners communicated that they thought that their local community pharmacies would find the presence of the practice pharmacist threatening and were concerned about the impact of the intervention on their existing collaborative relationships with community pharmacy.

Both general practitioners and pharmacists indicated that support from the other members of the practice team improved the success of the intervention.

(e) Incentives and resources

Costs relating to the intervention included the cost of the consultation room, software login and surgery utilities. One pharmacist mentioned that they had been employed for several weeks without receiving payment and that without reliable wages they were unlikely to continue working for the project.GP5 "The lack of grant money and ability to pay the pharmacist's ongoing salary is a barrier to the service."

The clinical pharmacists were often only present at practice sites for between four and eight hours per week. This limited availability was raised as a barrier to effective implementation of the service as the limited contact hours was seen to reduce the practice pharmacists' potential impact. One pharmacist and two general practitioners mentioned that increasing the pharmacist contact hours increases collaboration and the effectiveness of the intervention.

Situational context

There was no agreed protocol for the intervention across the project. As a result the method of patient selection and recruitment, the activities conducted by each practitioner and the way the results of the consultation were recorded and communicated varied between both practitioners and practice sites. One example is that four different methods were used for the selection and recruitment of patients.

The level of support for pharmacists provided by practices varied between sites. This included aspects of physical design (lack of a room, nameplate), the provision of support from other practice staff and provision of access to information and systems. This is illustrated in the case of practice software access where most sites provided the pharmacist with an individual login for practice software but at one site one pharmacist relied on the reception staff to log them into the practice software.

Data collection procedures varied between pharmacists and not all pharmacists accurately recorded all data fields. For example, one pharmacist did not complete the co-morbidity field, or the percentage of recommendations accepted. In addition not all pharmacists recorded detail about the recommendations made as a result of the consultation which reduced the information provided for analysis regarding the activities performed.

Table 5 outlines quantitative information differences in different practice sites and between different pharmacist practitioners, highlighting the variability in both the average number of recommendations made by different pharmacist practitioners and the differences in the percentage of recommendations accepted by general practitioners at various sites. The percentage of pharmacist recommendations accepted varied between practices as demonstrated by pharmacist four who had a 75% acceptance rate at one surgery and a 67% acceptance rate at the second surgery.

Discussion

This study provides key information about how a newly implemented integrated healthcare intervention works in a real-world setting. By examining the mechanisms used to achieve the intervention outcomes, the circumstances affecting how the intervention was implemented, and how the situational context of the intervention affected its implementation, insights were gained to enable suggestions for improvement in processes for the project going forward. The lack of a standardised intervention procedure allowed comparison of the different approaches used between both pharmacists and different practice sites and this in turn increased the potential learnings available from the process evaluation.

Table 5: Quantitative data informing the Situational context.

Pharmacist	Number of recommendations made per patient consultation (mean ± *standard deviation*)	Recommendations accepted by general practitioner n (%)
1	2.6 ± *2.0*	97 (94)
2	2.2 ± *1.8*	Not evaluable*
3	3.6 ± *1.4*	39 (91)
4	4.3 ± *1.4*	121 (72)
5	3.7 ± *1.6*	72 (92)

* Pharmacist 2 did not consistently record the number of recommendations accepted by the GP.

In a systematic review of inter-professional collaborative interventions Supper et al. [9] found that a flexible model of care that was adapted for the setting and stakeholders received greater support from the team. The model of collaborative care used in the WentWest project appeared to support this premise as, although there were some common activities at each site, many of the processes and procedures conducted by the pharmacists varied depending on the requirements of each practice and the health care professionals and patients involved.

The professional relationship between the GP, health professional and practice staff are identified as a key implementation consideration in previous studies [4–6] and this was supported by our study. Establishing the professional credibility of the health professional (in this case the pharmacist) and clearly describing their role to all collaborators may help to proactively assist the development of a collaborative professional relationship. Funding and system level support is essential in allowing not only successful initial implementation of an intervention but also for the longer term exploration and maintenance stages. Supper et al. [9] identified the lack of remuneration, long-term funding and physical space as a significant barrier for pharmacists. These findings are supported by the results of this evaluation in which several participants identified both the lack of government funding and the difficulty of allocating consultation space for the pharmacists as significant barriers to the provision of the integrated pharmacist service. Long term sustainability of the intervention relies on sufficient ongoing funding and any implementation plan should include a comprehensive funding model.

Previous studies examining roles and guidelines for pharmacists integrated in primary care teams have identified the importance of establishing the role of the pharmacist in accordance with the needs and priorities of the general practice team and patients. In addition, the importance of ensuring that pharmacists are clinically competent, highly visible and proactive was identified as requirement for successful integration [16, 17]. These findings were supported by the process evaluation results where project pharmacists found patient recruitment and communication of recommendations to general practitioners worked best where the pharmacist role and professional competencies were clearly understood.

Differences in situational context including individual practitioner pharmacist characteristics and differences in setting were both found to be important in predicting the success of a pharmacist's integration and effectiveness by Jorgensen et al. [6] who examined the differences in the success of inter-professional collaboration between 24 pharmacists integrated into primary care teams in Canada. In the WentWest project several differences were identified in both the qualitative and quantitative data between individual practitioner pharmacists and between different practice sites. Sometimes these differences were due to different procedures adopted by different practitioners illustrated by the differences in data recording procedures and in other instances the cause of the variation was more difficult to detect. Ensuring that pharmacists receive training in essential project procedures such as data collection and recording prior to the commencement of the project should increase the level of consistency of results between practitioners. Other contextual differences such as the ability of a pharmacist to proactively communicate and overcome barriers to collaboration are perhaps more difficult to address but should still be taken into account when planning an intervention.

This study highlights the importance of clearly defining and communicating an intervention's components to all collaborators. In addition, ensuring that all staff are trained and provided with sufficient guidelines, resources and system level support will improve the consistency and reproducibility of an intervention's delivery. Establishing health practitioner competency and credibility and clearly defining individual practitioner roles will assist with improving the effectiveness of a collaborative intervention. In addition, effective inter-professional communication between all collaborators will improve the success of complex interventions involving multiple health practitioners.

This study was limited by the time and resources available to the research team. As a result the sample size of general practitioners interviewed was limited to five out of a potential 20 general practitioners and this may have meant that data saturation was not reached and there are further potential learnings that have not been presented in the data. However, the information gathered from the interviews was sufficient to allow for the identification of the main themes. It recommended that further process evaluation is conducted at later stages of the project to ensure that the learnings from the study are comprehensive and allow for further adjustment of the model and implementation plan where required.

This process evaluation has provided insight into the potential impact of pharmacists in general practice. Additional research is required, and currently underway examining the economic, humanistic and clinical outcomes resulting from the integration of general practice pharmacists.

Conclusion

Conducting a process evaluation in the pilot phase of a complex intervention is particularly relevant as it enables the intervention model to be adapted to reduce the chance of future intervention failure. Addressing relevant implementation barriers and facilitators, evaluating intervention model design and considering situational context can aid the development of a robust, reproducible intervention that is potentially less likely to fail in the exploration and sustainability phase. The analysis of both qualitative and quantitative data collected in the first twelve weeks of the WentWest non-dispensing pharmacist project by the UTS research team has allowed the authors to provide advice and insight to the project team and has resulted in the standardisation of the interventional model.

The results from this process evaluation were communicated to WentWest via an internal report and the UTS team

assisted in implementing the report recommendations by liaising with the WentWest project team and by conducting a training day for all participating project pharmacists. As a result of this study adjustments have been made to the ongoing project including changes to patient selection and recruitment procedures, Activities conducted during the patient consultation and communication and recording of pharmacist recommendations.

Reviewers

Jennifer D. Lake, PharmD, PhD(c), Lecturer and PhD candidate, Health Services Research, Institute for Health Policy Management & Evaluation (IHPME) University of Toronto, Ontario, Canada.

Thomas R.J. McFarlane, BScPhm PharmD RPh, Clinical Lecturer, Faculty of Science, School of Pharmacy, University of Waterloo, Ontario, Canada.

Competing Interests

The authors have no competing interests to declare.

References

1. **Pande, S, Hiller, JE, Nkansah, N** and **Bero, L.** The effect of pharmacist-provided non-dispensing services on patient outcomes, health service utilisation and costs in low- and middle-income countries. *The Cochrane Database of Systematic Reviews*, 2013; 2. DOI: https://doi.org/10.1002/14651858.CD010398
2. **Tan, EC, Stewart, K, Elliott, RA** and **George, J.** Pharmacist services provided in general practice clinics: a systematic review and meta-analysis. *Research in Social & Administrative Pharmacy: RSAP*, 2014; 10(4): 608–22. DOI: https://doi.org/10.1016/j.sapharm.2013.08.006
3. **Ackermann, E, Douglas Williams, I** and **Freeman, C.** Pharmacists in general practice a proposed role in the multidisciplinary team. *Australian Family Physician*, 2010; 39(3): 163–4.
4. **Tan, EC, Stewart, K, Elliott, RA** and **George, J.** Stakeholder experiences with general practice pharmacist services: a qualitative study. *British Medical Journal Open,* 2013; 3(9). DOI: https://doi.org/10.1136/bmjopen-2013-003214
5. **Freeman, C, Cottrell, WN, Kyle, G, Williams, I** and **Nissen, L.** Integrating a pharmacist into the general practice environment: opinions of pharmacists, general practitioners, health care consumers, and practice managers. *British Medical Council Health Services Research,* 2012; 12: 229. DOI: https://doi.org/10.1186/1472-6963-12-229
6. **Jorgenson, D, Laubscher, T, Lyons, B** and **Palmer, R.** Integrating pharmacists into primary care teams: barriers and facilitators. *The International Journal of Pharmacy Practice*, 2014; 22(4): 292–9. DOI: https://doi.org/10.1111/ijpp.12080
7. **Brandt, MHJ, Graabek, T** and **Pottegard, A.** Description of a practice model for pharmacist medication review in a general practice setting. *Pharmacy Practice*; 2014. DOI: https://doi.org/10.4321/S1886-36552014000300005
8. **Angley, MT, Kellie, A** and **Barrow, G.** Integration of a consultant pharmacist into a general practice: development of a collaborative care model. *Journal of Pharmacy Practice and Research*, 2015; 45: 81–85. DOI: https://doi.org/10.1002/jppr.1075
9. **Supper, I, Catala, O, Lustman, M, Chemla, C, Bourgueil, Y** and **Letrilliart, L.** Interprofessional collaboration in primary health care: a review of facilitators and barriers perceived by involved actors. *Journal of Public Health*, 2015; 37(4): 716–27.
10. **Schepman, S, Hansen, J, de Putter, ID, Batenburg, RS** and **de Bakker, DH.** The common characteristics and outcomes of multidisciplinary collaboration in primary health care: a systematic literature review. *International Journal of Integrated Care* [Electronic Resource]. 2015; 15: e027. DOI: https://doi.org/10.5334/ijic.1359
11. **Moore, GF, Audrey, S, Barker, M, Bond, L, Bonell, C, Hardeman, W,** et al. Process evaluation of complex interventions: Medical Research Council Guidance. *British Medical Journal*, 2015; 350: 1258. DOI: https://doi.org/10.1136/bmj.h1258
12. **Clyne, B, Cooper, JA, Hughes, CM, Fahey, T** and **Smith, SM.** A process evaluation of a cluster randomised trial to reduce potentially inappropriate prescribing in older people in primary care (OPTI-SCRIPT study). *Trials*, 2016; 17(1): 386. DOI: https://doi.org/10.1186/s13063-016-1513-z
13. **Howard, R, Rodgers, S, Avery, AJ** and **Sheikh, A.** Description and process evaluation of pharmacists' interventions in a pharmacist-led information technology-enabled multicentre cluster randomised controlled trial for reducing medication errors in general practice (PINCER trial). *The International Journal of Pharmacy Practice*, 2014; 22(1): 59–68. DOI: https://doi.org/10.1111/ijpp.12039
14. **Flottorp, SA, Oxman, AD, Krause, J, Musila, NR, Wensing, M, Godycki-Cwirko, M,** et al. A checklist for identifying determinants of practice: A systematic review and synthesis of frameworks and taxonomies of factors that prevent or enable improvements in healthcare professional practice. *Implementation Science,* 2013; 8: 35. DOI: https://doi.org/10.1186/1748-5908-8-35
15. **IBM Corporation SPSS Statistics for Windows.** Version 24. Armonk, NY 2016.
16. **Kennie-Kaulbach, N, Farrell, B, Ward, N,** et al. Pharmacist provision of primary health care: a modified Delphi validation of pharmacists' competencies. *BMC Family Practice*, 2012; 13: 27. DOI: https://doi.org/10.1186/1471-2296-13-27
17. **Jorgenson, D, Dalton, D, Farrell, B, Tsuyuki, R** and **Dolovich, L.** Guidelines for pharmacists integrating into primary care teams. *Canadian Pharmacy Journal* (Ottawa), 2013; 146: 342–352. DOI: https://doi.org/10.1177/1715163513504528

How to cite this article: Benson, H, Sabater-Hernández, S, Benrimoj, SI and Williams, KA. Piloting the Integration of Non-Dispensing Pharmacists in the Australian General Practice Setting: A Process Evaluation. *International Journal of Integrated Care*, 2018; 18(2): 4, 1–10. DOI: https://doi.org/10.5334/ijic.3293

Submitted: 02 August 2017 **Accepted:** 28 March 2018 **Published:** 18 April 2018

]u[*International Journal of Integrated Care* is a peer-reviewed open access journal published by Ubiquity Press.

OPEN ACCESS

Chapter 4

The General Practice Pharmacists' role in identifying and resolving Drug-Related Problems

Pharmacists in General Practice: a focus on drug-related problems

International Journal of Clinical Pharmacy 2018; 40(3).

Benson H, Lucas C, Kmet W, Benrimoj C, Williams K

Chapter Description

The previous chapter described the evaluation conducted after the pilot phase of the WentWest GP Pharmacist Project. In response to this evaluation, the GP pharmacist intervention model was standardised and the GP pharmacists were provided with additional training in intervention procedures and data collection. WentWest provided additional funds to extend the project and expanded it to 15 general practice sites. The UTS research team continued to evaluate the data collected by project pharmacists.

This chapter describes a multi-centre prospective observational study conducted relating to the initial implementation phase of the WentWest General Practice Pharmacist Project (October 2016-March 2017). All 15 general practice sites from three different general practice association districts (Blacktown, Mt Druitt and the Hills District) in Western Sydney NSW were included in the study.

The thesis aim of evaluating the implementation of the GP pharmacist project is addressed in this chapter by analysing the impact of GP pharmacists on the detection and resolution of Drug-Related Problems (DRPs).

Drug Related Problems (DRPs) Background

One of the direct patient care roles that pharmacists in general practice can undertake is in the detection and resolution of Drug-Related Problems (DRPs). (Ellitt 2010)

A drug-related problem can be described as any undesirable event experienced by a patient that may actually, or potentially, impact desired patient outcomes and that are thought to involve drug therapy. (Comite de Consenso 2007)

In Europe, the Pharmaceutical Care Network Europe Foundation classification system separates the drug-related problem (or potential problem) from the causes of the problem and then suggests the appropriate intervention in response. (Pharmaceutical Care Network Europe 2017) In Sweden, the Westerlund system of classifying DRPs consists of 13 DRP categories and nine categories of interventions and is implemented across the Swedish community pharmacy network through incorporation into pharmacy dispensing systems.

(Westerlund 2006) In the USA, the Medication therapy management (MTM) model of medication review identifies eight types of DRPs. (Isetts 2008; Strand 1990)

A systematic review conducted in 2014 concluded that is a currently no established consensus on which DRP classification system to use. (Basger 2014)
In response to this review, an aggregated system for classifying causes of DRPs was developed and this system was used for the purposes of this study. (Basger 2015)
This system classed the causes of DRPs into nine categories including:
(1) drug selection,
(2) drug form,
(3) dose selection,
(4) treatment duration,
(5) drug use process,
(6) logistics,
(7) monitoring,
(8) unexpected or adverse drug reaction or no obvious cause of DRP and
(9) other: where a cause was present that could not be classified into one of the other eight categories.
These categories were then further separated into 33 sub-categories.

Examples of DRPs include adverse drug reactions (ADRs), incorrect medication dosage, medication use without indication, and patients with medical conditions that are currently untreated and require pharmacotherapy.

Resolution of DRPs is complex and requires different solutions depending on the problem detected. For example, in the case of an adverse drug reaction, the appropriate action may be to prescribe an antidote, change to an alternate medication or, to cease the medication.

Implications of Research

This study demonstrated the impact GP pharmacists can have to improve patient therapy and prevent the potential negative consequences of DRPs. The GP pharmacists were not

only able to detect adverse drug-reactions and drug interactions, they also made a contribution to improving the efficacy of therapy by addressing adherence concerns, increasing doses and suggesting alternate medications where a therapy was deemed ineffective.

Despite the exciting potential of the study findings , the lack of specific detail regarding the agents associated with each recommendation recorded by the pharmacists limited the depth of analysis able to be performed and reduced the ability of the research team to draw conclusions in regards to the potential clinical impact that the pharmacist recommendations had made.

In response to these limitations, the research team identified the need to conduct a further investigation into GP pharmacist recommendations (Chapter 5) including the agents associated with each recommendation type.

International Journal of Clinical Pharmacy (2018) 40:566–572
https://doi.org/10.1007/s11096-018-0617-9

RESEARCH ARTICLE

Pharmacists in general practice: a focus on drug-related problems

Helen Benson[1] · Cherie Lucas[1] · Walter Kmet[2] · Shalom I. Benrimoj[1] · Kylie Williams[1]

Received: 26 October 2017 / Accepted: 7 March 2018 / Published online: 14 March 2018

Abstract
Background Team based care has been used internationally to improve the delivery of best practice primary health care. The WentWest General Practice Pharmacist Project, involving the integration of pharmacists within general practice teams, was commissioned to improve medication management of general practice patients. A particular focus of the project was the performance of medication review to allow the detection and resolution of drug related problems (DRPs). *Objective* The objectives of this 6-month study (October 2016–March 2017) were to: (1) identify and classify the DRPs detected as a result of pharmacist activities within a general practice primary care setting. (2) compare the number of pharmacist recommendations and GP acceptance rates as a result of pharmacist patient consultations across multiple general practice sites. *Setting* 15 general practice primary care sites in Western Sydney NSW Australia. A multi-centre prospective observational study conducted over a 6-month period from October 2016 to March 2017. *Main outcome measure* Drug-related problems (DRPs). *Results* Six pharmacists recorded the results from 493 patient consultations. The pharmacists identified 1124 DRPs and made 984 recommendations, of which 685 (70%) were recorded as accepted by the GP. *Conclusion* Pharmacists have a valuable role to play in the detection and resolution of DRP as part of the general practice team.

Keywords Australia · Collaborative care · Drug-related problems · General practice pharmacist · Multidisciplinary care · Team based care

Impacts on practice

- One of the roles of general practice pharmacists should include identifying and resolving DRPs.
- General practice patients particularly those with multiple health conditions and/or medications are likely to benefit from a consultation with a pharmacist.

Introduction

Inter-professional collaborative care interventions are designed to improve patient care by combining the various competencies and skills of multiple healthcare professionals in an integrated cooperative way [1]. These interventions have been associated with an improvement in patient outcomes and offer an opportunity to utilise the skills of multiple healthcare professionals with team based collaboration [2].

One example of team-based primary care in Australia involves the integration of pharmacists in the general practice setting. Previous research has demonstrated that activities performed by integrated pharmacists are associated with significant improvements in patient health outcomes [3]. Despite this evidence, pharmacists are not currently routinely included as integrated general practice team members in Australia and there is no system level funding available to support this innovative practice.

Including pharmacists as part of the general practice team offers multiple advantages related to being located onsite in the general practice offices. These include improved access to comprehensive patient medical information and the ability for pharmacists to develop close collaborative relationships with prescribing General Practitioners (GPs) [4].

Pharmacists integrated in general practice teams can perform a variety of roles. These include direct patient care, population management activities and the provision

✉ Helen Benson
helen.benson@uts.edu.au

[1] University of Technology Sydney, Sydney, NSW, Australia

[2] WentWest, Western Sydney Primary Health Network, Blacktown, NSW, Australia

of expert drug information and education for other primary care team members [5]. An example of one of the direct patient care roles that integrated pharmacists can undertake is in the detection and resolution of Drug-Related Problems (DRPs) [6, 7].

WentWest, the primary health network region for Western Sydney in New South Wales, Australia, as part of it's long term work in supporting general practice and primary care providers to implement team based care, commissioned the WentWest General Practice Pharmacist Project [8]. This project involved the integration of six non-dispensing pharmacists across 15 general practice sites in Western Sydney. The pilot phase commenced in March 2016 and the implementation phase of the project is currently ongoing.

Aim of the study

The aims of this observational study was to:

1. Identify and classify the DRPs detected as a result of pharmacist-patient consultations within a general practice setting as part of the WentWest General Practice Pharmacist Project.
2. Compare the number of pharmacist recommendations and GP acceptance rates as a result of pharmacist-patient consultations across multiple general practice sites.

Ethics approval

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

Methods

WentWest general practice pharmacist project processes

Project recruitment

Six non-dispensing pharmacists were recruited for the project by WentWest project staff and associated general practice associations. Patients were selected and recruited either by the general practice staff, integrated pharmacists or general practitioners (GPs) with the assistance of a clinical audit tool [9]. In addition, some patients requested a pharmacist consultation in response to a sign advertising the pharmacist's availability posted in the general practice waiting room. The ten criteria for patient selection were defined by WentWest to capture the study target population of patients at risk of medication misadventure. These criteria were selected to target those with complex medication regimens and/or multiple co-morbidities and included: (1) polypharmacy, (2) diabetes, (3) adherence concerns, (4) asthma/COPD, (5) inadequate response to therapy, (6) suspected adverse reaction, (7) patient request, (8) pain management, (9) recent hospital discharge and (10) medication with a narrow therapeutic index.

Polypharmacy was defined by the project team as patients taking more than five medications. Adherence concerns were patients selected by GPs in response to suspected adherence issues.

Inadequate response to therapy were patients selected by the GP that were considered not to be responding as expected to seemingly appropriate therapy.

Project pharmacist training

Pharmacists participating in the project attended several meeting relating to data collection procedures and one full day training session that covered all aspects of the project intervention. (Pharmacist 5 and 6 joined the project later and only attended the full day training session.)

Project intervention: pharmacist consultation

The pharmacist intervention involved a consultation with the selected general practice patients, and may have included any of the following: (1) medication reconciliation and review; (2) adherence counselling; (3) patient education on medical conditions and medications; (4) review and ordering of laboratory tests; (5) healthy lifestyle advice including smoking cessation, diet and exercise; and (6) chronic disease management activities including advice on optimisation of therapy, disease state monitoring and the development of patient action plans where appropriate. Recommendations were then communicated to the patient's GP and focused on the detection and resolution of DRPs and requests for lab tests or monitoring where required. Where possible recommendations were communicated face to face with a consultation between the pharmacist, GP and the patient. When the GP was unavailable to discuss the pharmacist's recommendations face to face the pharmacist's recommendations were discussed with the patient, entered in the patient record and flagged for action by the GP.

Drug-related problem study methods

Study design

A multi-centre prospective observational study was conducted over a six-month period from October 2016 to March 2017. All 15 general practice sites from three different general

practice association districts (Blacktown, Mt Druitt and the Hills District) in Western Sydney NSW were included in the study.

DRP classification

A literature review conducted in 2014 concluded that there are several internationally recognised classification systems to analyse DRP. There is however, currently no established consensus on which classification system to use [10]. In response to this review, an aggregated system for classifying causes of DRPs was developed and this system was used for the purposes of this study [11]. This system classed the causes of DRPS into nine categories including (1) drug selection, (2) drug form, (3) dose selection, (4) treatment duration, (5) drug use process, (6) logistics, (7) monitoring, (8) unexpected or adverse drug reaction or no obvious cause of DRP and (9) other: where a cause was present that could not be classified into one of the other 8 categories. These categories were then further classified into 33 sub-categories that were used in this evaluation.

Data collection and analysis

As part of their usual practice the pharmacists participating in the project collected quantitative patient data using a data collection spreadsheet (in Microsoft Excel 2010©) that was developed to support the delivery of the intervention by the WentWest project team. This data collection spreadsheet was reviewed by the research team after the pilot phase of the project in July 2016 and refined to ensure accurate and relevant data was collected. This data was then entered into the Statistical Package for Social Sciences (SPSS) for Windows Version 24.0 (IBM, New York, USA) for analysis [12]. To ensure accuracy of the data, the classification of DRP causes was verified by two researchers. The data was then analysed using standard descriptive statistics. Means are presented ± standard deviation (sd). A one way analysis of variance (ANOVA) test with post hoc Tukey HSD (honestly significant difference) was conducted to compare means between individual pharmacists and individual practice sites and the number of recommendations made by pharmacists. Chi-squared tests were performed to examine the relationship between individual pharmacists and the proportion of recommendations accepted and between the practice site and proportion of recommendations accepted.

Results

Patient demographic data

Over the 6 month period, pharmacists collected data on 493 patient consultations. The average patient age was 67.7 years (± 13.6). Patients on average had 5.5 co-morbidities (± 2.7) and took 9.2 prescription and non-prescription medications (± 4.3). Although some patients met multiple selection criteria Fig. 1 describes the primary criteria patients were selected for consultation with a pharmacist.

The majority of the study patient population (81%) was selected for intervention due to polypharmacy, diabetes management, medication adherence concerns and asthma or COPD management.

DRPs identified

The majority of patients (94%) seen by the pharmacists presented with at least one DRP, with a mean number of 2.3 DRPs per patient (± 1.3).

The causes of the DRPs detected as a result of the pharmacist consultation related to five of the nine classification system categories namely drug selection, dose selection, drug use process, monitoring and unexpected or adverse drug reaction, and nine sub-categories as detailed in Fig. 2.

Pharmacists made a total of 984 recommendations in relation to the 1140 DRPs identified, of which 685 (70%) were recorded as actioned by the GP (Table 1).

The number of recommendations was lower than the number of DRPs detected as not all DRPs required action by the doctor. This was the case with patient education on inhaler technique or, where the pharmacist addressed adherence concerns. In addition, sometimes multiple DRPs were resolved with one recommendation, for example, ceasing a medication may have resolved both a 'dose too high' and a 'no indication for drug' problem.

Of the DRPs described in Fig. 2, 50% of the causes related to medication use without indication (340) and over dosage (220).

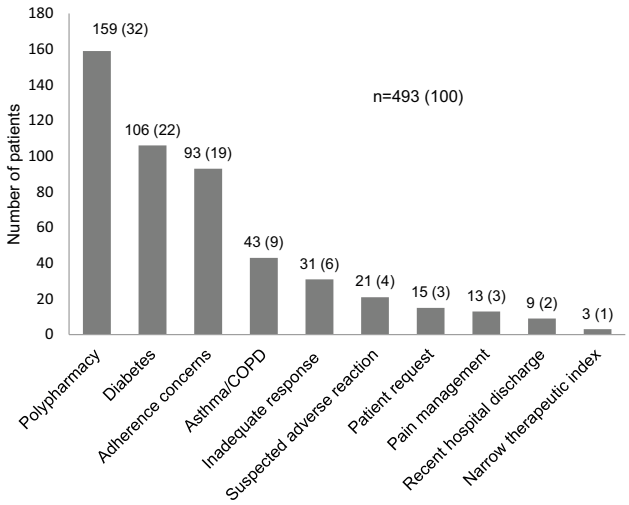


Fig. 1 Patient selection criteria n = number of patients (%)

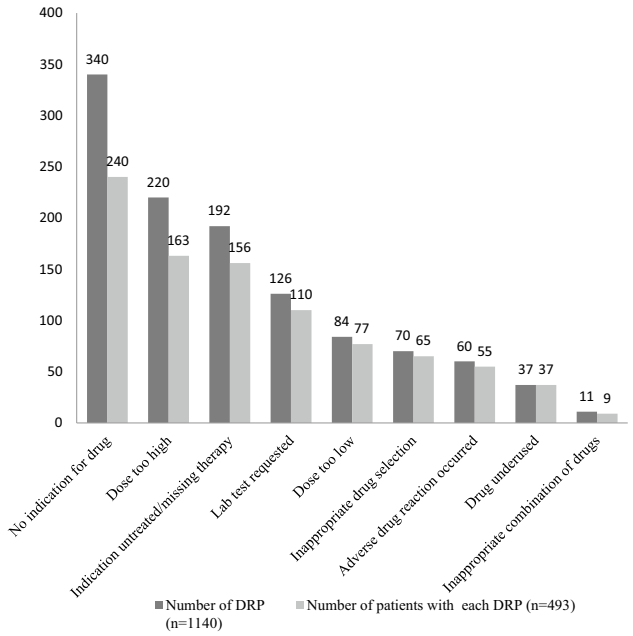


Fig. 2 Categorisation of causes of DRPs

Table 1 outlines the contributions of the individual pharmacists and demonstrates the variability between both individual pharmacist recommendations per consultation and the percentage of recommendations accepted by the GP.

The average consultation length (Table 1) for individual pharmacists varied from between 25 to 48 min. It is interesting to note that an increased length of consultation did not correlate with increased number of recommendations or an increase in the recommendation acceptance rate. In fact, Pharmacist 5 and 6 who had the longest average consult lengths at 44 and 48 min respectively, did not have the highest number of recommendations per consult.

One pharmacist was employed full time on the project and conducted 60% of the patient consultations (296 of 493). The remaining pharmacists worked a maximum of 1 day per week with most pharmacists doing a regular 4 h shift on a designated day at each practice, thus limiting their contribution to the data set. Several pharmacists had taken leave over January 2017 that also reduced their contribution to the data. Two pharmacists (Pharmacist 5 and 6) commenced patient consultations in January 2017, limiting both their training in project procedures and contribution to the dataset. One consequence of this, was that both Pharmacist 5 and 6 failed to record the number of their recommendations that were accepted by the GPs.

There was a statistically significant difference in the mean number of recommendations made by individual pharmacists ($F(15,436) = 2.6$, $p < 0.001$). Post hoc analysis (Tukey HSD) showed that Pharmacist 2 had a significantly greater mean number of recommendations per patient consultation than Pharmacist 1 ($p < 0.001$) however, there was no statistically significant difference in means between the remaining pharmacists. This difference could be due to a number of reasons. The fact that Pharmacist 1 number worked full time in the project and visited a large number of sites in comparison with Pharmacist 2 who worked 1 day per week in two practices may have contributed. A significant difference was found between four pharmacists and the proportion of recommendations accepted ($x^2 = 272.1$, $p < 0.001$), two pharmacists (Pharmacists 5 and 6) were excluded from the analysis as they did not record the number of their recommendations accepted.

Table 2 shows detail on the activities of the pharmacists at the 15 general practice sites. Of particular interest is the difference in the percentage of recommendations accepted for the same pharmacist across different sites, clearly illustrated by Pharmacist 1 who had differing rates of acceptance across eleven practice sites. In addition, the difference between pharmacists at the same practice site is illustrated with Practice 12 where Pharmacist 2 recorded 2.5 recommendations per consult and Pharmacist 4 recorded 2.3 recommendations per consult.

There was a statistically significant difference in the mean number of recommendations made per patient consultation by pharmacists at individual practice sites (F

Table 1 Pharmacist consultations and acceptance rates

Pharmacist	Number of patient consultations	Average consultation length (min ± SD)	Number of recommendations	Recommendations/consultation (mean)	Recommendations accepted by GP n (%)
Pharmacist 1	296	45 ± 7.0	501	1.7	256 (51%)
Pharmacist 2	159	23 ± 10.6	408	2.6	398 (98%)
Pharmacist 3	11	32 ± 7.1	20	1.8	20 (100%)
Pharmacist 4	6	25 ± 10.6	14	2.3	11 (79%)
Pharmacist 5	14	48 ± 12.4	26	1.9	Not recorded
Pharmacist 6	7	44 ± 3.8	14	2.0	Not recorded
Total	493	34 (± 12.7)	984	2.0	685 (70%)

Table 2 Pharmacist consultations, recommendations and GP acceptances by practice

Pharmacist ID	Practice ID	No. of patient consultations	No. of recommendations	Recommendations/consultation	Recommendations accepted by GP n (%)
1	Practice 1	17	29	1.7	17 (59%)
1	Practice 2	7	19	2.7	6 (32%)
1	Practice 3	20	44	2.2	28 (64%)
1	Practice 4	54	80	1.5	39 (49%)
1	Practice 5	41	65	1.6	29 (45%)
1	Practice 6	19	30	1.6	9 (30%)
1	Practice 7	24	34	1.4	16 (47%)
1	Practice 8	3	8	2.7	8 (100%)
1	Practice 9	90	158	1.8	77 (49%)
1	Practice 10	2	1	0.5	1 (100%)
1	Practice 11	19	34	1.8	26 (76%)
2	Practice 12	90	227	2.5	219 (96%)
2	Practice 13	84	214	2.5	208 (97%)
3	Practice 14	11	20	1.8	20 (100%)
4	Practice 12	6	14	2.3	11 (79%)
5	Practice 4	9	19	2.1	Not recorded
5	Practice 15	5	7	1.4	Not recorded
6	Practice 5	4	4	1.0	Not recorded
6	Practice 7	3	10	3.3	Not recorded
Totals		493	984	2.0	685 (70%)

(15,436) = 2.558, $p < 0.001$). This is consistent across all pharmacists who visited multiple sites. Post Hoc analysis (Tukey HSD) showed that Practice 2 had a statistically significant difference in the mean number of recommendations per patient consultation made in comparison with Practice 12 ($p < 0.027$) however, there was no statistically significant difference in means between the remaining practices. There was a significant difference between practice sites and the number of recommendations accepted ($x^2 = 231.6$ $p < 0.001$).

Discussion

Pharmacists integrated in general practice were effective in identifying the causes of patient DRPs and making recommendations for their resolution. GPs were willing to collaborate with pharmacists demonstrated by the high acceptance (70%) of pharmacist recommendations to resolve DRPs.

An advantage of this study included the implementation of the intervention across multiple sites in differing socioeconomic areas with multiple participating pharmacists. This multiple site, multiple practitioner design demonstrates that this type of intervention is potentially reproducible and feasible for more widespread implementation.

A similar study involving a pharmacist integrated in family practice by Vande Griend et al. [13] identified that in addition to patients with diabetes and COPD, patients with cardiovascular disease (especially those with heart failure and/or hypertension), depression and kidney impairment were most likely to benefit from medication review by an integrated pharmacist. Adjustment of patient selection and recruitment methods used by pharmacists and GPs to take into account these additional patient groups, may increase the potential impact of the intervention.

The fact that a majority (90%) of the patient population had at least one DRP, indicated that an appropriate target population had been selected for the intervention and is consistent with the results from previous studies [14, 15].

A large proportion (50%) of the causes of DRPs described in Fig. 2 related to medication use without indication (340) and over dosage (220).This highlights the potential opportunities for integrated pharmacists to recommend de-prescribing in appropriate cases. Reducing the number and dosage of medications a patient is taking is likely to reduce medication costs, reduce DRPs and increase the ability of patients to adhere to their medication due to reduction in medication regimen complexity [16].

In contrast to Pharmacist 1–4 who joined the project in the trial phase in March 2016 and who attended multiple meeting regarding data collection for the project, Pharmacists 5 and 6 joined the project in January 2017 and received only 1 day of training in project procedures. This may explain why both Pharmacist 5 and 6 failed to record the number of their recommendations accepted as they may have

been still adjusting to project procedures, including data collection. This theory is supported by a study by Jorgensen et al. [17], examining barriers and facilitators to integrating pharmacists in primary care teams, which found that when there was no pre-existing professional relationship between the pharmacist and other members of the team, there was a delay in the development of a collaborative role until these relationships were established and other teams members learned to trust and value the pharmacist.

The integrated pharmacists made recommendations for DRP resolution and these recommendations were accepted by GPs in 70% of cases. This acceptance rate supports the findings of previous research, which found that integrated pharmacists had a 71% acceptance of recommendations made to GPs [18].

We noted there was a statistically significant variability in the number of recommendations made, and the proportion of recommendations accepted by both individual pharmacists (51–100%). When we analysed the data by practice site, recommendation acceptance rates varied between 30 and 100%. As highlighted by Jorgensen et al. [17] this variability may have been due to a number of factors including the practice infrastructure, the pharmacist's professional relationship with the collaborating GPs and the willingness of the participating practitioners to collaborate.

These variabilities between pharmacists and practice sites have highlighted the potential benefit of conducting further research investigating how and why the differences between sites and pharmacists occurred. Qualitative data could be collected relating to barriers and facilitators for acceptance of pharmacist recommendations from participating pharmacists, GPs and patients to allow further insights to be gained.

Limitations of this study included that the data collected about recommendations made by pharmacists lacked specific detail on the agent associated with each recommendation. This limited the depth of analysis able to be performed and the ability of the research team to assess the potential clinical significance of the pharmacist recommendations.

In addition, the variability in pharmacist hours, length of time in the project and number of sites visited limited the ability of the research team to compare the results of individual pharmacists and may have reduced the significance of the statistical analysis. Additional research is required, and currently underway, to examine the impact of integrated pharmacists on long-term patient and health system outcomes.

Conclusion

This study supports the premise that pharmacists integrated in the general practice will be effective in identification of DRPs. GPs are willing to accept pharmacist recommendations and collaborate with pharmacists as part of the general practice team.

Acknowledgements The authors acknowledge the contribution made by the participating pharmacists and the WentWest project team in collating and distributing the data used for the study.

Funding Helen Benson is supported by an Australian Government Research Training Program Scholarship. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest All authors declare that they have no personal or financial conflicts to report.

References

1. Körner M, Bütof S, Müller C, Zimmermann L, Becker S, Bengel J. Interprofessional teamwork and team interventions in chronic care: a systematic review. J Interprof Care. 2016;30:15–28.
2. Reiss-Brennan B, Brunisholz KD, Dredge C, Briot P, Grazier K, Wilcox A, et al. Association of integrated team-based care with health care quality, utilization, and cost. JAMA. 2016;316:826–34.
3. Tan EC, Stewart K, Elliott RA, George J. Pharmacist services provided in general practice clinics: a systematic review and meta-analysis. Res Social Adm Pharm. 2014;10:608–22.
4. Freeman C, Cottrell WN, Kyle G, Williams I, Nissen L. Integrating a pharmacist into the general practice environment: opinions of pharmacist's, general practitioner's, health care consumer's, and practice manager's. BMC Health Serv Res. 2002;12:229.
5. Weber ZA, Skelley J, Sachdev G, Kliethermes A, Haydon-Greatting A, Patel A, et al. Integration of pharmacists into team-based ambulatory care practice models. Am J Health Syst Pharm. 2015;72:745–51.
6. Ellitt GR, Engblom E, Aslani P, Westerlund T, Chen TF. Drug related problems after discharge from an Australian teaching hospital. Pharm World Sci. 2010;32:622–30.
7. de Consenso Comite. Third consensus of Grenada on drug related problems (DRP) and negative outcomes associated with medicines. Ars Pharm. 2007;48:5–17.
8. Patient Centred Primary Care Collaborative Robert Graham Centre. The impact of primary care practice transformation on cost, quality, and utilization a systematic review of research published in 2016. https://www.pcpcc.org/sites/default/files/resources/pcmh_evidence_es_071417%20FINAL.pdf. Accessed 19 Oct 2017.
9. Pen CS PEN Clinical Audit Tool. http://www.pencs.com.au/. Accessed 19 Oct 2017.
10. Basger BJ, Moles RJ, Chen TF. Application of drug-related problem (DRP) classification systems: a review of the literature. Eur J Clin Pharm. 2014;70:799–815.
11. Basger BJ, Moles RJ, Chen TF. Development of an aggregated system for classifying causes of drug-related problems. Ann Pharmacother. 2015;49:405–18.
12. IBM Corporation SPSS Statistics for Windows, Version 24. Armonk, NY2016.
13. Vande Griend JP, Saseen JJ, Bislip D, Emsermann C, Conry C, Pace WD. Prioritization of patients for comprehensive medication review by a clinical pharmacist in family medicine. J Am Board Fam Med. 2015;28:418–24.
14. Tan EC, Stewart K, Elliott RA, George J. Pharmacist consultations in general practice clinics: the Pharmacists in Practice Study (PIPS). Res Social Adm Pharm. 2014;10:623–32.

15. Chan DC, Chen JH, Kuo HK, We C-J, Lu I-S, Chiu L-S, et al. Drug-related problems (DRPs) identified from geriatric medication safety review clinics. Arch Gerontol Geriatr. 2012;54:168–74.
16. Reeve E, Thompson W, Farrell B. Deprescribing: a narrative review of the evidence and practical recommendations for recognizing opportunities and taking action. Eur J Intern Med. 2017;38:3–11.
17. Jorgenson D, Laubscher T, Lyons B, Palmer R. Integrating pharmacists into primary care teams: barriers and facilitators. Int J Pharm Pract. 2014;22:292–9.
18. 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.

Chapter 5

Analysis of General Practice Pharmacist Recommendations

Pharmacists in general practice: recommendations resulting from team-based collaborative care. *Australian Journal of Primary Health 2018;* Vol.24 (6), p.448-454

Benson H, Lucas C, Kmet W, Benrimoj S I, Williams K A.

Chapter Overview

The previous chapter described how general practice pharmacists can contribute to patient care by detecting and resolving drug-related problems. A limitation of the study data was that the exact agent associated with each pharmacist recommendation was not recorded.

