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Exploring the potential impact of integrating pharmacists into general practice in Ireland

Eoin Hurley, BPharm, MPharm, MPSI

A thesis submitted to the National University of Ireland, Cork for the degree of Doctor of Philosophy in the School of Pharmacy

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Head of School

Professor Brendan Griffin

Supervisors

Professor Stephen Byrne

Dr Kieran Dalton

Professor Tony Foley

Dr Elaine Walsh

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Declaration

This is to certify that the work I am submitting is my own and has not been submitted for another degree, either at University College Cork or elsewhere. All external references and sources are clearly acknowledged and identified within the contents. I have read and understood the regulations of University College Cork concerning plagiarism.

Signed: Eoin Hurley Date: 2nd February 2024

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List of Abbreviations

ACB	Anticholinergic Cognitive Burden
ADE	Adverse drug event
ADR	Adverse drug reaction
APEASE	Acceptability, Practicability, Effectiveness/cost-effectiveness, Affordability, Safety/side effects, Equity
BCT	Behaviour change technique
BCW	Behaviour Change Wheel
cADE	Cost of adverse drug event
CASP	Critical Appraisal Skills Programme
CCI	Charlson Comorbidity Index
CENTRAL	The Cochrane Central Register of Controlled Trials
CERQual	Confidence in the Evidence from Reviews of Qualitative research
CFIR	Consolidated Framework for Implementation Research
CHEERS	Consolidated Health Economic Evaluation Reporting Standards
CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
COREQ	Consolidated Criteria for Reporting Qualitative Studies
CDM	Chronic disease management
CP	Clinical pharmacist
CREC	Clinical Research Ethics Committee of the Cork Teaching Hospitals
CROSS	Consensus-Based Checklist for Reporting of Survey Studies
DBI	Drug Burden Index
DCS	Direct cost savings
DRP	Drug-related problem
EMR	Electronic medical record

ENTREQ	Enhancing transparency in reporting the synthesis of qualitative research
EQUATOR	Enhancing the QUAlity and Transparency Of health Research
EU	European Union
FI	Frailty Index
GMS	General Medical Services
GORD	Gastro-oesophageal reflux disease
GP	General practitioner
GRADE	Grading of Recommendations, Assessment, Development, and Evaluations
HbA1c	Glycated haemoglobin
HIQA	Health Information and Quality Authority
HRCDC	Health Research Consent Declaration Committee
HSE	Health Service Executive
ICD	International Classification of Diseases
IMPACT	The Integrating Family Medicine and Pharmacy to Advance Primary Care Therapeutics
IQR	Interquartile range
iSIMPATHY	Implementing Stimulating Innovation in the Management of Polypharmacy and Adherence Through the Years
IT	Information technology
LESS-CHRON	List of Evidence-Based Deprescribing for Chronic Patients
MMAI	Modified Medication Appropriateness Index
MPharm	Master of Pharmacy
MRC	Medical Research Council

MY COMRADE	MultimorbiditY COllaborative Medication Review And DEcision Making
NDP	Non-dispensing pharmacist
NHS	National Health Service
NHSE	National Health Service England
NORGEP-NH	The Norwegian General Practice – Nursing Home criteria
NPT	Normalisation process theory
NSAID	Non-steroidal anti-inflammatory drug
OCF	Opportunistic Case Finding
OECD	Organisation for Economic Co-operation and Development
OR	Odds ratio
pADE	Probability of an adverse drug event
PBP	Practice-based pharmacist
PC-MAI	Patient-centred medication-appropriateness index
PCN	Primary care network
PCPEP	Primary Care Pharmacy Education Pathway
PCRS	Primary Care Reimbursement Services
PIM	Potentially inappropriate medication
PINCER	Pharmacist-led information technology intervention for medication errors
PIP	Potentially inappropriate prescribing
PiRACF	Pharmacists in Residential Aged Care Facilities
POINT	Pharmacotherapy Optimisation through Integration of a Non-dispensing pharmacist in a primary care Team
PP	Prevention Programme
PPP	Purchasing power parity