In response, a detailed analysis of GP pharmacist recommendations was conducted and is described in this chapter. The recommendation analysis was a multi-centre prospective observational study, relating to the implementation phase of the WentWest General Practice Pharmacist Project (April 2017-September 2017).

This chapter adds to the body of evidence gathered in the previous two investigations addressing the thesis aim in relation to the evaluation of an integrated pharmacist intervention in Australia.

Pharmacist Recommendations Background

There is no universally recognised classification system for pharmaceutical care recommendations by pharmacists. Multiple classifications systems have been documented in the literature but these have usually been used for single studies and/or do not comprehensively evaluate pharmacist interventions. (Krska 2002; Hoth 2007; Vo 2016)

A systematic review assessing tools for measuring the potential significance of pharmacist interventions conducted in 2016 found 82 distinct tools were available. Of these tools, the authors recommended that investigators should choose a tool that had been validated and evaluated for pharmacist interventions from a multi-impact perspective (clinical, humanistic, economic) rather than choosing a tool limited to focusing on clinical impact alone. (Vo 2016)

The guidelines for pharmacists conducting medication management reviews in Australia refer to the DOCUMENT recommendation classification system.(Pharmaceutical Society of Australia 2011; Williams 2012)

This classification system was chosen by the research team as it was designed for the Australian context and it not only classifies identified DRPs it also allows for classification of the recommendations made by the pharmacist in order to resolve the DRPs identified, the outcomes of the actions undertaken to resolve the DRP and the perceived clinical significance of the DRP.

The system consisted of eight categories (types) of DRP, with each category encompassing between one and five subcategories to further classify the DRP.

1. Drug selection—DRPs related to the choice of drug prescribed or taken (such as drug duplication, drug interaction, wrong drug and no apparent indication).

2. Over or underdose prescribed—DRPs related to the prescribed dose or schedule of the drug (such as dose too high, dose too low and incorrect schedule).

3. Adherence—DRPs related to the patient's medication-related behaviour (such as taking too little, taking too much, intentional drug misuse and difficulty using a dosage form).

4. Untreated indications—DRPs related to actual or potential conditions that require management (such as a diagnosed condition not adequately treated or preventative therapy required).

5. Monitoring—DRPs related to inadequate monitoring of the efficacy or adverse effects of a drug (including laboratory and non-laboratory monitoring).

6. Education or information—DRPs related to knowledge of the disease or its management (such as requests for drug information, confusion about therapy or disease states and demonstration of dose administration devices).

7. Non-clinical—DRPs related to administrative aspects of the prescription.

8. Toxicity or adverse reaction—DRPs related to the presence of signs or symptoms which are suspected to be related to an adverse effect of the drug (such as toxicity caused by dose, drug interaction or unknown causes).

Study Objectives

The objectives of this study were to describe, classify and analyse recommendations made by pharmacists to general practitioners (GPs), resulting from patient consultations between pharmacists and patients in a general practice setting.

Implications of Research

The 88% acceptance rate for GP pharmacist recommendations resulting from this study showed a significant increase from the previous two studies, perhaps highlighting the development of trust and improvement of collaboration over the 18 month period that the project had been ongoing at the time of this evaluation.

Despite this improvement in overall acceptance of pharmacists' recommendations, there was still significant variability between the acceptance rates by individual pharmacists. This variability could be related to a large number of factors including the individual pharmacist's skills, knowledge and level of professional competence and confidence in making and communicating recommendations.

The pharmacists involved in the WentWest project were given no training before commencing their roles in March 2016. The UTS research team conducted one two day training session in July 2016 and two half day training sessions (In Sept 2016 and March 2018) to support the pharmacists working within the project. The need for further specialised training designed to equip GP pharmacists for this challenging role was raised by the pharmacists participating in the project during the training session evaluation feedback.

In order to investigate the training needs of GP pharmacists, seven pharmacists currently participating or who had previously participated in the WentWest GP Pharmacist project were surveyed in March 2018. Five of the seven pharmacists surveyed were female (71%). The pharmacists were all experienced practitioners and had been registered to practice for either 5-10 years (43%) or more than ten years (57%) respectively.

All seven pharmacists worked in additional practice areas to the GP environment and these included community pharmacy (14%), hospital pharmacy (43%) and academia (14%). Six of the seven pharmacists (86%) also practiced as independent consultant pharmacists performing government funded medication review services. At the time of the survey one pharmacist had left the project and one had been recruited and was yet to commence work

as a GP pharmacist. The remaining five pharmacists worked an average of 15 hours (± 9 hours) in general practice per week and had an average of 18 months (±12) experience as GP pharmacists.

All seven pharmacists (100%) indicated that they would like further training in how to conduct practice support activities such as prescribing audits, drug-use evaluations, assisting the general practice with accreditation requirements and conducting in-practice research projects.

Five of the seven pharmacists (71%) identified that they would like additional training in providing education to professional colleagues and the provision of smoking cessation and lifestyle advice.

In addition, four pharmacists (57%) indicated they would benefit from training in conducting chronic disease management clinics, medication review and medication information provision. The majority of pharmacists (57%) felt that they did not require additional training in conducting adherence assessments and counselling. An additional area of training need raised by one of the survey participants was in conducting spirometry.

This survey prompted the research team to identify the need to focus further research on the educational needs of GP pharmacists to enable the development of an evidence-based education program tailored to the needs of these pharmacists.

CSIRO PUBLISHING
Australian Journal of Primary Health
https://doi.org/10.1071/PY18022

Research

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

Helen Benson[A,C], *Cherie Lucas*[A], *Shalom I. Benrimoj*[A], *Walter Kmet*[B] *and Kylie A. Williams*[A]

[A]Graduate School of Health, University of Technology Sydney, Building 7, 67 Thomas Street, Ultimo, NSW 2007, Australia.
[B]WentWest, Western Sydney Primary Health Network, Level 1, 85 Flushcombe Road, Blacktown, NSW 2148, Australia.
[C]Corresponding author. Email: helen.benson@uts.edu.au

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.

Received 30 January 2018, accepted 19 July 2018, published online 2 November 2018

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*. 2014*b*). 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, 2014*a*; 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)

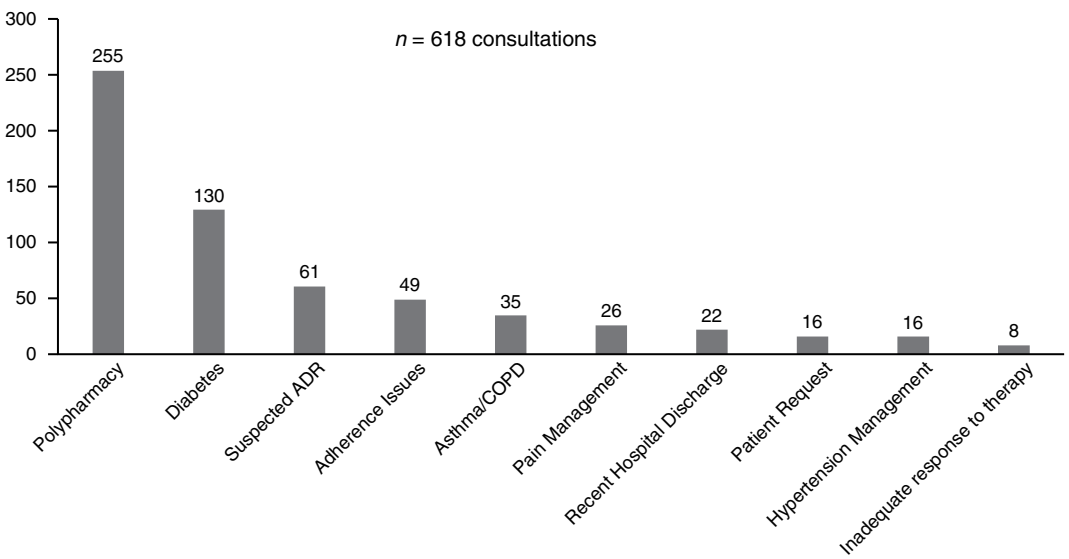


Fig. 1. Reason for patient selection into the project by a pharmacist or referral to a pharmacist by GP.

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 ($x^2 = 105.3$, $P < 0.05$). There was also a significant difference between Pharmacist 2 and Pharmacist 3 ($x^2 = 32.4$ $P < 0.05$) and Pharmacist 2 and Pharmacist 4 ($x^2 = 30.0$ $P < 0.05$). There was not a statistically significant difference in acceptance rate between Pharmacist 3 and Pharmacist 4 ($x^2 = 0.1$ $P = 0.71$).

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,

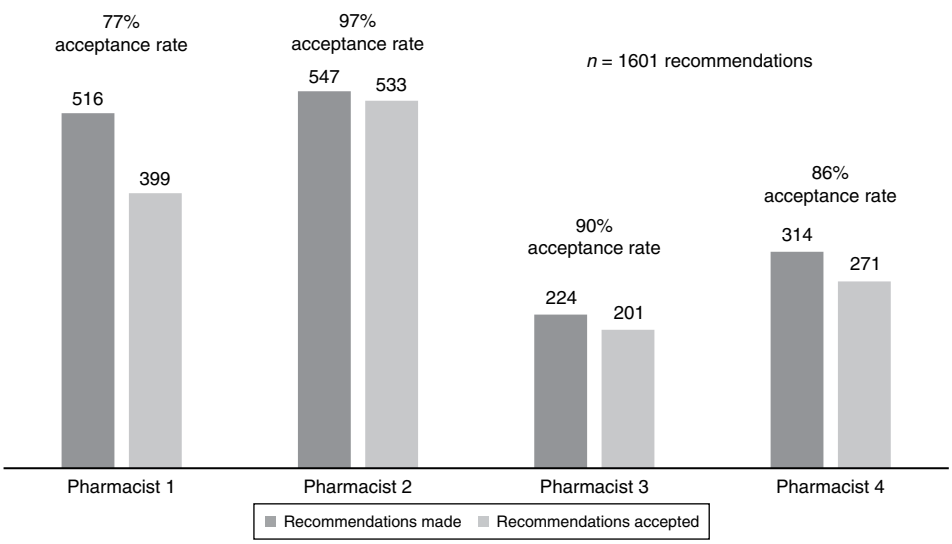


Fig. 2. Number of pharmacist recommendations and GP acceptance rate.

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	*n*	% accepted	Subcategory	Definition	*n*	% accepted
Change in therapy	1169	84	Dose increase	Pharmacist recommends the daily dose of medication is increased. e.g. *Increase gliclazide dose.* (Pharmacist 1)	174	89
			Dose decrease	Pharmacist recommends the daily dose of medication is decreased. e.g. *Decrease omeprazole dose.* (Pharmacist 2)	259	82
			Drug change	Pharmacist recommends a change in current medications such as initiating or ceasing a medication. e.g. *Cease analgesics*, *oxycodone/naloxone and paracetamol.* (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. *Change regular metformin to metformin extended release.* (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. *Change moclobemide dosage time to morning, to aid compliance.* (Pharmacist 2)	12	91
Referral required	36	97	Refer for medication review	Pharmacist recommends patient has a home medicines review (HMR). e.g. *Refer for HMR.* (Pharmacist 3)	1	100
			Other referral required	Pharmacist refers patient to another health professional such as a dentist, podiatrist, specialist physician, etc. e.g. *GP agreed to refer patient to a neurologist.* (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. *Patient education to increase adherence.* (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. *Commence dose administration aid*, *GP agreed.* (Pharmacist 2)	15	93
Monitoring	190	97	Monitoring laboratory	Pharmacist suggests that prescriber undertakes some laboratory monitoring. e.g. *Review ferritin level.* (Pharmacist 4)	138	97
			Monitoring non-laboratory	Pharmacist suggests that prescriber undertakes non-laboratory monitoring. e.g. *Conduct spirometry.* (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. *Reduce omeprazole to when required use.* (Pharmacist 4)	70	74
	Blood glucose-lowering agents excluding insulin e.g. *Reduce sitagliptin dose*, *reduced renal function.* (Pharmacist 1)	21	86
	Drugs for obstructive airways disease e.g. *Decrease inhaled corticosteroid dose.* (Pharmacist 1)	20	75
	Lipid modifying agents e.g. *Decrease fenofibrate dose.* (Pharmacist 1)	15	80
Dose increase ($n = 174$)	Blood glucose-lowering medications excluding insulin e.g. *Increase gliclazide dose.* (Pharmacist 2)	22	77
	Drugs for obstructive airways disease e.g. *Increase inhaled corticosteroid/long acting β agonist dose.* (Pharmacist 2)	22	91
	Other analgesics and anti-pyretics e.g. *Increase paracetamol to maximum daily dose.* (Pharmacist 3)	24	92
	Blood glucose-lowering medications - insulin. e.g. *Increase insulin dose.* (Pharmacist 3)	20	100
Drug change Medication cessation ($n = 405$)	Blood glucose-lowering medications excluding insulin e.g. *Cease sulfonylurea.* (Pharmacist 1)	39	56
	Anti-thrombotic agents e.g. *Cease aspirin* (*patient taking apixaban*). (Pharmacist 2)	25	72
	Supplements e.g. *Cease glucosamine as it is ineffective for patients.* (Pharmacist 4)	25	96
	Lipid modifying agents e.g. *Cease pravastatin.* (Pharmacist 3)	19	53
Drug change Initiation of new therapy ($n = 303$)	Blood glucose-lowering agents excluding insulin e.g. *Add metformin.* (Pharmacist 1)	48	92
	Lipid modifying agents e.g. *Add statin to improve lipid control.* (Pharmacist 2)	33	72
	Psycho-analeptics e.g. *Add SSRI* (e.g. *sertraline*). (Pharmacist 3)	23	96
	Angiotensin-converting enzyme (ACE) inhibitors plain. e.g. *Add ACEI inhibitor* (e.g. *enalapril*). (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.

Acknowledgements

The authors acknowledge the contribution made by the participating pharmacists and the WentWest project team in collating and distributing the data used for the study. H. Benson is supported by an Australian Government Research Training Program Scholarship. This research did not receive any specific grants from funding agencies in the public, commercial, or not-for-profit sectors.

References

Australian Government Treasury (2010) Intergenerational Report 2010. Australia to 2050: Future Challenges. (Australian Government Treasury: Canberra, ACT, Australia) Available at: https://treasury.gov.au/publication/2015-intergenerational-report/ [Verified 24 October 2017]

Benson H, Sabater-Hernández D, Benrimoj SI, Williams KA (2018) Piloting the integration of non-dispensing pharmacists in the Australian general practice setting: a process evaluation. *International Journal of Integrated Care* **18**, 4. doi:10.5334/ijic.3293

Berdine HJ, Skomo ML (2012) Development and integration of pharmacist clinical services into the patient-centered medical home. *Journal of the American Pharmacists Association: JAPhA.* **52**, 661–667. doi:10.1331/JAPhA.2012.10206

Britt HC, Miller G, Knox S (2008) Prevalence and patterns of multimorbidity in Australia. *The Medical Journal of Australia* **189**, 72–77.

Caughey GE, Kalisch Ellett LM, Goldstein S, Roughead EE (2015) Suboptimal medication-related quality of care preceding hospitalisation of older patients. *The Medical Journal of Australia* **203**, 220–227. doi:10.5694/mja14.01479

Farrell B, Pottie K, Haydt S, Kennie N, Sellors C, Dolovich L (2008) Integrating into family practice: the experiences of pharmacists in Ontario, Canada. *International Journal of Pharmacy Practice* **16**, 309–315. doi:10.1211/ijpp.16.5.0006

Freeman C, Cottrell WN, Kyle G, Williams I, Nissen L (2012) Integrating a pharmacist into the general practice environment: opinions of pharmacist's, general practitioner's, health care consumer's, and practice manager's. *BMC Health Services Research* **12**, 229. doi:10.1186/1472-6963-12-229

Freeman CR, Cottrell WN, Kyle G, Williams ID, Nissen L (2013) An evaluation of medication review reports across different settings. *International Journal of Clinical Pharmacy* **35**, 5–13. doi:10.1007/s11096-012-9701-8

Geurts MM, Talsma J, Brouwers JR, de Gier JJ (2012) 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* **74**, 16–33. doi:10.1111/j.1365-2125.2012.04178.x

Gheewala PA, Peterson GM, Curtain CM, Nishtala PS, Hannan PJ, Castelino RL (2014) Impact of the pharmacist medication review services on drug-related problems and potentially inappropriate prescribing of renally cleared medications in residents of aged care facilities. *Drugs & Aging* **31**, 825–835. doi:10.1007/s40266-014-0208-y

Gnjidic D, Hilmer SN, Blyth FM, Naganathan V, Waite L, Seibel MJ, McLachlan AJ, Cumming RG, Handelsman DJ, Le Couteur DG (2012) Polypharmacy cutoff and outcomes: five or more medicines were used to identify community-dwelling older men at risk of different adverse outcomes. *Journal of Clinical Epidemiology* **65**, 989–995. doi:10.1016/j.jclinepi.2012.02.018

Howard R, Rodgers S, Avery AJ, Sheikh A (2014) Description and process evaluation of pharmacists' interventions in a pharmacist-led information technology-enabled multicentre cluster randomised controlled trial

for reducing medication errors in general practice (PINCER trial). *International Journal of Pharmacy Practice* **22**, 59–68. doi:10.1111/ijpp.12039

Jorgenson D, Laubscher T, Lyons B, Palmer R (2014) Integrating pharmacists into primary care teams: barriers and facilitators. *International Journal of Pharmacy Practice* **22**, 292–299. doi:10.1111/ijpp.12080

Kwint HFA, Gussekloo J, Bouvy M (2011) Effects of medication review on drug-related problems in patients using automated drug-dispensing systems. A pragmatic randomized controlled study. *Drugs & Aging* **28**, 305–314. doi:10.2165/11586850-000000000-00000

Lenander C, Elfsson B, Danielsson B, Midlöv P, Hasselström J (2014) Effects of a pharmacist-led structured medication review in primary care on drug-related problems and hospital admission rates: a randomized controlled trial. *Scandinavian Journal of Primary Health Care* **32**, 180–186. doi:10.3109/02813432.2014.972062

NHS England (2016) General Practice Forward View. (NHS England: England, UK) Available at: https://www.england.nhs.uk/wp-content/uploads/2016/04/gpfv.pdf [Verified 18 April 2018]

Roughead EE, Semple SJ, Rosenfeld E (2016) The extent of medication errors and adverse drug reactions throughout the patient journey in acute care in Australia. *International Journal of Evidence-Based Healthcare* **14**, 113–122. doi:10.1097/XEB.0000000000000075

Tan ECK, Stewart K, Elliott RA, George J (2013) Stakeholder experiences with general practice pharmacist services: a qualitative study. *BMJ Open* **3**, e003214. doi:10.1136/bmjopen-2013-003214

Tan ECK, Stewart K, Elliott RA, George J (2014*a*) Pharmacist consultations in general practice clinics: the Pharmacists in Practice Study (PIPS). *Research in Social & Administrative Pharmacy* **10**, 623–632. doi:10.1016/j.sapharm.2013.08.005

Tan ECK, Stewart K, Elliott RA, George J (2014*b*) Pharmacist services provided in general practice clinics: a systematic review and meta-analysis. *Research in Social & Administrative Pharmacy* **10**, 608–622. doi:10.1016/j.sapharm.2013.08.006

Williams M, Peterson GM, Tenni PC, Bindoff IK, Stafford AC (2012) DOCUMENT: a system for classifying drug-related problems in community pharmacy. *International Journal of Clinical Pharmacy* **34**, 43–52. doi:10.1007/s11096-011-9583-1

World Health Organization Collaborating Centre for Drug Statistics Methodology (2017) ATC/DDD Index 2017. (World Health Organization: Oslo, Norway) Available at: https://www.whocc.no/atc_ddd_index/2017 [Verified 5 October 2017]

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)	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			

Chapter 6

Establishing GP Pharmacist Scope of Practice: Literature Review

The development of a role description and competency map for pharmacists in an interprofessional care setting.

International Journal of Clinical Pharmacy 2019; Volume 41, Issue 2, pp 391–407

Benson H, Lucas C, Benrimoj S I, Williams K A

Chapter Overview

The three previous thesis chapters evaluating the WentWest GP Pharmacist Project identified the need to define the GP pharmacist scope of practice and the need for an evidence-based education program to enable pharmacists to develop the skills and knowledge required to perform the GP pharmacist role. The lack of such a program was identified as a significant barrier to the intervention.

To address this barrier, the research team identified a need to investigate the roles performed by GP pharmacists, define the competencies required to perform those roles and establish the educational needs of pharmacists who have obtained initial general registration and are wishing to perform the GP pharmacist role.

This chapter addresses the thesis objectives relating to the identification of the activities performed by GP pharmacists. Two internationally recognised competency frameworks (The FIP Global Competency Framework and the 2016 National Competency Framework Standards for Pharmacists in Australia) were utilised to map the various GP pharmacists' activities. (Federation International Pharmaceutical 2012; Pharmaceutical Society of Australia 2016b) Two important tasks when designing a competency-based education program are defining the scope of practice for the role and linking that scope of practice to required competencies. (Gruppen 2016)

Competency-based educational design models are widely used in health professional education development. (Gruppen 2016) The aim of competency-based education is to focus on equipping a practitioner with the skills and knowledge to perform a particular role. This contrasts with a more traditional curriculum design that focuses on the delivery of specified educational objectives. (Gruppen 2016; Koster 2017).

A comprehensive review of the international literature relating to GP pharmacist interventions was conducted and is included in this chapter. This review describes the range of roles performed by general practice pharmacists (scope of practice) and maps them to associated global pharmacist competencies.

The competency framework chosen to map the GP pharmacist role in the literature review was the FIP global competency framework. (Federation International Pharmaceutique 2012) This framework was developed to comprehensively map pharmacists' competencies and is aligned with other internationally established competency frameworks. (Stupans 2016) The FIP framework separates competencies into four domains: (1) pharmaceutical public health, (2) pharmaceutical care, (3) organisation and management and (4) professional/personal competencies.

Previously the Pharmaceutical Society of Australia (PSA) has published a sample scope of practice for GP pharmacists in Australia. (Pharmaceutical Society of Australia 2016a) but it was not known if this scope practice was comprehensive and included all potential GP pharmacist roles. In response in addition to the manuscript submitted and under review for publication, a further competency mapping exercise was conducted to enable mapping of GP pharmacist activities to the National Competency Framework for Pharmacists in Australia (NCSFPA) and for this to be compared to the PSA sample scope of practice this is included at the end of Chapter 6. (Pharmaceutical Society of Australia 2016b)

The NCSFPA incorporates both the standards intended for pharmacists seeking initial general registration in Australia, and those practicing at an advanced level. This framework is divided into five domains including: (1) Professionalism and ethics, (2) Communication and collaboration, (3) Medicines management and patient care, (4) Leadership and management and (5) Education and research.

Implications of Research

The comprehensive role description developed from the literature review enabled the GP Pharmacist scope of practice to be defined. The competency mapping activity allowed the identification of required GP Pharmacist competencies. When mapping competencies it is important to acknowledge that there is a vast difference between the level of skill and knowledge required to perform each competency at a base or minimum level to that which is required for advanced practice.

At initial general registration, pharmacists have clinical skills and knowledge to enable them to perform their professional role. The difference between the level of skill and knowledge

at initial registration and the level of skill and knowledge required to perform the GP pharmacist role is the educational need that the training program must address.

The next step required for the development of an evidence-based education program was to use the GP pharmacist scope of practice and competency map to inform the development of potential GP pharmacist educational needs (Chapter 7).

International Journal of Clinical Pharmacy (2019) 41:391–407
https://doi.org/10.1007/s11096-019-00808-4

REVIEW ARTICLE

The development of a role description and competency map for pharmacists in an interprofessional care setting

Helen Benson[1] · Cherie Lucas[1] · Shalom I. Benrimoj[2] · Kylie A. Williams[1]

Received: 3 November 2018 / Accepted: 1 March 2019 / Published online: 16 March 2019

Abstract

Background Pharmacists are increasingly being included as members of general practice primary care teams. To date, there have been few published studies describing the competencies of general practice (GP) pharmacists and establishing their subsequent educational needs. *Aim of the review* The aim of this literature review is to establish the activities of pharmacists in general practice to inform the development of a comprehensive role description and competency map. *Method* A systematic literature search of EMBASE, MEDLINE, international pharmaceutical abstracts and the Cochrane database of systematic reviews was conducted from the start of the databases to August 2018. The search focused on studies investigating the roles performed by GP pharmacists. Full text peer-reviewed English language articles were included. A qualitative content analysis of included studies was performed. Two researchers reviewed studies to identify pharmacist roles. Subcategories of roles were then agreed by the research team and used to present the data. GP pharmacist's activities were mapped by two researchers to associated competencies. Any discrepancies between role descriptions and competency maps were resolved in consultation with a third member of the research team. *Results* The search conducted resulted in 5370 potential articles. Two hundred and twenty-seven full text articles were selected for review resulting in 34 articles that were included for analysis. Seven GP pharmacist role sub-categories and 48 GP pharmacist individual roles were identified. The seven GP pharmacist role sub-categories included medication management, patient examination and screening, chronic disease management, drug information and education, collaboration and liaison, audit and quality assurance and research. All FIP competency domains were included in the GP pharmacist competency map. Competencies related to compounding, dispensing and packaging of medications were not found relevant to the GP Pharmacist role. No roles were mapped to competencies relating to reimbursement for medicines, procurement, or medication production. All areas of professional and personal competence were relevant to the GP pharmacist role. *Conclusion* A comprehensive role description and competency map for GP pharmacists is described and may be used to inform future research into the education of GP pharmacists.

Keywords Australia · Collaborative care · General practice pharmacist · Integrated care · Interprofessional care · Non-dispensing pharmacist

Impacts on practice

- The comprehensive role description developed from literature review enables the GP Pharmacist scope of practice to be defined.
- A role description and competency map for general practice pharmacists facilitates the utilisation of the defined scope of practice and required competencies to be incorporated by those developing GP pharmacist interventions and designing training for GP pharmacists.

✉ Helen Benson
helen.benson@uts.edu.au

[1] Graduate School of Health, University of Technology Sydney, Level 4, Building 7, 67 Thomas St, Ultimo, P.O. Box 123, Sydney, NSW 2007, Australia

[2] Sydney Pharmacy School, The University of Sydney Australia, Pharmacy and Bank Building (A15), Science Road, Sydney, NSW 2006, Australia

Introduction

Previous systematic reviews on the integration of non-dispensing pharmacists in the primary care or general practice setting have highlighted their impact in chronic disease management and patient-centred care [1, 2]. General practice (GP) pharmacists are required to perform a wide range of professional activities and may require training to gain the competencies required to perform these roles [3, 4].

The implementation of competency-based education has been proposed as an evidence-based means for preparing healthcare professionals for the requirements of their roles [5–8]. Designing a competency based curriculum requires several steps including identifying the required competencies and professional requirements for the proposed role and then defining the required learning outcomes associated with the identified competencies [6–9].

Professional bodies such as the royal pharmaceutical society (RPS) and the Pharmaceutical Society of Australia (PSA) have developed role descriptions and competency maps for GP pharmacists however these documents were prepared for specific national contexts and there is no clear link to the evidence used to develop them [10, 11].

To date, only one published study was identified in the literature exploring the competencies required by GP pharmacists. This study was limited to the Canadian context and as a result may not be generalizable to all international settings [12, 13]. Other studies that have examined pharmacist competencies were not specific to the GP pharmacist role [14].

This narrative review aims to analyse the growing international evidence relating to GP pharmacists in order to develop a comprehensive description of roles and required competencies for pharmacists working with general practice teams.

Pharmacy practice educators will then be able to determine a list of educational needs and associated learning objectives to inform educational design and to ensure future practitioners are qualified to perform these roles.

Aim of the review

The aim of this literature review was to establish the activities of pharmacists in general practice to inform the development of a comprehensive role description and competency map.

Methods

Research design

This review follows the principles of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [15]. Methodological strategies for the review were discussed prior to each step of the process with all members of the research team and unclear issues were resolved together in consensus.

Literature search strategy

A systematic literature search of EMBASE, MEDLINE, International Pharmaceutical Abstracts (IPA) and the Cochrane Database of Systematic Reviews was conducted from the start of the databases to August 2018. The search was focused on studies investigating the roles performed by GP pharmacists. Full text peer-reviewed English language articles that involved qualitative, quantitative and mixed methods studies with any outcomes reported were included. Searches were conducted using Boolean logic, with Medical Subject Headings (MeSH) and terms. The search terms used were:

> pharmaceutical care OR pharmacy OR pharmacist AND general practice OR general practitioners OR general practitioner OR primary health care OR community health cent* OR health center OR family physicians OR (general adj2 practic*) OR (family adj2 practi*) OR (primary adj2 care) OR (family adj2 physician) OR clinic AND role OR professional competence OR clinical competence OR competence OR curriculum OR competency OR education.

Inclusion and exclusion criteria

GP pharmacists were defined as non-dispensing pharmacists operating in a general practice or medical centre setting [16]. Studies were excluded if they related to hospital, aged care or community pharmacy interventions, those not exclusively relating to pharmacists, those across multiple clinical settings. In addition, conference abstracts with no links to full text articles were excluded.

Screening of publications

In total 5370 articles were found in the databases used. Articles were compiled and duplicates were excluded. A

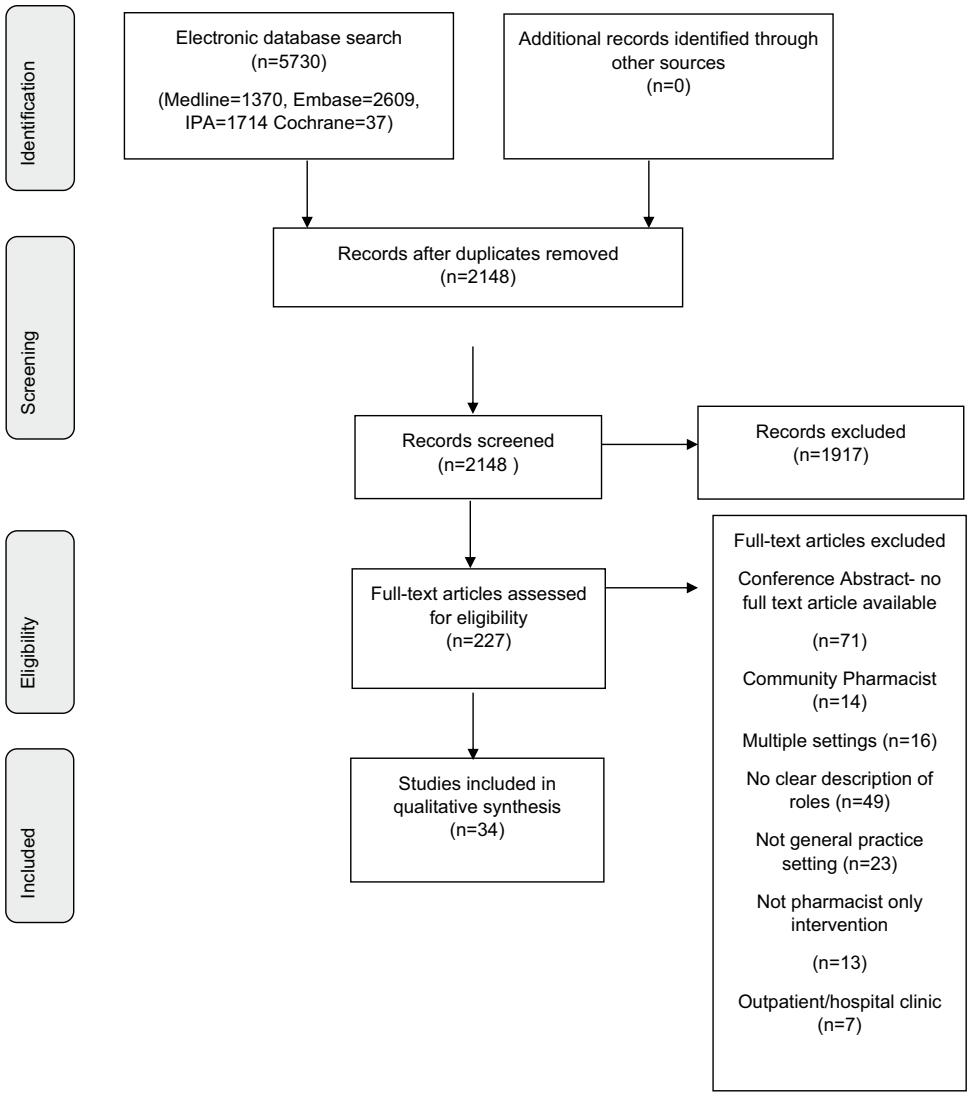


Fig. 1 Screening and selection of studies

PRISMA flow diagram representing the screening and selection of studies is shown in Fig. 1.

Titles and abstracts were screened against the inclusion criteria by one of the authors (HB). Any ambiguity/uncertainty about inclusion or exclusion of articles were discussed and resolved after reading the full text by three of the research team (HB, CL and KW). Full texts of the chosen articles were retrieved. The remaining 227 articles were read and assessed by two researchers (HB and CL) against the inclusion criteria.

Data analysis

A qualitative content analysis of included studies was performed. In order to gain a comprehensive role description the analysis focused on all study findings relevant to the study question, regardless of the type of study examined [16]. Two researchers (HB and NC) reviewed studies to identify pharmacist roles. The list of roles (content) was compiled and analysed by classifying activities of pharmacists into agreed discrete units of content (roles) [17]. Subcategories of roles were then agreed by the research team and used to present the data [18].

As the FIP (International Pharmaceutical Federation) global competency framework is not tailored to a specific country, but relevant across all countries, it was selected to classify the competency requirements of GP pharmacists [19]. This framework was developed to comprehensively map pharmacists' competencies and is aligned with other internationally established competency frameworks [20]. The FIP framework separates competencies into four domains: (1) pharmaceutical public health, (2) pharmaceutical care, (3) organisation and management and (4) professional/personal competencies. "Appendix" section details the complete list of FIP competencies.

Activities of GP pharmacists were mapped to corresponding FIP competencies independently by two researchers (HB and NC). Any discrepancies between role descriptions and competency maps were resolved in consultation with a third member of the research team (CL).

Results

Study characteristics

The 34 selected studies came from five countries with the majority (n = 22) from the USA [21–41], five from Australia [42–46], five from the UK [47–51], two from Canada [52, 53] and one from Brazil [54]. Articles varied from reviews of national case reports across multiple general practice locations to single site qualitative studies (Table 1).

Of the 34 articles analysed all were published between 1984 and 2018, with the majority of the articles (n = 30) being from 2010 onwards.

Roles performed by pharmacists

Figure 2 describes the seven GP pharmacist role sub-categories identified in the content analysis, which include 48 individual GP Pharmacist activities.

Competency mapping

Table 2 links the activities outlined in Fig. 2 to the number of studies describing each activity and then maps each activity to the corresponding FIP Competencies. The review of immunisations can be mapped to 1.1.1 which is to assess primary healthcare needs however, the administration of immunisations by GP pharmacists was not possible to be mapped to a FIP competency.

GP pharmacist activities required competencies from all four FIP framework domains. All competencies related to pharmaceutical public health were relevant for GP pharmacists.

In contrast, GP pharmacists are required to be competent in 17 of the 25 pharmaceutical care competencies but do not require the 8 pharmacist competencies relating to compounding, dispensing and packaging of medications.

Addressing adherence issues was the most common medication management activity with this role appearing in 21 of the 34 articles. Sixteen articles listed repeat and independent prescribing as activities performed by GP pharmacists.

In relation to organisation and management competencies, GP pharmacists do not require skills in arranging reimbursement for medicines, procurement competencies related to medication supply, or medication production competencies.

All 39 areas of professional and personal competence were found to be relevant to the GP pharmacist's role. Communication skills, continuing professional development, professional and ethical practice and self-management skills are relevant for all pharmacists. Quality assurance activities such as conducting drug use evaluations and prescribing audits are less commonly performed in community pharmacy and are particularly relevant to the GP pharmacist role.

Discussion

This narrative review is one of the first to assess the international literature to provide a comprehensive description of roles for GP pharmacists. By considering articles from multiple countries and contexts, the GP pharmacist role description is potentially generalisable for use internationally. In addition, using the FIP global competency framework to map competencies should allow individual countries to use this competency map and apply it to their local context.

Despite the fact that large numbers of pharmacists are integrated in general practice sites in the UK and Canada, the majority of included studies were derived from the USA. This may be because the focus of research in other locations has centred more towards assessing barriers and facilitators to the general practice pharmacist intervention and investigating outcomes associated with these interventions, rather than examining the roles performed by these pharmacists [55–65].

Medication management was one of the seven pharmacist role sub-categories and included the widely recognised roles of medication reconciliation and review, detection and resolution of medication related problems and addressing medication adherence barriers. These roles are within the usual scope of pharmacist practice although additional training in medication review is required for provision of these services in some countries [62].

Pharmacists are currently legally able to prescribe prescription medications in New Zealand, the UK, in certain provinces of Canada and in some states of the USA [63–65]. Studies have been conducted with pharmacist prescribers in Australia however, this role in not currently within the recognised scope of practice for Australian pharmacists [66].

Performing patient examination and screening including conducting physical examinations may require extra study and/or qualifications however, some activities such as performing blood glucose or blood pressure testing are well within the usual scope of pharmacist activities [67–69]. Recommending diagnostic tests is within the usual scope of pharmacist practice however, ordering of these tests independent from prescribers as listed in nine of the included studies may be considered outside the usual scope of pharmacist practice [70].

Table 1 Included articles

References	Country	Description
Tan et al. [42]	Australia	Multicentre prospective intervention study with a pre-post design (1 pharmacist, 2 general practice clinics)
Otaguro and Kruse [21]	USA	Prospective DRP study (2 FTE pharmacists, single site ambulatory care medical centre)
Mendonça et al. [54]	Brazil	Retrospective descriptive study (3 pharmacy students, 1 pharmacist, 3 family health unit sites)
Nigro et al. [22]	USA	Opinion paper reviewing PCMH practices and the roles performed by pharmacists within these practices (221 pharmacists, 312 PCMH sites)
Stone and Williams [47]	UK	Descriptive article describing the role of a GP pharmacist [1 pharmacist, multiple general practice sites in Tamar valley (number not specified)]
Boudreau et al. [23]	USA	Randomised trial of a clinical pharmacist consultation (1 pharmacist, single site academic general practice)
Gerber et al. [24]	USA	Randomised trial to evaluate the effectiveness of clinical pharmacists and health promoters on diabetes behaviours.(number of pharmacists not specified, single medical centre site)
Musselman et al. [25]	USA	Analysis of development and implementation of clinical pharmacist services integrated within a medical group (3 FTE pharmacists, 40 primary care and 60 specialty offices in USA)
Sisson et al. [26]	USA	Study examining contribution of an integrated pharmacist (single pharmacist, single safety-net clinic site)
Smith et al. [27]	USA	Retrospective cohort study examining the effectiveness of a care management program provided by clinical pharmacists for veterans with dyslipidaemia (1 pharmacist, 2 primary care clinics within a Veterans Affairs medical centre)
Benedict et al. [28]	USA	Retrospective cohort study examining type 2 diabetes management by clinical pharmacists (number of pharmacists not specified, large single site medical centre)
Carter et al. [29]	USA	Controlled study comparing prescribing patterns in family practice residency-training offices with clinical pharmacists (2 clinical pharmacists, 2 intervention and 2 control family practice sites)
Heilmann et al. [30]	USA	Description of activities of 37 pharmacists integrated in Kaiser Permanente of Colorado medical centres (30 FTE pharmacists, unspecified number of sites)
Barker et al. [31]	USA	Prospective cohort study conducted at one primary care practice with an integrated clinical pharmacist (1 pharmacist, single medical centre site)
Weidman-Evans et al. [32]	USA	Descriptive study examining the impact of a pharmacist run telephonic insulin titration service (4 FTE pharmacists, single academic family medicine clinic)
Kennedy et al. [33]	USA	Demonstration project to determine the impact of integrating pharmacists into primary care practices in Vermont 1 day per week (3.5 FTE pharmacists, 7 general practice sites)
Freeman et al. [43]	Australia	Qualitative study examining the views of 58 participants (8 GPs, 18 healthcare consumers, 28 pharmacists and 4 practice managers)
Kolodziejak et al. [52]	Canada	Results from a focus group study examining the activities of an integrated clinical pharmacist.(1 pharmacist, single academic medical centre site)
Tan et al. [1]	Australia	Qualitative survey of 27 participants investigating the integration of pharmacists in general practice clinics.(11 GPs and 16 pharmacists)
Joseph et al. [34]	USA	Literature review of pharmacist-driven services in accountable care organisations from 2009 to 2016 (2 GP pharmacists, literature review of 40 accountable care organisations)
Barnes et al. [48]	UK	Description of roles performed by clinical pharmacists as part of the NHS clinical pharmacist project (no specified number of pharmacists or sites)
Choe et al. [35]	USA	Describing the role of pharmacists in the patient centred medical home (2.5 FTE pharmacists, 8 general medical health centres)
Manolakis and Skelton [36]	USA	AACP report examining pharmacist's contributions in primary care (3 case studies unspecified number of pharmacists and sites)
Develin [45]	Australia	Descriptive article outlining the roles performed by a general practice pharmacist (3 part-time pharmacists at 3 general practice sites)
Albanese et al. [37]	USA	A cross-sectional on-line survey sent to primary care physicians, nurse practitioners and physician assistants regarding the role of pharmacists in the patient centred medical home (35 survey respondents 24 GPs, 7 pharmacists, 4 nurse practitioners)
Woodall et al. [38]	USA	Study examining the effectiveness and financial benefit of pharmacist-led annual wellness visits in conjunction with comprehensive medication management (1 pharmacist, single site community clinic)
Cawley et al. [39]	USA	Study aimed at examining integrated pharmacists providing spirometry services in the medical centre environment (case studies from 3 family health clinics)

Table 1 (continued)

References	Country	Description
Chen and Britten [49]	UK	Study examining the activities of primary care pharmacists in general practice (3 FTE pharmacists, number of general practice sites not specified)
Freeman et al. [46]	Australia	Electronic questionnaire completed by GP pharmacists in Australia (26 pharmacists)
Johnson et al. [40]	USA	Retrospective cohort study examining impact of integrated clinical pharmacists (number of pharmacists and safety-net clinics not specified)
Smith et al. [41]	USA	Review of pharmacist roles in the Patient Centred Medical Home (5 PCMH medication management programs (number of clinics not specified)
Farrell et al. [53]	Canada	Qualitative study investigating roles performed by integrated pharmacists (7 pharmacists, 6 family health teams)
Bradley et al. [50]	UK	Longitudinal study investigating roles performed by GP pharmacists (2 questionnaires completed by 158 pharmacists)
Ryan et al. [51]	UK	Exploratory, descriptive interview study (7 GPs, 6 Nurses, 8 practice managers, 9 patients, 5 pharmacists, 4 pharmacy technicians and 8 receptionists)

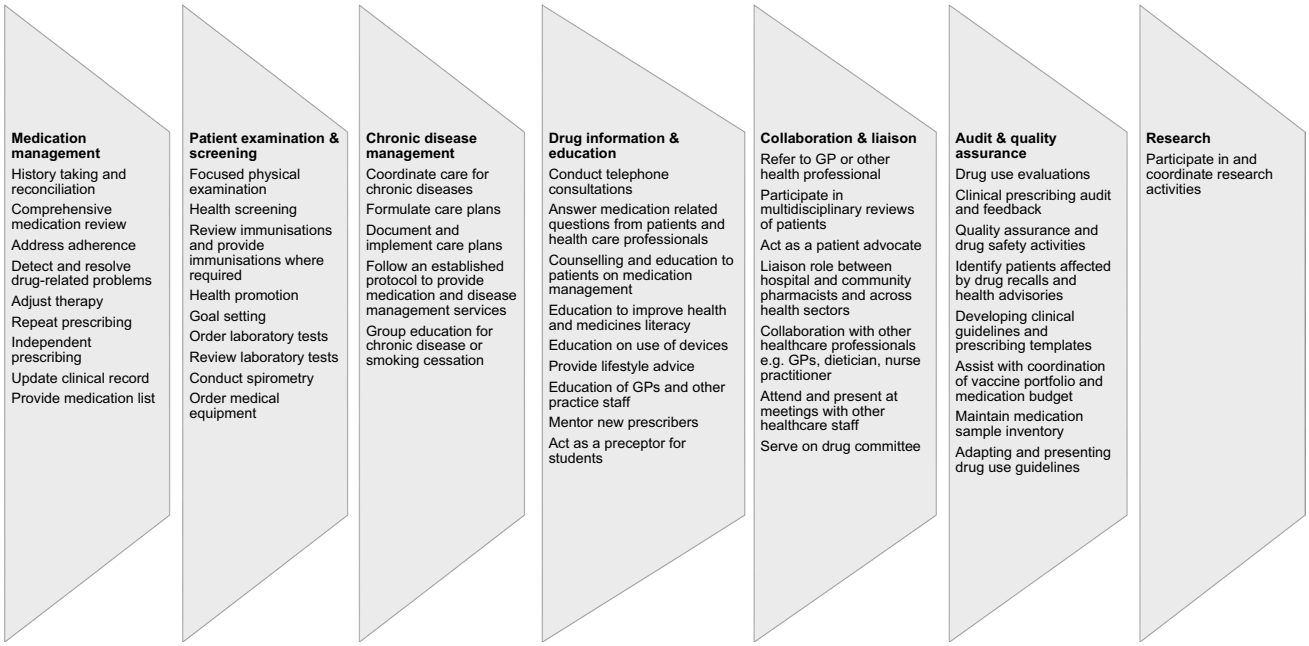


Fig. 2 Activities performed by GP pharmacists

The administration of immunisations by GP pharmacists was not able to be mapped to a FIP competency. The FIP competency framework was developed in 2012 and the provision of immunisations by pharmacists is an expanded area of pharmacist practice that has occurred since that time explaining the reason it is not included in the FIP competency list [71].

The most commonly reported chronic disease management activity was following an established management protocol to provide medication and disease management services. This role allows pharmacists to adjust doses of medication and to initiate or cease medications where outlined in the designated protocol. Performing this role requires GP pharmacists to have an advanced level of understanding in the disease state concerned and has traditionally required pharmacists to have advanced clinical skills or to have undergone additional training [72–75].

The majority of articles (n = 25) listed education and drug information activities performed by GP pharmacists. These roles are performed by pharmacists in all settings and are within the usual scope of pharmacist practice. The advanced level of communication skills required to competently provide drug information and education to GPs and other healthcare providers may require further training on the part of the pharmacist practitioner [75].

Table 2 GP Pharmacist activities and associated FIP competencies

Activities subcategories in italicizes	n = number of studies listing activity	Pharmaceutical public health competencies	Pharmaceutical care competencies	Organisation and management competencies	Professional/personal competencies
Medication management					
History taking and reconciliation	13		2.1.2; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.4; 2.6.6		4.1.4; 4.1.5; 4.3.1; 4.4.3; 4.5.2; 4.5.9
Comprehensive medication review	17	1.1.1; 1.1.2; 1.2.1; 1.2.2	2.1.1; 2.1.2; 2.4.1; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.2; 2.6.3; 2.6.4; 2.6.5 2.6.6	3.2.3; 3.3.2; 3.6.6	4.1.2; 4.1.3; 4.1.4; 4.1.5; 4.3.1; 4.3.3; 4.3.6; 4.4.1; 4.4.2; 4.4.3; 4.4.4; 4.4.5
Address adherence	15	1.1.1; 1.1.2; 1.2.1; 1.2.2	2.4.3; 2.5.3; 2.6.4	3.3.2	4.1.2; 4.1.4; 4.1.5
Detect and resolve drug-related problems	18	1.2.2	2.1.1; 2.1.2; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.2; 2.6.3; 2.6.4; 2.6.5; 2.6.6	3.2.3; 3.3.2	4.1.2; 4.1.4; 4.1.5; 4.4.2; 4.4.3; 4.4.5; 4.5.8
Adjust therapy	6	1.1.1; 1.2.1; 1.2.2	2.1.1; 2.1.2; 2.3.3; 2.4.1; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.3; 2.6.4; 2.6.5; 2.6.6	3.2.3; 3.3.2	4.3.1; 4.3.6; 4.4.1; 4.4.2; 4.4.3; 4.4.4; 4.4.5
Repeat prescribing	8	1.1.1	2.1.1; 2.3.3; 2.4.3; 2.5.1; 2.6.3; 2.6.4; 2.6.5; 2.6.6	3.2.3; 3.3.2	4.3.1; 4.3.6; 4.4.1; 4.4.2; 4.4.3; 4.4.4; 4.4.5
Independent prescribing	8	1.1.1; 1.2.1; 1.2.2	2.1.1; 2.1.2; 2.3.3; 2.4.1; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.3; 2.6.4; 2.6.5; 2.6.6	3.2.3; 3.3.2	4.3.1; 4.3.6; 4.4.1; 4.4.2; 4.4.3; 4.4.4; 4.4.5
Update clinical record	4		2.6.5; 2.6.6		
Provide medication list	4	1.2.2	2.6.6		4.1.2
Patient examination and screening					
Focused physical examination	4		2.6.3		
Health screening	10	1.1.1	2.5.1; 2.5.2; 2.6.3; 2.6.4; 2.6.5; 2.6.6	3.3.2	4.1.2; 4.1.4; 4.1.5; 4.3.6; 4.4.2; 4.4.3
Review immunisations and administer immunisations where required[a]	5	1.1.1; 1.1.2; 1.2.2	2.1.1; 2.4.3; 2.5.1; 2.5.2; 2.6.1; 2.6.3; 2.6.4; 2.6.5; 2.6.6		4.1.2; 4.1.3; 4.1.4; 4.1.5; 4.3.6; 4.4.2; 4.4.3
Health promotion	3	1.1.1; 1.1.2; 1.2.2	2.6.4	3.2.1; 3.2.3; 3.2.5	4.1.2; 4.1.3; 4.1.4; 4.1.5
Goal setting	3	1.1.2	2.6.4	3.2.3	4.1.2; 4.1.3; 4.1.4; 4.1.5
Order laboratory tests	9		2.1.2; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.3	3.2.3; 3.3.2	4.1.2; 4.1.4
Review laboratory tests	6	1.1.1; 1.2.1	2.1.2; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.3; 2.6.6		4.1.2; 4.1.4; 4.4.4; 4.4.5
Conduct spirometry	1	1.1.1	2.6.3		4.1.2; 4.1.4; 4.1.5; 4.4.3
Order medical equipment	1	1.2.1	2.3.4	3.4.5; 3.4.6	
Chronic disease management					

Table 2 (continued)

Activities subcategories in italicizes	n = number of studies listing activity	Pharmaceutical public health competencies	Pharmaceutical care competencies	Organisation and management competencies	Professional/personal competencies
Coordinate care for chronic diseases	6	1.1.1; 1.1.2	2.1.1; 2.1.2; 2.4.1; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.2; 2.6.3; 2.6.4;2.6.5;2.6.6	3.2.3; 3.2.5	4.1.2; 4.1.3; 4.1.4; 4.4.2; 4.4.3; 4.4.4; 4.6.2
Formulate care plans	6	1.1.1; 1.2.1	2.1.1; 2.4.1; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.2; 2.6.3; 2.6.4; 2.6.5; 2.6.6	3.2.3; 3.2.5	4.1.2; 4.1.4; 4.1.5; 4.3.1; 4.3.6; 4.4.2; 4.4.3; 4.4.5
Document and implement treatment plans	6	1.1.1; 1.2.1	2.1.1; 2.4.1; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.2; 2.6.3; 2.6.4; 2.6.5; 2.6.6	3.2.3; 3.2.5	4.1.2; 4.1.4; 4.1.5; 4.3.1; 4.3.6; 4.4.5
Follow an established protocol to provide medication and disease management services	13	1.1.1; 1.2.1	2.1.1; 2.1.2; 2.4.1; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.2; 2.6.3; 2.6.4; 2.6.5; 2.6.6	3.2.3; 3.2.5; 3.3.2; 3.4.5; 3.6.2;3.6.6	4.1.2; 4.1.3; 4.1.4; 4.1.5; 4.3.1; 4.3.3; 4.3.6; 4.4.1; 4.4.2; 4.4.3; 4.4.4; 4.4.5
Group education for chronic disease or smoking cessation	2	1.1.1; 1.1.2; 1.2.1; 1.2.2			4.1.2; 4.1.3; 4.1.4; 4.1.5
Drug information and education					
Conduct telephone consultations	7	1.1.1, 1.1.2, 1.2.1;1.2.2	2.1.1; 2.1.2; 2.4.2; 2.4.3;2.5.1; 2.5.2; 2.5.3;2.6.2; 2.6.3; 2.6.4; 2.6.5; 2.6.6	3.2.3	4.1.2; 4.1.4; 4.1.5; 4.4.2
Answer medication related questions from patients and health care professionals	8	1.1.2; 1.2.1; 1.2.2	2.4.1; 2.4.3;2.5.2; 2.5.3; 2.6.4	3.3.2	4.1.1; 4.1.2; 4.1.3; 4.1.4; 4.1.5; 4.4.2
Counselling and education to patients on medication management	13	1.1.2; 1.2.1; 1.2.2	2.4.1; 2.4.3;2.5.2; 2.5.3; 2.6.4	3.3.2	4.1.2; 4.1.3; 4.1.4; 4.1.5; 4.4.2
Education to improve health and medicines literacy	9	1.1.1; 1.1.2; 1.2.1; 1.2.2	2.4.1; 2.4.3; 2.5.2; 2.5.3; 2.6.4	3.3.2	4.1.2; 4.1.3; 4.1.4; 4.1.5; 4.4.2
Education on use of devices	4	1.2.1; 1.2.2	2.3.4		4.1.2; 4.1.3; 4.1.4; 4.1.5
Provide lifestyle advice	8	1.1.1; 1.1.2; 1.2.1; 1.2.2			4.1.2; 4.1.3; 4.1.4; 4.1.5
Education of GPs and other practice staff	10	1.2.2		3.2.1; 3.2.3; 3.2.6	4.1.1; 4.1.2; 4.1.5; 4.3.3; 4.6.2
Mentor new prescribers	2			3.2.1; 3.2.6	4.1.1; 4.2.2; 4.2.3; 4.2.4; 4.2.5; 4.2.8; 4.6.1; 4.6.2
Act as a preceptor for students	6			3.2.6	4.1.1; 4.2.2; 4.2.3; 4.2.4; 4.2.5; 4.2.8; 4.6.1; 4.6.2
Collaboration/liaison					
Refer to GP or other health professional	7		2.6.2;	3.2.3; 3.2.5	4.1.2; 4.4.4; 4.4.5

Table 2 (continued)

Activities subcategories in italicizes	n = number of studies listing activity	Pharmaceutical public health competencies	Pharmaceutical care competencies	Organisation and management competencies	Professional/personal competencies
Participate in multidisciplinary reviews of patients	7	1.1.1	2.1.1; 2.1.2; 2.4.3; 2.5.1; 2.5.2; 2.5.3; 2.6.3; 2.6.4;2.6.5; 2.6.6	3.2.3; 3.2.5; 3.3.2	4.1.1;4.1.2;4.1.5; 4.3.1; 4.4.2; 4.4.3; 4.4.4; 4.6.2
Act as a patient advocate	3		2.4.3; 2.6.4		4.1.2; 4.1.5
Liaison role between hospital and community pharmacists and across health sectors	3	1.2.2		3.2.3; 3.2.5	4.1.2; 4.1.5; 4.4.2; 4.6.2
Collaboration with other healthcare professionals e.g. GPs, dietician, nurse practitioner	6	1.2.2	2.1.1; 2.6.2; 2.6.6	3.2.2; 3.2.3; 3.2.4; 3.2.5	4.1.2;4.1.5; 4.4.2; 4.6.2
Attend and present at meetings with other healthcare staff	3	1.2.2	2.5.1	3.2.1; 3.2.3; 3.2.5; 3.3.2; 3.6.5	4.1.2; 4.1.5; 4.3.1
Serve on drug committee	1	1.2.2	2.5.1	3.2.1; 3.2.3; 3.2.5; 3.3.2;3.4.1; 3.6.5	4.1.2; 4.1.5; 4.3.1
Audit and quality assurance					
Drug use evaluations	4		2.1.1; 2.5.1	3.2.1; 3.2.3; 3.3.2; 3.4.1; 3.6.5	4.1.2; 4.3.1; 4.3.6; 4.5.2; 4.5.3; 4.5.6; 4.5.7; 4.5.8; 4.5.9
Clinical prescribing audit and feedback	8		2.1.1; 2.5.1	3.2.1; 3.2.3; 3.3.2; 3.4.1; 3.6.5	4.1.2; 4.3.1; 4.3.6; 4.5.2; 4.5.3; 4.5.6; 4.5.7; 4.5.8; 4.5.9
Quality assurance and drug safety activities	6			3.2.3; 3.2.5; 3.3.2	4.5.2; 4.5.3; 4.5.4; 4.5.5; 4.5.6; 4.5.7; 4.5.8; 4.5.9
Identify patients affected by drug recalls and health advisories	3		2.3.2; 2.5.1; 2.5.3; 2.6.5	3.2.1; 3.2.3; 3.2.5; 3.3.2	4.1.2; 4.1.4; 4.4.2; 4.5.1; 4.5.8; 4.5.9
Developing clinical guidelines and prescribing templates	4	1.2.2	2.5.1	3.2.1; 3.2.3; 3.2.5; 3.3.2; 3.6.5	4.1.2; 4.1.5; 4.3.1
Assist with coordination of vaccine portfolio and medication budget	2			3.1.1; 3.1.2; 3.2.1; 3.2.3; 3.2.5; 3.4.1;3.4.5; 3.5.1; 3.5.2;3.5.3; 3.5.5	4.3.6
Maintain medication sample inventory	2			3.1.1; 3.1.2; 3.2.1; 3.2.3; 3.2.5; 3.4.1;3.4.5; 3.5.1; 3.5.2;3.5.3; 3.5.5	4.3.6
Adapting and presenting drug use guidelines	5	1.1.2	2.5.1	3.2.1; 3.2.3; 3.2.5; 3.6.5	4.3.6; 4.5.3; 4.5.6; 4.5.9
Research					
Participate in and coordinate research activities	1			3.2.1; 3.2.3; 3.3.1	4.5.1; 4.5.2; 4.5.3; 4.5.6; 4.5.7; 4.5.9; 4.6.2; 4.6.5

[a]Administration of immunisations by pharmacists not able to be mapped to FIP competency framework

Pharmacists providing audit and quality assurance services require an ability to communicate effectively and work collaboratively as part of an interprofessional team [76, 77]. As a result, including learning outcomes associated with communication and teamwork should be a focus for educational designers.

Previous competency maps have been developed for local implementation, or have not been specifically tailored for GP pharmacists [12, 14]. The competency map developed for GP pharmacists as a result of this review includes an international perspective and provides a comprehensive list of competencies required for pharmacists wishing to perform the GP Pharmacist role.

When establishing educational needs of GP pharmacists it is important to distinguish between base level activities and advanced practice activities requiring additional skills and knowledge [78]. Further studies are required to establish the educational needs of GP pharmacists. Once educational needs are established, an evidence based educational program can be designed to enable pharmacists develop the skills and knowledge required to perform the GP pharmacist's role.

Conclusion

This literature review has resulted in the development of a comprehensive description of roles for GP pharmacists. These GP pharmacist roles have then been used to inform the development of a global competency map for GP pharmacists. Using this competency map to design a competency-based training curriculum will ensure that the GP pharmacists of the future have the knowledge and skills to implement best practice primary care and improve the lives of the patients they treat.

Acknowledgements The authors would like to acknowledge the support and assistance provided by Ms Nerida Croker (NC) Project Officer for the WentWest General Practice Pharmacist Project in mapping GP pharmacist roles to associated competencies.

Funding Author one (HB) is supported by an Australian Government Research and Training Grant. This research was funded by the Western Sydney Primary Health Network (Project ID PRO 17-4279)

Conflicts of interest The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Appendix

See Table 3.

Table 3 FIP global competency frame work

Category	Competency	Behaviour
1. Pharmaceutical public health competencies	1.1 Health promotion	1.1.1 Assess the primary healthcare needs (taking into account the cultural and social setting of the patient)
		1.1.2 Advise on health promotion, disease prevention and control and healthy lifestyle
	1.2 Medicines information and advice	1.2.1 Counsel population on the safe and rational use of medicines and devices (including the selection, use, contraindications, storage and side effects of non-prescription and prescription medications)
		1.2.2 Identify sources, retrieve, evaluate, organise, assess and disseminate relevant medicines information according to the needs of patients and clients and provide appropriate information
2. Pharmaceutical care competencies	2.1 Assessment of medicines	2.1.1 Appropriately select medicines (e.g. according to the patient, hospital, government policy, etc.)
		2.1.2 Identify, prioritise and act upon medicine–medicine interactions, medicine disease interactions, medicine-patient interactions, medicine-food interactions
	2.2 Compounding medicines	2.2.1 Prepare pharmaceutical medicines (e.g. extemporaneous, cytotoxic medicines), determine the requirements for preparation (calculations, appropriate formulation, procedures, raw materials, equipment etc.)
		2.2.2 Compound under the good manufacturing practice for pharmaceutical (GMP) medicines
	2.3 Dispensing	2.3.1 Accurately dispense medicines for prescribed and/or minor ailments and monitor the dispense (re-checking the medicines)
		2.3.2 Accurately report defective or substandard medicines to the appropriate authorities
		2.3.3 Appropriately validate prescriptions, ensuring that prescriptions are correctly interpreted and legal
		2.3.4 Dispense devices (e.g. inhaler or a blood glucose meter)
		2.3.5 Document and act upon dispensing errors
		2.3.6 Implement and maintain a dispensing error reporting system and a "near misses" reporting system
		2.3.7 Label the medicines (with the required and appropriate information)
		2.3.8 Learn from and act upon previous "near misses" and "dispensing errors"

Table 3 (continued)

Category	Competency	Behaviour
	2.4 Medicines	2.4.1 Advise patients on proper storage conditions of the medicines and ensure that medicine
		2.4.2 Appropriately select medicines formulation and concentration for minor ailments (e.g. diarrhoea, constipation, cough, hay fever, insect bites etc.)
		2.4.3 Ensure appropriate medicines, route, time, dose, documentation, action, form and response for individual patients
		2.4.4 Package medicines to optimise safety (ensuring appropriate re-packaging and labelling of the medicines)
	2.5 Monitor medicines therapy	2.5.1 Apply guidelines, medicines formulary system, protocols and treatment pathways
		2.5.2 Ensure therapeutic medicines monitoring, impact and outcomes (including objective and subjective measures)
		2.5.3 Identify, prioritise and resolve medicines management problems (including errors)
	2.6 Patient consultation and diagnosis	2.6.1 Apply first aid and act upon arranging follow-up care
		2.6.2 Appropriately refer
		2.6.3 Assess and diagnose based on objective and subjective measures
		2.6.4 Discuss and agree with the patients the appropriate use of medicines, taking into account patient's preferences
		2.6.5 Document any intervention (e.g. document allergies, medicines and food, in patient medicines history)
		2.6.6 Obtain, reconcile, review, maintain and update relevant patient medication and diseases history
3. Organisation and management competencies	3.1 Budget and re-imbursement	3.1.1 Acknowledge the organisational structure
		3.1.2 Effectively set and apply budgets
		3.1.3 Ensure appropriate claim for reimbursement
		3.1.4 Ensure financial transparency
		3.1.5 Ensure proper reference sources for service reimbursement
	3.2 Human resources management	3.2.1 Demonstrate organisational and management skills (e.g. know understand and lead on medicines management, risk management, self-management, time management, people management, project management, policy management)
		3.2.2 Identify and manage human resources and staffing issues
		3.2.3 Participate, collaborate, advise in therapeutic decision-making and use appropriate referral in a multi-disciplinary team

Table 3 (continued)

Category	Competency	Behaviour
		3.2.4 Recognise and manage the potential of each member of the staff and utilise systems for performance management (e.g. carry out staff appraisals)
		3.2.5 Recognise the value of the pharmacy team and of a multidisciplinary team
		3.2.6 Support and facilitate staff training and continuing professional development
	3.3 Improvement of service	3.3.1 Identify and implement new services (according to local needs)
		3.3.2 Resolve, follow up and prevent medicines related problems
	3.4 Procurement	3.4.1 Access reliable information and ensure the most cost-effective medicines in the right quantities with the appropriate quality
		3.4.2 Develop and implement contingency plan for shortages
		3.4.3 Efficiently link procurement to formulary, to push/pull system (supply chain management) and payment mechanisms
		3.4.4 Ensure there is no conflict of interest
		3.4.5 Select reliable supplies of high-quality products (including appropriate selection process, cost effectiveness, timely delivery)
		3.4.6 Supervise procurement activities
		3.4.7 Understand the tendering methods and evaluation of tender bids
	3.5 Supply chain and management	3.5.1 Demonstrate knowledge in store medicines to minimise errors and maximise accuracy
		3.5.2 Ensure accurate verification of rolling stocks
		3.5.3 Ensure effective stock management and running of service with the dispensary
		3.5.4 Ensure logistics of delivery and storage
		3.5.5 Implement a system for documentation and record keeping
		3.5.6 Take responsibility for quantification of forecasting
	3.6 Work place management	3.6.1 Address and manage day to day management issues
		3.6.2 Demonstrate the ability to take accurate and timely decisions and make appropriate judgements
		3.6.3 Ensure the production schedules are appropriately planned and managed
		3.6.4 Ensure the work time is appropriately planned and managed
		3.6.5 Improve and manage the provision of pharmaceutical services
		3.6.6 Recognise and manage pharmacy resources (e.g. financial, infrastructure)

Table 3 (continued)

Category	Competency	Behaviour
4. Professional/personal competencies	4.1 Communication skills	4.1.1 Communicate clearly, precisely and appropriately while being a mentor or tutor
		4.1.2 Communicate effectively with health and social care staff, support staff, patients carer, family relatives and clines/customers, using lay terms and checking understanding
		4.1.3 Demonstrate cultural awareness and sensitivity
		4.1.4 Tailor communications to patient needs
		4.1.5 Use appropriate communication skills to build, report and engage with patients, health and social care staff and voluntary services (e.g. verbal and non-verbal)
	4.2 Continuing professional development	4.2.1 Document CPD activities
		4.2.2 Engage with students/interns/residents
		4.2.3 Evaluate currency of knowledge and skills
		4.2.4 Evaluate learning
		4.2.5 Identify if expertise needed outside the scope of knowledge
		4.2.6 Identify learning needs
		4.2.7 Recognise own limitations and act upon them
		4.2.8 Reflect on performance
	4.3 Legal and regulatory practice	4.3.1 Apply and understand regulatory affairs and the key aspects of pharmaceutical registration and legislation
		4.3.2 Apply knowledge in relation to the principals of business economics and intellectual property rights including the basics of patent interpretation
		4.3.3 Be aware of and identify new medicines coming to the market
		4.3.4 Comply with legislation for drugs with the potential for abuse
		4.3.5 Demonstrate knowledge in marketing and sales
		4.3.6 Engage with health and medicines policies
		4.3.7 Engage with health and medicines policies
	4.4 Professional and ethical practice	4.4.1 Demonstrate awareness of local/national codes of ethics
		4.4.2 Ensure confidentiality (with the patient and with other healthcare professionals)
		4.4.3 Obtain patient consent (it can be implicit on occasion)
		4.4.4 Recognise own professional limitations
		4.4.5 Take responsibility for own action and for patient care

Table 3 (continued)

Category	Competency	Behaviour
	4.5 Quality assurance and research in the workplace	4.5.1 Apply research findings and understand the benefit risk (e.g. preclinical. Clinical trials, experimental clinical-pharmacological research and risk management)
		4.5.2 Audit quality of service (ensure that they meet local and national standards and specifications)
		4.5.3 Develop and implement Standard Operating Procedures (SOPs)
		4.5.4 Ensure appropriate quality control tests are performed and managed appropriately
		4.5.5 Ensures medicines are not counterfeit and quality standards
		4.5.6 Identify and evaluate evidence base to improve the use of medicines and services.
		4.5.7 Identify, investigate and conduct, supervise and support research at the workplace (enquiry-driven practice)
		4.5.8 Implement conduct and maintain a reporting system of pharmacovigilance (e.g. report adverse drug reactions)
		4.5.9 Initiate and implement audit and research activities
	4.6 Self-management	4.6.1 Apply assertiveness skills
		4.6.2 Demonstrate leadership and practice management skills, initiative and efficiency
		4.6.3 Document risk management (e.g. critical incidents)
		4.6.4 Ensure punctuality
		4.6.5 Prioritise work and implement innovative ideas

References

1. Tan EC, Stewart K, Elliott RA, George J. Pharmacist services provided in general practice clinics: a systematic review and meta-analysis. Res Soc Adm Pharm. 2014;10(4):608–22.
2. Hazen ACM, de Bont AA, Boelman L, Zwart DLM, de Gier JJ, de Wit NJ, et al. The degree of integration of non-dispensing pharmacists in primary care practice and the impact on health outcomes: a systematic review. Res Soc Adm Pharm. 2018;14(3):228–40.
3. Anderson C, Zhan K, Boyd M, Mann C. The role of pharmacists in general practice: a realist review. Res Soc Adm Pharm. 2018. https://doi.org/10.1016/j.sapharm.2018.06.001.
4. Benson H, Sabater-Hernández D, Benrimoj SI, Williams KA. Piloting the integration of non-dispensing pharmacists in the Australian general practice setting: a process evaluation. Int J Integr Care. 2018;18(2):1–9.
5. Koster A, Schalekamp T, Meijerman I. Implementation of competency-based pharmacy education (CBPE). Pharmacy. 2017;5(1):10.
6. Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T, et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. Lancet. 2010;376(9756):1923–58.
7. Gruppen LD, Mangrulkar RS, Kolars JC. The promise of competency-based education in the health professions for improving global health. Hum Resour Health. 2012;10(1):43.
8. Anderson C, Bates I, Brock T, Brown AN, Bruno A, Futter B, et al. Needs-based education in the context of globalization. Am J Pharm Educ. 2012;76:56.
9. Frank JR, Snell LS, Cate OT, Holmboe ES, Carraccio C, Swing SR, et al. Competency-based medical education: theory to practice. Med Teach. 2010;32(8):638–45.
10. Pharmaceutical Society of Australia. General practice pharmacist sample scope of practice; 2016. https://my.psa.org.au/s/article/General-Practice-PharmacistSample-Scope-of-Practice-2016. Accessed 19 Sept 2018.
11. Royal Pharmaceutical Society. RPS practice-based-pharmacist-job-specification: royal pharmaceutical society; 2015. https://www.rpharms.com/Portals/0/RPS%20document%20library/Open%20access/Policy%20statements/practice-based-pharmacist-job-spec-final.pdf?ver=2016-10-13-101708-230. Accessed 19 Sept 2018.

12. Kennie-Kaulbach N, Farrell B, Ward N, Johnston S, Gubbels A, Eguale T, et al. Pharmacist provision of primary health care: a modified Delphi validation of pharmacists' competencies. BMC Fam Pract. 2012;13:27.
13. Farrell BBPF, Ward NMA, Kennie NBP, Jorgenson DBSPP, Tewodros EMDM, Dolovich LBPM, et al. Validating primary health care pharmacist competencies: checking our aim. Can Pharm J. 2011;144(5):1.
14. Saseen JJ, Ripley TL, Bondi D, Burke JM, Cohen LJ, McBane S, Vande Griend JP. ACCP clinical pharmacist competencies. Pharmacotherapy. 2017;37(5):630–6. https://doi.org/10.1002/phar.1923.
15. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JPA, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. Ann Intern Med. 2009;151(4):W65–94.
16. Sandelowski M, Leeman J, Knafl K, Crandell JL. Text-in-context: a method for extracting findings in mixed-methods mixed research synthesis studies. J Adv Nurs. 2013;69(6):1428–37.
17. Haggarty L. What is… content analysis? (article). Med Teach. 1996;18(2):9.
18. Holdford D. Content analysis methods for conducting research in social and administrative pharmacy. Res Soc Adm Pharm. 2008;4(2):173–81.
19. Federation Internationale Pharmaceutique. Pharmacy Education Taskforce a Global Competency Framework Version 1. 2012(1) Available at https://www.fip.org/files/fip/PharmacyEducation/GbCF/GbCF_v1_online_A4.pdf. Accessed 11 Mar 2019.
20. Stupans I, Atkinson J, Mestrovic A, Nash R, Rouse MJ. A shared focus: comparing the Australian, Canadian, United Kingdom and United States pharmacy learning outcome frameworks and the global competency framework. Pharmacy (Basel). 2016;4(3):1–9.
21. Otaguro JE, Kruse LE. Assessment of drug-prescribing problems in a multidisciplinary primary care clinic. J Pharm Technol. 1996;12(4):155–9.
22. Nigro SC, Garwood CL, Berlie H, Irons B, Longyhore D, McFarland MS, et al. Clinical pharmacists as key members of the patient-centered medical home: an opinion statement of the Ambulatory Care Practice and Research Network of the American College of Clinical Pharmacy. Pharmacotherapy. 2014;34(1):96–108.
23. Boudreau DM, Capoccia KL, Sullivan SD, Blough DK, Ellsworth AJ, Clark DL, et al. Collaborative care model to improve outcomes in major depression. Ann Pharmacother. 2002;36(4):585–91.
24. Gerber BS, Rapacki L, Castillo A, Tilton J, Touchette DR, Mihailescu D, et al. Design of a trial to evaluate the impact of clinical pharmacists and community health promoters working with African-Americans and latinos with diabetes. BMC Public Health. 2012;12(1):891.
25. Musselman KT, Moczygemba LR, Pierce AL, Plum M-BF, Brokaw DK, Kelly DL. Development and implementation of clinical pharmacist services within an integrated medical group. J Pharm Pract. 2015;30(1):75–81.
26. Sisson EM, Dixon DL, Kildow DC, Van Tassell BW, Carl DE, Varghese D, et al. Effectiveness of a pharmacist-physician team-based collaboration to improve long-term blood pressure control at an inner-city safety-net clinic. Pharmacotherapy. 2016;36(3):342–7.
27. Smith MC, Boldt AS, Walston CM, Zillich AJ. Effectiveness of a pharmacy care management program for veterans with dyslipidemia. Pharmacotherapy. 2013;33(7):736–43.
28. Benedict ASM, Sie J, Chin H, Ngo C, Salmingo J, Vidaurreta A, Rashid N. Evaluation of a pharmacist-managed diabetes program in a primary care setting within an integrated health care system. J Manag Care Spec Pharm. 2018;24(2):114–22.
29. Carter BL, Helling DK, Jones ME, Moessner H, Waterbury CA. Evaluation of family physician prescribing: influence of the clinical pharmacist. Drug Intell Clin Pharm. 1984;18(10):817–21.
30. Heilmann RMF, Campbell SM, Kroner BA, Proksel JR, Billups SJ, Witt DM, et al. Evolution, current structure, and role of a primary care clinical pharmacy service in an integrated managed care organization. Ann Pharmacother. 2013;47(1):124–31.
31. Barker EA, Pond ST, Zaiken K. Impact of medication onboarding: a clinical pharmacist-run "onboarding" telephone service for patients entering a primary care practice. J Pharm Technol. 2015;32(1):9–15.
32. Weidman-Evans E, Evans J, Eastwood R, Fort A. Implementation of a pharmacist-run telephonic insulin titration service. J Am Pharm Assoc (2003). 2012;52(6):e266–72.
33. Kennedy AG, Chen H, Corriveau M, MacLean CD. Improving population management through pharmacist-primary care integration: a pilot study. Popul Health Manag. 2015;18(1):23–9.
34. Joseph T HG, Eltaki S, Prados Y, Jones R, Seamon M, Moreau C, Gernant S. Integration strategies of pharmacists in primary care-based accountable care organizations: a report from the accountable care organization research network, services, and education. J Manag Care Spec Pharm. 2017;23(5):541–48.
35. Choe HM, Farris KB, Stevenson JG, Townsend K, Diez HL, Remington TL, et al. Patient-centered medical home: developing, expanding, and sustaining a role for pharmacists. Am J Health Syst Pharm. 2012;69(12):1063–71.
36. Manolakis PG, Skelton JB. Pharmacists' contributions to primary care in the United States collaborating to address unmet patient care needs: the emerging role for pharmacists to address the shortage of primary care providers. Am J Pharm Educ. 2010;74:S7.
37. Albanese NP, Pignato AM, Monte SV. Provider perception of pharmacy services in the patient-centered medical home. J Pharm Pract. 2016;30(6):612–20.
38. Woodall T, Landis SE, Galvin SL, Plaut T, Roth McClurg MT. Provision of annual wellness visits with comprehensive medication management by a clinical pharmacist practitioner. Am J Health Syst Pharm. 2017;74(4):218–23.
39. Cawley MJ, Moon J, Reinhold J, Willey VJ, Warning Ii WJ. Spirometry: tool for pharmacy practitioners to expand direct patient care services. J Am Pharm Assoc (2003). 2013;53(3):307–15.
40. Johnson KA, Chen S, Cheng IN, Lou MM, McCombs J. The impact of clinical pharmacy services integrated into medical homes on diabetes-related clinical outcomes. Ann Pharmacother. 2010;44(12):1877–86.
41. Smith M, Bates DW, Bodenheimer TS. Pharmacists belong in accountable care organizations and integrated care teams. Health Aff (Millwood). 2013;32(11):1963–70.
42. Tan E, Stewart K, Elliott RA, George J. An exploration of the role of pharmacists within general practice clinics: the protocol for the pharmacists in practice study (PIPS). BMC Health Serv Res. 2012;12:246.
43. Freeman C, Cottrell WN, Kyle G, Williams I, Nissen L. Integrating a pharmacist into the general practice environment: opinions of pharmacist's, general practitioner's, health care consumer's, and practice manager's. BMC Health Serv Res. 2012;12(1):229.
44. Tan EC, Stewart K, Elliott RA, George J. Integration of pharmacists into general practice clinics in Australia: the views of general practitioners and pharmacists. Int J Pharm Pract. 2014;22(1):28–37.
45. Develin A. Pharmacists in general practice—ACT pilot program: my journey so far. J Pharm Pract Res. 2017;47(4):308–12.
46. Freeman C, Cottrell N, Rigby D, Williams ID, Nissen L. The Australian practice pharmacist. J Pharm Pract Res. 2014;44(4):240–8.

47. Stone MC, Williams HC. Clinical pharmacists in general practice: value for patients and the practice of a new role. Br J Gener Pract. 2015;65(634):262–3.
48. Barnes EAI, Din A. New roles for clinical pharmacists in general practice. Prescriber. 2017;2017:26–9.
49. Chen J, Britten N. 'Strong medicine': an analysis of pharmacist consultations in primary care. Fam Pract. 2000;17(6):480–3.
50. Bradley F, Seston E, Mannall C, Cutts C. Evolution of the general practice pharmacist's role in England: a longitudinal study. Br J Gen Pract. 2018;68(675):e727–34.
51. Ryan K, Patel N, Lau WM, Abu-Elmagd H, Stretch G, Pinney H. Pharmacists in general practice: a qualitative interview case study of stakeholders' experiences in a West London GP federation. BMC Health Serv Res. 2018;18(1):234.
52. Kolodziejak L, Remillard A, Neubauer S. Integration of a primary healthcare pharmacist. J Interprof Care. 2010;24:274–84.
53. Farrell B, Ward N, Dore N, Russell G, Geneau R, Evans S. Working in interprofessional primary health care teams: what do pharmacists do? Res Soc Adm Pharm. 2013;9(3):288–301.
54. Mendonça SdAM, Melo AC, Pereira GCC, Santos DMdSSd, Grossi EB, Sousa MdCVB, et al. Clinical outcomes of medication therapy management services in primary health care. Braz J Pharm Sci. 2016;52(3):365–73.
55. Gilani F, Majumdar SR, Johnson JA, Tsuyuki RT, Lewanczuk RZ, Spooner R, et al. Adding pharmacists to primary care teams increases guideline-concordant antiplatelet use in patients with type 2 diabetes: results from a randomized trial. Ann Pharmacother. 2013;47(1):43–8.
56. Hazen AC, Sloeserwij VM, Zwart DL, de Bont AA, Bouvy ML, de Gier JJ, et al. Design of the POINT study: pharmacotherapy optimisation through integration of a non-dispensing pharmacist in a primary care team (POINT). BMC Fam Pract. 2015;16:76.
57. Dolovich L, Pottie K, Kaczorowski J, Farrell B, Austin Z, Rodriguez C, et al. Integrating family medicine and pharmacy to advance primary care therapeutics. Clin Pharmacol Ther. 2008;83(6):913–7.
58. Jorgenson D, Dalton D, Farrell B, Tsuyuki R, Dolovich L. Guidelines for pharmacists integrating into primary care teams. CPJ/RPC. 2013;146:342–52.
59. Trinacty M, Farrell B, Schindel TJ, Sunstrum L, Dolovich L, Kennie N, et al. Learning and networking: utilization of a primary care listserv by pharmacists. Can J Hosp Pharm. 2014;67(5):343–52.
60. Elliott RA, Putman K, Franklin M, Verhaeghe N, Annemans L, Eden M, et al. Determining economic impact of a pharmacist-led it-based intervention with simple feedback in reducing rates of clinically important errors in medicines management in general practices (pincer). Value Health. 2013;16(3):A206.
61. 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. Br J Clin Pharmacol. 2012;74(1):16–33.
62. Law MRP, Ma T, Fisher JP, Sketris ISPMPA. Independent pharmacist prescribing in Canada. Can Pharm J. 2012;145(1):17–23E1.
63. Bourne RS, Baqir W, Onatade R. Pharmacist independent prescribing in secondary care: opportunities and challenges. Int J Clin Pharm. 2016;38(1):1–6.
64. Raghunandan R, Tordoff J, Smith A. Non-medical prescribing in New Zealand: an overview of prescribing rights, service delivery models and training. Ther Adv Drug Saf. 2017;8(11):349–60.
65. Hale A, Coombes I, Stokes J, Aitken S, Clark F, Nissen L. Patient satisfaction from two studies of collaborative doctor-pharmacist prescribing in Australia. Health Expect. 2016;19(1):49–61.
66. McKeirnan KC, Akers JM, Czapinski JC, Robinson JD. Using collaborative drug therapy agreements to train student pharmacists to provide clinical patient care services. Am J Pharm Educ. 2017;81(2):1–8.
67. McConeghy KW, Wing C. A national examination of pharmacy-based immunization statutes and their association with influenza vaccinations and preventive health. Vaccine. 2016;34(30):3463–8.
68. Hattingh L. Pharmacy legal: pharmacist immunisation services. Aust Pharmacist. 2015;34(4):72–3.
69. Woolf R, Locke A, Potts C. Pharmacist prescribing within an integrated health system in Washington. Am J Health Syst Pharm. 2016;73(18):1416–24.
70. Isenor JE, Edwards NT, Alia TA, Slayter KL, MacDougall DM, McNeil SA, Bowles SK. Impact of pharmacists as immunizers on vaccination rates: a systematic review and meta-analysis. Vaccine. 2016;34(47):5708–23. https://doi.org/10.1016/j.vaccine.2016.08.085.
71. Ripley TL, Adamson PB, Hennebry TA, Van Tuyl JS, Harrison DL, Rathbun RC. Collaborative practice model between cardiologists and clinical pharmacists for management of patients with cardiovascular disease in an outpatient clinic. Ann Pharmacother. 2013;48(3):412–9.
72. Leal S, Soto M. Pharmacists disease state management through a collaborative practice model. J Health Care Poor Underserved. 2005;16(2):220–4.
73. Cohen H. Pharmacists and collaborative drug therapy management in New York State. J Pharm Pract. 2011;24(6):582–3.
74. Moreno G, Lonowski S, Fu J, Chon JS, Whitmire N, Vasquez C, et al. Physician experiences with clinical pharmacists in primary care teams. J Am Pharm Assoc. 2017;57(6):686–91.
75. Jorgenson D, Laubscher T, Lyons B, Palmer R. Integrating pharmacists into primary care teams: barriers and facilitators. Int J Pharm Pract. 2014;22(4):292–9.
76. Patterson BJ, Solimeo SL, Stewart KR, Rosenthal GE, Kaboli PJ, Lund BC. Perceptions of pharmacists' integration into patient-centered medical home teams. Res Soc Adm Pharm. 2015;11(1):85–95.
77. Körner M, Bütof S, Müller C, Zimmermann L, Becker S, Bengel J. Interprofessional teamwork and team interventions in chronic care: a systematic review. J Interprof Care. 2016;30(1):15–28.
78. Boyle M, Myford C. Pharmacists' expectations for entry-level practitioner competency. Am J Pharm Educ. 2013;77:1. https://doi.org/10.1186/1472-6963-12-246.