PRISMA-S	Preferred Reporting Items for Systematic Reviews and Meta-Analyses literature search extension
PRN	*Pro re nata* (as needed)
PSI	Pharmaceutical Society of Ireland
QES	Qualitative evidence synthesis
Quality of life	QoL
RCGP	Royal College of General Practitioners
RCSI	The Royal College of Surgeons in Ireland
RCT	Randomised controlled trial
REMAIN HOME	Reducing Medical Admissions and Presentations Into Hospital through Optimising Medicines
ROI	Republic of Ireland
SD	Standard deviation
SMART	The Seniors Medication Assessment Research Trial
SPPiRE	Supporting Prescribing in Older Adults with Multimorbidity in Irish Primary Care
SPSS	Statistical Package for the Social Sciences
SREC	Social Research Ethics Committee
STOPP	Screening Tool of Older Persons' Prescriptions
STOPPFrail	Screening Tool of Older Persons' Prescriptions in Frail adults with limited life expectancy
TCD	Trinity College Dublin
TDF	Theoretical Domains Framework
TIDieR	Template for intervention description and replication
UCC	University College Cork
UK	United Kingdom

US	United States
VAS	Visual analogue score
WTE	Whole time equivalent

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Publications and Presentations

Thesis Related Publications

1. **Hurley E**, Gleeson LL, Byrne S, Walsh E, Foley T, Dalton K. General practitioners' views of pharmacist services in general practice: a qualitative evidence synthesis. Family Practice. 2022 Aug 1;39(4):735–46. (Chapter 2)
   https://academic.oup.com/fampra/article/39/4/735/6375552
2. **Hurley E**, Walsh E, Foley T, Heinrich C, Byrne S, Dalton K. General practitioners' perceptions of pharmacists working in general practice: a qualitative interview study. Family Practice. 2023 Mar 28;40(2):377–86. (Chapter 3)
   https://academic.oup.com/fampra/article/40/2/377/6761495
3. **Hurley E**, Foley T, Walsh E, Byrne S, Dalton K. (2023) GPs' perceptions of pharmacists working in general practices: A mixed methods survey study, European Journal of General Practice, 29:1. (Chapter 4)
   https://www.tandfonline.com/doi/full/10.1080/13814788.2023.2273841?src=exp-la

Non-thesis Related Publications

1. Heinrich CH, **Hurley E**, McCarthy S, McHugh S, Donovan MD. Barriers and enablers to deprescribing in long-term care facilities: a 'best-fit' framework synthesis of the qualitative evidence, Age and Ageing, Volume 51, Issue 1, January 2022, afab250. https://academic.oup.com/ageing/article/51/1/afab250/6514232
2. Morel T, Heinrich CH, Zerah L, **Hurley E**, Christiaens A, Fournier JP. Use of deprescribing search filters in systematic review search strategies: A case study. Basic & Clinical Pharmacology & Toxicology. https://onlinelibrary.wiley.com/doi/abs/10.1111/bcpt.13908
3. **E Hurley**. Are pharmacists a solution to the GP workload crisis? GP Forum, 2022 Oct, 7.

Peer-reviewed published abstracts

1. **Hurley E**, Gleeson LL, Byrne S, Walsh E, Foley T, Dalton K. GPS' views/experiences of pharmacist services in general practice: a qualitative evidence synthesis. Int J Clin Pharm. 2021 Dec 1;43(6):1736–801.
2. **Hurley E**, Foley T, Byrne S, Dalton K, Walsh E. Pharmacist-guided deprescribing for frail older adults in nursing homes using STOPPFRAIL: preliminary findings. Int J Clin Pharm. 2022 Dec 3; 44(6): 1464–1566.
3. **Hurley E**, Foley T, Walsh E, Byrne S, Heinrich CH, Dalton K. General practitioners' perceptions of pharmacists working in general practice: a qualitative interview study. Rural and Remote Health. 2023 Jan 10; 23: 8105.
4. **Hurley E**, Foley T, Walsh E, Byrne S, Dalton K. GPs' perceptions of pharmacists working in general practices in Ireland: a cross-sectional survey. Int J Pharm Pract. 2023 April; 31(Supplement 1): i6-i7.
5. **Hurley E**, Byrne S, Foley T, Walsh E, Woods N, Dalton K. Cost avoidance of pharmacist-led deprescribing using STOPPFrail for frail older adults in residential care. In: European Society of Clinical Pharmacy Clinical Symposium 2023. Aberdeen, Scotland: Int J Clin Pharm; 2024.