The narrative review produced by the research team mapped GP pharmacist activities to the FIP Competency framework. In addition to this work, in order to ensure the activities were mapped to a relevant local framework, the research team mapped the listed GP pharmacist activities to the 2016 National Competency Standards Framework for Pharmacists in Australia (NCSFPA). (Pharmaceutical Society of Australia, 2016b)

Two researchers independently mapped GP pharmacist activities and any differences between maps were resolved in consultation with a third member of the research team.

Table 4 shows the GP pharmacist activities and corresponding National Competency Framework competencies and Table 5 outlines the combined GP pharmacist competencies or scope of practice. All pharmacist standards except Standard 3.4 Compound Medicines was included in the GP pharmacist competency map demonstrating the breadth of activities performed by GP pharmacists.

Table 4: GP Pharmacist activities and associated National Competency Standards Framework for Pharmacists in Australia Competencies					
Activities **Subcategories in bold**	Domain 1 Professionalism and ethics	Domain 2 Communication and collaboration	Domain 3 Medicines management and patient care	Domain 4 Leadership and management	Domain 5 Education and Research
Medication Management					
History taking and reconciliation	1	2.1.1, 2.1.3, 2.1.4 2.3.1, 2.3.2 2.4	3.1.1, 3.1.2 3.2.5, 3.2.6 3.6.1	4.3.4 4.5.2	
Comprehensive medication review	1	2	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.6	4.1 4.2 4.3 4.5.2	5.1.2 5.3
Address adherence	1	2	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.5.2 3.6	4.3.3, 4.3.4 4.5.2 4.7.2	5.1.2 5.3
Detect and resolve drug-related problems	1	2	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.5 3.6.1	4.2 4.3.2, 4.3.3, 4.3.4 4.5.2	5.1 5.3
Adjust therapy	1	2	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.5.2 3.6	4.1 4.2 4.3 4.5.2 4.7.2, 4.7.5, 4.7.7	5.1.2 5.3
Repeat prescribing	1	2	3.1 3.2.2, 3.2.4, 3.2.5 3.3 3.5 3.6	4.1 4.2 4.3.2, 4.3.3, 4.3.4 4.5.2, 4.5.3 4.7.2, 4.7.5, 4.7.7	5.1.2 5.3
Independent prescribing	1	2	3.1 3.2.2, 3.2.4, 3.2.5	4.1 4.2	5.1.2 5.3

			3.3 3.5 3.6	4.3.2, 4.3.3, 4.3.4 4.5.2, 4.5.3 4.7.2, 4.7.5, 4.7.7	
Update clinical record	1	2.1.1 2.3	3.1.1 3.2.6 3.3.3	4.2.1 4.5.2	
Provide medication list	1	2.1.1, 2.1.3, 2.1.4 2.3.1, 2.3.2	3.2.5	4.5.2 4.7.5	
Patient examination and screening					
Focused physical examination	1	2	3.1.1 3.3 3.6	4.2 4.5.2, 4.5.3 4.7.5	
Health screening	1	2	3.1 3.2.2 3.3 3.5.2 3.6	4.2 4.5.2, 4.5.3 4.7.5	
Review immunisations and administer immunisations where required*	1	2	3.1 3.2 3.3 3.5.2 3.6	4.2 4.5.3 4.7.5	5.1.2, 5.1.4
Health promotion	1	2	3.2.2, 3.2.5 3.5.2 3.6	4.2 4.3.3, 4.3.4 4.5.2 4.7.2, 4.7.4	5.1.1, 5.1.2, 5.1.4 5.3.1
Goal setting	1	2	3.1 3.2.5 3.3 3.5.2 3.6	4.2 4.3.3, 4.3.4	5.1.2 5.3.4
Order laboratory tests	1	2	3.1.1, 3.1.2, 3.1.3	4.5.3 4.7.5	

Review laboratory tests	1	2	3.1.1 3.3	4.2.1, 4.2.2, 4.2.3, 4.2.4 4.5.3 4.7.2	5.3.3, 5.3.4
Conduct spirometry	1	2	3.1.1 3.3	4.2.1, 4.2.2, 4.2.3, 4.2.4 4.5.2, 4.5.3	
Order medical equipment	1	2.3		4.2.1 4.5.2, 4.5.3	
Chronic Disease Management					
Coordinate care for chronic diseases	1	2	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.5 3.6	4.1 4.2 4.3 4.5.3 4.7	5.1 5.2.3 5.3
Formulate care plans	1	2	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.5 3.6	4.1 4.2 4.3 4.5.3 4.7.1, 4.7.2, 4.7.4, 4.7.5, 4.7.6, 4.7.7	5.3.4
Document and implement treatment plans	1	2	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.5 3.6	4.1 4.2 4.3 4.5.3 4.7.1, 4.7.2, 4.7.4, 4.7.5, 4.7.6, 4.7.7	5.3.4
Follow an established protocol to provide medication and disease management services	1	2	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.5 3.6	4.1 4.2 4.3 4.5.3 4.7.1, 4.7.2, 4.7.4,	5.3.3, 5.3.4

				4.7.5, 4.7.6, 4.7.7	
Group education for chronic disease or smoking cessation	1	2	3.2.2, 3.2.5 3.5 3.6	4.1 4.2 4.3 4.5.3 4.7.1, 4.7.2, 4.7.4, 4.7.5, 4.7.6	5.1 5.2.3 5.3
Drug Information and Education					
Conduct telephone consultations	1	2.1 2.3 2.4	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.5.2 3.6	4.1 4.2 4.3.3, 4.3.4 4.5.2, 4.5.3 4.7.1, 4.7.2, 4.7.5, 4.7.6, 4.7.7	5.1.2 5.3
Answer medication related questions from patients and health care professionals	1	2	3.1 3.2.2, 3.2.5	4.1 4.2 4.3.2, 4.3.3, 4.3.4 4.7.1, 4.7.2, 4.7.4, 4.7.5, 4.7.6, 4.7.7	5.1.3, 5.1.4 5.3
Counselling and education to patients on medication management	1	2.1 2.3 2.4	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.5.2 3.6	4.1 4.2 4.3.2, 4.3.3, 4.3.4 4.7.1, 4.7.2, 4.7.5, 4.7.6, 4.7.7	5.1.1, 5.1.2, 5.1.4 5.3
Education to improve health and medicines literacy	1	2	3.1 3.2.2, 3.2.5 3.5 3.6	4.1 4.2 4.3.2, 4.3.3, 4.3.4 4.7.1, 4.7.2, 4.7.4, 4.7.5, 4.7.6, 4.7.7	5.1 5.3
Education on use of devices	1	2	3.1 3.2.2, 3.2.5 3.3 3.5 3.6	4.1 4.2 4.3.3, 4.3.4 4.5.2, 4.5.3 4.7.2, 4.7.5, 4.7.6,	5.1

				4.7.7	
Provide lifestyle advice	1	2.1 2.3 2.4	3.1 3.6	4.1 4.2 4.3.3, 4.3.4 4.5.3	5.1.2, 5.1.4
Education of GPs and other practice staff	1	2.2 2.3 2.4	3.1 3.2.2, 3.2.5 3.5 3.6	4.1 4.2 4.3 4.4.5 4.5.3 4.6.4	5.1 5.3
Mentor new prescribers	1	2.2 2.3 2.4	3.2.5 3.5.2 3.6	4.1 4.2 4.3 4.4.5 4.5.3 4.6.2, 4.6.3, 4.6.4, 4.6.5	5.1 5.2.5 5.3
Act as a preceptor for students	1	2.2 2.3 2.4	3.2.5 3.5.2 3.6	4.1 4.2 4.3 4.4.5 4.5.3 4.6.2, 4.6.3, 4.6.4, 4.6.5 4.7.1, 4.7.2, 4.7.5	5.1 5.2.5 5.3
Collaboration and liaison					
Refer to GP or other health professional	1	2.1.1, 2.1.2, 2.1.4 2.2 2.3 2.4	3.1.3	4.1.1, 4.1.2 4.2 4.7.5	5.3.3, 5.3.4
Participate in multidisciplinary reviews of patients	1	2	3.1 3.2.2, 3.2.5, 3.2.6	4.1 4.2	5.3

			3.3 3.5 3.6	4.3 4.5.3 4.7	
Act as a patient advocate	1	2	3.2.6 3.6.1	4.1.1, 4.1.3 4.3.3, 4.3.4	5.3.4
Liaison role between hospital and community pharmacists and across health sectors	1	2	3.1 3.2.2, 3.2.5, 3.2.6 3.5.2 3.6.2, 3.6.3	4.1 4.2 4.3 4.5.3 4.7.1, 4.7.2, 4.7.4, 4.7.5, 4.7.6, 4.7.7	5.3.4
Collaboration with other healthcare professionals e.g. GPs, dietician, nurse practitioner	1	2	3.1 3.2.2, 3.2.5, 3.2.6 3.3 3.5.2 3.6.2, 3.6.3	4.1 4.2 4.3 4.5.3 4.7.1, 4.7.2, 4.7.4, 4.7.5, 4.7.6, 4.7.7	5.3.4
Attend and present at meetings with other healthcare staff	1	2.1.1, 2.1.3 2.2 2.3 2.4	3.2.5 3.5.2 3.6	4.1 4.2 4.3 4.5.2, 4.5.3 4.6.2, 4.6.4, 4.6.5 4.7	5.1 5.3
Serve on drug committee	1	2.1.1, 2.1.3 2.2 2.3 2.4	3.3.2, 3.2.3 3.5 3.6	4.1 4.2 4.3 4.4.1, 4.4.4, 4.4.5 4.5.1, 4.5.3 4.6.2, 4.7	5.1 5.2.3 5.3

Audit & Quality Assurance					
Drug use evaluations	1	2	3.1 3.3 3.5	4.1 4.2 4.3.2, 4.3.3, 4.3.4 4.4.1, 4.4.5 4.5.1, 4.5.3 4.7.1, 4.7.2, 4.7.3, 4.7.5, 4.7.6, 4.7.7	5.2.3 5.3
Clinical prescribing audit and feedback	1	2	3.1 3.3 3.5	4.1 4.2 4.3.2, 4.3.3, 4.3.4 4.4.1, 4.4.5 4.5.1, 4.5.3 4.7.1, 4.7.2, 4.7.3, 4.7.5, 4.7.6, 4.7.7	5.2.3 5.3
Quality assurance and drug safety activities	1	2	3.1 3.3 3.5 3.6.2, 3.6.3	4.1 4.2 4.3 4.4 4.5 4.7	5.1 5.2.2, 5.2.3, 5.2.4, 5.2.5 5.3
Identify patients affected by drug recalls and health advisories	1	2	3.1 3.3	4.2.1 4.7.1, 4.7.2, 4.7.7	5.2.3 5.3.2
Developing clinical guidelines and prescribing templates	1	2	3.1 3.2.2 3.5 3.6	4.1 4.2 4.3 4.4.1, 4.4.5 4.5.3 4.7	5.1 5.2.3 5.3

Assist with coordination of vaccine portfolio and medication budget	1	2.2 2.3 2.4	3.2.2 3.5	4.1 4.2 4.3 4.4.1, 4.4.2, 4.4.5 4.5 4.7.1, 4.7.5, 4.7.7	5.1.4
Maintain medication sample inventory	1	2.2 2.3 2.4		4.2.1, 4.2.2, 4.2.3, 4.2.4 4.4.2 4.5.1, 4.5.2, 4.5.3 4.7.1, 4.7.5, 4.7.7	
Adapting and presenting drug use guidelines	1.1 1.2 1.3.1, 1.3.2 1.4 1.5 1.6	2	3.1 3.2.2 3.5 3.6	4.1 4.2 4.3 4.4.1, 4.4.5 4.5 4.7	5.1 5.2.2, 5.2.3 5.3
Research					
Participate in and coordinate research activities	1	2	3.5 3.6.2, 3.6.3	4	5.2 5.3

Table 5: National Competency Standards Framework for Australian Pharmacists GP Pharmacist Competency Map		
Domain	Standard	Enabling competency
Domain 1: Professionalism and Ethics	1.1 Uphold professionalism in practice	1.1.1 Promote a culture of professionalism
		1.1.2 Uphold the professional role of the pharmacist
		1.1.3 Apply understanding and knowledge of medicines management and use in society
		1.1.4 Accept professional responsibility and accountability
		1.1.5 Work with commitment, diligence and care
	1.2 Observe and promote ethical standards	1.2.1 Support ethical professional practice
		1.2.2 Manage ethical issues arising in practice
		1.2.3 Promote ethical professional practice
	1.3 Practice within applicable legal framework	1.3.1 Comply with statute law, guidelines, codes and standards
		1.3.2 Respond to common law requirements
		1.3.3 Respect and protect the individual's rights to privacy and confidentiality
		1.3.4 Assist individuals to understand and grant informed consent
	1.4 Maintain and extend professional competence	1.4.1 Adopt a scope of practice consistent with competence
		1.4.2 Determine professional development needs with reference to the competency standards
		1.4.3 Acquire and apply practice expertise
	1.5 Apply expertise in professional practice	1.5.1 Apply expert knowledge and skills
		1.5.2 Use reasoning and judgement
		1.5.3 Demonstrate accountability and responsibility
		1.5.4 Use professional autonomy
	1.6 Contribute to continuous improvement in quality and safety	1.6.1 Collaborate to improve quality and safety across the continuum of care
		1.6.2 Monitor and respond to sources of risk
		1.6.3 Follow up incidents or lapses in care
Domain 2: Communication and Collaboration	2.1 Collaborate and work in partnership for the delivery of patient-centred culturally responsive care	2.1.1 Respect the personal characteristics, rights, preferences, values, beliefs, needs and cultural and linguistic diversity of patients and other clients, including Aboriginal and Torres Strait Islander peoples
		2.1.2 Support and respect the rights of patients and other clients to contribute to decision-making
		2.1.3 Promote patient/client engagement with feedback and follow-up systems
		2.1.4 Consider the impact of the physical environment
	2.2 Collaborate with professional colleagues	2.2.1 Show a commitment to interprofessional practice

		2.2.2 Engage in teamwork and consultation
		2.2.3 Promote effective interprofessional practice
	2.3 Communicate effectively	2.3.1 Use appropriate communication skills
		2.3.2 Confirm the effectiveness of communication
	2.4 Apply interpersonal communication skills to address problems	2.4.1 Analyse the problem or issue to be addressed and the possible solutions
		2.4.2 Engage with others as appropriate to resolve the identified problem or issue
		2.4.3 Review outcomes achieved and assess follow-up requirements
Domain 3: Medicines management and patient care	3.1 Develop a patient-centred, culturally responsive approach to medication management.	3.1.1 Obtain relevant health and medicines information
		3.1.2 Assess medication management practices and needs
		3.1.3 Collaborate to develop a medication management strategy or plan
	3.2 Implement the medication management strategy or plan	3.2.1 Administer medicines
		3.2.2 Provide primary care and promote judicious use of medicines
		3.2.3 Dispense medicines(including compounded medicines) in consultation with the patient and/or prescriber
		3.2.4 Prescribe medicines
		3.2.5 Provide counselling and information for safe and effective medication management
		3.2.6 Facilitate continuity of care including during transitions of care
	3.3 Monitor and evaluate medication management	3.3.1 Undertake a clinical review
		3.3.2 Apply clinical review findings to improve health outcomes
		3.3.3 Document clinical review findings and changes in medication management
	3.5 Support Quality Use of Medicines	3.5.1 Review trends in medicine use
		3.5.2 Promote evidence-based medicine use
	3.6 Promote health and well-being	3.6.1 Assist development of health literacy
		3.6.2 Support health promotion activities and health services intended to maintain and improve health
		3.6.3 Support evidence-based public health programs
Domain 4: Leadership and Management	4.1 Show leadership of self	4.1.1 Display emotional awareness and effective self-regulation of emotions
		4.1.2 Apply reflective skills for self-assessment
		4.1.3 Display self-motivation, an innovative mindset and motivate others
	4.2 Manage professional contribution	4.2.1 Work with established systems

		4.2.2 Plan and prioritise work
		4.2.3 Maintain productivity
		4.2.4 Monitor progress and priorities
	4.3 Show leadership in practice	4.3.1 Inspire a strategic vision and common purpose
		4.3.2 Foster initiative and contribute to innovation, improvement and service development
		4.3.3 Encourage, influence and facilitate change
		4.3.4 Serve as a role model, coach and mentor for others
	4.4 Participate in organisational review and planning	4.4.1 Undertake strategic and/or operational planning
		4.4.2 Develop a business plan and monitor performance
		4.4.3 Establish suitable premises and infrastructure
		4.4.4 Undertake workforce planning
		4.4.5 Develop and maintain supporting systems and strategies
	4.5 Plan and manage physical and financial resources	4.5.1 Plan and manage finances
		4.5.2 Maintain the physical environment and acquire required resources
		4.5.3 Contribute to the efficient and effective use of resources
	4.6 Plan, manage and build human resource capability	4.6.1 Recruit and retain personnel
		4.6.2 Establish role clarity and performance standards
		4.6.3 Supervise personnel
		4.6.4 Develop personnel and promote improved performance
		4.6.5 Manage interpersonal relationships with supervised personnel
	4.7 Participate in organisational management	4.7.1 Understand and contribute to organisational/corporate and clinical governance
		4.7.2 Apply and monitor standards of practice
		4.7.3 Undertake project management
		4.7.4 Contribute to professional activities planning with consideration of strategic context
		4.7.5 Apply and monitor standards of practice
		4.7.6 Work across service delivery boundaries
		4.7.7 Contribute to the effective management of risk, including threats to service continuity
Domain 5: Education and research	5.1 Deliver education and training	5.1.1 Plan education and training
		5.1.2 Conduct education and training consistent with educational practice
		5.1.3 Contribute to continuing professional development of others
		5.1.4 Link practice and education

	5.2 Participate in research	5.2.1 Establish research partnerships
		5.2.2 Identify gaps in the evidence base
		5.2.3 Undertake critical evaluation activities
		5.2.4 Design and deliver research projects to address gaps in the evidence-base and identify areas for innovation and advances in practice
		5.2.5 Supervise others undertaking research
	5.3 Research, synthesise and integrate evidence into practice	5.3.1 Identify information needs and resource requirements
		5.3.2 Retrieve relevant information/evidence in a timely manner
		5.3.3 Apply research evidence into practice
		5.3.4 Provide advice and recommendations

Previously the Pharmaceutical Society of Australia (PSA) has published a sample scope of practice for GP pharmacists in Australia. (Pharmaceutical Society of Australia, 2016a) The PSA scope of practice was mapped using the 2016 NCSFPA and included all of Domain 1 (Professionalism and ethics) and Domain 2 (Communication and collaboration), this matched the competency map produced by the research team for these domains.

In Domain 3 (Medicines management and patient care) the competency map produced by the research team differed from the PSA sample scope of practice as it included 3.2.1 Administer medicines, 3.2.3 Dispense medicines (including compounded medicines) in consultation with the patient and/or prescriber and 3.2.4 Prescribe medicines.

These three competencies were mapped to the GP pharmacist activity relating to the review and administration of immunisations, which would require the GP pharmacist to prescribe a vaccine, dispense and administer the vaccine. Vaccination by pharmacists in Australia is an expanding area of practice and at present pharmacist vaccination rights differ from state to state. Ensuring that GP pharmacists are competent to prescribe, dispense and administer vaccinations will also ensure that they are equipped for delivering care in this expanding area of practice.

As compounding medicines is not an activity performed by GP pharmacists, both the competency map produced by the research team and the PSA scope of practice omitted standard 3.4 Compound medicines.

The PSA scope of practice did not include the following enabling competencies from Domain 4 (Leadership and management);

4.5.3 Contribute to the efficient and effective use of resources although the research team mapped this competency to multiple activities performed by GP pharmacists. These included any activity where the use of resources was deemed to be required for example, health screening where blood glucose or INR strips might need to be used by the GP pharmacist.

4.6.3 Supervise personnel, 4.6.4 Develop personnel and promote improved performance and 4.6.5 Manage interpersonal relationships with supervised personnel. These

competencies were mapped to the GP pharmacist activities of mentoring new prescribers and acting as a preceptor to students.

In addition, 4.6.4 was mapped to providing education to GPs and other healthcare staff and to attending and presenting at meetings with other healthcare staff.

The standards 4.7.5 Apply and monitor standards of practice and 4.7.6 Work across service delivery boundaries were mapped to GP pharmacist activities of liaising between the hospital and community settings and collaborating with other healthcare professionals.

The competency mapping for Domain 5 (Education and research) differed between the map produced by the research team and the PSA GP pharmacist sample scope of practice in that the PSA scope of practice did not include the following enabling competencies:

5.1.3 Contribute to continuing professional development of others, this competency was mapped to the GP pharmacist activities relating to attending and presenting at meetings with other healthcare professionals, providing education to GPs and other healthcare staff, mentoring new prescribers and acting as a preceptor for students.

5.2.1 Establish research partnerships and 5.2.5 Supervise others undertaking research, these competencies were both mapped to the GP pharmacist activity of participating and co-ordinating research activities. In addition, mentoring new prescribers and acting as a preceptor for students was seen as activities were the supervision of others undertaking research may be required.

When comparing the GP pharmacist competency map developed using the FIP global competency framework and that produced using the NCSFPA it is first important to highlight the similarities and differences between these two frameworks.

The FIP global competency framework has four domains Pharmaceutical Public Health, Pharmaceutical Care, Organisation and Management and Professional/Personal. The NCSFPA has five domains Professionalism and ethics, Communication and collaboration, Medicines management and patient care, Leadership and management and Education and training.

Table 6 highlights the similarities and differences between the two competency frameworks.

Table 6: Comparison between FIP Global Competency Framework and NCSFPA			
FIP Global Competency Framework 2012 Domains	FIP Global Competency Framework 2012	National Competency Standards Framework for Pharmacists in Australia 2016 Domains	National Competency Standards Framework for Pharmacists in Australia 2016 Standards
Pharmaceutical Public Health	Health Promotion	Medicines Management and Patient Care	Promote health and well-being
	Medicines information and advice		Support quality use of medicines
Pharmaceutical Care	Assessment of medicines	Medicines Management and Patient Care	Monitor and evaluate medication management
	Compounding medicines		Compound medicines
	Dispensing		Implement the medication management strategy or plan
	Medicines		Support quality use of medicines
	Monitor medicines therapy		Monitor and evaluate medication management
	Patient consultation and diagnosis		Develop a patient-centred, culturally responsive approach to medication management
Organisation and Management	Budget and reimbursement	Leadership and Management	Plan and manage physical and financial resources
	Human resources management		Plan, manage and build human resource capability
			Collaborate with professional colleagues
			Show leadership of self

	Improvement of service	Professionalism and Ethics	Contribute to continuous improvement in quality and safety
	Procurement	Leadership and Management	Plan and manage physical and financial resources
	Supply chain and management		Participate in organisational planning and review Plan and manage physical and financial resources
	Work place management		Participate in organisational management
			Manage professional contribution
Professional /Personal	Communication skills	Communication and Collaboration	Communicate effectively
			Collaborate and work in partnership for the delivery of patient-centred culturally responsive care
			Apply interpersonal communication skills to address problems
	Continuing professional development	Professionalism and Ethics	Maintain and extend professional competence
	Legal and regulatory practice	Professionalism and Ethics	Uphold professionalism in practice
			Observe and promote ethical standards
			Practice within applicable legal framework
No matching FIP Domain		Education and Research	Deliver education and training
			Participate in research
			Research, synthesise and integrate evidence into practice

All the FIP competencies were mapped to NCSFPA standards however, the NCSFPA Domain 5 of Education and Research was not able to be mapped to any FIP domains or competencies. This domain includes delivering education and training, participating in research and the research, synthesis and integration of evidence into practice, which are all relevant to the GP pharmacist role. By mapping the GP pharmacist activities to the NCSFPA the research team was able to ensure that the competency map produced was relevant and applicable for implementation in the local context.

The result of this competency mapping and scope of practice development exercise informed the next stage of the research into GP pharmacist educational needs. (Chapter 7)

Chapter 7

Establishing General Practice Pharmacist Educational Needs

Establishing the educational needs of general practice pharmacists: a Delphi validation study. *Currents in Pharmacy Teaching and Learning (under peer review)*

Benson H, Lucas C, Williams K A

Chapter Outline

This chapter reports on a Delphi validation study. The manuscript is currently under peer review at *Currents in Pharmacy Teaching and Learning.*

Chapter 7 addresses the fourth thesis objective of investigating the educational needs of general practice pharmacists. This study aims to establish the educational needs of pharmacists who have obtained initial general registration and are wishing to perform the GP pharmacist role.

Determining educational needs necessitates determining the difference between an individual's current skills and knowledge and that of the desired level of skills and knowledge to perform a certain role or task. This process relies on the professional judgement of educational designers and is therefore an inherently subjective process. The Delphi process of establishing consensus is a validated systematic method of establishing a consensus position for subjective data. (Jones 1995)

Delphi Study Background

The Delphi validation process is a method used to establish an evidence-based consensus by providing a systematic method for collecting and aggregating informed judgements from a group of experts via multiple rounds of input. Typically, three rounds are used but this may vary according to the study requirements. (McKenna 1994)

Feedback given to the expert panel following sequential rounds, allows experts to be informed by the collective opinions of other panellists and to reassess their responses in light of this information. The Delphi method maximises the benefits of using an expert panel while allowing anonymity of response. (Thangaratinam 2005)

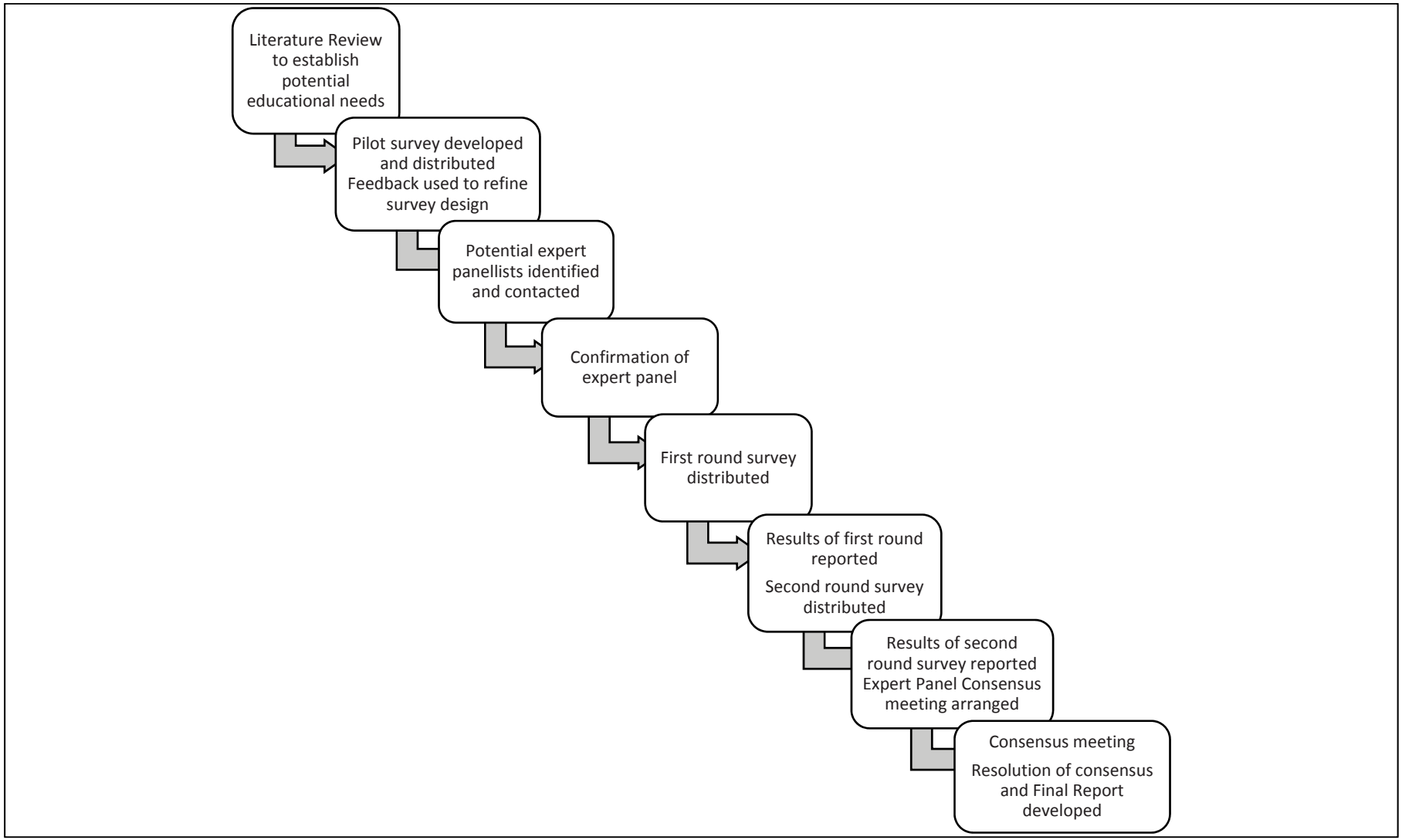
Figure 3 outlines the Delphi method used in this GP pharmacist educational needs study. This included a pilot phase where feedback regarding the Phase 1 survey questions was gathered to allow for the refinement of the survey questions.

Pharmacy practice educators were selected for the expert panel as they were judged most likely to be fully aware of the educational content of current pharmacist pre-registration training and therefore deemed to have a good understanding of the skills and knowledge that newly registered/licenced pharmacists were likely to have. All pharmacy academic

panel members were also registered/licenced pharmacists with a mean of 24 years registration (±12 years).

Expert panellists were invited from all 18 Australian pharmacy schools, with representatives from ten universities agreeing to participate.

Figure 3 Delphi Study process



Phase 1 of the study consisted of an electronic survey that asked panellists to rate their level of agreement in regards to the educational needs of newly registered pharmacists wishing to practice as GP pharmacists.

Following completion of Phase 1, panellists were provided with a report detailing the educational needs that had reached consensus. Consensus was defined as ≥ 75% agreement or disagreement. Areas of non-consensus were reported by reminding the panellist of their response and informing them of the responses of the remainder of the panel. An example is provided below:

Non-consensus positions

Consensus was not reached in relation to the following areas therefore these areas will be included in the Phase 2 survey. Your answers to the survey question are in **bold**.

Adherence assessment		
Your answer**: Strongly agree**		
	Frequency	Per cent
Strongly Disagree	1	10
Disagree	4	40
Neither agree nor disagree	0	0
Agree	4	40
Strongly Agree	1	10
Total	10	100

A link to the electronic Phase 2 pharmacist educational needs survey was then provided to panelists to allow them to complete Phase 2 after having being fully informed of the opinions of the remainder of the panel.

An example of the questions asked of expert panellists for the Phase 2 electronic survey is included below.

Medication management roles for GP pharmacists include adherence assessment, identification and resolution of drug-related problems and updating the clinical medication record. Do you think registered pharmacists wishing to perform the GP Pharmacist role required further training in addition to that which they received to gain initial general registration in adherence assessment? (Previous responses 10% Strongly disagree, 40% Disagree, 40% Agree, 10% Strongly agree)

Strongly disagree, Disagree, Neither agree nor disagree, Agree, Strongly Agree

Following completion of Phase 2, panellists were provided with a report describing the educational needs that had reached consensus. Areas of non-consensus were reported and were marked for discussion at the Phase 3 videoconference.

In order to allow for maximum expert panel participation, the one hour Phase 3 expert panel videoconference was scheduled over two sessions. (Seven of the ten expert panel members were able to attend one of the two sessions, the other three panellists were sent a summary of the videoconference discussion and asked to complete the Phase 3 survey)

Research Implications

By consulting pharmacy practice academics from across Australia, a consensus position on the educational needs to be addressed by a GP pharmacist education program was reached. The results of this study were used to inform the education program curriculum design that is discussed in Chapter 8.

Establishing consensus for general practice pharmacist education: a Delphi study.

Authors

Helen Benson. PhD Candidate, BPharm; Graduate School of Health, University of Technology, Sydney, Australia. Email: helen.benson@uts.edu.au

Cherie Lucas. PhD, BPharm, GradCertEdSt (Higher Educ). Pharmacy lecturer (UTS: Pharmacy); Graduate School of Health, University of Technology Sydney, Australia. Email: cherie.lucas@uts.edu.au

Kylie A. Williams. PhD, BPharm, DipHospPharm. Head of Discipline (UTS: Pharmacy); Graduate School of Health, University of Technology Sydney, Australia. Email: kylie.williams@uts.edu.au

Corresponding author: Helen Benson

Graduate School of Health, University of Technology Sydney.

Level 4, Building 7, 67 Thomas St, Ultimo (PO Box 123)

Phone: +61 2 9514 7236; Email: helen.benson@uts.edu.au

Abstract

Introduction: An evolving area of professional practice for pharmacists is performing as team members in integrated general practice teams. There is a need to ensure that these pharmacists are adequately trained to perform the duties and skills of this challenging role. To date, there is a paucity of literature to guide schools and colleges of pharmacy in relation to the educational needs of pharmacists training for this area of practice.

Method: This study employed a three-round e-Delphi method with the aim of establishing a consensus position of the educational needs of pharmacists intending to work in the general practice setting. Pharmacy practice educators from all Australian universities with a pharmacy school were invited to participate as part of the expert panel. Delphi panelists completed two e-survey rounds. A panel videoconference was then completed with results of the discussion confirmed in a final third e-survey. Survey questions were developed and drawn from a comprehensive list of general practice pharmacist activities established by a previous literature review. Panelists were asked to determine if general practice pharmacist activities were within the scope of practice of recently registered/licenced pharmacists or if they would require additional training. This study defined a proportion of experts rating agree or strongly agree at ≥ 75% to determine consensus and a rating of disagree or strongly disagree at ≥ 75% to determine non-consensus.

Results:

Ten of the 18 invited panelists agreed to participate in the study and completed both survey rounds, nine panelists completed the third round survey. The expert panelists had an average of 24 years (range 10-46 years) practice experience as

registered/licenced pharmacists and an average of 15 years (range 7-26 years) experience as pharmacy practice academics.

Twenty six general practice pharmacist activities were identified as requiring additional training. Seventeen general practice pharmacist activities were identified as requiring no additional training. Five general practice pharmacist activities did not reach consensus.

Discussion: This study is one of the first investigations of educational needs of pharmacists wishing to practice in the general practice setting. The panel were able to differentiate between activities that could be performed by less experienced pharmacists operating at a general level and those that would require further training.

Conclusion: The educational needs identified in this study were used to provide guidance to help inform learning outcomes and objectives and influence curriculum development for a program designed to educate pharmacists training to practice in primary care or general practice settings.

Keywords (Delphi process; postgraduate training; general practice pharmacist; pharmacist education)

Introduction

Pharmacists integrated in general practice teams can perform a variety of roles. These include direct patient care, population management activities (such as health care assessments and patient group education) and the provision of expert drug information and education for other primary care team members.[1-2] Despite evidence to support the benefits to patients resulting from the addition of pharmacists to general practice teams, this practice is still in the early stages of implementation.[3]

A search of the international literature identified that programs have been developed for pharmacists wishing to work in an integrated primary care or general practice setting in the United Kingdom, Canada and The Netherlands.[5-9] These international education programs are not currently available to Australian pharmacists and there is therefore a need for the development of a program to address this training gap.

In Australia, the Pharmaceutical Society of Australia (PSA) has developed introductory modules for pharmacists wishing to work in general practice but these modules focus more on the practicalities of working in general practice and do not comprehensively address all GP pharmacist educational needs.[10]

Despite the existence of international education programs, there has previously been limited literature published in relation to the educational needs of GP pharmacists. To establish the educational needs of GP pharmacists, it was important to firstly determine possible/potential activities that are performed by these pharmacists. As a result, a literature review of GP pharmacist activities was performed.[2] Content analysis from this review resulted in the development of a comprehensive GP pharmacist role description and competency map. Seven GP pharmacist role sub-categories and 48 GP pharmacist activities were identified.

The seven GP pharmacist role sub-categories were: (1) medication management, (2) chronic disease management, (3) research, (4) drug information and education, (5) patient examination and screening, (6) collaboration and liaison and (7) audit and quality assurance.

When establishing the educational needs of pharmacists wishing to perform these GP pharmacist roles it is important to establish a consensus position on the skills and knowledge required by GP pharmacists in addition to that obtained at initial general

pharmacist registration (licencing). The gap between these two levels of skills and knowledge, is the training gap or educational needs to be addressed by the GP pharmacist training program.

GP pharmacists are often working without the support of fellow pharmacist colleagues and are therefore required to be able perform each professional activity autonomously to a high standard. Miller's framework[11] for clinical assessment differentiates between having knowledge of a task (knows), knowing how to complete a task (knows how), showing others how to complete a task (shows how) and being able to do a task to a high standard consistently (does). When establishing the educational needs of licenced pharmacists, it is important to establish if a recently licenced pharmacist would be able to perform the GP pharmacist activity at the highest level of the framework (does).

In order to ensure that the educational program would be suited for pharmacists of all levels of competence and experience, the educational needs study was designed to consider the educational requirements of pharmacists at the general level of practice who had recently gained initial registration/licencing.

Method

The Delphi method was chosen to determine a consensus position on educational needs as it is a validated, systematic approach to achieving consensus.[12] When using a Delphi process, a group of relevant experts is consulted anonymously over several rounds and the input given from these rounds is aggregated to achieve an agreed position.[13] The anonymous nature of responses avoids panelists's responses from being swayed by dominant individuals and allows for the collection of a comprehensive range of opinions. The Delphi process usually concludes after an

agreed consensus is reached. In modified Delphi studies a pre-defined number of input rounds is used to improve efficiency.[14] Where an electronic survey is used Delphi studies may be referred to as using an e-Delphi method.[15]

For this study a three-step modified e-Delphi method was employed.[15] Proposed quality indicators for conducting a Delphi study were followed including: assigning a planning committee, establishing consensus thresholds prior to commencing the study, defining expert panel and participant selection procedures, defining survey format and question structure and establishing analysis requirements.[13]

The planning committee consisted of three researchers from the Discipline of Pharmacy at the University of Technology Sydney. All researchers are experienced tertiary educators with experience working with pharmacists in general practice. Research methods were established in a face to face meeting.

Delphi panels can vary in size from six to over 1000 with no established agreement in the literature around the ideal size.[13] A minimum number of ten panel participants was set by the planning committee.

Consensus was defined when: ≥ 75% of respondents provide a positive result (four or five) on the Likert-type scale for all criteria.

Consensus was defined as excluded when: ≥ 75% (of respondents provide a negative response (one or two) on the Likert-type scale for all criteria.

The non-consensus threshold was defined when the proposed priority research question met neither the inclusion or exclusion thresholds.

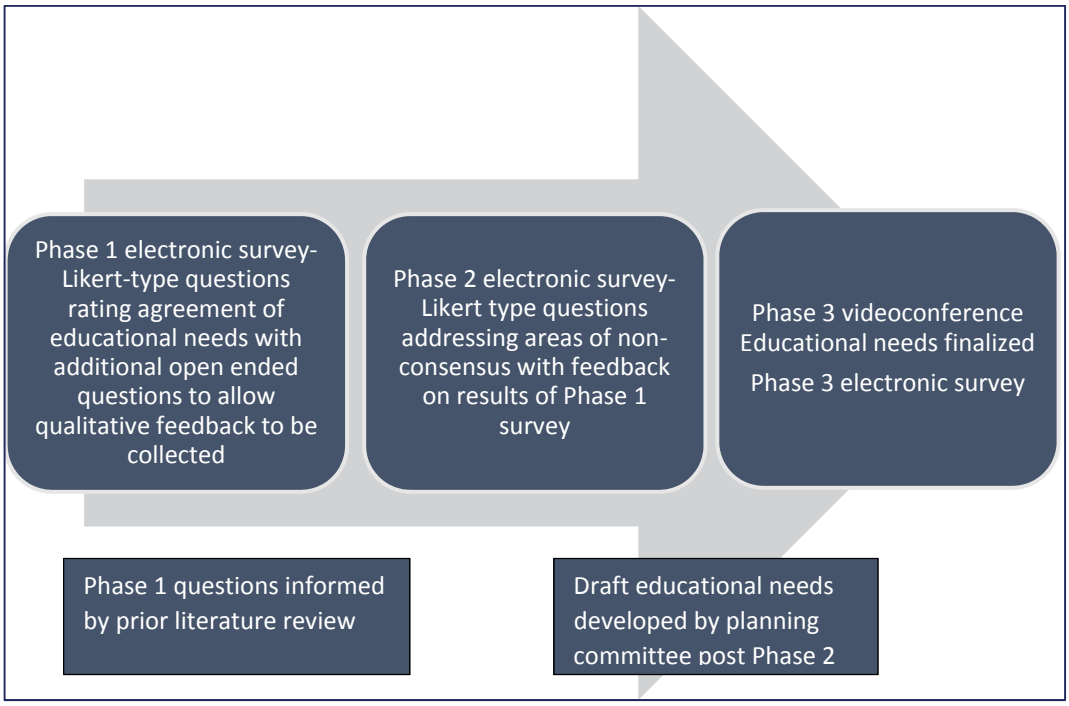
Pharmacy practice educators were selected for the expert panel as they were judged most likely to be fully aware of the educational content of current pharmacist pre-

registration training and therefore deemed to have a good understanding of the skills and knowledge that newly registered/licenced pharmacists were likely to have.

Potential expert panel participants were selected from all Australian Universities offering pharmacy education by the planning committee. Potential participants were e-mailed materials to inform them of the study objectives and design and the commitment required for participation.

Figure 1 is an overview of the modified e-Delphi process used for this study

Figure 1: Study Method



Prior to distribution of the Phase 1 electronic survey it was piloted amongst ten pharmacy academics not participating as part of the expert panel and feedback was gathered to ensure question readability and clarity of interpretation.

In Phase 1 panelists' opinions relating to the educational needs of GP pharmacists was recorded using an electronic data collection form. Participants were asked to rank the educational needs for GP pharmacists related to each GP pharmacist role individually using a 5-point Likert-type scale (see Table 1).

Table 1: Phase 1 and 2 Survey Likert Scale

1	2	3	4	5
Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

Two open-ended questions were included in the Phase 1 survey to enable panelists to raise any additional areas of potential educational needs and suggestions for survey improvement.

Panellists were give two weeks to respond to the Phase 1 survey with follow up e-mails sent after one week and again after ten days.

In the Phase 2 subsequent ranking evaluation, the results of the Phase 1 survey were reported to the expert panel. The expert panel were then asked to respond to the Phase 2 survey with the aim of resolving items of non-consensus. Panelists were given two weeks to respond to the Phase 2 survey with follow up e-mails sent after one week and again after ten days.

To allow for the geographical and cost constraints associated with having expert panel members from multiple states in Australia, the planning committee decided that the Phase 3 moderated discussion would be held by videoconference.

The one hour Phase 3 videoconference was designed to allow expert panel members to reassess their views through moderated discussion with the aim of achieving consensus.

Within two weeks of the videoconference panelists were asked to complete the Phase 3 survey. Follow up e-mails were sent after one week and again after ten days.

Data Collection

Study data was collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tool hosted at The University of Technology Sydney.[16]

REDCap is a secure, web-based application designed to support data capture for research studies providing: (1) an intuitive interface for validated data entry; (2) audit trails for tracking data manipulation and export procedures; (3) automated export procedures for seamless data downloads to common statistical packages; and (4) procedures for importing data from external sources.

Ethical Considerations

Ethics approval for this study was obtained from, the Human Research Ethics Committee at the University of Technology Sydney. (ETH-182851)

Results

with a mean of 24 years registration (±12 years). In addition, the panellists were also seasoned academics with a mean of 15 years academic experience (±6 years).

The expert panel consisted of experienced pharmacy practice educators from five of the eight Australian states/territories and represented a diverse range of pharmacy programs from ten of the eighteen Australian pharmacy schools. The panel included representatives from both rural and metropolitan universities with a mix of both undergraduate and postgraduate pharmacy programs.

All ten panellists participated in the Phase 1 and 2 surveys with nine (90%) of the ten panelists completing the Phase 3 survey. Table 2 illustrates how consensus was reached over the three phases of the study.

Table 2: Phases consensus reached on educational needs

	Phase 1	Phase 2	Phase 3	Total
GP Pharmacist activities identified as EDUCATIONAL NEEDS	6	2	18	26
GP pharmacist activities identified as NOT requiring further training	10	1	6	17
GP Pharmacist activities that failed to reach consensus	32	29	5	5

Table 3 describes the GP pharmacists activities identified as requiring training (educational needs) that reached consensus (agree or disagree).

Table 3: GP pharmacist activities that reached consensus	
GP Pharmacist activities identified as requiring training (EDUCATIONAL NEEDS)	**GP pharmacist activities identified as NOT requiring training**
Comprehensive medication review	Provision of a medication list to patients
Adjusting therapy under protocol	Referring to GPs and other health professionals
Repeat prescribing	Identifying patients affected by drug recalls and health advisories
Independent prescribing	Medication management counselling and education for patients
Conducting focused physical examination	Provision of lifestyle advice
Mentoring new prescribers	Answering medication related questions from patients and health care professionals
Co-ordinating care for chronic disease	Taking a medication history and medication reconciliation
Formulating care plans	Health Promotion
Implementing and documenting care plans	Education on use of devices
Ordering of laboratory tests	Maintaining the medication sample inventory
Developing clinical guidelines and prescribing templates	Collaborating with other health care professionals
Clinical prescribing audit and feedback provision	Identification and resolution of drug related problems
Conducting spirometry	Conducting telephone consultations
Health screening	Attending and presenting at meetings with other healthcare staff
Conducting research	Providing education to GPs and other practice staff
Review of laboratory tests	Liaising between hospital and community pharmacists and across health sectors
Patient goal setting	Provision of group education for chronic diseases
Adherence assessment and counselling	
Participation in multidisciplinary reviews	
Acting as a patient advocate	
Education to improve health and medicines literacy	
Acting as a preceptor for students	
Updating the clinical record	
Ordering of medical equipment	
Assisting with co-ordination of vaccine portfolio and medication budget.	
Conducting quality assurance and drug safety activities	

The panel failed to reach consensus in relation to five GP pharmacist activities including;

1. Review and provision of immunizations (67% consensus reached)
2. Conducting drug use evaluations (56% consensus)
3. Provision of medication and disease management services (56% consensus)
4. Adapting and presenting drug use guidelines (67% consensus)

5. Serving on drug committees. (67% consensus)

Discussion

To our knowledge this study is the first to investigate the educational needs of pharmacists intending to operate in a primary care or general practice setting. This study has established a consensus position from academics across Australia on the educational needs of GP pharmacists. The 75% level of consensus and non-consensus demonstrates a high level of expert panel agreement.[13]

Over half (26) of the 48 GP pharmacist activities were identified as educational needs by the expert panel. Only eight of these educational needs reached consensus in Phases 1 and 2 with a further eighteen reaching consensus in Phase 3. This increase in consensus over time demonstrates the validity of the Delphi technique in allowing clarification and refinement of expert opinion. Table 2 highlights the importance of the videoconference discussion with the number of items of non-consensus reduced from 29 after Phase 2 to just five after Phase 3. The facilitated discussion was so affective as it allowed the panelists to clarify any areas of ambiguity, to communicate their opinions and to hear the opinions of the fellow panellists, allowing them to reach consensus.

Although activities such as conducting comprehensive medication review and adherence assessment are currently included in pre-registration pharmacy programs, these areas were still identified as educational needs by the expert panel. The panel considered that although newly licenced pharmacists may be aware of what is required to conduct these activities ('knows how') they may not have yet reached the required level of clinical competence to accurately and competently perform these tasks (does).[11]

The expert panel's inability to reach consensus in relation to five GP pharmacist activities may have been due to the variation in the pharmacy education programs at the different universities. For example, the review and provision of immunizations has been introduced in several university programs but is yet to be included in others. In addition, there may have been a difference in opinion between panellists on their perception of the capabilities of newly registered/licensed pharmacists. Conducting drug use evaluations and the provision of medication and disease management services had the lowest level of consensus with just 56% agreement between panellists. Further research into the reason for this difference of opinion would be interesting to investigate in future studies.

Several international GP pharmacist education programs currently exist and their content has been reviewed to enable the results of our study to be placed in context.[5-9] When considering the processes followed by educational designers in the development of these programs, there is limited detail documented in the literature. No published information in regards to the processes used in the development of the UK program "Developing Clinical Pharmacists in General Practice" was identified.[6] Moczygemba *et al* briefly described the content design of the Canadian ADAPT patient skills program outlining that course content was developed in response to consultation with Canadian pharmacy educators and researchers.[8] The Netherlands 15-month primary care pharmacist training program designers followed a similar approach to the authors by first determining relevant activities performed by the GP pharmacist role by consulting five clinical pharmacy experts from two (of three) Dutch universities.[5] The program was then developed by adapting clinical pharmacy (not GP pharmacist) programs from the US, Canada and Europe. The Delphi study expert consensus approach taken by the study authors to determine content for the

GP pharmacist program contrasts with the less comprehensive approaches taken by the international programs.

When comparing international GP pharmacist education program content with the educational needs identified by the expert panel, several similar themes were identified. The UK program focused on the development of medication review and clinical examination skills activities which were both identified as part of our study.[6] One area of GP pharmacist educational need not covered by the UK course is training in relation to independent and supplementary prescribing. This may be because prescribing by pharmacists is covered under a separate training program in the UK (although, all GP pharmacists are encouraged to also become prescribers) and leads to a recognized prescribing qualification.[17]

The Canadian ADAPT program themes of medication assessment, interprofessional collaboration, patient interviewing and assessment, evidence-based clinical decision making and record keeping align with several of the educational needs identified as part of our study.[8] As ADAPT was designed to solely develop skills in dealing with patients, it did not address educational needs related to population management and system level improvement such as developing clinical guidelines and performing clinical prescribing audits and was therefore not designed to be as comprehensive as the program developed by the authors.[9]

Five key learning objectives were developed for the Netherlands program including (1) communication with patients, (2) identification of drug-related problems, (3) development of pharmaceutical care plans, (4) quality control of general practice medication related processes and (5) education of prescribers and other healthcare professionals.[6] These key learning objectives align well with the educational needs

identified as a result of our study including: comprehensive medication review, care plan development, clinical prescribing audit , quality assurance activities and education to improve health and medicines literacy. As a result the Netherlands program was similar to our program in both scope and content.

As discussed above, the educational needs identified by the expert panellists in this study have common themes with GP pharmacist educational programs internationally. The differences identified between countries may be as a result of international variation in healthcare systems and pharmacist roles. This study is the first to describe in detail the approach taken to establish an evidence base for GP pharmacist education program design. Ensuring the program is designed to address identified educational needs enables it to be tailored to address these needs with the aim of producing competent, practice-ready GP pharmacists.

Limitations of this educational needs study included the fact that not all invited pharmacy practice educators approached agreed to participate in the study and therefore a number of Australian universities were not represented on the expert panel. As the panel included representatives from both rural and metropolitan universities and a range of undergraduate and postgraduates programs. This range and diversity of the panel university programs may have increased the generalisability of the panel findings and mitigated this limitation.

An additional limitation of the study is that the third round videoconference had to be held over two sessions and this may have reduced the depth of discussion. However, this limitation was mitigated by the fact that representatives from the research team were present at both meetings and facilitated the communication of feedback for the panelists who were unable to attend.

Conclusion

The high level of autonomy and broad scope of practice required by GP pharmacists resulted in the identification by the expert panel of twenty six educational needs that newly licenced/registered pharmacists are required to address in order to competently perform the GP pharmacist role. This study contributes to the international body of evidence relating to GP pharmacist education and the findings from this study were used by pharmacy education designers to inform the development of a post-graduate training program for GP pharmacists in Australia.

Conflicts of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Funding

No funding was received for this study.

Acknowledgements

The authors would like to acknowledge the Western Sydney Primary Health Network. In addition, the authors would like to acknowledge the significant contribution of the expert panel members in providing both their time and expertise. The first author is supported by an Australian Government Research and Training Grant.

References

1. Weber ZA, Skelley J, Sachdev G, et al. Integration of pharmacists into team-based ambulatory care practice models. *Am J Health Syst Pharm.* 2015;72(9):745-751.
2. Benson H, Lucas C, Benrimoj SI, Williams KA. The development of a role description and competency map for pharmacists in an interprofessional care setting. *Int J Clin Pharm.* 2019.
3. Tan EC, Stewart K, Elliott RA, George J. Pharmacist services provided in general practice clinics: a systematic review and meta-analysis. *Res Social Adm Pharm.* 2014;10(4):608-622.
4. Benson H, Sabater-Hernández D, Benrimoj SI, Williams KA. Piloting the Integration of Non-Dispensing Pharmacists in the Australian General Practice Setting: A Process Evaluation. *Int J of Int Care.* 2018;18(2).
5. Hazen A, de Groot E, de Gier H, Damoiseaux R, Zwart D, Leendertse A. Design of a 15-month interprofessional workplace learning program to expand the added value of clinical pharmacists in primary care. *Curr Pharm Teach Learn.* 2018;10(5):618-626.
6. The University of Manchester Centre for Pharmacy Postgraduate Education (CPPE). Developing your career: GP pharmacist training pathway. Accessed at<https://www.cppe.ac.uk/career/gp-pharmacist-training-pathway> Accessed 10/5/2019
7. Butterworth J, Sansom A, Sims L, Healey M, Kingsland E, Campbell J. Pharmacists' perceptions of their emerging general practice roles in UK primary care: a qualitative interview study. *Br J Gen Pract.* 2017;67(662):e650-e658.

8. Moczygemba LR, Pierce AL, Dang A, Emberley P, Czar MJ, Matzke GR. The ADAPT online education program: A tool for practicing pharmacists delivering patient-centered care. *J Am Pharm Assoc (2003).* 2017;57(5):601-607.

9. Farrell B, Dolovich L, Emberley P, et al. Designing a novel continuing education program for pharmacists:: Lessons learned. *Can Pharm J (Ott).* 2012;145(4):E7-E16.

10. Pharmaceutical Society of Australia General Practice Pharmacist Essential Guide. Ed: Pharmaceutical Society of Australia. Accessed at<https://my.psa.org.au/s/article/GPPharmacistmypsa.org.au/ Date Accessed 10/5/2019

11. Miller G. The Assessment of Clinical Skills/Comptence/Performance. *Acad Med.* 1990;65(9).13. Cole ZD, Donohoe HM, Stellefson ML.

12. Jones J, Hunter D. Qualitative Research: Consensus methods for medical and health services research. *BMJ.* 1995;311(7001):376-380.

13. Mckenna H. The Delphi technique: a worthwhile research approach for nursing? *J Adv Nurs.* 1994;19:1221-1225.

14. Hasson F, Keeney S. Enhancing rigour in the Delphi technique research. *Technol Forecast Soc Change.* 2011;78(9):1695-1704.

15. Cole ZD, Donohoe HM, Stellefson ML. Internet-Based Delphi Research: Case Based Discussion. *J Environ Manage.* 2013;51(3):511-523.17.

16. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)--a metadata-driven methodology and

workflow process for providing translational research informatics support. *J Biomed Inform.* 2009;42(2):377-381.

17. The University of Manchester Centre for Pharmacy Postgraduate Education (CPPE). Developing your career: Prescribing. Accessed at<https://www.cppe.ac.uk/career/prescribing> Accessed 10/5/2019

Chapter 8

General Practice Pharmacist Education Program Design

Training for team-based care: development of a novel continuing education curriculum for general practice pharmacists in Australia.

Medical Teacher (submitted for peer review)

Benson H, Lucas C, Williams KA.

Chapter Description

This chapter addresses the thesis aim of describing the development of an evidence-based education program for GP pharmacists in Australia and the thesis objective of developing an evidence-based curriculum to equip GP pharmacists with the skills and knowledge required to perform the GP pharmacist role.

This chapter outlines the curriculum development process for a Graduate Certificate in Advanced Practice (General Practice Pharmacist) conducted by the research team.

Curriculum Design Background

Figure 4 has been adapted from Ho *et al* and outlines the evidence- based curriculum design model used demonstrating the relationship between GP pharmacist competencies, scope of practice, educational needs, desired learning outcomes, learning activities, assessment, feedback, actual learning outcomes and evaluation. (Ho 2009)

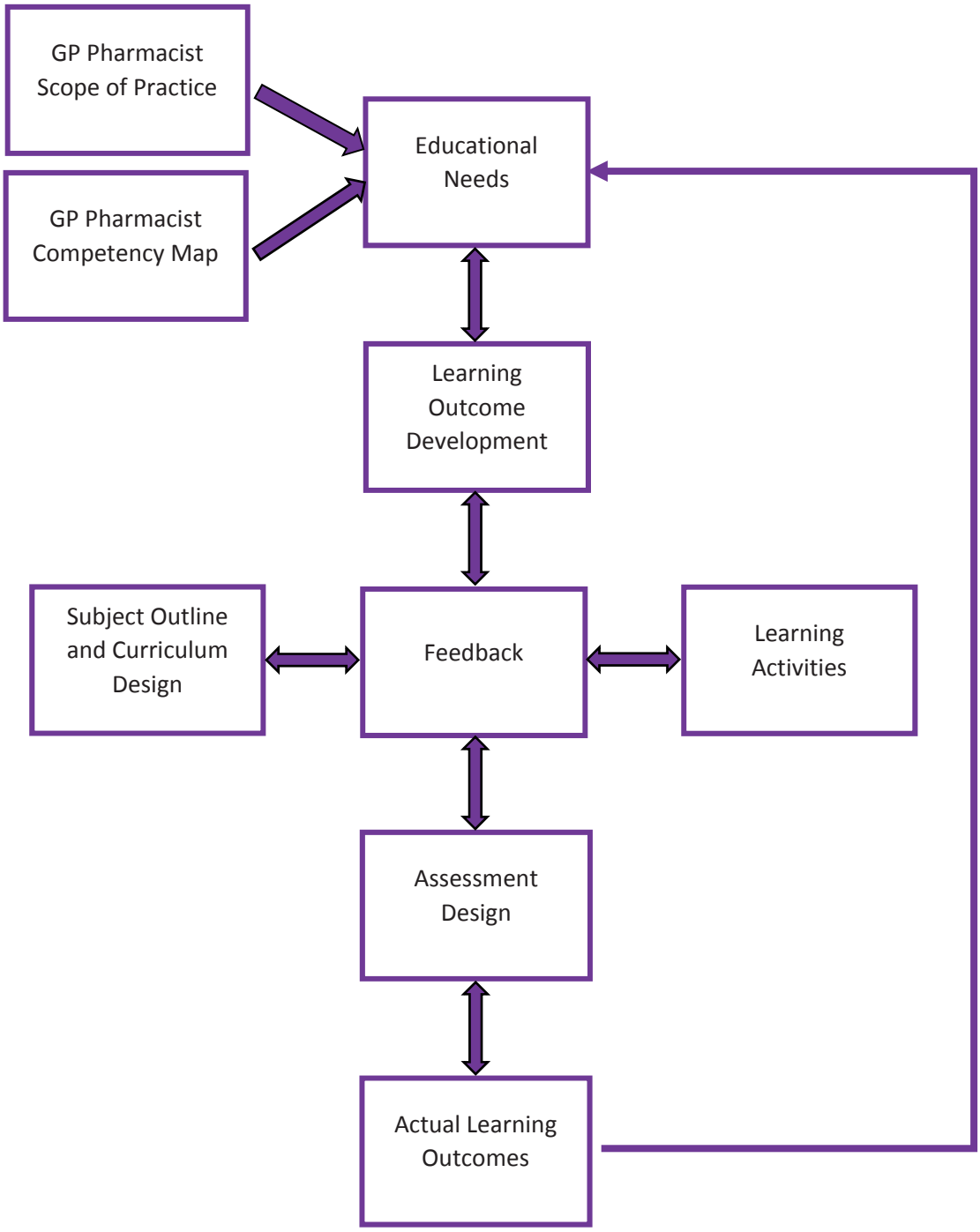
When designing an evidence-based education program the first step was the development of the GP pharmacist scope of practice and competency map (Chapter 6). By comparing the scope of practice requirements of a GP pharmacist with that performed by a pharmacist at attainment of initial general registration, the educational needs of GP pharmacists were determined. As outlined in Chapter 7 a Delphi validation study was undertaken by the research team to establish an expert consensus on GP pharmacist educational needs.

This establishment of learning or educational needs confirmed the educational program requirements and enabled learning outcome design. Learning outcomes were then used to inform the development of the curriculum and learning activities.

Learning outcomes were mapped to the identified educational needs and these in turn were mapped to the course outline, subject outlines and learning activities. The educational program advisory committee was consulted to confirm the course

content was appropriate and suggestions for improvement were incorporated in the design.

Figure 4: GP pharmacist curriculum design model



teaching staff will be evaluated, to allow adjustment and continuous improvement of the curriculum and learning activities. The results from student assessments and feedback relating to the course will allow the establishment of the actual course learning outcomes for participants. These actual course outcomes will then be used to further refine student educational needs and allow for refinement and continuous improvement of the program.

GP Pharmacist Education Programs Background

Internationally education programs for GP pharmacists are limited. Specific GP pharmacist programs have been developed in the United Kingdom (UK) and the Netherlands and more general primary care pharmacist education is available in the United States of America (USA) and Canada. (Butterworth 2017; Health Education England 2016; Hazen 2018b; Moczygemba 2017)

In Australia, the Pharmaceutical Society of Australia (PSA) currently has some introductory educational modules for GP Pharmacists but there is no comprehensive evidence based education program aimed at addressing the educational needs of GP Pharmacists that results in a postgraduate qualification currently available. (Pharmaceutical Society of Australia 2016b)

Implications of Research

By producing a competency-based curriculum supported by evidence, the education program is designed to produce pharmacists with the skills and knowledge required to competently perform the GP pharmacist role. Future research is planned to assess the course and to allow for continuous improvement of the program going forward.

Training for team-based care: development of a novel continuing education curriculum for General Practice pharmacists in Australia.

Authors

Helen Benson. PhD Candidate, BPharm; Graduate School of Health, University of Technology, Sydney, Australia. Email: helen.benson@uts.edu.au

Cherie Lucas. PhD, BPharm, GradCertEdSt (Higher Educ). Pharmacy lecturer (UTS: Pharmacy); Graduate School of Health, University of Technology Sydney, Australia. Email: cherie.lucas@uts.edu.au

Jim Woulfe. BA, MEd. Educational Designer; Graduate School of Health, University of Technology Sydney, Australia. Email: jim.woulfe@uts.edu.au

Kylie A. Williams. PhD, BPharm, DipHospPharm. Head of Discipline (UTS: Pharmacy); Graduate School of Health, University of Technology Sydney, Australia. Email: kylie.williams@uts.edu.au

Corresponding author: Helen Benson
Graduate School of Health, University of Technology Sydney.
Level 4, Building 7, 67 Thomas St, Ultimo (PO Box 123)
Phone: +61 2 9514 7236; Email: helen.benson@uts.edu.au

Abstract

Background: The integration of pharmacists into primary care and general practice teams is expanding. Educating pharmacists to equip them with the skills and knowledge to perform as part of a primary care team will facilitate this expanded scope of practice.

Aim: This paper describes the rationale and approach for the development of a competency-focussed curriculum of a novel postgraduate pharmacist education programme in Australia.

Methods: The authors describe an evidence-based approach to curriculum development including establishing an educational programme advisory committee, consultation with an expert panel of Australian pharmacy practice educators, course content development by specialist faculty members and mapping of curriculum to both learning outcomes and competency standards.

Conclusions: Including the achievement of external competencies in the curriculum ensures that the education programme is fit for purpose and designed to provide pharmacists with the skills, training and knowledge required to perform the general practice pharmacist role. By ensuring that the majority of content is delivered in an online flexible fashion, it is hoped that pharmacists from all areas of Australia will have the opportunity to be trained for this evolving role. The education programme is due to be piloted in 2020, followed by an evaluation of the programme to allow further adjustment and improvement of the course design.

Practice Points

- Competency-based education is increasingly being adopted as an evidence-based method of curriculum design for pharmacist continuing education.
- The GP pharmacist scope of practice and competency map was used to identify potential pharmacist educational needs.
- Educational needs are established by considering the skills and knowledge of the registered practitioner prior to commencing the course and comparing them to the skills and knowledge desired to perform the role.
- Competency-based education has a focus on the assessment of learning outcomes rather than assuming learning has occurred just because educational content has been delivered.

Notes on Contributors

Helen Benson is an experienced consultant pharmacist who works as a practitioner teacher teaching pharmacy professional services subjects for the Discipline of Pharmacy at the University of Technology Sydney, Australia. Helen is in the final stages of a PhD investigating the integration of pharmacists in Australian general practice settings.

Dr Cherie Lucas is a lecturer from the Discipline of Pharmacy at the University of Technology Sydney. Cherie has been a registered pharmacist for more than 27 years and is currently a trained Pharmacist Immuniser and Accredited Mental Health First Aid Instructor and university Lecturer. Cherie has had more than 18 years' experience in teaching pharmacy at both The University of Sydney and the University of Technology Sydney. Cherie's main areas of interest in pharmacy practice includes: hospital, community, industry, academia and research most recently interprofessional education and collaboration.

Mr Jim Woulfe is an educational designer from the Graduate School of Health at the University of Technology Sydney, experienced in the development and mapping of health curricula.

Professor Kylie Williams is the Head of the Discipline of Pharmacy from the Graduate School of Health at the University of Technology Sydney, Australia.

Professor Williams has extensive experience as PhD supervisor she is a registered pharmacist with more than 20 years of academic experience in teaching and research at both the University of Technology Sydney and The University of Sydney.

Introduction

Pharmacists' involvement as part of primary care or general practice teams is increasing, but few education programmes address the specific needs of General Practice (GP) pharmacists. Specific GP pharmacist education programmes have been developed in the United Kingdom (UK) and the Netherlands, and more general primary care pharmacist education is available in the United States of America (USA) and Canada (Butterworth et al., 2017; Hazen et al., 2018; Moczygemba et al., 2017).

Two recent systematic reviews, (Hazen et al., 2018; Tan, Stewart, Elliott, & George, 2014) have highlighted the impact of GP pharmacists in chronic disease management and patient-centred care. GP pharmacists are required to perform a wide range of professional activities, and require additional post-registration training to gain the skills and knowledge required to perform these roles (Anderson, Zhan, Boyd, & Mann, 2018; Benson, Sabater-Hernández, Benrimoj, & Williams, 2018).

In Australia, the Pharmaceutical Society of Australia (PSA) has developed continuing professional development modules for GP pharmacists (Pharmaceutical Society of Australia, 2016a), but these do not currently lead to a post-graduate qualification for pharmacists wishing to practice in this area.

Aim

This aim of this paper is to describe the rationale and approach for the development of a novel postgraduate pharmacist education programme for pharmacists integrated into the Australian general practice setting, oriented towards the competencies required for practice.

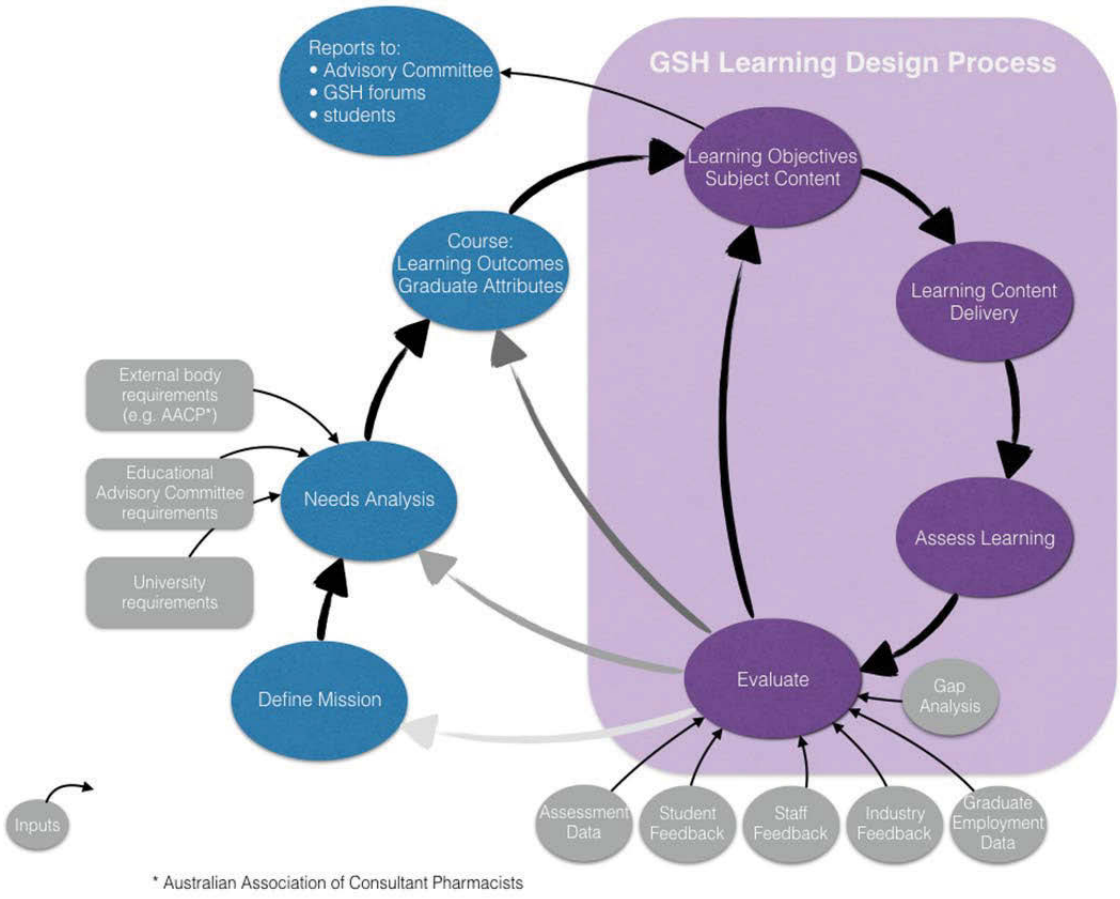
Setting

The Graduate School of Health (GSH) is a specialised school within the University of Technology Sydney, Australia, set up to deliver graduate-entry masters

programmes leading to a qualification in a health discipline. Currently, Masters' programmes are offered in Pharmacy, Clinical Psychology, Orthoptics, Physiotherapy, Genetic Counselling and Speech Pathology. The GSH is committed to graduating work-ready professionals, capable of leading change in a rapidly changing environment. The School's masters programmes embody a constructivist approach to learning (Biggs & Tang, 2011) while addressing the competency standards of the accrediting bodies for each respective discipline (for example, Pharmaceutical Society of Australia, 2016b).

In response to a specific need identified by an Australian local area health service, academics from the GSH Discipline of Pharmacy were appointed to develop and deliver a postgraduate continuing education programme for GP pharmacists. It was decided to follow the School's established learning design process (see Figure 1), incorporating industry consultation, collaborative development of learning objectives, alignment with industry competency standards, and comprehensive feedback and evaluation processes. Aligned with the Australian Qualifications Framework (https://www.aqf.edu.au/sites/aqf/files/aqf-2nd-edition-january-2013.pdf) at the postgraduate level, the course is a Graduate Certificate in Advanced Practice (General Practice Pharmacist), a formal qualification enabling licensed pharmacists to develop the skills and knowledge required to carry out the role of GP pharmacist.

Figure 1: GSH Learning Design Process adapted for the Graduate Certificate in Advanced Practice (GP Pharmacist)



The part-time programme takes a minimum of 12 months to complete. The programme is designed for multi-modal delivery, integrating short on-campus residential components, online modules and clinical placement experiences.

Rationale

The WentWest General Practice Pharmacist Project was commissioned to trial the implementation of a patient-centred primary care model including a pharmacist as part of the general practice team. This project involved the integration of pharmacists across multiple general practice sites in Western Sydney. The project commenced in March 2016 and is ongoing. An evaluation of the project identified that a lack of specific GP pharmacist training as a significant barrier to the intervention's success (Benson, Lucas, Kmet, Benrimoj, & Williams, 2018; Benson et al., 2018).

In response to this evidence, and due to the increasing number of pharmacists practicing in general practice settings in Australia, the development of an explicit curriculum directed at providing GP pharmacists with the skills, training and knowledge to perform the role was required. A competency-based curriculum was deemed particularly relevant for the Graduate Certificate programme as it would enable the programme to be focussed on equipping pharmacist learners to perform the GP pharmacist professional role.

Curriculum development

Recently, competency-based models are becoming the dominant method for evidence-based curriculum development in the health sciences (Gruppen et al., 2016; Iglar, Whitehead, & Takahashi, 2013; Katajavuori et al., 2017; Lockyer et al., 2017). In 2010, the Carnegie Foundation's Flexner centenary report related to the future of medical education in the USA (Cooke, Irby, O'Brien, & Shulman, 2010) endorsed a competency-based approach to curriculum development as a gold standard.

However, the use of competency-based education is still an emerging practice in pharmacy continuing education (Bruno, Bates, Brock, & Anderson, 2010; Farrell et al., 2012; Foot et al., 2017; Koster, Schalekamp, & Meijerman, 2017). According to Frank *et al* competency-based education differs from traditional educational approaches as it focuses on outcomes and abilities of graduates, reducing the emphasis on time-based training and promoting learner-centredness (Frank et al., 2010).

Competency-based models are closely linked to the assessment of educational outcomes but the relationship to teaching and learning activities is less well established (Morcke, Dornan, & Eika, 2013). The approach for the programme curriculum design included combining the outcomes identified through a competency-focussed approach with the principles of constructive alignment to ensure that all aspects of the course were tailored to reinforce each other. A constructively aligned curriculum is described as one that envelops the learner in a system, where intended learning outcomes, teaching and learning activities, assessment tasks and their grading are designed to support each other (Biggs & Tang, 2011). In addition, Boud *et al* emphasises the importance of designing

assessments that facilitate learning and encourage prospective learning after completion of the training programme (Boud and Falchicov 2006).

Course Construction

Figure 1 shows the GSH learning design process. In the case of the Graduate Certificate in Advanced Practice (General Practice Pharmacist), the needs analysis phase included defining the GP pharmacist scope of practice by performing a comprehensive review of the international literature relating to the roles of GP pharmacists. A GP pharmacist competency map was developed by mapping the roles included in the scope of practice to the National Competency Standards Framework for Pharmacists in Australia, 2016 (Pharmaceutical Society of Australia, 2016b).

The results of the literature review identified seven role sub-categories and 48 individual activities performed by GP pharmacists. Figure 2 outlines the seven role subcategories.

Examples of GP pharmacist activities from each role sub-category are:

(1) Medication management activities included conducting comprehensive medication review and repeat prescribing,

(2) Patient examination and screening activities included conducting spirometry and the review and provision of immunisation,

(3) Chronic disease management activities included conducting group education for chronic disease and adjusting doses under a chronic disease treatment protocol,

(4) Research activities included participating in general practice research projects,

(5) Drug information and education activities included the provision of medication education to both prescribers and patients,

(6) Audit and quality and assurance activities included conducting drug use evaluations and audits of prescribing and

(7) Collaboration and liaison activities included transition of care management between hospital, community and aged care settings.

Figure 2: GP Pharmacist role subcategories

When designing the postgraduate course, the educational design team needed to differentiate between GP pharmacist activities that could be performed by newly registered pharmacists, and those that registered/licensed pharmacists would need additional training to gain the skills and knowledge to perform.

Both the GP pharmacist scope of practice and competency map were used to define proposed GP pharmacist educational needs. An expert panel of Australian pharmacy practice educators was consulted via a Delphi validation process to establish a consensus position on the educational needs of registered/licensed pharmacists wishing to perform the GP pharmacist role.

The Delphi validation process is a method used to establish an evidence-based consensus by providing a systematic method for collecting and aggregating informed judgements from a group of experts via multiple rounds of input (McKenna, 1994). Feedback given following sequential rounds allows experts to be informed by the opinions of other panellists and to reassess their responses in light of this feedback. The Delphi method maximises the benefits of using an expert panel while allowing anonymity of response (Thangaratinam, 2005).

Pharmacy practice experts were approached from all Australian pharmacy schools and experts from ten of a possible eighteen pharmacy schools (56%) participated as part of the panel. The expert panel agreed that the GP pharmacist programme needed to provide training in all role sub-category areas and for 30 GP pharmacist activities. Examples of GP pharmacist activities designated as educational needs included conducting comprehensive medication review, repeat prescribing, conducting focused physical examinations and clinical prescribing audits.

The panel deemed that some individual GP pharmacist activities such as taking a medication history, counselling on lifestyle modifications and providing medication device training did not need to be addressed by the programme as pharmacists would be capable of performing these roles at initial registration.

The GP pharmacist educational needs identified by the expert panel, were used to inform both the learning outcomes for the programme and the learning objectives for the Units of Study (UoS). Four UoS have been developed to address the educational needs identified.

The four UoS include:

(1) medication management (for pharmacists not accredited to perform medication reviews) OR Advanced medication management[1] (for pharmacists who are accredited to perform medication review)
(2) interprofessional communication and collaboration
(3) evidence based practice; and
(4) clinical placement in general practice.

The GP Pharmacist Educational Programme Advisory Committee (Consisting of a General Practitioner, three pharmacy practice experts, an educational designer and

[1] In Australia, pharmacists can undertake postgraduate training to be credentialed as accredited pharmacists able to perform government-funded medication review services. Pharmacists completing the Graduate Certificate in Advanced Pharmacy Practice program who are currently accredited to provide medication review services, will be enrolled in the advanced medication management unit of study.

two representatives from the Western Sydney Primary Health Network) was consulted to confirm the validity of learning outcomes and objectives, learning activities, unit of study outlines and curriculum design. Learning outcomes and objectives, learning activities and assessment tasks were aligned to support the learner in the development of professional competence.

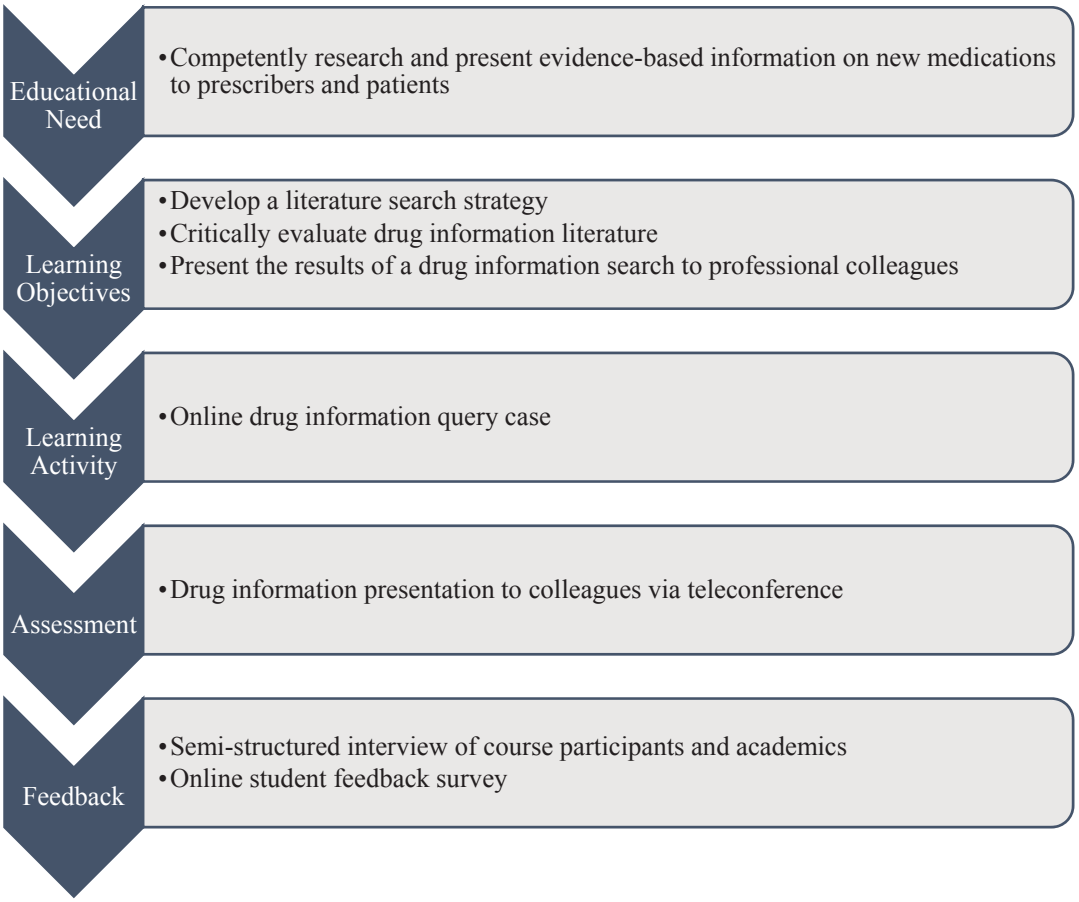
Learning activities have been developed to address the learning objectives, with the needs of programme learners at the heart of the design. Participants are registered/licensed pharmacists and will likely to be juggling the requirements of work at the same time as completing the programme requirements. In response to this, learning activities have been designed for flexible delivery, with one-week residential components at the beginning and end of each semester and the remainder of the course content designed to be delivered on-line.

Case-based learning (Tais et al., 2014) will be used, to ensure that students are able to practically apply their learning to real-world scenarios (Lloyd-Jones and Rushworth, 2000). An example of this is in the medication management course unit, where each week pharmacists will be provided with a complex medication management case scenario. Pharmacists will be required to perform a comprehensive medication review and produce a list of recommendations for the collaborating GP which will then be posted on the on-line discussion board for group feedback and comment.

Assessments will include online quizzes, participation in online discussion boards and completion of an advanced practice portfolio where learners will provide evidence from their clinical placement to confirm that they have capably performed the target professional activities. In addition, performing reflections on practical experiences and Objective Structured Clinical Examinations (OSCEs) will also be included as assessment tasks.

Figure 3 shows how an example educational need was constructively aligned to learning objectives, learning activities and assessments.

Figure 3: Example of constructive alignment of educational needs, learning objectives, learning activities and assessment



The planned evaluation processes at completion of the pilot in 2020 include:

- survey and focus group feedback from both programme participants and academic staff,
- analysis of student results to adjust learning objectives and assessments, and
- following the university teaching and learning accreditation process to ensure on-going governance and compliance with University standards.

Discussion

This article describes the development of a comprehensive postgraduate education programme for GP pharmacists. The educational design team used a systematic approach to curriculum development including reviewing the GP pharmacist scope of practice, mapping GP pharmacist competencies, consulting an expert panel of pharmacy practice educators in relating to educational needs and confirmation of the appropriateness of proposed curriculum content with an educational advisory

committee. With a focus on desired learner outcomes and learner-centredness, the use of a competency-based learning design ensures that graduates are equipped to competently perform the GP pharmacist role (Frank et al., 2010).

As course participants will probably be drawn from diverse pharmacy backgrounds, they are likely to have had a wide variety of previous work experiences and educational qualifications. This obliges a need for flexibility in the course design to enable learner-centred course delivery (Iglar et al., 2013). This course flexibility, in the form of recognition of prior learning, is illustrated in the case of the medication management course unit where pharmacists complete either the medication management or advanced medication management modules, depending on whether they have previously completed the educational requirements for medication review accreditation.

Ensuring accessibility is also an important element of successful continuing education design (Farrell et al., 2012). Learners for this course are likely to originate from all states of Australia. Due to the geographical distances between states in Australia, designing the course to provide a combination of short residential components, online tasks and clinical placements in the students' local areas will ensure the course is suitable for a wider range of pharmacist participants.

In order to ensure that graduate outcomes align with the competencies required of GP pharmacists, the Graduate Certificate in Advanced Pharmacy Practice is designed to accommodate the need for adjustment and continuous improvement as the GP pharmacist scope of practice evolves. This is demonstrated by the planned collection of survey and focus group feedback from programme participants and academic staff.

Conclusion

The Graduate Certificate in Advanced Pharmacy Practice is a successful extension of the approach used in the GSH for the development of graduate-entry masters programs in health disciplines. This evidence-based approach to curriculum development has combined a widely consultative, needs-focussed approach with the best of constructivist methodologies to achieve a set of learning objectives that align with the competencies identified by the representatives of Australian pharmacy

schools. It is expected that pharmacists completing the course are equipped with the skills, training and knowledge to provide best-practice general practice pharmacy care to their patients.

Acknowledgements

The authors thank the Western Sydney Primary Health Network for their contribution to the development of this program. In particular Dr Kean Seng-Lim and Mr Walter Kmet for their ongoing support and contributions.

Funding

Author one is supported by an Australian Government Research and Training Grant. This research was funded by the Western Sydney Primary Health Network (Project ID PRO 17-4279)

Declaration of Interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the article.

References

Anderson, C., Zhan, K., Boyd, M., & Mann, C. (2018). The role of pharmacists in general practice: A realist review. *Res Social Adm Pharm*. doi:10.1016/j.sapharm.2018.06.001

Benson, H., Lucas, C., Kmet, W., Benrimoj, S. I., & Williams, K. (2018). Pharmacists in general practice: a focus on drug-related problems. *Int J Clin Pharm, 40*(3), 566-572. doi:10.1007/s11096-018-0617-9

Benson, H., Sabater-Hernández, D., Benrimoj, S. I., & Williams, K. A. (2018). Piloting the Integration of Non-Dispensing Pharmacists in the Australian General Practice Setting: A Process Evaluation. *International Journal of Integrated Care, 18*(2). doi:10.5334/ijic.3293

Biggs, J. B., & Tang, C. (2011). *Teaching For Quality Learning At University*. Maidenhead,United Kingdom: McGraw-Hill Education.

Boud, D and Falchikov N, (2006). Aligning assessment with long-term learning, *Assessment and Evaluation in Higher Education*, 31, 4, 399-413. doi: 10.1080/02602930600679050

Bruno, A., Bates, I., Brock, T., & Anderson, C. (2010). Towards a global competency framework. *American Journal of Pharmaceutical Education, 74*.

Butterworth, J., Sansom, A., Sims, L., Healey, M., Kingsland, E., & Campbell, J. (2017). Pharmacists' perceptions of their emerging general practice roles in UK primary care: a qualitative interview study. *Br J Gen Pract, 67*(662), e650-e658. doi:10.3399/bjgp17X691733

Cooke, M., Irby, D. M., O'Brien, B. C., & Shulman, L. S. (2010). *Educating Physicians : A Call for Reform of Medical School and Residency*. Hoboken, UNITED STATES: John Wiley & Sons, Incorporated.

Farrell, B., Dolovich, L., Emberley, P., Gagné, M.-A., Jennings, B., Jorgenson, D., . . . Woloschuk, D. M. M. (2012). Designing a novel continuing education program for pharmacists: Lessons learned. *Canadian Pharmacists Journal / Revue des Pharmaciens du Canada, 145*(4), e7-e16. doi:10.3821/145.4.cpje7

Foot, H., Freeman, C., Hemming, K., Scott, I., Coombes, I. D., Williams, I. D., . . . Cottrell, N. (2017). Reducing Medical Admissions into Hospital through Optimising Medicines (REMAIN HOME) Study: protocol for a stepped-wedge, cluster-randomised trial. *BMJ Open, 7*(4), e015301. doi:10.1136/bmjopen-2016-015301

Frank, J. R., Snell, L. S., Cate, O. T., Holmboe, E. S., Carraccio, C., Swing, S. R., . . . Harris, K. A. (2010). Competency-based medical education: theory to practice. *Med Teach, 32*(8), 638-645. doi:10.3109/0142159X.2010.501190

Gruppen, L. D., Burkhardt, J. C., Fitzgerald, J. T., Funnell, M., Haftel, H. M., Lypson, M. L., Vasquez, J. A. (2016). Competency-based education: programme design and challenges to implementation. *Medical Education, 50*(5), 532-539. doi:10.1111/medu.12977

McKenna, H, (1994). The Delphi technique: a worthwhile research approach for nursing? *Journal of Advanced Nursing, 19*, 1221-1225.

Hazen, A., de Groot, E., de Gier, H., Damoiseaux, R., Zwart, D., & Leendertse, A. (2018). Design of a 15-month interprofessional workplace learning program to expand the added value of clinical pharmacists in primary care. *Curr Pharm Teach Learn, 10*(5), 618-626. doi:10.1016/j.cptl.2018.01.006

Hazen, A. C. M., de Bont, A. A., Boelman, L., Zwart, D. L. M., de Gier, J. J., de Wit, N. J., & Bouvy, M. L. (2018). The degree of integration of non-dispensing

pharmacists in primary care practice and the impact on health outcomes: A systematic review. *Res Social Adm Pharm, 14*(3), 228-240. doi:10.1016/j.sapharm.2017.04.014

Ho S, K. D., Lau C B, Yeung M B, Leung D Y, Moses S C. (2009). An Outcomes-based Approach to Curriculum Development in Pharmacy. *American Journal of Pharmaceutical Education, 73*(1).

Iglar, K., Whitehead, C., & Takahashi, S. G. (2013). Competency-based education in family medicine. *Med Teach, 35*(2), 115-119. doi:10.3109/0142159X.2012.733837

Iobst, W. F., Sherbino, J., Cate, O. T., Richardson, D. L., Dath, D., Swing, S. R., Frank, J. R. (2010). Competency-based medical education in postgraduate medical education. *Med Teach, 32*(8), 651-656. doi:10.3109/0142159X.2010.500709

Katajavuori, N., Salminen, O., Vuorensola, K., Huhtala, H., Vuorela, P., & Hirvonen, J. (2017). Competence-Based Pharmacy Education in the University of Helsinki. *Pharmacy, 5*(2), 29. doi:http://dx.doi.org/10.3390/pharmacy5020029

Koster, A., Schalekamp, T., & Meijerman, I. (2017). Implementation of Competency-Based Pharmacy Education (CBPE). *Pharmacy, 5*(1), 10. doi:http://dx.doi.org/10.3390/pharmacy5010010

Lloyd-Jones, G., & Rushworth, S. (2000). Problem-based Learning in Medicine: A Practical Guide for Students and Teachers. *Medical Education, 34*(4), 322-323. doi:10.1046/j.1365-2923.2000.0597f.x

Lockyer, J., Bursey, F., Richardson, D., Frank, J. R., Snell, L., & Campbell, C. (2017). Competency-based medical education and continuing professional development: A conceptualization for change. *Medical Teacher, 39*(6), 617-622. doi:10.1080/0142159X.2017.1315064

Moczygemba, L. R., Pierce, A. L., Dang, A., Emberley, P., Czar, M. J., & Matzke, G. R. (2017). The ADAPT online education program: A tool for practicing pharmacists delivering patient-centered care. *J Am Pharm Assoc (2003), 57*(5), 601-607. doi:10.1016/j.japh.2017.05.007

Morcke, A. M., Dornan, T., & Eika, B. (2013). Outcome (competency) based education: an exploration of its origins, theoretical basis, and empirical

evidence. *Adv Health Sci Educ Theory Pract, 18*(4), 851-863. doi:10.1007/s10459-012-9405-9

Pharmaceutical Society of Australia, (2016a) General Practice Pharmacist Essential Guide. I (Ed.): Pharmaceutical Society of Australia. Retrieved from

Pharmaceutical Society of Australia (2016b) National-Competency-Standards-Framework-for-Pharmacists-in-Australia-2016. Retrieved from

Tais F. Galvao, Marcus T. Silva, Celiane S. Neiva, Laura M. Ribeiro, and Mauricio G. Pereira (2014) Problem-Based Learning in Pharmaceutical Education: A Systematic Review and Meta-Analysis**,** *The Scientific World Journal*, Volume 2014, Article ID 578382 http://dx.doi.org/10.1155/2014/578382

Tan, E. C., Stewart, K., Elliott, R. A., & George, J. (2014). Pharmacist services provided in general practice clinics: a systematic review and meta-analysis. *Res Social Adm Pharm, 10*(4), 608-622. doi:10.1016/j.sapharm.2013.08.006

Thangaratinam S, R. C. (2005). The Delphi technique. *The Obstetrician and Gynaecologist, 7*, 120-125.

Chapter 9

Discussion and Conclusion

Discussion

In this thesis the implementation of an intervention involving the integration of pharmacists in the Australian general practice setting was evaluated. This interprofessional model of practice aligns with the shift towards patient centred team-based primary care. (Moreno 2017)

This thesis explored the processes involved in the implementation of an integrated GP pharmacist intervention. (Chapter 3) By reviewing mechanisms used to achieve the intervention outcomes, barriers and facilitators to the intervention, and how the situational context of the intervention affected both its implementation and potential reproducibility, insights were gained into the processes involved in this collaborative model of care. Further analysis demonstrated that GP pharmacists are effective at detecting and resolving drug-related problems. (Chapter 4) By analysing the recommendations made by GP pharmacists, additional insight was gained in relation to their contribution to patient care. (Chapter 5)

A significant barrier identified from the evaluation, was the lack of comprehensive evidence-based education to equip GP pharmacists with the skills and knowledge for competent performance of their role. In response to this barrier, the latter part of the thesis focussed on the development of a competency-based education program for GP pharmacists. (Chapters 6-8)

This discussion chapter discusses the results of the research conducted as part of this thesis. Steps to improve the implementation of future GP pharmacist interventions, the activities performed by GP pharmacists and the educational needs of registered/licensed pharmacists wishing to perform the GP pharmacist role will be discussed. Finally, the content of the proposed education program and the implications for the pharmacy profession will also be discussed.

Implementation of a GP pharmacist intervention.

Multiple pathways to improve implementation were identified as a result of the evaluation of the GP pharmacist intervention. Patients, GPs, GP pharmacists and other members of the general practice team were all found to have influence over the successful implementation of the intervention.

Two important steps for improving acceptance for a GP pharmacist intervention included (i) ensuring that patients were aware of how a GP pharmacist could assist them and (ii) ensuring that any practice staff (including GPs) understood the potential benefits of incorporating a pharmacist as part of the team for both patients and the practice.

Jorgenson *et al* developed a guideline for pharmacists wishing to integrate into primary care teams and identified that the need for the GP pharmacist to be professionally confident in their decisions and proactive was an important overarching theme in facilitating this model of practice. (Jorgenson 2013)

If GP pharmacists understand the evidence supporting the GP pharmacist role and its potential benefits to both patients and the healthcare team, it is likely that they will not only be more confident, but also better equipped to proactively educate patients and other members of the primary care team about these benefits. Supper *et al* supported this approach recommending that an approach with a professional pharmacist guiding team- building was a facilitator to the integration of pharmacists in primary care. (Supper 2015)

Initially, GP pharmacists need to act as their own advocates. By allowing pharmacists to understand the potential activities they could perform and designing training to furnish them with the skills and knowledge to perform them, the work from this thesis will support pharmacists wishing to operate in the general practice environment. Over time, as the other members of the primary care team develop an understanding of the advantages an integrated pharmacist brings they too are likely to act as supporters and promote the GP pharmacist role.

Once there is widespread support for the GP pharmacist role from patients, GPs and other members of the primary care team it is hoped that there will be a corresponding increase in the level of support and funding for the employment of these pharmacists on an ongoing basis.

An important indicator of success of the GP pharmacist intervention was the acceptance rate of pharmacist recommendations accepted by the GP. One factor found to be important in influencing this indicator was ensuring that pharmacist recommendations provided to the physician were discussed in person rather than via a written report. This could be due to several reasons, with examples including; enabling the physician to raise any concerns or ask for further information and allowing the pharmacist to advocate for the patient by communicating their concerns.

Bardet *et al* identified that true collaboration occurs when regular reciprocal communication is the norm between the pharmacist and physician. (Bardet 2015) Where made possible by a supportive GP and collaborative environment GP pharmacists can help establish their professional credibility and facilitate the development of a truly collaborative relationship by increasing their opportunities for face to face communication.

Ensuring patients are present during the communication of the pharmacist recommendations with the physician was also found to be a facilitator to improving the recommendation acceptance rate. It may be that involving the patient in the decisions that affect their treatment allows them to take ownership of their care. When patients are fully educated about both the potentials risks and benefits of any treatment decision they are truly able to provided informed consent for treatment and are potentially more likely to adhere to the treatment plan. (Berdine 2012)

Training the general practice staff on the pharmacist's role and how they can contribute to patient care was also identified by the pharmacists and GPs from the WentWest GP Pharmacist Project as essential for the success of the intervention.

This correlates with Recommendation 3 of Jorgenson *et al's* guidelines which identified the importance of educating the team about the pharmacist's role. Training the practice staff can be addressed in a variety of ways including by attending staff meetings, presenting case studies that highlight the pharmacist's contribution to care and one on one interactions with individual staff members where the pharmacist job description is discussed. (Jorgenson 2013)

Both pharmacists and GPs from the WentWest General Practice Pharmacist Project also identified the importance of pharmacists being adequately trained in order to competently perform the role as important.

The three observational studies (Chapters 3 to 5) demonstrated an increase in the rate of acceptance of pharmacist's recommendations from 44% in the first study, 70% in the second study to 88% in the final study. One possible reason for this increase is that after the completion of the process evaluation (Chapter 3) the GP pharmacists received training on both the activities to be conducted as part of their consultation and on data collection techniques. In addition, it is logical to expect that the development of the professional relationship, trust and rapport between the pharmacists and the GPs in their teams over time may have improved GP acceptance.

In their guidelines for pharmacists integrating into primary care teams Jorgenson *et al* identified inadequate pharmacist training as a frequently reported barrier to pharmacist integration. (Jorgenson 2013) Recommendation 7 of the guidelines states that even experienced pharmacists will find the primary care role a challenge with a need for the development of expertise in conducting medication assessments, collaborating with other health care professionals, interviewing and assessing patients, developing care plans, completing appropriate documentation and making evidence-based decisions.

The Pharmaceutical Society of Australia's GP Pharmacist Practice Fundamentals course is an introductory course for pharmacists wishing to operate in the general practice environment. (Pharmaceutical Society of Australia 2016c) Due to its

introductory nature, it does not address all the potential learning needs of GP pharmacists and thus there is a need for the development of an evidence-based training program for Australian GP pharmacists.

To design an evidence-based training program it is important to describe the GP pharmacist scope of practice. Once the list of activities performed by GP pharmacists have been categorised, training can be tailored to equip pharmacists with the skills and knowledge to perform these roles.

Activities performed by GP pharmacists

The comprehensive narrative review of the international literature reported in Chapter 6 enabled the research team to define the GP pharmacist scope of practice. This scope of practice differed slightly from the Pharmaceutical Society of Australia's GP pharmacist sample scope of practice which did not include competencies relating to the review and provision of immunisations, mentoring and supervision of students and some competencies relating to research and education. (Pharmaceutical Society of Australia 2016a)

The PSA sample scope of practice was developed in 2016 and there has since been a significant increase in the number of general practice pharmacists both internationally and in Australia. In Australia, several general practice pharmacist projects have commenced since 2016. Evaluations from these projects have demonstrated the evolving nature of the Australian GP pharmacist role and the subsequent requirement for the development of an updated scope of practice. (Develin 2017; Benson 2018a; Foot 2017)

The scope of practice developed in this thesis was based on a review of the international literature. The differences identified between this scope of practice and the PSA sample scope of practice may also be a result of the differences in GP pharmacists' scope of practice in different countries. One example of this difference the ability of GP pharmacists in Canada and the UK to qualify as prescribing pharmacists whereas Australian pharmacists are not currently able to be recognised as authorised prescribers.

Since it commenced in 2015 the NHS clinical pharmacists in general practice project has been expanded from the initial pilot of 470 clinical pharmacists across 700 general practices with an aim of employing over 2000 clinical pharmacists across the United Kingdom by 2020. (NHS England 2016) The independent report produced evaluating the pilot phase of this project reported GP pharmacists performing a wide range of activities that often differed between practice sites. (Mann 2018) An identified barrier to the scheme was the lack of a national competence assessment and capability framework which was speculated to result in the wide variability between pharmacist activities at different sites. (Mann 2018)

By clearly defining the GP pharmacist scope of practice and mapping it to recognised competency frameworks this thesis aims to assist those planning to implement a GP pharmacist intervention by identifying potential activities to be performed by and competencies required of GP pharmacists both in Australia and internationally.

GP's and other members of the healthcare team may use the GP pharmacist comprehensive scope of practice to better understand the activities a GP pharmacist can perform. This understanding may then be used to inform the design of a collaborative care model that capitalises on the unique strengths and abilities of practitioners from each profession included in the team.

In addition, the GP pharmacist scope of practice and competencies related to it allow the identification of potential educational needs of pharmacists wishing to perform the GP pharmacist role. Identifying potential educational needs allows academics designing GP pharmacist education programs to ensure that any course or educational program is tailored to produce graduates with the skills and knowledge required to perform this role.

Educational needs of GP pharmacists

When considering educational needs it is important not only to establish what activities the program needs to prepare graduates to perform the tasks required but also at what level they are required to perform those activities.

Miller's framework for clinical assessment differentiates between having knowledge of a task (knows), knowing how to complete a task (knows how), showing others how to complete a task (shows how) and being able to do a task to a high standard consistently (does). (Miller 1990) When establishing the educational needs of registered/licensed pharmacists the expert panel were asked to consider if a recently registered pharmacist would be able to perform the GP pharmacist activity at the highest level of the framework (does).

Pharmacists in Australia are required to complete a recognised pharmacy undergraduate (Bachelor of Pharmacy) or postgraduate (Masters of Pharmacy) course and an additional 12 months of supervised practice in their pre-registration year which is accompanied by assessment including written and oral examinations. The GP pharmacist role requires practitioners to perform a wide range of professional activities autonomously. As many of the GP pharmacist activities are specific to the GP setting they are unlikely to be activities previously conducted prior to initial professional registration.

As the number of pharmacists employed in the GP setting increases so too will the demand for specific education for these pharmacists. The final published work in this thesis described the approach taken for the development of a GP pharmacist education program.

GP pharmacist education program design

Chapters 6 and 7 described the activities performed by GP pharmacists, their associated competencies and educational needs. Using an outcomes-based approach these educational needs were then used to inform the learning outcomes and objectives of the program. (Ho 2009)

Applying the principles of constructive alignment to the education program design ensured that intended learning outcomes and objectives were supported by both the teaching and learning activities and their grading. (Biggs 2011) It can be speculated that this approach to curriculum design facilitates active learning and

allows graduates to gain the skills and knowledge to allow them to be practice ready and confident in their professional abilities.

Ensuring accessibility of the program for pharmacists from a variety of work backgrounds and multiple areas of Australia has been a priority of the curriculum design approach. In their evaluation of a similar continuing education program for pharmacists Farrell *et al* emphasised the importance of ensuring that the program is practical in both the skills taught and the method of course delivery. (Farrell 2012) The GP pharmacist program content will be delivered in a flexible fashion involving varied learning modes with short one-week residential components at the beginning and end of each semester and the remainder of the course content and assessments to be delivered on-line.

The education program content has been designed to equip Australian pharmacists to perform the current GP pharmacist activities that are within the current NCSFPA competencies and scope of practice. (Pharmaceutical Society of Australia 2016b) However, the flexible approach to curriculum development used by the educational design team allows for adjustment of this content in the case of potential pharmacist scope of practice advances. For example, Australian pharmacists are currently unable to prescribe prescription medication but this may and hopefully will change in the future. In the UK the addition of independent prescribing to the GP pharmacist's role has allowed these pharmacists to contribute significantly to improving patient care and truly reduce the workload of the GPs they support.

The international perspective on GP pharmacist roles presented in this thesis means that the education program has been designed to address educational needs for current and future expanded pharmacist roles. By providing a basis for an evidence-based education program for GP pharmacists this thesis supports pharmacy practice educators wishing to develop similar programs. In addition, pharmacists who participate in the training and their patients are likely to benefit by the new skills and knowledge they have gained.

Educating pharmacists to allow them to operate at their full-scope of practice will allow them to practice at the highest level professionally and will benefit both GPs and other members of the primary care team. When all members of the team are highly competent in their specialist areas and maximally contributing both the team and the patient are likely to benefit.

Strengths

Previous research into the integration of pharmacists in general practice in the Australian setting have been small in scale and often involving only one or two sites and one or two pharmacists. (Tan 2012, Freeman 2013) The observational studies conducted as part of this thesis had the advantage of a multi-site, multi-practitioner design with multiple pharmacists and participating general practices. (Benson 2018a, Benson 2018b, Benson 2018c)

The analysis of barriers and facilitators to the GP pharmacist intervention adds to the body of evidence that may be used to support the design of future interventions. (Jorgenson 2014)

The outcomes from this thesis may be of benefit to Primary Health Networks (PHNs) and other relevant commissioning and funding bodies by illustrating how a GP pharmacist intervention may be implemented and the potential benefits associated with this implementation. In addition, the research into the activities performed by GP pharmacists may assist health service commissioners such as state and federal health departments, private health insurers and primary health networks with understanding what these pharmacists can do and how GP pharmacist services may best be utilised. By improving the awareness and understanding of funding and commissioning bodies in relation to GP pharmacists it is hoped changes will be made to ensure that these pharmacists are funded in a comprehensive, sustainable way in the future.

Previous competency maps for GP pharmacists have been designed for use in individual countries but this meant that they did not include all roles performed by

GP pharmacists internationally. (Kennie-Kaulbauch 2012, Pharmaceutical Society of Australia 2016a) The narrative review of GP pharmacist roles conducted in Chapter 6 identified the wide variety of roles performed by GP pharmacists internationally. The development of a comprehensive role description and competency map using both the international FIP global competency framework and the national Australian NCSFPA competency framework in Chapter 6 ensures that the findings from this research are applicable both locally and internationally.

The investigation of GP pharmacist educational needs in Chapter 7 is a unique piece of research and ensures that the design of the GP pharmacist education program is informed by evidence. The educational design approach of combining a competency-based curriculum design process with the principle of constructive alignment builds on previous curriculum design research and may be used by other health professional educators wishing to develop their own continuing education curriculum. (Frank 2010, Lockyer 2017)

Limitations

The implementation evaluation (Chapters 3-5) was observational in nature and there was no control group allocated to allow for the full impact of the GP pharmacist intervention on outcomes such as patient hospitalisations, improvements in clinical indicators and improvements in quality of life to be evaluated. The pragmatic nature of the research did not allow for allocation of a control group and this will be addressed in future research.

The general practice sites originated from only one area of Australia (Western Sydney) and this may have reduced the generalisability of the results. However, Western Sydney has a varied population with diverse demographics representing regions of both high and low socio-economic status that may have reduced the impact of this concern.

The evidence-base for the educational program development may have been limited by the fact that only pharmacy practice educators were included as expert

panel members in the Delphi study investigation where the opinions of general practitioners or GP pharmacists may have been valuable to include. This was mitigated by the fact that expert panel members were also experienced registered/licensed pharmacists with relevant expertise in both education and pharmacy practice.

Future Directions

Further research is planned and underway in investigating the clinical, humanistic and economic outcomes associated with a GP pharmacist intervention. Clinical outcomes to be investigated include chronic disease indicators such as blood pressure measurements, glycosylated haemoglobin and asthma symptom scores. Humanistic outcomes to be evaluated include health related quality of life measurements and health literacy scores. Economic outcomes include cost-benefit analyses of the intervention and hospitalisation and emergency department visit costs.

Further research to evaluate the GP pharmacist education program to allow for adjustment and ongoing program improvement is also planned.

Conclusions

This thesis is one of the first to describe comprehensively the GP pharmacist scope of practice. By understanding in detail what GP pharmacists can do, pharmacists wishing to practice in this space are able to ensure that they are performing all aspects of the role to benefit patients and other members of the healthcare team. In addition allowing other members of the team to understand the full range of GP pharmacist activities will be enable them to maximise the contribution of all team members and avoid duplication of care.

The outcomes from this thesis have provided pharmacy practice educators with evidence for the design of a GP pharmacist education program. By informing educators on how to equip pharmacists with the skills and knowledge to perform this complex role this thesis is likely to influence the advancement of the pharmacy profession in Australia.

The thesis has addressed the three aims of evaluating the implementation of an integrated pharmacist project, developing a comprehensive role description and competency map for GP pharmacists and describing the development of an evidence-based education program for GP pharmacists.

The results of this thesis may be used to support the implementation of similar projects/programs internationally and adds to the body of evidence supporting the integration of pharmacists in primary care settings.

It is the intended that the work from this thesis may be used to promote the importance of the GP pharmacist role by advocating and educating relevant health stakeholders with the aim of enabling sustainable funding and widespread implementation of this model of care.

References

Alexander, J A, and Bae D. 2012. 'Does the patient-centred medical home work? A critical synthesis of research on patient-centred medical homes and patient-related outcomes', *Health Services Management Research*, 25: 51-59. **doi:** 10.1258/hsmr.2012.012001

Anderson C K, Zhan K, Boyd M, and Mann C. 2018. 'The role of pharmacists in general practice: A realist review', *Research in Social and Administrative Pharmacy*. **doi:** 10.1016/j.sapharm.2018.06.001

Austin Z, Dolovich L, Lau E, Tabak D, Sellors C, Marini A, Kennie N. 2005 'Teaching and Assessing Primary Care Skills in Pharmacy: The Family Practice Simulator Model.' *American Journal of Pharmaceutical Education,*69(4):500-507.

Australian Medical Association. 2015. "General Practice Pharmacists Improving Patient Care." Accessed at https://ama.com.au/article/general-practice-pharmacists-improving-patient-care Date Accessed 21/12/2018

Bardet J D, Vo T H, Bedouch P, and Allenet B. 2015. 'Physicians and community pharmacists collaboration in primary care: A review of specific models', *Research in Social and Administrative Pharmacy*, 11: 602-22. **doi:** 10.1016/j.sapharm.2014.12.003

Barnes E, Ashraf I , Din A. 2017. 'New roles for clinical pharmacists in general practice', *Prescriber*: Vol 28 (4) 26-29. **doi:** 10.1002/psb.1558

Basger B J, Moles R J, and Chen T F. 2014. 'Application of drug-related problem (DRP) classification systems: a review of the literature', *European Journal of Clinical Pharmacology*, 70 (7) : 799-815. **doi:** 10.1007/s00228-014-1686-x

Basger B J, Moles R J, and Chen T F. 2015. 'Development of an Aggregated System for Classifying Causes of Drug-Related Problems', *Annals of Pharmacotherapy*, 49: 405-18. **doi:** 10.1177/1060028014568008

Benson H, Lucas C, Kmet W, Benrimoj S I, and Williams K A. 2018a. 'Pharmacists in general practice: a focus on drug-related problems', *International Journal of Clinical Pharmacy*, 40: 566-72. **doi:** 10.1007/s11096-018-0617-9

Benson H, Sabater-Hernández D, Benrimoj S I, and Williams K A. 2018b. 'Piloting the Integration of Non-Dispensing Pharmacists in the Australian General

Practice Setting: A Process Evaluation', *International Journal of Integrated Care*, 18. **doi:** 10.5334/ijic.3293

Benson H, Lucas C, Kmet W, Benrimoj S I, and Williams K A.2018c. 'Pharmacists in general practice: recommendations resulting from team-based collaborative care.' *Australian Journal of Primary Health,*24 (6): 448-454. **doi:** 10.1071/PY18022

Berdine H J and Skomo M L. 2012. 'Development and integration of pharmacist clinical services into the patient-centered medical home', *Journal of the American Pharmacists Association (2003)*, 52: 661-7. **doi:** 10.1331/JAPhA.2012.10206

Biggs J B and Tang C. 2011. 'Teaching For Quality Learning At University.' Maidenhead,United Kingdom: McGraw-Hill Education.

Bush J, Langley C A, Jenkins D, Johal J, and Huckerby C. 2017. 'Clinical pharmacists in general practice: an initial evaluation of activity in one English primary care organisation', *International Journal of Pharmacy Practice*. December 2018, Vol.26(6), pp.501-506 **doi:** 10.1111/ijpp.12426

Butterworth J, Sansom A, Sims L, Healey M, Kingsland E, and Campbell J. 2017. 'Pharmacists' perceptions of their emerging general practice roles in UK primary care: a qualitative interview study', *British Journal of General Practice*, 67: e650-e58. **doi:** 10.3399/bjgp17X692237

Canadian Pharmacists Association. 2016. "Pharmacists Scope of Practice Canada." In. Accessed at https://www.pharmacists.ca/pharmacy-in-canada/scope-of-practice-canada/ Date Accessed 21/12/2018

Carter B L, Coffey C S, Chrischilles E A, Ardery G, Ecklund D, Gryzlak B, Vander Weg M W, James P A, Christensen A J, Parker C P, Gums T, Finkelstein R J, Uribe L, Polgreen L A, and M. EDication Focused Outpatient Care for Underutilization of Secondary Prevention Trial Investigators. 2015. 'A Cluster-Randomized Trial of a Centralized Clinical Pharmacy Cardiovascular Risk Service to Improve Guideline Adherence', *Pharmacotherapy*, 35: 653-62. **doi:** 10.1002/phar.1603

Chisholm-Burns M A, Kim Lee J, Spivey C A, et al. 2010. 'US pharmacists' effect as team members on patient care: systematic review and meta-analyses.', *Medical Care*, 48: 923-33. **doi:** 10.1097/MLR.0b013e3181e57962

Comite de Consenso. 2007. 'Third consensus of Grenada on drug related problems (DRP) and negative outcomes associated with medicines. ', *Ars Pharmaceutica.*, 48: 5-17.

Craig P, Dieppe P, Macintyre S,Michie S, Nazareth I, Petticrew M, and Guidance Medical Research Council. 2008. 'Developing and evaluating complex interventions: the new Medical Research Council guidance', *British Medical Journal*, 337: a1655. **doi:** 10.1136/bmj.a1655

Deloitte Access Economics. 2015. 'Analysis of non-dispensing pharmacists in general practice clinics' Accessed at https://www2.deloitte.com/au/en/pages/economics/articles/analysis-non-dispensing-pharmacists-general-practice-clinics.html Date Accessed 23/1/2019

Develin A. 2017. 'Pharmacists in general practice - ACT pilot program: my journey so far', *Journal of Pharmacy Practice and Research*, 47: 308-12. **doi:** 10.1002/jppr.1367

Dolovich L, Pottie K, Kaczorowski J, Farrell B, Austin Z, Rodriguez C, Gaebel K, and Sellors C. 2008. 'Integrating family medicine and pharmacy to advance primary care therapeutics', *Clinical Pharmacology and Therapeutics*, 83: 913-7. **doi:** 10.1038/clpt.2008.29

Dolovich L. 2012. 'Ontario Pharmacists Practicing in Family Health Teams and the Patient-Centered Medical Home', *Annals of Pharmacotherapy*, 46: 33S-39S. **doi:** 10.1345/aph.1Q804

Elliott R A, Putman K, Franklin M, Verhaeghe N, Annemans L, Eden M, Hayre J, and Avery A. 2013. 'Determining economic impact of a pharmacist-led it-based intervention with simple feedback in reducing rates of clinically important errors in medicines management in general practices (PINCER)', *Value in Health*, 16 (3): A206. **doi:** 10.1016/j.jval.2013.03.1039

Ellitt G R, Engblom E, Aslani P, Westerlund T, and Chen T F. 2010. 'Drug related problems after discharge from an Australian teaching hospital', *Pharmacy World Science*, 32: 622-30. **doi:**10.1007/s11096-010-9406-9

Farrell B, Ward N, Dore N, Russell G, Geneau R, and Evans S. 2013. 'Working in interprofessional primary health care teams: what do pharmacists do?', *Research in Social & Administrative Pharmacy*, 9: 288-301. **doi:**10.1016/j.sapharm.2012.05.005

Farrell B, Pottie K, Haydt S, Dolovich L, Kennie N et al. 2008. 'Examining physicians' perspectives during the integration of a pharmacist into family practice: Qualitative results from the IMPACT study', *Canadian Pharmacists Journal*, 141: 39. **doi:** 10.3821/1913701X200814139:EPPDTI20CO2

Farrell B, Ward N M A, Kennie N, Jorgenson D, Tewodros E, Dolovich L, and Winslade N. 2011. 'Validating primary health care pharmacist competencies: Checking our aim', *Canadian Pharmacists Journal*, 144: 1. **ISSN:** 17151635

Farrell B, Dolovich L, Emberley P, Gagné M-A, Jennings B, Jorgenson D, Kennie N, Marks P Z, Papoushek C, Waite N, and Woloschuk D. 2012. 'Designing a novel continuing education program for pharmacists:: Lessons learned', *Canadian Pharmacists Journal*, 145: E7-E16. **doi:** 10.3821/145.4.cpje7

Federation, International Pharmaceutical. 2012. 'Pharmacy Education Taskforce a Global Competency Framework Version 1'. Accessed at https://www.fip.org/files/fip/PharmacyEducation/GbCF_v1.pdf Date Accessed 23/1/2019

Foot H, Freeman C, Hemming K, Scott I, Coombes I D, Williams I D, L. Connelly L, Whitty J A, Sturman N, Kirsa S, Nicholson C, Russell G, Kirkpatrick C, and Cottrell N. 2017. 'Reducing Medical Admissions into Hospital through Optimising Medicines (REMAIN HOME) Study: protocol for a stepped-wedge, cluster-randomised trial', *BMJ Open*, 7: e015301. **doi:** 10.1136/bmjopen-2016-015301

Frank J R, Snell L S, Cate O T, Holmboe E S, Carraccio C, Swing S R, Harris P, Glasgow N J, Campbell C, Dath D, Harden R M, Iobst W, Long D M, Mungroo D,

Richardson D L, SherbinoJ, Silver I, Taber S, Talbot M, and Harris K A. 2010. 'Competency-based medical education: theory to practice', *Medical Teacher*, 32: 638-45. **doi:** 10.3109/0142159X.2010.501190

Freeman C R, Cottrell W N, Kyle G, Williams I D, and Nissen L. 2013. 'An evaluation of medication review reports across different settings', *International Journal of Clinical Pharmacy*, 35: 5-13. **doi:** 10.1007/s11096-012-9701-8

Freeman C, Cottrell W N, Kyle G, Williams I, and Nissen L. 2012. 'Integrating a pharmacist into the general practice environment: opinions of pharmacist's, general practitioner's, health care consumer's, and practice manager's', *BMC Health Services Research*, 12: 229. **doi:** 10.1186/1472-6963-12-229

Freeman C, Cottrell N, Rigby D, Williams I D, and Nissen L. 2014. 'The Australian practice pharmacist', *Journal of Pharmacy Practice and Research*, 44: 240-48. **doi:** 10.1002/jppr.1027

Gruppen L D, Burkhardt J C, Fitzgerald J T, Funnell M, Haftel H M, Lypson M L, P. B. Mullan P B, Santen S A, Sheets K J, Stalburg C M, and Vasquez J A. 2016. 'Competency-based education: programme design and challenges to implementation', *Medical Education*, 50: 532-9. **doi:** 10.1111/medu.12977

Hattingh, L. 2015. 'Pharmacy legal: Pharmacist immunisation services ', *Australian Pharmacist*, 34. **ISSN:** 0728-4632

Hazen A C, Sloeserwij V M, Zwart D L, de Bont A A, Bouvy M l, de Gier J J, de Wit N J, and Leendertse A J. 2015. 'Design of the POINT study: Pharmacotherapy Optimisation through Integration of a Non-dispensing pharmacist in a primary care Team (POINT)', *BMC Family Practice*, 16: 76. **doi:** 10.1186/s12875-015-0296-8

Hazen, A C M, de Bont A A,Boelman L, Zwart D L M, de Gier J J, de Wit N J, and Bouvy M L. 2018a. 'The degree of integration of non-dispensing pharmacists in primary care practice and the impact on health outcomes: A systematic review', *Research in Social & Administrative Pharmacy*, 14: 228-40. **doi:** 10.1016/j.sapharm.2017.04.014

Hazen A, de Groot E, de Gier H, Damoiseaux R, Zwart D, and Leendertse A. 2018b. 'Design of a 15-month interprofessional workplace learning program to

expand the added value of clinical pharmacists in primary care', *Currents in Pharmacy Teaching and Learning*, 10: 618-26. **doi:** 10.1016/j.cptl.2018.01.006

Health Education England. 2016. 'General Practice Pharmacist Learning Pathway.' In.: Centre for Pharmacy Postgraduate Education. Accessed at https://www.cppe.ac.uk/wizard/files/general-practice/gpptp-promo-brochure.pdf Date Accessed 23/1/2019

Health Workforce Australia. 'Australia's Health Workforce Series Pharmacists in Focus March 2014' Accessed at http://iaha.com.au/wp-content/uploads/2014/03/HWA_Australia-Health-Workforce-Series_Pharmacists-in-focus_vF_LR.pdf Date Accessed 23/1/2019.

Ho S , Kember D, Lau C, Yeung M Y, Leung D Y, and Chow M. 2009. 'An Outcomes-based Approach to Curriculum Development in Pharmacy', *American Journal of Pharmaceutical Education*, 73: 1-14. **ISSN:** 0002-9459

Hoth A, Carter B, Ness J, Bhattacharyya A, Shorr R, Rosenthal G, Kaboli P. 2007. 'Development and Reliability Testing of the Clinical Pharmacist Recommendation Taxonomy', *Pharmacotherapy*, 27. **ISSN:** 0277-0008

Isetts B J, Schondelmeyer S J, Artz M B, Lenarz L A, Heaton A H, Wadd W B, Brown L M, and Cipolle R J. 2008. 'Clinical and economic outcomes of medication therapy management services: The Minnesota experience', *Journal of the American Pharmacists Association*, 48: 203-14. **doi:** https://doi.org/10.1331/JAPhA.2008.07108

Jones J, and Hunter D. 1995. 'Qualitative Research: Consensus methods for medical and health services research', *British Medical Journal*, 311: 376-80. **doi:** 10.1136/bmj.311.7001.376

Jorgenson D, Dalton D, Farrell B, Tsuyuki R T, and Dolovich L. 2013. 'Guidelines for pharmacists integrating into primary care teams', *Canadian Pharmacists Journal / Revue des Pharmaciens du Canada*, 146: 342-52. **doi:** 10.1177/1715163513504528

Jorgenson D, Laubscher T, Lyons B and Palmer R. 2014. 'Integrating pharmacists into primary care teams: barriers and facilitators', *International Journal of Pharmacy Practice*, 22: 292-99. **doi:** 10.1177/1715163513504528

Kennie-Kaulbach N, Farrell B, Ward N, Johnston S, Gubbels A, Eguale T, Dolovich L, Jorgenson D, Waite N, and Winslade N. 2012. 'Pharmacist provision of primary health care: a modified Delphi validation of pharmacists' competencies', *BMC Family Practice*, 13: 27. **doi:** 10.1186/1471-2296-13-27

Koster A, Schalekamp T and Meijerman I. 2017. 'Implementation of Competency-Based Pharmacy Education (CBPE)', *Pharmacy*, 5: 10. **doi:** 10.3390/pharmacy5010010

Krska J, Jamieson D, Arris F, McGuire A, Abbott S, Hansford D, Cromarty J 2002. 'A classification system for issues identified in pharmaceutical care practice', *International Journal of Pharmacy Practice*, 10: 91-100. **doi:** 10.1111/j.2042-7174.2002.tb00593.x

Lau E, Dolovich L, Austin Z. 2007 'Comparison of self, physician, and simulated patient ratings of pharmacist performance in a primary care family practice simulator', *Journal of Interprofessional Care,* 21(2):129-140. **doi:** 10.1080/13561820601133981

Lockyer J, Bursey F, Richardson D, Frank J R, Snell L, and Campbell C. 2017. 'Competency-based medical education and continuing professional development: A conceptualization for change', *Medical Teacher*, 39: 617-22. **doi:** 10.1080/0142159X.2017.1315064

Majumdar S R, Johnson J A, Tsuyuki R T, Lewanczuk R Z, Guirguis L M, Makowsky M, and Simpson S H. 2015. 'Pharmacists on primary care teams: Effect on antihypertensive medication management in patients with type 2 diabetes', *Journal of the American Pharmacists Association*, 55: 265-68. **doi:** 10.1331/JAPhA.2015.14225

Mann C, Anderson C, Avery A J, Waring J and Boyd M J. 2018 'Clinical Pharmacists in General Practice: Pilot Scheme Independent Evaluation Report: Full Report June 2018' Accessed at https://nottingham.ac.uk/pharmacy/documents/generalpracticeyearfwdrev

/clinical-pharmacists-in-general-practice-pilot-scheme-full-report.pdf Date Accessed 23/1/2019.

McConaha J L, Tedesco G W, Civitarese L and Hebda M F. 2015. 'A pharmacist's contribution within a patient-centered medical home', *Journal of the American Pharmacists Association*, 55: 302-06. **doi:** 10.1331/JAPhA.2015.14119

Mckenna H.1994 'The Delphi technique: a worthwhile research approach for nursing?' *Journal of Advanced Nursing.* 1994;19:1221-1225.**doi:**10.1111/j.1365-2648.1994.tb01207.x

Miller G. 1990. 'The Assessment of Clinical Skills/Comptence/Performance', *Academic Medicine*, 65.

Molyneux J. 2001. 'Interprofessional teamworking: what makes teams work well?', *Journal of Interprofessional Care*, 15 (1) 29-35. **doi:** 10.1080/13561820020022855

Moore G F, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, Moore L, O'Cathain A, Tinati T, Wight D and Baird J. 2015. 'Process evaluation of complex interventions: Medical Research Council guidance', *British Medical Journal*, 350: h1258. **doi:** 10.1136/bmj.h1258

Moreno G, Lonowski S, Fu J, Chon J S, Whitmire N, Vasquez C, Skootsky S A, Bell D S, Maranon R, and Mangione C M. 2017. 'Physician experiences with clinical pharmacists in primary care teams', *Journal of the American Pharmacists Association*, 57: 686-91. **doi:** 10.1016/j.japh.2017.06.018

NHS England 2016 'Clinical Pharmacists in General Practice' Accessed at https://www.england.nhs.uk/gp/gpfv/workforce/building-the-general-practice-workforce/cp-gp/ Date Accessed 23/1/2019

Nigro S C, Garwood C L, Berlie H,Irons B, Longyhore D, McFarland M S, Saseen J J, and Trewet C B. 'Clinical pharmacists as key members of the patient-centered medical home: an opinion statement of the Ambulatory Care Practice and Research Network of the American College of Clinical

Pharmacy', *Pharmacotherapy:The Journal of Human Pharmacology & Drug Therapy*, 34: 96-108. **doi:** 10.1002/phar.1357

Patient-Centred Primary Care Collaborative. 2017. "Shared Principles of Primary Care." Accessed at https://www.pcpcc.org/about/shared-principles Date Accessed 23/1/2019.

Patterson B J, Solimeo S L, Stewart K R, Rosenthal G E, Kaboli P J, and Lund B C. 'Perceptions of pharmacists' integration into patient-centered medical home teams', *Research In Social & Administrative Pharmacy*, 11: 85-95. **doi:** 10.1016/j.sapharm.2014.05.005

Pharmaceutical Care Network Europe Foundation. 2017. "Classification of Drug Related Problems Version 8.2." Accessed at https://www.pcne.org/working-groups/2/drug-related-problem-classification Date Accessed 23/1/2019

Pharmaceutical Society of Australia 2011. "Guidelines for Pharmacists providing Home Medicines Review (HMR) services." Accessed at https://aacp.com.au/app/uploads/home-medicines-review-services-1.pdf Date accessed 23/1/2019

Pharmaceutical Society of Australia 2016a. 'General Practice Pharmacist Sample Scope of Practice' Accessed at https://my.psa.org.au/s/article/General-Practice-Pharmacist-Sample-Scope-of-Practice-2016 Date Acccessed 23/1/2019.

Pharmaceutical Society of Australia 2016b. "National Competency Standards Framework for Pharmacists." In, edited by National Policy Unit. Deakin ACT Australia: Pharmaceutical Society of Australia. Accessed at https://www.psa.org.au/practice-support-industry/national-competency-standards/ Date Accessed 23/1/2019

Pharmaceutical Society of Australia 2016c. 'General Practice Pharmacist Fundamentals', Accessed at https://my.psa.org.au/s/training-plan/a117F0000019tVvQAI/general-practice-pharmacist-fundamentals Date Accessed 23/1/2019.

Royal Australian College of General Practitioners. 2016. "RACGP-Standards-for-Patient-Centred-Medical-Homes : Patient centred, comprehensive, co-

ordinated, accessible and quality care." Accessed at https://www.racgp.org.au/running-a-practice/practice-standards/standards-for-other-health-care-settings/view-all-health-care-standards/patient-centred-medical-homes Date Accessed 23/1/2019

Samuelson M, Tedeschi P, Aarendonk D ,de la Cuesta C, Groenewegen P on behalf of the postion paper working group. 2011. "Improving inter- professional collaboration in Primary Care." *Quality in Primary Care* 2012;20:303–12

Sellors J, Kaczorowski J, Sellors C, Dolovich L, Woodward C, Goeree R Willan A, Cosby R, Trim R, Sebaldt R, Howard M, Posten J and Hardcastle L. 2003. 'A randomized controlled trial of a pharmacist consultation program for family physicians and their elderly patients', *Canadian Medical Journal*, 169. **ISSN:** 0820-3946

Stone M C and Williams H C. 2015. 'Clinical pharmacists in general practice: value for patients and the practice of a new role', *The British Journal of General Practice*, 65: 262-63. **doi:** 10.3399/bjgp15X685033

Strand L M, Morley P C, Cipolle R J, Ramsey R, Lamsam G D. 1990 'Drug-related problems: Their structure and function' *Annals of Pharmacotherapy,* 24(1):1093-1097 **doi:** 10.1177/106002809002401114

Stupans I, Atkinson J, Mestrovic A, Nash R, and Rouse M J. 2016. 'A Shared Focus: Comparing the Australian, Canadian, United Kingdom and United States Pharmacy Learning Outcome Frameworks and the Global Competency Framework', *Pharmacy (Basel)*, 4. **doi:** 10.3390/pharmacy4030026

Supper I, Catala O, Lustman M,Chemla C, Bourgueil Y, and Letrilliart L. 2015. 'Interprofessional collaboration in primary health care: a review of facilitators and barriers perceived by involved actors', *Journal of Public Health*, 37: 716-27. **doi:** 10.1093/pubmed/fdu102

Tan E C, George J, Stewart K, and Elliott R A. 2014a. 'Improving osteoporosis management in general practice: a pharmacist-led drug use evaluation program', *Drugs & Aging*, 31: 703-9.

Tan E C, Stewart K, Elliott R A, and George J. 2014b. 'Pharmacist services provided in general practice clinics: a systematic review and meta-analysis', *Research in*

Social & Administrative Pharmacy, 10: 608-22. **doi:** 10.1016/j.sapharm.2013.08.006

Tan, E. C., K. Stewart, R. A. Elliott, and J. George. 2014c. 'Pharmacist consultations in general practice clinics: the Pharmacists in Practice Study (PIPS)', *Research In Social & Administrative Pharmacy*, 10: 623-32. **doi:** 10.1016/j.sapharm.2013.08.005

Tan, Edwin, Kay Stewart, Rohan A. Elliott, and Johnson George. 2012. 'An exploration of the role of pharmacists within general practice clinics: the protocol for the pharmacists in practice study (PIPS)', *BMC Health Services Research*, 12: 246. **doi:** 10.1186/1472-6963-12-246

Thangaratinam S, R. C. (2005). The Delphi technique. *The Obstetrician and Gynaecologist, 7*, 120-125. **doi:** 10.1576/toag.7.2.120.27071

Trinacty, M., B. Farrell, T. J. Schindel, L. Sunstrum, L. Dolovich, N. Kennie, G. Russell, and N. Waite. 2014. 'Learning and networking: Utilization of a primary care listserv by pharmacists', *Canadian Journal of Hospital Pharmacy*, 67: 343-52. **doi:** 10.4212/cjhp.v67i5.1388

Vo, Thi-Ha, Bruno Charpiat, Claire Catoire, Michel Juste, Renaud Roubille, François-Xavier Rose, Sébastien Chanoine, Jean-Luc Bosson, Ornella Conort, Benoît Allenet, and Pierrick Bedouch. 2016. 'Tools for Assessing Potential Significance of Pharmacist Interventions: A Systematic Review', *Drug Safety*, 39: 131-46. **doi:** 10.1007/s40264-015-0370-0

Weber, Z. A., J. Skelley, G. Sachdev, M. A. Kliethermes, S. Haydon-Greatting, B. Patel, and S. Schmidt. 2015. 'Integration of pharmacists into team-based ambulatory care practice models', *American Journal of Health-System Pharmacy*, 72: 745-51. **doi:** 10.2146/ajhp140576

Westerlund, L. O. Tommy, and H. Thony Björk. 2006. 'Pharmaceutical Care in Community Pharmacies: Practice and Research in Sweden', *Annals of Pharmacotherapy*, 40: 1162-69. **doi:** 10.1345/aph.1G680

Williams, Mackenzie, Gregory M. Peterson, Peter C. Tenni, Ivan K. Bindoff, and Andrew C. Stafford. 2012. 'DOCUMENT: a system for classifying drug-related

problems in community pharmacy', *International Journal of Clinical Pharmacy*, 34: 43-52. **doi:** 10.1007/s11096-011-9583-1

Appendices

Appendix 1: APSA Conference 2016 Poster Presentation

Integrating pharmacists in general practice: The WentWest Project

Helen Benson[1] , Kylie A Williams[1] ,Daniel Sabater-Hernandez[1], Shalom I Benrimoj[1].

1. Graduate School of Health, University of Technology Sydney, Sydney, Australia

Introduction

Previous international studies have shown that the integration of a non-dispensing pharmacist in general practice has led to an improvement in health outcomes and a reduction of medication-related problems (MRPs) but limited studies have been conducted in the Australian setting. [1,2]

The WentWest Pharmacist Project was commissioned by the Western Sydney Primary Health Network to examine the impact of integrating a non-dispensing pharmacist in general practice on both patient clinical outcomes and broader health goals.

The objectives of the project were to:
1. Develop an interventional model
2. Improve the quality use of medicines,
3. Reduce adverse drug events
4. Better coordinate patient care.

Four pharmacists are currently being employed across 12 general practice sites in Western Sydney.

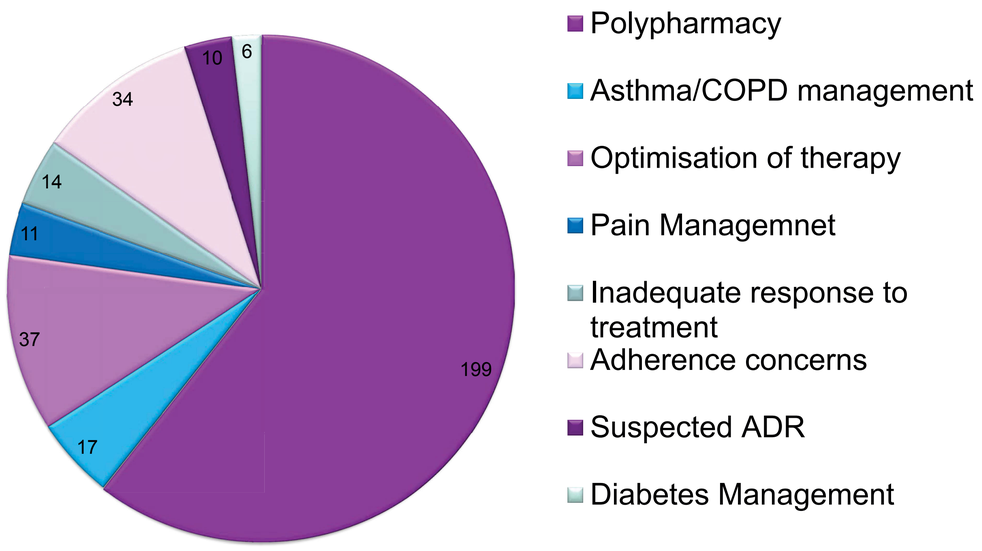
Patients were selected for the pharmacist intervention if they met defined selection criteria Figure 1.

The pharmacist-patient consultation was a 30-60 minute session and included :
1. A complete medication history,
2. A medication reconciliation
3. An adherence assessment
4. Chronic disease management where required
5. Detection and resolution of MRPs.

Patients were referred by the pharmacist for follow up if they had identified adherence issues, identified MRPs or required ongoing disease state management.

A research team from the Graduate School of Health, University of Technology Sydney has been engaged to conduct an outcome and process evaluation on the pilot study.

Figure 1 Selection Criteria



Method

A mixed method study including qualitative data collected from semi-structured interviews of participating pharmacists and general practitioners (GPs) and quantitative data collected by project pharmacists when conducting their consultation.

Results

From July-Sep16 328 patients were selected.

Patients were taking an average of 8.6 ± 4.0 medications and had an average of 5.8±2.4 medical conditions.

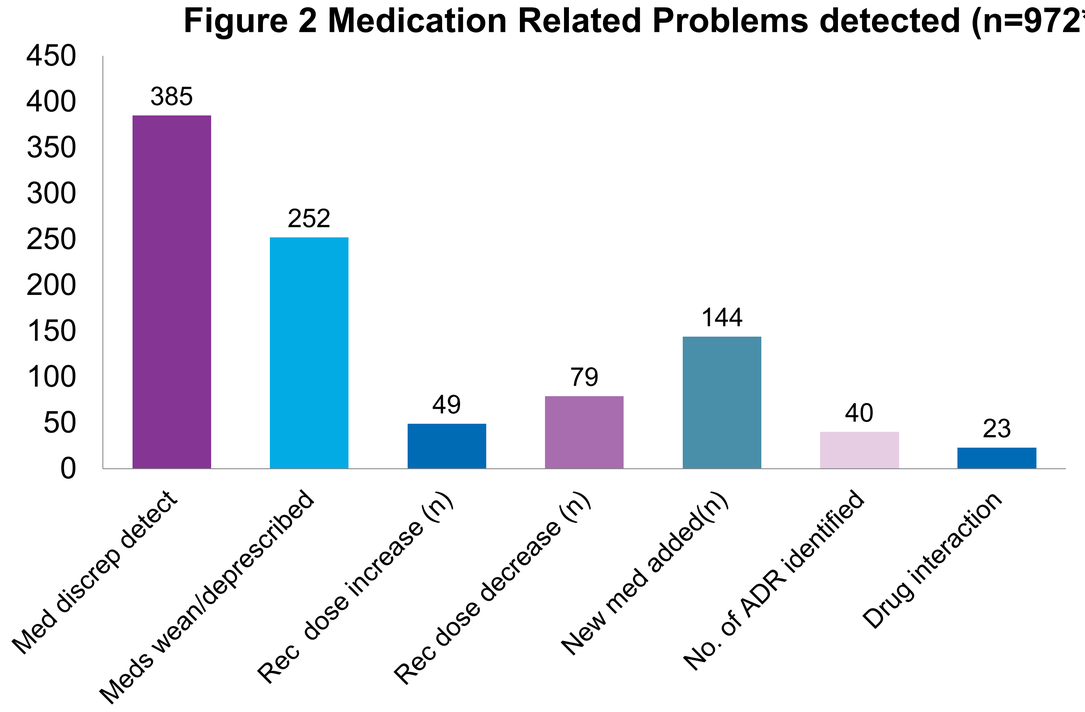
Consultations resulted in 874 pharmacist recommendations with an average acceptance rate of 84.9%±2.3.

Figure 2 outlines the medication related problems detected

Qualitative data gathered from semi-structured interviews of four of the participating pharmacists and five participating general practitioners resulted in the identification of key factors to enable improvement of the model.

These included:
- The importance of communicating and defining the non-dispensing pharmacist role.
- Training provision for the non-dispensing pharmacists.
- Confirming clinical guidelines and data collection procedures
- Adequate funding and room availability.

Figure 2 Medication Related Problems detected (n=972*)



Conclusion

The preliminary results of the study support the premise that the integration of pharmacists in general practice leads to positive patient outcomes particularly in the area of the resolution of medication related problems.

The qualitative data analysis has enabled WentWest to refine and improve the current model and further data is currently being collected.

References

1.Tan EC, Stewart K, Elliott RA, George J. Pharmacist services provided in general practice clinics: a systematic review and meta-analysis. Research in social & administrative pharmacy : RSAP. 2014;10(4):608-22.
2.Pande S, Hiller JE, Nkansah N, Bero L. The effect of pharmacist-provided non-dispensing services on patient outcomes, health service utilisation and costs in low- and middle-income countries. The Cochrane database of systematic reviews. 2013(2):CD010398.

Appendix 2: WentWest General Practice Pharmacist Project Ethics Application

ResearchMaster

Human Ethics Application

Application ID :	ETH16-0689
Application Title :	WentWest Clinical Pharmacist GP Project
Date of Submission :	N/A
Primary Investigator :	Mrs Helen Benson; 5Research Student
Other Personnel :	Dr Daniel Sabater Hernandez; Co-Supervisor
	Prof Charlie Isaac Benrimoj; 4Advisor
	A/Prof Kylie Williams; Chief Investigator

Section 1: Ethics Portal

Select your application type

What type of application are you looking for?
Please **do not** change your application type without first consulting with the Ethics Secretariat (9514 9772).*

- (•) New application (including scope-checking for nil/negligible risk research)
- ( ) Ratification of existing approval
- ( ) Transfer of existing approval
- ( ) Evaluation of teaching and learning activities
- ( ) Amendment to existing approval
- ( ) Program approval

You have selected "new application (including scope checking for nil/negligible risk research)". This option allows you to create a new form. The system will check if your application can be approved by the Faculty or whether it requires full ethics approval by the HREC. Please click "save" before continuing.

What should I know before I start?

Would you like more information on:

- ( ) This system
- ( ) The ethics process
- ( ) Purpose of the ethics review process

This question is not answered.

Section 1A: Risk evaluation

Determining the level of risk

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Please refer to the UTS HREC criteria for determining level of risk for assistance in completing this page.

Please answer each question carefully and thoughtfully.
If you need to contact the Research Ethics Officer you can call (02) 9514 9772 or you can email the Research Ethics Officer

Does your research involve:

Collecting identifying information from participants?*

- ( ) Yes
- (•) No

Direct interaction between researcher/s and participants?*

- (•) Yes
- ( ) No

Any significant alteration to any routine care or service provided to participants?*

- ( ) Yes
- (•) No

Any risks for participants beyond that experienced in their everyday activities?*

- ( ) Yes
- (•) No

Participation by a member of any vulnerable group, other than incidental? REF NS Chapter 4 *

- ( ) Yes
- (•) No

Randomisation or the use of a control group or a placebo?*

- ( ) Yes
- (•) No

Infringing the rights, privacy or professional reputation of participants?*

- ○ Yes
- ◉ No

Access or establishing a register or database which will be maintained after the completion of the research?*

- ○ Yes
- ◉ No

The system has assessed your research as being more than nil/negligible risk research which means you will need to complete a full Human Research Ethics application. If you disagree and still think your research is nil/negligible risk, you should contact the Ethics Secretariat before continuing.

Please save and continue to the next page

Section 2: Project information

Project title

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Application ID (automatically generated):

ETH16-0689

Application Title:*

WentWest Clinical Pharmacist GP Project

Please note that the HREC is now granting a standard approval period for the research proposals.
The approval period for your project will be specified in your approval letter.
Please also note that research should not commence until ethics approval has been granted. The Committee cannot grant retrospective approval for data that has already been collected.

Ethics category code (automatically selected):*

Human

Is this a resubmission of a previous application?*

- ○ Yes
- ◉ No

Is this a pilot study? *

- ◉ Yes
- ○ No

Please save and continue to the next page

Consultation

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Have you undertaken any consultation in preparing this application?*

- ◉ Yes
- ○ No

Please describe (2000 character limit)*

Assistance from my PhD supervisors in completing the application.

Please save and continue to the next page

Section 3: Personnel

Investigators

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Are there external investigators or personnel listed on this protocol?*

- ○ Yes
- ◉ No

Is this application for a student project?*

- ◉ Yes
- ○ No

Students - Please note that once you submit your application is submitted it will go directly to your supervisor and not to the Committee. Once your supervisor endorses your application it will come to the Research Ethics Officer for review. Please hold off on printing your hardcopy until you have received feedback from the Research Ethics Officer. Your electronic application must be submitted by the closing date.

Personnel Table

Position type	In the personnel table use the following positions from the drop-down list
Chief Investigator	1Chief Investigator
Co Investigator	3Assoc. Investigator
Supervisor	1Chief Investigator
Co Supervisor	Co-Supervisor
Research Student	5Research Student

Further options are available for Research/Project Managers and Administrators.
The main contact should be marked as 'primary' and should be a UTS staff member.
Please click on 'More Criteria' located on the top right hand side of the table to find personnel.

If any details are incorrect or missing please contact the Ethics Secretariat on (02) 9514 9772 or by email.

Instructions on how to add a person to the personnel table:
1. Click on 'More criteria' which is located on the top right hand corner of the table below
2. Enter the surname (and given name if the surname is common) in the fields marked 'Surname' and 'Given name' and click 'Search'
If the system cannot find the person you are looking for you have the option of adding them in - just click "Ok" when the pop-up window shows.
3. Click on the name of the person you wish to add
4. If they are the primary contact (e.g. Chief Investigator/Supervisor), tick "Yes" under 'Primary contact'
5. Select the position from the drop-down list (e.g. Chief Investigator/Research Student)
6. Click on the green tick

Students must add their supervisors to their application and must mark their primary supervisor as a Chief Investigator and as a primary contact.
Students should be listed as "5Research student"

Internal personnel listed on this ethics protocol:
*

1	Primary	Yes
	ID	128965
	Surname	Benson
	Given Name	Helen
	Name	Mrs Helen Benson
	Position	5Research Student
	Type	Internal
	AOU	GSH.Pharmacy
	Managing Unit	Graduate School of Health
	Email Address	Helen.Benson@uts.edu.au
	Contact Phone	
2	Primary	No
	ID	112663
	Surname	Williams
	Given Name	Kylie
	Name	A/Prof Kylie Williams
	Position	Chief Investigator
	Type	Internal
	AOU	GSH.Pharmacy
	Managing Unit	Graduate School of Health
	Email Address	Kylie.Williams@uts.edu.au
	Contact Phone	4050
3	Primary	No
	ID	115360
	Surname	Sabater Hernandez
	Given Name	Daniel
	Name	Dr Daniel Sabater Hernandez
	Position	Co-Supervisor
	Type	Internal
	AOU	GSH.Pharmacy
	Managing Unit	Graduate School of Health
	Email Address	Daniel.SabaterHernandez@uts.edu.au
	Contact Phone	7201
4	Primary	No
	ID	111638
	Surname	Benrimoj
	Given Name	Charlie
	Name	Prof Charlie Isaac Benrimoj
	Position	4Advisor
	Type	Internal
	AOU	GSH.Graduate School of Health
	Managing Unit	Graduate School of Health
	Email Address	Shalom.Benrimoj@uts.edu.au
	Contact Phone	4013

If you cannot find a person through the personnel table(s) above, please enter their details here (title, name, organisation, department, phone number, address, email address and their position on this protocol). (2000 character limit)

This question is not answered.

Please provide additional (or preferred) contact details of any of the people listed on the project if necessary (2000 character limit)

Helen Benson preferred contact phone number 0430 735 052

Please provide details of any formal qualifications (REF NS 1.1(e)) of each person listed on the project (2000 character limit)*

Helen Benson- BPharm, MAACP accredited consultant pharmacist, UTS Practitioner Teacher, MPharm candidate
A//Prof Kylie Willliams Associate Professor, Bachelor of Pharmacy, Graduate Diploma of Hospital Pharmacy, Doctor of Philosophy, Registered Pharmacist
Dr Daniel Sabater Hernandez B Pharm, MPharm, PhD, Chancellors Post Doctoral Research Fellow
Prof Charlie Benrimoj Head of the Graduate School of Health, BPharm (Hons), PhD, Registered Pharmacist

Please outline the experience of each person listed on this project relevant to this application (2000 character limit)*

Helen Benson has been a registered pharmacist since 2000 and was first accredited to conduct home medicines review in 2002.
She has extensive experience working collaboratively with general practitioners in the area of medication management. Helen commenced teaching as a practitioner teacher for the school of pharmacy this year and is just beginning her research career.
A/Prof Kylie Williams has extensive experience as PhD supervisor she is a registered pharmacist with 18 years of academic experience in teaching and research at both the University of Technology Sydney and The University of Sydney.
Dr Daniel Sabater-Hernández completed his PhD in 2010 at University of Granada (Spain) and, currently is a full-time research fellow at the UTS Graduate School of Health since 2012. In 2014, he was awarded a highly-competitive UTS Chancellor's Postdoctoral Fellowship.As part of his career, Dr Sabater-Hernández has supervised/co-supervised 9 PhD candidates. He has been involved in more than 20 research projects and published over 40 articles in refereed journals.

Professor Charlie Isaac Benrimoj is the current Head of the Graduate School of Health. Prof Benrimoj was the Foundation Professor of Pharmacy practice, Dean of the Faculty of Pharmacy and Pro-Vice Chancellor (Strategic Planning) University of Sydney.
He has published over 110 papers in refereed journals, 20 major research reports and presented and co-authored 200 conference presentations.
He has been elected a Fellow of three distinguished international and national societies: Pharmaceutical Society of Australia (2008), Royal Pharmaceutical Society of Great Britain (2008) and International Pharmacy Federation (2007).

Primary AOU*

GSH.Pharmacy

Please save and continue to the next page

Student details

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Degree being undertaken (500 character limit)*

Masters of Pharmacy (Research) with view to extension to a PhD by publication.

Have you been successful in your doctoral/masters assessment? *

- ○ Yes
- ◉ No

Please indicate why you are applying for ethics approval at this stage, and when you will be seeking assessment or re-assessment? (2000 character limit)*

We are seeking approval to enable us to commence the study around the Wentwest project that is currently underway.
I will be aiming to complete Stage 1 assessment by the end of the year.

Students, please read carefully: Your application should be reviewed by the Ethics Secretariat prior to submitting to the Committee. Once you have completed this application and followed the submission instructions, your application will go to your supervisor for review. Once your supervisor has endorsed the application it will come to the Ethics Secretariat for a pre-review. This pre-review process is necessary to ensure that your application is complete, has all necessary attachments, and that the quality of responses to the questions meets the Committeeċs expectations. Your application should therefore be submitted at least one week prior to the closing date. If you do not submit your application in time, it may be delayed and held off until the next closing date.

Section 4: Funding

Funding details

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Have you received funding in relation to this research?*

- ○ Yes
- ◉ No

Do you intend to apply for funding in the future?*

- ○ Yes
- ◉ No

Please save and continue to the next page

Section 5: Methodology

Description

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

The purpose of this section is to place your research in context for the HREC and demonstrate your ability to conduct the research. The HREC may only approve research which is methodologically sound. Remember to use simple language that can be understood by people from a variety of backgrounds. Avoid jargon and acronyms.

What are the hypotheses/goals/aims/objectives of your research? Please include a brief description using plain English explaining your research aims (approximately 100 words) (2000 character limit)*

Wentwest a western Sydney primary health network has requested the assistance of UTS Pharmacy in evaluating the Wentwest clinical pharmacist project.This project is currently employing 4 clinical pharmacists across 12 GP surgeries across western Sydney conducting a variety of medication management activities including medication review, education and chronic disease management. The aim of the project is to demonstrate the value to patients of having access to a clinical pharmacist in the general practice setting. The benefits may include a reduction in medication misadventure, poly-pharmacy, medication related problems and an improvement in appropriate medication use . General practitioners may also benefit from the access to a pharmacist as a medication expert . The UTS pharmacy study is to conduct an outcome evaluation on the WentWest clinical pharmacist project looking at clinical indicators and medication related problems and to explore barriers and facilitators for the successful integration of pharmacists in general practice.

Note: Clinical Trials, Recruitment of Participants and Data Collection are dealt with later so you will not need to describe them in detail below

Please provide a brief description of the research design including research questions and proposed methods for conducting the research (approximately 250 words) (2000 character limit)*

This is a mixed method evaluation.The research will include gathering qualitative data from participating pharmacists, general practitioner and practice staff through one on one interviews which will be transcribed and analysed. Currently pharmacists in this project record the results of their interventions on a spreadsheet and we will be analysing this data after it has been de-identified and forwarded to the UTS Pharmacy researcher.

What do you hope the outcome(s) of this research will be? (2000 character limit)*

The research objectives of this evaluation are:
1.To determine the effectiveness of having a pharmacist available in a GP surgery in terms of improvement in:
identification and resolution of medication related problems; chronic disease management in conditions such as hypertension, asthma and diabetes; patient adherence; accuracy of prescribing records.
2. To identify facilitators and barriers to successful inter-professional collaboration between general practitioners , practice staff and pharmacists.

Who do you think will benefit from this research? (2000 character limit)*

If the WentWest project demonstrates positive outcomes then there are several potential groups who will benefit from this type of service.
Patients will potentially benefit due to reductions in medication related problems, improvements in chronic disease management and potential reductions in hospital admissions.
The primary health network may be able to use the evidence from the evaluation to justify ongoing funding to ensure service continuation.
Pharmacists may benefit from the creation of a new professional role for clinical pharmacists that provides a new opportunity to improve patient care in a collaborative setting.
General Practitioners will benefit through utilising the pharmacists skills to improve patient care and achieve better health outcomes.

Please provide a brief description of the significance of your research (approximately 100 words) (2000 character limit)*

There are currently limited studies nationally and internationally that examine the benefits of integrating clinical pharmacists in the general practice setting. In the few studies published there is some evidence to show improved patient outcomes in limited areas but more research is needed to confirm the benefits.
This research may provide evidence that supports the development of a new patient focused collaborative service in primary health care in Australia.

Please save and continue to the next page

Literature review & references

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Please give a brief literature review (no more than 500 words). The aim is to explain how your research fits into the context of other research in the area (REF NS 1.1(c)) (2000 character limit)
Please note that you cannot paste links into the online form
*

A review of the literature of previous studies on GP pharmacist practice collaboration care was conducted.
Studies were included if pharmacists were integrated into a general practice or primary care clinic on an ongoing basis; and delivered an intervention designed at improving medication management, reducing medication related adverse effects or optimising chronic disease management.
These articles were further refined by including articles that looked specifically at barriers or facilitators for integration or examined different models of pharmacist integration in general practice leaving a remainder of 8 studies
Identified facilitators were when there was a perceived common interest in improving patient care, pharmacists had adequate training, full access to medical records, face to face meeting with GP.
Identified barriers were a lack of understanding of the clinical pharmacist roles and competencies, a lack of training and funding constraints.
This review demonstrated that there are very few studies involving GP and pharmacist collaboration in the Australian setting with 7 out of 8 identified articles originating from other countries.
Most of the studies were centred around outcome studies and included only a limited examination of barriers and facilitators for successful integration of the clinical pharmacist.

Please list the references only used in the literature review and cited in your application
NOTE: Do not include references you have not used in this application (2000 character limit)
*

1. Wilbur K,et al. Physician perceptions of pharmacist roles in a primary care setting in Qatar. Globalization and health. 2012;8:12.
2. Tan EC, et al. Integration of pharmacists into general practice clinics in Australia: the views of general practitioners and pharmacists. The International journal of pharmacy practice. 2014;22(1):28-37.
3. Supper I, et al. Interprofessional collaboration in primary health care: a review of facilitators and barriers perceived by involved actors. Journal of public health. 2015;37(4):716-27.
4. Stringer K, et al.. Pharmacists and family physicians: improving interprofessional collaboration through joint understanding of our competencies. Frontiers in pharmacology. 2013;4:151.
5. Patterson BJ, et al. Perceptions of pharmacists' integration into patient-centered medical home teams. Research in social & administrative pharmacy : RSAP. 2015;11(1):85-95.
6. McCullough MB, et al. Balancing collaborative and independent practice roles in clinical pharmacy: a qualitative research study. The Annals of pharmacotherapy. 2015;49(2):189-95.
7. Kwint HF, 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(2):91-102.
8. Isetts BJ, et al. Evaluation of Pharmacists' Work in a Physician-Pharmacist Collaborative Model for the Management of Hypertension. Pharmacotherapy. 2016;36(4):374-84.

Please save and continue to the next page

Methods and methodologies

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

In order to consider your research, the HREC will need to know what it will involve for your participants (REF NS 3.1)

What kinds of methods and methodologies will you use in your research? (More than one box may be checked)*

- [x] Quantitative
- [x] Qualitative

Please save and continue to the next page

Quantitative

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Section 1: Quantitative Methodologies*

- [ ] Experimental
- [ ] Quasi-experimental
- [ ] Correlational research
- [ ] Survey Design
- [ ] Meta analysis
- [x] Other *(Please describe below)

Please describe other methodologies (2000 character limit)*

Analysis of existing data that will be collected by participating pharmacists as part of routine practice.

Section 2: Quantitative methods*

- [ ] Written survey
- [ ] Online survey/research
- [ ] Other* (please describe below)
- [ ] Pre-post/testing
- [ ] Telephone survey
- [ ] Questionnaires
- [ ] Access to records
- [ ] Clinical trial
- [x] Statistical analysis
- [x] Content analysis
- [ ] Physiological testing/assessment

What **quantitative** methodology and methods will you be using in this research? More than one box may be checked.

Please save and continue to the next page

Qualitative

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

What **qualitative** methodology and methods will be using in this research?

Section 1: Qualitative methodology*

- [ ] Auto-ethnography
- [ ] Historical research
- [ ] Other *(Please describe below)
- [ ] Action research
- [x] Narrative enquiry
- [ ] Biographical research
- [ ] Case study
- [ ] Phenomenology
- [ ] Indigenous research paradigm
- [ ] Discourse analysis
- [ ] Grounded theory

Section 2: Qualitative methods*

- [ ] Participants observation
- [ ] Covert observation
- [ ] Life story or oral history
- [ ] Focus groups
- [ ] Structured interviews
- [x] Semi-structured interviews
- [ ] Unstructured interviews
- [ ] Other * (Please describe below)
- [ ] On-line research
- [ ] Psychological testing/assessment
- [ ] Verbal protocol
- [ ] Journaling
- [ ] Artifact analysis
- [ ] Document/Policy analysis
- [ ] Access to records
- [ ] Audio/video recording

Please describe how interviews will be conducted, including how many participants will be involved (from each participant group if there is more than one group/cohort), the amount of time required of participants for this, whether it will be recorded, and any other information applicable*

GPs and Pharmacists and practice staff where relevant currently participating in the WentWest project will be interviewed by the researcher at two time points during the project - one month into the project and again at the completion. All 4 clinical pharmacists and a sample of participating GPs and practice staff will be included.
Each interview will take between 15-30 minutes of the participants time. Written notes will be taken by the UTS researcher during the interviews.
No patients will be interviewed.

Please save and continue to the next page

Section 6: Research participants/subjects part 1

Recruitment of participants

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

In line with the National Statement, the definition of participants includes not only those humans who are the primary focus of the research but also those who will be affected by the research. The HREC regards the principle of respect for persons as of paramount importance. (REF NS 1.1 (d), 1.6-1.9, 1.10, 2.1).

How will you initially select and contact your participants? More than one box may be checked, if appropriate*

- [ ] Advertisement/flyer
- [x] E-mail
- [x] Telephone
- [ ] Internet
- [ ] Organisation
- [ ] Personal contact
- [ ] Letter
- [x] Other contact method to be used

Please describe what other method you will use for recruitment (2000 character limit)*

Wentwest has gained consent from participating pharmacists and general practitioners for the UTS researcher to contact them for the purpose of setting up interviews to discuss the project.

Outline how you will obtain participants' contact details and what your recruitment process will be (2000 character limit)*

This evaluation does not include a recruitment phase. Pharmacists and GPs are already participating in the project undertaken by WentWest. Clinical Pharmacist contact phone and e-mail details have been provided to the researchers by the WentWest project team.
Appropriate General Practitioners for interview will be determined by the clinical pharmacists. The pharmacists will obtain consent from these GPs for them to be contacted by the UTS research team.

Please describe your recruitment plan/strategy

Wentwest currently have the project in place, UTS Pharmacy researchers are evaluating information collected by the current project staff as part of routine practice.

How many participants do you intend to recruit? (If you are intending to recruit different groups of participants, please answer all relevant questions for each group, e.g. control group, test group, etc) (2000 character limit)*

All 4 Clinical Pharmacists and a representative sample of consenting GPs and identified relevant practice staff will be interviewed. De-identified patient data will be collated by one of the clinical pharmacists and forwarded to the UTS research team for evaluation. Data for all patients seen by the pharmacists during the study period will be included in the evaluation.

Explain how and why you have chosen this number (If the research is quantitative, explain the power calculations; if the research is qualitative, explain why the proposed number is likely to result in adequate data) (2000 character limit)*

We are interviewing all participating pharmacists and aiming to interview as many general practitioners as is practical taking into account consent and access issues. We anticipate this will give a representative view of general practitioner and pharmacists attitudes to the project.
As all patient data collected during the study period will be evaluated, thus the results will provide the best possible evaluation of this model.

Describe your inclusion and exclusion criteria for participants (2000 character limit)*

All pharmacists and GPs participating in the WentWest Clinical Pharmacist Project are eligible for inclusion in this evaluation. Participants have been selected by the Wentwest Project Office and communicated to UTS Pharmacy research staff.
As part of routine practice, pharmacists will identify appropriate patients to receive the service, on the basis of previously agreed criteria set by the PHN. This criteria includes patients who: are taking more than 5 medications; have poorly managed diabetes, hypertension and asthma; have inadequate responses to therapy; or are experiencing suspected adverse drug reactions.

Please save and continue to the next page

Participant involvement

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

What time commitment will the research involve for your participants?
NOTE: This information must be included in any information to participants
(2000 character limit)*

Clinical Pharmacists and General Practitioners will be required to participate in 2 feedback interviews throughout the project. Each interview will take approximately 15-30 minutes.
For one clinical pharmacist there will be some time involved in collating and de-identifying the patient data.
All pharmacists will attend a training session of approximately 7 hours.
Collection of patient data is part of routine practice, and will therefore not contribute to additional time requirements for the pharmacists.

In what location will the research/data collection take place?
NOTE: This information must be included in any information to participants
(2000 character limit)*

Clinical pharmacist and general practice interviews will be conducted at the project practice sites or over the phone when a face to face interview is not possible.
Patient data collection takes place during the pharmacist-patient consultation in the participating surgeries.

What travel, if any, does the research involve for your participants?
NOTE: This information must be included in any information to participants
(2000 character limit)*

No travel required by participants.

Please include any additional information relating to participants that you think relevant
NOTE: This information must be included in any information to participants
(2000 character limit)*

N/A

Describe and justify any benefit, payment or compensation the participants will receive. For research being conducted with Aboriginal and Torres Strait Islander People, the described benefits from research should have been discussed with and agreed to by the Aboriginal or Torres Strait Islander research stakeholders. (REF NS 2.1) and 4.7.8 & 4.7.9)
(2000 character limit)*

Participants will receive no compensation.

Please save and continue to the next page

Consent

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Will you be obtaining written consent?*

- ○ Yes
- ◉ No

Please explain why and describe how you will obtain and record consent (2000 character limit)*

The Wentwest project has recruited GP surgeries to participate in the project, as well as employed pharmacists in these practices. The WentWest Project Office has approached all participants and gained consent from them to be included in the evaluation. At the time of interview, the UTS researcher will verbally confirm consent. If any pharmacists or GPs indicate that they do not wish to participate the researcher will stop the interview at that point.

Do you believe there will be any special issues relating to consent in your research? (REF NS 1.13, 2.2, 2.3, Chapter 4)*

- ○ Yes
- ◉ No

Are the participants able to consent fully? (REF NS Chapter 2, 4.4, 4.5)*

- ◉ Yes
- ○ No

Please save and continue to the next page

Limited disclosure

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Does this research involve limited disclosure to participants? (REF NS 2.3)*

- ○ Yes
- ◉ No

Please save and continue to the next page

Vulnerable populations

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Indicate if your research will involve the following vulnerable populations (as per the National Statement) other than as incidental participants (i.e. they are not included in the design of the project but may be participants) (REF NS Chapter 4)
*

- ☐ Women who are pregnant and the human foetus
- ☐ Children and young people
- ☐ People in dependent or unequal relationships
- ☐ People highly dependent upon medical care who may be unable to give consent
- ☐ People with a cognitive impairment, an intellectual disability or a mental illness
- ☐ People who may be involved in illegal activities
- ☐ People who are incarcerated
- ☐ Aboriginal and Torres Strait Islander Peoples
- ☐ People in other countries
- ☑ None of the above

If your research is being conducted in Australia, does it involve Culturally and Linguistically Diverse (CALD) People?*

- ○ Yes
- ◉ No

Do you intend to recruit any members of the Australian Defence Force?*

- ○ Yes
- ◉ No

Please save and continue to the next page

Section 7: Research participants/subjects part 2

Risk/harm

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Risk or harm could be described as damage or hurt to the wellbeing, interests or welfare of an individual, institution or group. Harm could range from physical hurt or damage such as illness or injury, to psychological or emotional hurt or damage, such as embarrassment or distress.
Please note that as a researcher, you are not necessarily immune from risk yourself and should give careful consideration to this question (REF NS 2.1).
For help in addressing the risk/harm section please click here.

NOTE:
It is **really** important that you carefully consider all ***potential*** risks that could occur, even if they seem negligible.
Please **do not** provide one-word answers to any of the questions below.
Please refer to the guidelines to address risk and harm located on the UTS HREC website titled: Help for how to address the risk/harm section.
You may also wish to look at the Criteria for determining the level of risk on the UTS HREC website.

Describe, as best as you can, any possible risks to research participants, subjects and related groups
NOTE: This information must be included in any information to participants (2000 character limit)*

While unlikely, it is possible that due to the small number of pharmacist participants there may be a small risk that they may be identifiable. This may be perceived by pharmacists as a possible risk to their job security.
There is no risk of patients being identified, as de-identified data only will be provided to the researchers.

How would you categorise the magnitude of potential risk? (e.g. inconvenience, discomfort, harmful, painful)
Explain why you believe this is so (2000 character limit)*

If a pharmacist were identified to be performing at a lower level than other participants, this might result in a threat to their employment. This would categorise the magnitude of this risk as severe.

How would you categorise the likelihood of risk? (i.e. slight, possible, likely, probable, unavoidable)
Explain why you believe this is so (2000 characters)*

This risk is unlikely as we will implement the strategies below.

What strategies will you use to minimise and/or manage the risks? (2000 character limit)*

In any report or publication pharmacist interview data will only be presented in a non-identifiable form. The evaluation of patient data will not be linked to any identifiable pharmacist or surgery data.

Discuss likely or possible risk to researchers (including yourself), and your strategies for minimising such risks (2000 character limit)*

The UTS researcher is visiting pharmacists and GPs during regular business hours and the UTS pharmacy research team is aware of all scheduled researcher activities and appointments. This should minimise any risk.

Please save and continue to the next page

Pre-existing relationships

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Are there likely to be any pre-existing relationships with research participants? (e.g. employer/employee, colleague, friend, relation, student/teacher, etc)*

- (•) Yes
- ( ) No

Please describe (2000 character limit)*

One of the participating clinical pharmacists is a current UTS employee. Another of the pharmacists is an ex UTS employee.
WentWest recruited these participants independently without any input from UTS.
These relationships will not affect the conduct of the research and the UTS researcher conducting the interviews has no previous relationship with either participant.

How might these relationships influence their decision to participate, be affected by the proposed research or create potential ethical conflict? Please describe strategy for dealing with this (2000 character limit)*

When approached by WentWest these pharmacists expressed their willingness to participate in the research. As the input from pharmacists is completely de-identified they should not be concerned about freely participating.

Describe how you will ensure that student assessment, employee security, etc., will not be adversely affected by participation in this research (2000 character limit)*

All information from interviews is de-identified and will not be linked to any individuals as a result there will be no undue influence on current or future job security or opportunities for participants.

Will you be recruiting UTS staff and/or students as research participants?*

- ( ) Yes
- (•) No

Please save and continue to the next page

External organisations

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Indicate if your research will involve any of the following:*

- [ ] Institution
- [x] Organisation
- [ ] Community Group
- [ ] None of the above

Please describe what type(s) of institution / organisation / community group will be involved and how many will be involved (2000 character limit)*

WentWest Primary Health Network has commissioned the pilot program so they will be involved in the research. In this particular project there are 12 surgeries from 3 GP associations that are part of the Wentwest Primary Health Network participating.

Was the research generated from within the institution / organisation / community group?*

- (•) Yes
- ( ) No

Please provide details of how the research was generated from within the institution / organisation / community group (2000 character limit)*

Wentwest provided the Hills District, Mt Druitt and Blacktown GP Associations with funding to commission the pilot study. The WentWest project office then approached UTS Pharmacy to conduct an outcome evaluation.

Please save and continue to the next page

External organisation consent

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Have you sought appropriate approval or support from the institution / organisation / community group involved?*

- (●) Yes
- ( ) No

Please attach a copy of any letter of approval/agreement at the end of this form

Do you intend to feed the research results back to the institution / organisation /community group?*

- (●) Yes
- ( ) No

Please describe how (2000 character limit)*

At the request of WentWest UTS Pharmacy will provide a outcome evaluation report on the pilot phase at the conclusion of the project.

Does this research involve any contracts, including confidentiality agreements? (REF NS 3.2.12, 3.5.6) (Section 2.5 and 4, The Code)*

- ( ) Yes
- (●) No

Please save and continue to the next page

Section 8: Data

Data collection

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

The collection, storage and use of data involve important considerations of privacy. When collecting data, researchers should show due sensitivity and respect for persons. It is also important that data be reliable, authentic, and where appropriate, replicable. This section will provide the HREC with information as to how you intend to deal with these issues.
(REF NS 2.2.6(f), 3.2) (Section 2, The Code)

Who will collect the data? (More than one box may be checked) (Section 2, The Code)*

- [ ] External contract researcher
- [ ] External associate researcher
- [ ] External student
- [ ] Internal (UTS) academic researcher
- [ ] Internal (UTS) research assistant
- [x] Internal (UTS) student
- [ ] Research Assistant
- [ ] Volunteers
- [x] Other

Please provide further details of additional people who will be involved in data collection (2000 character limit)*

While the UTS research student will conduct the qualitative interviews with project participants, the patient data will be collected as part of routine practice by the project pharmacists. This data will be de-identified by one of these pharmacists before being provided to the UTS research team. A copy of the standard data collection form used by the pharmacists is attached.

Will you be attaching a sample of your data recording/measurement instrument(s) to this application (e.g. survey, interview format, etc?)*

(●) Yes
( ) No

Please save and continue to the next page

Information database or personal records

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Do your data collection or recruitment methods include access to an information database or personal records? (Section 95 and 95A, Privacy Act) (REF NS 3.2) *

( ) Yes
(●) No

Please save and continue to the next page

Data type

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

The HREC is required to report on privacy to the Federal and NSW Privacy Commissioners

Indicate the category of data you will be obtaining at the point of data collection (More than one box may be checked):*

☑ Individually identifiable data
☐ Re-identifiable data
☑ Non-identifiable data

Are you obtaining consent for individually identifiable or re-identifiable information?*

(●) Yes
( ) No

Please select how you will be obtaining consent from the list below*

Other

Please describe what other method you will use to obtain consent (2000 character limit)*

As part of the surgery and pharmacist recruitment process for the WentWest project, consent to participate in the evaluation has been obtained by the WentWest Project team.

Why do you need to have access to individually identifiable and/or re-identifiable data? (2000 character limit)*

Interviews are conducted face-to-face, therefore participants must be identified. Data from these interviews will only be presented in an aggregated, de-identified way.

Will you be seeking identifiable information from a Commonwealth agency, without the consent from the individuals to which the data refer?*

( ) Yes
(●) No

How will you ensure that data will be non-identifiable? (2000 character limit)*

Transcribed data from pharmacist, GP, and practice staff interviews will be stored in a de-identified way, for example Pharmacist 1.
All identifiable patient data will be removed by the Project Manager at WentWest before the data is sent to the researcher. The researcher does not have access to the patients themselves, or their medical records.

Please save and continue to the next page

Data storage

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Data must be stored and secured for a minimum of 5 years after publication (Some data are required for longer periods of time and the storage will need to take this into account). For further details on retention requirements, refer to the UTS Records Management Policy http://www.records.uts.edu.au/policies/index.html The data should be stored so as to ensure maximum privacy for participants, reliability and retrievability of data.

Indicate the format(s) the data will be stored in (Choose as many categories as applicable)
NOTE: This information must be included in any information to participants
*

- [x] Electronic/digital recording
- [ ] Handwritten notes
- [ ] Microfilm
- [ ] Non-identifiable(anonymous)data
- [ ] On-line data storage
- [ ] Paper questionnaires/Surveys
- [ ] Transcripts of tapes/recordingd
- [ ] Video tapes
- [ ] Other

Who will have access to the raw data? (Choose as many categories as applicable)
NOTE: This information must be included in any information to participants
*

- [x] UTS academic researcher(s)
- [x] UTS student(s) and supervisors
- [ ] External researcher(s)
- [ ] Research assistant(s)
- [ ] Funding body/organisation
- [ ] Partner organisation(s)
- [ ] Other

Please save and continue to the next page

Use & publication of data

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

How do you intend to use and/or publish the data? (Choose as many categories as applicable)
NOTE: This information must be included in any information to participants
*

- [ ] Book
- [ ] Client Report
- [x] Conference paper
- [ ] Electronic publication
- [ ] Media
- [x] Report
- [x] Thesis
- [x] Journal articles
- [ ] Other

Do you envisage any additional use of data in future research projects?*

- ( ) Yes
- (•) No

Please save and continue to the next page

Privacy principles

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

As a general principle, privacy and confidentiality should be respected at all stages of the research (raw data, analysis, published or archived), and by all those involved in the research (including the researcher, research assistants, administrative assistants, students, interpreters, translators, data processors, members of focus groups, etc.)

Note: Privacy and confidentiality is complicated in NSW because it is governed by a number of separate Acts. From 12 March 2014, the new Australian Privacy Principles (APPs) were introduced to regulate the handling of personal information by Australian government agencies and some private sector organisations.

The privacy fact sheet providing the text of the 13 APP can be accessed here.

The 13 APP apply to all research conducted by staff and students of this University.

Will this research be undertaken in conformity to ALL the Privacy Principles?*

- (•) Yes
- ( ) No

Please save and continue to the next page

Privacy & confidentiality

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

How will you ensure the security of the data? (2000 character limit)*

The data will not be forwarded to anyone outside the research team. All members of the research team are aware of privacy and confidentiality requirements. The data will be stored on a password protected computer at UTS.

How will you protect the confidentiality/privacy of your participants? (2000 character limit)*

No identifiable data from pharmacists, GP's or surgeries will be published or propagated. Only de-identified patient data will be obtained.

To what extent will you or anyone else be able to identify the research participants from the published or unpublished data? Please describe: (2000 character limit)*

Patient participants will not be identifiable.In relation to the quantitative patient related data, the research team may be able to identify the clinical pharmacist participants due to their knowledge of the different pharmacist schedules and the small number of participating pharmacists. The student researcher will be conducting interviews with the participants, however transcriptions will be stored in a de-identified form. In all publications, only de-identified, aggregated data will be reported.

Please save and continue to the next page

Interpretation/analysis/disposal

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Regardless of whether data collected is qualitative or quantitative, how do you plan to analyse these data into material that is valid and reliable? (Include a brief summary of your Analysis Plan) (2000 character limit)*

Transcripts from the qualitative interviews will be analysed to identify themes, including barriers and facilitators to the GP-pharmacist model of practice.
Quantitative data analysis will be undertaken using the Statistical Package for the Social Sciences (SPSS) and descriptive statistics will be calculated.

Will the data be archived or destroyed? *

- [x] Archived
- [ ] Destroyed

Where will the data be archived, who will have access to it, and will there be any conditions attached? (2000 character limit)*

The data will be archived on a password-protected computer, with access for the research team only.

Please save and continue to the next page

Section 9: Additional information

Other ethical issues

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

If there are any additional ethical issues which you do not believe have been covered by this form, please explain them for the HREC: (2000 character limit)*

No additional ethical issues have been identified.

Please save and continue to the next page

Section 10: Attachments

Attachments

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Note - You must attach the Ethics Checklist with your application.

I have attached the following supporting documents

Doctoral or Masters assessment*

- ○ Yes
- ◉ N/A

Participant Information Sheet(s)*

- ◉ Yes
- ○ No

Survey(s)/questionnaire(s)/outline of question(s)*

- ◉ Yes
- ○ N/A

Evidence of approval from external institution, organisation or community group*

- ◉ Yes
- ○ N/A

Explanations of any technical terms used*

- ○ Yes
- ◉ N/A

Standard Operating Procedures*

- ○ Yes
- ◉ No

Please explain why any of the above items have not been attached (either softcopy/hardcopy) and when they will be provided (2000 character limit)*

There are no relevant standard operating procedures for this evaluation. Initially the participant information sheet was not attached as the research team deemed that WentWest had previously gained particpant consent and had provided them with the relevant information so the UTS research team did not need to duplicate this action. In response to the ethics committee request a participant information sheet and informed consent form has been developed and is attached below.

NOTE: If you are only attaching a hardcopy of any attachments relating to this application, you must still click on 'Add New Document' on the right hand side of the table.

If possible, please consolidate all attachments into one PDF

How to attach
1. Click on "Add New Document"
2. Enter a title in the "Document description" field
3. Click on the green tick
4. Click on SOFT COPY icon
5. Follow the instructions in the upload dialog box

To add a reference to a hard copy document:
1. Click on "Add New Document"
2. Enter a title in the "Document Description" field
3. Tick check box for "Hard Copy"
4. Enter details in the "Reference (Document Title)" field
5. Click on the green tick

Please use the following HREC templates when creating an information sheet and consent form: HREC templates

Documents attached to this application:*

Description	Reference	Soft copy	Hard copy
Correspondence with WentWest	Correspondence with WentWest.pdf	✓	
ETH16-0689 - Williams - Combined Ethics Application	ETH16-0689 - Williams - Combined Ethics Application.pdf	✓	
ETH16-0689 - Williams - HREC Outcome and Comments	ETH16-0689 - Williams - HREC outcome and comments.docx	✓	
Gp Interview Form	Clinical Pharmacist Project Model GP Investigation.docx	✓	
Informed Consent	Template Consent form - editedJun2016_KW (1).doc	✓	
Informed Consent Retrospective	Template Consent formretrospective - editedJun2016_KW.doc	✓	
Participant Information Sheet	Template Participant information sheet WentWest - Jun2016_KW (1).doc	✓	
Pharmacist Data Collection Form	Pharmacist Data Collection Form.xlsx	✓	
Pharmacist Interview Form	Clinical Pharmacist Project Model Investigation.docx	✓	
Response to HREC Comments	ETH16-0689 - Williams - HREC outcome and commentsresponse_edited1.docx	✓	

Please read the submission instructions carefully at the end of this application form.
Please save and continue to the next page

How do I submit?

How do I submit and print this application?

Please read the submission instructions carefully.

1. Check all questions marked with a red asterisk (*) have been answered. You can do this by checking that all pages in the form menu (located on the left of this page) have a green tick next to them. Pages marked with a (!) indicate that one or more mandatory questions have not been answered.

2. Click on the 'Action' tab and click 'Submit'. The status of the application will change. The status is located above the 'Action' tab.

3. Follow the instructions in the email that will be sent to you after you click on the submit button.

If you would like any further information please see our instructions or contact the Ethics Secretariat by email or on (02) 9514 9772.

What happens next?

Please read before proceeding

This form will be electronically submitted to your supervisor for review before going to the Ethics Secretariat. If your supervisor has any comments, they will be able to either make comments on your application or discuss their comments with you outside of the system. Your supervisor will need to electronically send the application back to you for editing through the options listed in the Action Tab. Once your supervisor electronically endorses your application you will be notified by email and the application will be electronically available for the Ethics Secretariat to forward to the Committee. You must provide a signed copy, including a signature from the Associate Dean Research from your Faculty, before the Ethics Secretariat can finalise your application.

You are now ready to submit this application. Click on the Action Tab (located top left next to the Form Tab) and click on "Submit".

If you would like any further information please see our instructions or contact the Ethics Secretariat by email or on (02) 9514 9772. You can also watch videos on how to submit this form or download detailed instructions about the form and its features.

Have you signed and submitted a copy of this form for your supervisor and Faculty (ADR) to review?

- (●) Yes
- ( ) No

Declaration

Declaration

I declare that the information I have given above is true and that this research does not contravene the National Statement on Ethical Conduct in Human Research, the Australian Code for the Responsible Conduct of Research, and relevant UTS policy and guidelines relating to the safe and ethical conduct of research.

I also declare that I will respect the personality, rights, wishes, beliefs, consent and freedom of the individual participant in the conduct of my research and that I will notify the UTS Human Research Ethics Committee of any ethically relevant variation in this research.

In signing this declaration, I guarantee that this form has been distributed to each member of the research team, and they have agreed to abide by the principles and processes of the research as outlined in this application.

To signoff the ethics application **click on your name below and accept.**

Declaration Signoff*

1	Full Name	Mrs Helen Benson
	Position	5Research Student
	Declaration signed?	Yes
	Signoff Date	18/07/2016
2	Full Name	A/Prof Kylie Williams
	Position	Chief Investigator
	Declaration signed?	Yes
	Signoff Date	24/08/2016

You can save your application at any time by clicking on the save button on the left hand side in the toolbar. Further examples and information to help you successfully complete your application can be found here

Faculty review

Faculty Review - Associate Dean (Research) or nominee

I am aware that this research is being conducted within this faculty and am satisfied that the researchers have met faculty requirements in relation to this research.

Signature of Associate Dean (Research) or nominee (Please sign once printed):

This question is not answered.

Name of Associate Dean (Research) or nominee:

This question is not answered.

Date:

This question is not answered.

I do/do not* wish to add comments in relation to this application (*please circle which one when signing the hard copy):

This question is not answered.

Faculty Research Office only

Faculty Research Office check (hardcopy only)

Faculty Research Office only
Has this application been printed, signed and a hardcopy received by the Faculty Research Office? (tick on hardcopy only)

- ○ Yes
- ○ No

This question is not answered.

Comments/Notes:

This question is not answered.

Appendix 3: GP Pharmacist Educational Needs Study Ethics Application

ResearchMaster

Human Ethics Application

Application ID :	ETH18-2851
Application Title :	Establishing Educational Needs of GP Pharmacists
Date of Submission :	N/A
Primary Investigator :	Prof Kylie Williams; Chief Investigator
Other Personnel :	Mrs Helen Benson; 5Research Student
	Dr Cherie Lucas; Co-Supervisor

Section 1: Ethics Portal

Select your application type

What type of application are you looking for?
Please **do not** change your application type without first consulting with the Ethics Secretariat (9514 9772).*

- (•) New application (including scope-checking for nil/negligible risk research)
- ( ) Ratification of existing approval
- ( ) Transfer of existing approval
- ( ) Evaluation of teaching and learning activities
- ( ) Amendment to existing approval
- ( ) Program approval

You have selected "new application (including scope checking for nil/negligible risk research)". This option allows you to create a new form. The system will check if your application can be approved by the Faculty or whether it requires full ethics approval by the HREC. Please click "save" before continuing.

What should I know before I start?

Would you like more information on:

- ( ) This system
- ( ) The ethics process
- ( ) Purpose of the ethics review process

This question is not answered.

Section 1A: Risk evaluation

Risk A

Determining the level of risk

You can save your application at any time by clicking on the save button on the left hand side in the toolbar. For further information and help in completing your application go to Staff Connect.

Please answer each question carefully **and consecutively**.

If you need to contact the Research Ethics Officer you can call (02) 9514 9772

Does your research involve:

Projects involving covert observation, active concealment, or planned deception of participants

e.g. covert observation of the hand-washing behaviour of hospital employees, undisclosed role-playing by a researcher, etc. Does NOT include observation in a public place WITHOUT the use of photographs, images, video or audio footage (Chapter 2.3, page 19)

*

- ( ) Yes
- (•) No

Targeted recruitment or analysis of data from any of the vulnerable groups listed below (or where any of these vulnerable groups are likely to be significantly over-represented in the group being studied)

- Women who are pregnant and the human fetus (Chapter 4.1, page 46)
- Children and young people (under 18 years) (Chapter 4.2, page 50)
- People in dependent or unequal relationships (e.g. lecturer/student [except T&L], doctor/patient, employer/employee) (Chapter 4.3, page 53)
- People highly dependent on medical care who may be unable to give consent (Chapter 4.4, page 55)
- People with a cognitive impairment, an intellectual disability, or a mental illness (may include the disadvantaged/homeless) (Chapter 4.5, page 58)
- People who may be involved in illegal activities (including those affected e.g. victims of domestic violence) (Chapter 4.6, page 60)
- Aboriginal and Torres Strait Islander Peoples (Chapter 4.7, page 62)

*

- ( ) Yes
- (•) No

People in / from countries that are politically unstable; where human rights are restricted; and/or where the research involves economically disadvantaged, exploited or marginalised participants from such countries e.g. includes countries that score <50 on the Transparency Index

*

- ○ Yes
- ◉ No

Collection, use or disclosure of personal information WITHOUT consent of the participant

- **Name, address and other details about the participant (e.g. date of birth, financial information etc.)**
- **Photographs, images, video or audio footage**
- **Fingerprints**

*

- ○ Yes
- ◉ No

Collection, use or disclosure of health information

- Personal information collected to provide, or in providing, a health service (e.g. admission to hospital, GP visit, pathology, pharmacy etc.)
- Information or an opinion about:
  (i) the health or a disability (at any time) of an individual; or
  (ii) an individual's expressed wishes about the future provision of health services to him; or
  (iii) a health service provided, or to be provided, to an individual
- Personal information about organ donation;
- Genetic information about an individual or the individual's relatives

N.B Includes information collected through physiological testing or assessment. Examples include but are not limited to EEG, EMG, BMI, blood pressure, DEXA, etc.

*

- ○ Yes
- ◉ No

Collection, use or disclosure of sensitive information

Racial, ethnic information, political, religious and philosophical beliefs, sexual activity or identity, and trade union membership

*

- ○ Yes
- ◉ No

Activity that potentially infringes the privacy or professional reputation of participants, providers or organisations

e.g. observation in the workplace, collection of commercially confidential information, etc.
Commercially confidential information = Any information which is not in the public domain or publicly available, and where disclosure may undermine the economic interest or competitive position of the owner of the information (TGA adopted definition from European Medicines Agency (EMA)). N.B. if canvassing opinion via expert-to-expert modes of data collection(?) with full disclosure, consent, and information regarding identification and use in the public domain, answer "No" here

*

- ○ Yes
- ◉ No

Establishment of a register, database, or databank of identifiable information for possible use in future research projects

*

- ○ Yes
- ◉ No

Collection, transfer and/or banking of human biospecimens.
e.g. tissue, blood, urine, sputum etc.

*

- ○ Yes
- ◉ No

Any significant alteration to routine care or service provided to participants

e.g. deviation from standard care or usual practice

*

- ○ Yes
- ◉ No

Prospective assignment of human participants or groups of humans to one or more health-related interventions to evaluate the effects on health outcomes

WHO definition of a Clinical Trial

*

- ○ Yes
- ◉ No

Potential for participants to experience harm

e.g. physical, psychological, social, economic and/or legal (Chapter 2.1, page 13)

*

- ○ Yes
- ◉ No

Risks B

Collection, use or disclosure of personal information WITH consent of the participant

e.g. surveys, interviews, focus groups, publication.
N.B. if administering anonymous surveys and you have the particpant's contact information, answer "Yes" here.
N.B. if canvasing opinion via expert-to-expert modes of data collection(?) with full disclosure, consent and identification for use in the public domain, answer "No" here

*

- ○ Yes
- ◉ No

Involves direct contact with UTS staff/students, patients, consumers or members of the public

N.B. if canvasing opinion via expert-to-expert modes of data collection(?) with full disclosure, consent and identification for use in the public domain, answer "No" here

*

- ○ Yes
- ◉ No

Involves participants who have a pre-existing relationship with the researcher

e.g. relative, friend, co-worker. N.B. if canvasing opinion via expert-to-expert modes of data collection(?) with full disclosure, consent and identification for use in the public domain, answer "No" here

*

- ○ Yes
- ◉ No

People unable to give free informed consent due to difficulties in understanding the Information Sheet or Consent Form.

e.g. language difficulties

*

- ○ Yes
- ◉ No

People in other countries

Chapter 4.8, page 65

*

- ○ Yes
- ◉ No

Risks C

Involves the use of existing collections of data or records that contain only non-identifiable data about human beings

Section 5.1.22, page 70

*

- ○ Yes
- ◉ No

Involves the administration of anonymous surveys

i.e. name, address, date of birth, student ID are NOT collected AND you do not hvae the participant's contact details.

*

- ○ Yes
- ◉ No

Observation in a public place WITHOUT the use of photographs, images, video or audio footage*

- ○ Yes
- ◉ No

Expert panels and/or consultation

i.e. canvasing independent/individual opinions via expert-to-expert modes of data collection to derive practice recommendations/guidelines and/or expert commentaries with full disclosure, consent and identification for use in the public domain (excludes evaluation/investigation of practice/experiences and/or observations)

*

- ◉ Yes
- ○ No

Nil/Negligible Risk

Section 2: Project information

Project title

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Application ID (automatically generated):

ETH18-2851

Application Title:*

Establishing Educational Needs of GP Pharmacists

Please note that the HREC is now granting a standard approval period for the research proposals.
The approval period for your project will be specified in your approval letter.
Please also note that research should not commence until ethics approval has been granted. The Committee cannot grant retrospective approval for data that has already been collected.

Ethics category code (automatically selected):*

Human

Is this a resubmission of a previous application?*

- ○ Yes
- ◉ No

Is this a pilot study? *

- ○ Yes
- ◉ No

Has a pilot study been conducted as part of this project? *

- ○ Yes
- ◉ No

Please save and continue to the next page

Consultation

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Have you undertaken any consultation in preparing this application?*

- (•) Yes
- ( ) No

Please describe (1500 character limit)*

I have consulted with my PhD supervisor Professor Kylie Williams in preparing this application

Please save and continue to the next page

Section 3: Personnel

Investigators

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Are there external investigators or personnel listed on this protocol?*

- ( ) Yes
- (•) No

Is this application for a student project?*

- (•) Yes
- ( ) No

Students - Please note that once you submit your application is submitted it will go directly to your supervisor and not to the Committee. Once your supervisor endorses your application it will come to the Research Ethics Officer for review. Please hold off on printing your hardcopy until you have received feedback from the Research Ethics Officer. Your electronic application must be submitted by the closing date.

Personnel Table

Position type	In the personnel table use the following positions from the drop-down list
Chief Investigator	1Chief Investigator
Co Investigator	3Assoc. Investigator
Supervisor	1Chief Investigator
Co Supervisor	Co-Supervisor
Research Student	5Research Student

Further options are available for Research/Project Managers and Administrators.
The main contact should be marked as 'primary' and should be a UTS staff member.
Please click on 'More Criteria' located on the top right hand side of the table to find personnel.

If any details are incorrect or missing please contact the Ethics Secretariat on (02) 9514 9772 or by email.

Instructions on how to add a person to the personnel table:
1. Click on 'More criteria' which is located on the top right hand corner of the table below
2. Enter the surname (and given name if the surname is common) in the fields marked 'Surname' and 'Given name' and click 'Search'
If the system cannot find the person you are looking for you have the option of adding them in - just click "Ok" when the pop-up window shows.
3. Click on the name of the person you wish to add
4. If they are the primary contact (e.g. Chief Investigator/Supervisor), tick "Yes" under 'Primary contact'
5. Select the position from the drop-down list (e.g. Chief Investigator/Research Student)
6. Click on the green tick

Students must add their supervisors to their application and must mark their primary supervisor as a Chief Investigator and as a primary contact.
Students should be listed as "5Research student"

Internal personnel listed on this ethics protocol:
*

1	Primary	No
	ID	128965
	Surname	Benson
	Given Name	Helen
	Name	Mrs Helen Benson
	Position	5Research Student
	Type	Internal
	AOU	GSH.Pharmacy
	Managing Unit	Graduate School of Health
	Email Address	Helen.Benson@uts.edu.au
	Contact Phone	
2	Primary	Yes
	ID	112663
	Surname	Williams
	Given Name	Kylie
	Name	Prof Kylie Williams
	Position	Chief Investigator
	Type	Internal
	AOU	GSH.Pharmacy
	Managing Unit	Graduate School of Health
	Email Address	Kylie.Williams@uts.edu.au
	Contact Phone	4050
3	Primary	No
	ID	128450
	Surname	Lucas
	Given Name	Cherie
	Name	Dr Cherie Lucas
	Position	Co-Supervisor
	Type	Internal
	AOU	GSH.Pharmacy
	Managing Unit	Graduate School of Health
	Email Address	Cherie.Lucas@uts.edu.au
	Contact Phone	4275

If you cannot find a person through the personnel table(s) above, please enter their details here (title, name, organisation, department, phone number, address, email address and their position on this protocol). (2000 character limit)

This question is not answered.

Please provide additional (or preferred) contact details of any of the people listed on the project if necessary (2000 character limit)

Helen Benson- mobile 0436 358 559

Please provide details of any formal qualifications (REF NS 1.1(e)) of each person listed on the project (2000 character limit)*

Helen Benson- BPharm, MAACP accredited consultant pharmacist, UTS Practitioner Teacher, PhD candidate
Prof Kylie Willliams Professor, Bachelor of Pharmacy, Graduate Diploma of Hospital Pharmacy, Doctor of Philosophy, Registered Pharmacist
Dr Cherie Lucas, Bachelor of Pharmacy, Graduate Diploma of Hospital Pharmacy, Graduate Certificate in Educational Studies(Higher Education), Doctor of Philosophy, Registered Pharmacist

Please outline the experience of each person listed on this project relevant to this application (2000 character limit)*

Helen Benson has been a registered pharmacist since 2000 and was first accredited to conduct home medicines review in 2002.
She has extensive experience working collaboratively with general practitioners in the area of medication management. Helen commenced teaching as a practitioner teacher for the school of pharmacy in 2016 and is just beginning her research career. Helen has previously worked with WentWest in the pilot phase of the general practice pharmacist project.
Professor Kylie Williams has extensive experience as PhD supervisor she is a registered pharmacist with more than 20 years of academic experience in teaching and research at both the University of Technology Sydney and The University of Sydney.
Dr Cherie Lucas has been a registered pharmacist for more than 27 years and is currently a trained Pharmacist Immuniser and Accredited Mental Health First Aid Instructor. Cherie's main areas of interest in pharmacy practice includes all areas including: hospital, community, industry, academia and research most recently interprofessional education and collaboration . Previously Cherie attained a Specialist Clinical Pharmacist position at Royal Prince Alfred Hospital, Sydney. Cherie is an experienced educator and practitioner with a passion for working collaboratively.

Primary AOU*

GSH.Pharmacy

Managing Unit

Graduate School of Health

Please save and continue to the next page

Student details

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Degree being undertaken (500 character limit)*

PhD Pharmacy Practice

Have you been successful in your doctoral/masters assessment? *

- (•) Yes
- ( ) No

Please make sure you attach a copy of your DA/Stage one confirmation in the attachments section.

Students, please read carefully: Your application should be reviewed by the Ethics Secretariat prior to submitting to the Committee. Once you have completed this application and followed the submission instructions, your application will go to your supervisor for review. Once your supervisor has endorsed the application it will come to the Ethics Secretariat for a pre-review. This pre-review process is necessary to ensure that your application is complete, has all necessary attachments, and that the quality of responses to the questions meets the Committee¿s expectations. Your application should therefore be submitted at least one week prior to the closing date. If you do not submit your application in time, it may be delayed and held off until the next closing date.

Section 4: Funding

Funding details

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Have you received funding in relation to this research?*

- (•) Yes
- ( ) No

Do you have a RM Project ID number?*

- (•) Yes
- ( ) No

Please search for a linked funding application related to this project by clicking on 'More criteria'.
Please note that you can only search for projects where personnel listed on this application are also listed on the related project.
*

Project ID:	PRO17-4279
Project Title:	General Practice Pharmacist Training - Curriculum Development and Training Program Delivery Proposal
Primary Contact:	Prof Kylie Williams

All Investigators:

Name	Position	Org. Unit	Managing Unit	Organisation
Mrs Sarah Walsh Angus	RIO Business Development Manager	DVCRch RIO.Research Engagement	DVC (Research)	
Prof Charlie Isaac Benrimoj	Chief Investigator	GSH.Graduate School of Health	Graduate School of Health	
Mr Michael Joseph Morgan	RIO Contract Support	DVCRch RIO.Research Operations and Management	DVC (Research)	
Prof Kylie Williams	0First Named UTS Chief Investigator	GSH.Pharmacy	Graduate School of Health	

Fund Scheme:

Name	Amount Applied	Amount Approved
WENTWEST LIMITED	104,620.00	0.00

Status:	Approved
Is Primary:	Yes
Date Start:	2/11/2017
Date End:	31/12/2019

Please save and continue to the next page

Funding continued

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

Is there any potential conflict of interest for you as a researcher because of the funding or commercial arrangements?*

- ○ Yes
- ◉ No

Are there any constraints on the research as a result of the funding arrangements, e.g. to intellectual property, publication, etc? (Section 4, The Code)*

- ◉ Yes
- ○ No

Please provide details of any constraints on the research as a result of the funding arrangements
(1500 character limit)*

The research agreement between WentWest and UTS Pharmacy stipulates the following:

- We may each publish the results of the Project within the first 12 months after completion of the Project with the prior written consent of the other. In order to obtain consent, we must provide a copy of the proposed publication at least one month before publication. Consent will be deemed to be given if no response is received by the date of publication.
- If one of us reasonably requests that its Confidential Information be removed from a proposed publication then the other must not publish until it has taken reasonable steps to remove the Confidential Information,
Consent for publication is not required after the first 12 months if the publication does not include the others confidential Information.
- We must ensure that any material published under this clause includes an acknowledgement (in a form acceptable to us both) of the support given by the other for the project.

Please save and continue to the next page

Section 5: Methodology

Description

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

The purpose of this section is to place your research in context for the HREC and demonstrate your ability to conduct the research. The HREC may only approve research which is methodologically sound. Remember to use simple language that can be understood by people from a variety of backgrounds. Avoid jargon and acronyms.

What are the hypotheses/goals/aims/objectives of your research? Please include a brief description using plain English explaining your research aims (approximately 100 words) (1500 character limit)*

This study aims to develop a consensus position on the educational needs of GP Pharmacists. A 3-round modified Delphi process will be conducted with a panel of >10 experts. Participants will review a list of GP Pharmacist roles and establish GP Pharmacist educational needs. Ultimately the panel will rate their agreement using a 5-point Likert scale. The list of educational needs will then be rated for importance of inclusion in a training program.

Note: Clinical Trials, Recruitment of Participants and Data Collection are dealt with later so you will not need to describe them in detail below

Please provide a brief description of the research design including research questions and proposed methods for conducting the research (approximately 250 words) (1500 character limit)*

Research Question: What are the educational needs of GP Pharmacists?
Objective: Our primary objective will be to identify educational needs for general practice pharmacists in Australia.
Study Design Our study will employ a three-step modified Delphi method
Participants will be included if they are willing to participate and declare any conflict of interest. Potential participants have been selected from all Australian Universities offering pharmacy education. (See Expert Panel List in Study Protocol Attachment) Participants will be excluded if they are unable to commit to being available for the entire process.
Potential participants will receive materials to inform them of the study objectives and design and the commitment required for participation. Participants will be sent an invitation e-mail, participant information sheet and consent form.
Design and content of the survey
Study data will be collected and managed using REDCap electronic data capture tools hosted at The University of Technology Sydney.
Participants will be asked to rank the educational needs for GP pharmacists related to each GP Pharmacist role individually using a 5-point Likert scale
If consensus is reached on all points of the survey then there will be no Phase II and the results of Phase I will be taken to the expert panel consensus meeting
Consensus is reached when: > 75% of respondents provide a positive result (four or five) on the Likert scale for all criteria.

What do you hope the outcome(s) of this research will be? (1500 character limit)*

It is hoped a consensus will be obtained on a list of GP Pharmacist educational needs to inform the educational program development.

Who do you think will benefit from this research? (1500 character limit)*

The educational design team at UTS and GP pharmacists who will be trained as part of the educational program.

Please provide a brief description of the significance of your research (approximately 100 words) (1500 character limit)*

This research is contributing to development of the first evidence based educational program for GP Pharmacists in Australia.

Please save and continue to the next page

Section 10: Attachments

Attachments

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
For further information and help in completing your application go to Staff Connect

I have attached the following supporting documents

Doctoral or Masters assessment*

- (●) Yes
- ( ) N/A

Budget page from funding application*

- ( ) Yes
- (●) N/A

Participant Information Sheet(s)*

- (●) Yes
- ( ) No

Explanations of any technical terms used*

- (●) Yes
- ( ) N/A

Standard Operating Procedures (May include a distress or disclosure protocol; procedures for participant screening; physiological, psychological, or biological sampling and/or laboratory or safety procedures where relevant.)*

- (•) Yes
- ( ) No

Please explain why any of the above items have not been attached (either softcopy/hardcopy) and when they will be provided (1500 character limit)*

The budget page from the funding application for the educational development project as no funds will be used in the completion of this study.

NOTE: If you are only attaching a hardcopy of any attachments relating to this application, you must still click on 'Add New Document' on the right hand side of the table.

If possible, please consolidate all attachments into one PDF

How to attach
1. Click on "New Document"
2. Enter a title in the "Document description" field
3. Click on the OK button
4. Click on SOFT COPY icon
5. Follow the instructions in the upload dialog box

To add a reference to a hard copy document:
1. Click on "Add New Document"
2. Enter a title in the "Document Description" field
3. Tick check box for "Hard Copy"
4. Enter details in the "Reference (Document Title)" field
5. Click on the OK button

Please use the following HREC templates when creating an information sheet and consent form: HREC templates

Documents attached to this application:*

Description	Reference	Soft copy	Hard copy
DSP Stage 1 Assessment	DSPStage1helen benson.pdf	✓	
Participant Information and Consent Form	GP Pharmacist Educational Needs Study Participant information sheet-consent form.docx	✓	
Study Protocol	EducationNeeds of GP PharmacistsStudy Protocol_220818.doc	✓	

Please read the submission instructions carefully at the end of this application form.
Please save and continue to the next page

Declaration

Declaration

I declare that the information I have given above is true and that this research does not contravene the National Statement on Ethical Conduct in Human Research, the Australian Code for the Responsible Conduct of Research, and relevant UTS policy and guidelines relating to the safe and ethical conduct of research.

I also declare that I will respect the personality, rights, wishes, beliefs, consent and freedom of the individual participant in the conduct of my research and that I will notify the UTS Human Research Ethics Committee of any ethically relevant variation in this research.

In signing this declaration, I guarantee that this form has been distributed to each member of the research team, and they have agreed to abide by the principles and processes of the research as outlined in this application.

To signoff the ethics application **click on your name below and accept.**

Declaration Signoff*

1	Full Name	Mrs Helen Benson
	Position	5Research Student
	Declaration signed?	Yes
	Signoff Date	09/08/2018
2	Full Name	Prof Kylie Williams
	Position	Chief Investigator
	Declaration signed?	No
	Signoff Date	

You can save your application at any time by clicking on the save button on the left hand side in the toolbar.
Further examples and information to help you successfully complete your application can be found here

Confirmation

Confirmation by ADR

Application type

Human

Internal personnel listed on this ethics protocol

1	Primary	No
	ID	128965
	Surname	Benson
	Given Name	Helen
	Name	Mrs Helen Benson
	Position	5Research Student
	Type	Internal
	AOU	GSH.Pharmacy
	Managing Unit	Graduate School of Health
	Email Address	Helen.Benson@uts.edu.au
	Contact Phone	
2	Primary	Yes
	ID	112663
	Surname	Williams
	Given Name	Kylie
	Name	Prof Kylie Williams
	Position	Chief Investigator
	Type	Internal
	AOU	GSH.Pharmacy
	Managing Unit	Graduate School of Health
	Email Address	Kylie.Williams@uts.edu.au
	Contact Phone	4050
3	Primary	No
	ID	128450
	Surname	Lucas
	Given Name	Cherie
	Name	Dr Cherie Lucas
	Position	Co-Supervisor
	Type	Internal
	AOU	GSH.Pharmacy
	Managing Unit	Graduate School of Health
	Email Address	Cherie.Lucas@uts.edu.au
	Contact Phone	4275

Date of LRO review

23/01/2019 12:00:00 AM

Comments

This question is not answered.