Posters and presentations

1. **Hurley E**, Gleeson LL, Byrne S, Walsh E, Foley T, Dalton K. GPs' views/experiences of pharmacist services in general practice: a qualitative evidence synthesis. 49th European Society of Clinical Pharmacy Virtual Symposium on Clinical Pharmacy 19th – 21st October 2021 – Poster presentation.
2. **Hurley E**, Foley T, Walsh E, Byrne S, Heinrich CH, Dalton K. General practitioners' perceptions of pharmacists working in general practice: a qualitative interview study. WONCA Rural Health Conference, 17th – 20th June 2022, Limerick, Ireland – Oral presentation.
3. **Hurley E**, Foley T, Walsh E, Byrne S, Heinrich CH, Dalton K. GPs' perceptions of pharmacists working in general practice: a qualitative interview study. From Molecules to People Conference, 22nd September 2022, Cork, Ireland – Poster presentation.
4. **Hurley E**, Foley T, Byrne S, Dalton K, Walsh E. Pharmacist-guided deprescribing for frail older adults in nursing homes using STOPPFrail: preliminary findings. 50th European Society of Clinical Pharmacy Symposium on Clinical Pharmacy, 19th – 21st October 2022, Prague, Czech Republic – Oral presentation.
6. **Hurley E**, Foley T, Walsh E, Byrne S, Dalton K. GPs' perceptions of pharmacists working in general practices in Ireland: a mixed methods survey study. AUDGPI ICGP Joint Annual Scientific Meeting, 3rd – 4th March 2023, Galway, Ireland – Oral presentation.
7. **Hurley E**, Foley T, Walsh E, Byrne S, Dalton K. GPs' perceptions of pharmacists working in general practices in Ireland: a mixed methods survey study. Health Services Research in Pharmacy Practice Conference, 17th – 18th April 2023, Bradford, United Kingdom – Oral presentation.

8. **Hurley E**, Byrne S, Foley T, Walsh E, Woods N, Dalton K. Cost avoidance of pharmacist-led deprescribing using STOPPFrail for frail older adults in residential care. 51st European Society of Clinical Pharmacy Symposium on Clinical Pharmacy, 31st October – 2nd November 2023, Aberdeen, Scotland – Poster and oral presentation.
9. **Hurley E**, Byrne S, Foley T, Walsh E, Dalton K. Exploring the potential impact of integrating pharmacists into general practice in Ireland. Department of Health, '*Evidence for Reform - Where research meets policy*' Research Conference, 7th November 2023, Dublin, Ireland – Plenary presentation.

Thesis Abstract

Introduction

Globally, due to advances in medicine and public health, populations are living longer. Consequently, the prevalence of multimorbidity and polypharmacy is rising. General practitioners' (GPs') workloads are therefore increasing, further compounded by: initiatives to increase the capacity of primary care, the underserved needs of older frail adults in nursing homes, and workforce shortages. In response to growing pressures, pharmacists have been integrated into general practices and affiliated settings in several jurisdictions, most notably in the United Kingdom (UK).

Despite evidence showing that pharmacists in general practices improve patient outcomes, they have not been integrated into general practices in many countries. Key gaps in the literature that may be contributing to this include: 1) limited research focusing on GPs' perceptions of integrating pharmacists into practices, 2) little evaluation of the role of a general practice-based pharmacist in optimising frail older adults' medications, and 3) economic evidence for the viability of pharmacists in practices outside of the cost savings attributed to deprescribed medications.

Therefore, the overarching aims of this thesis were to: i) identify the key factors affecting pharmacist integration into practices through extensive theory-informed engagement with GPs, ii) evaluate the clinical outcomes of a pharmacist-led intervention with frail older adults in general practice-affiliated nursing homes, and iii) to determine the economic viability of the intervention by calculating the costs avoided as a result of the pharmacist-led intervention.

Methods

Firstly, a qualitative evidence synthesis (QES) was conducted to capture GPs' views regarding pharmacists working in general practices. Secondly, a qualitative interview study informed by the Theoretical Domains Framework (TDF), was undertaken to explore GPs' perceptions of working with pharmacists in general practices and identify the behavioural determinants of them doing so. Then, based on the QES and interview study, a mixed-methods survey study was carried out to establish consensus on key issues identified and to determine characteristics of GPs or practices that may be particularly suited to general practice-based pharmacists. Parallel to this work, evaluation of the clinical outcomes from a pharmacist-led intervention in general practices and affiliated nursing homes was conducted; this involved pharmacist-led medication reviews guided by Screening Tool of Older Persons Prescriptions in Frail adults with limited life expectancy (STOPPFrail) that were carried out on frail older adults. Finally, the economic viability of the pharmacist-led intervention was determined by calculating the cost savings associated with avoided adverse drug events (ADEs) and direct cost savings due to the cost of deprescribed medications.

Results

Firstly, a conceptual model was developed based on the QES' findings that described GPs' views of pharmacists working in general practices, which could be used to develop or optimise pharmacist services in general practice. The QES demonstrated that little research had been conducted that sought GPs' perceptions of pharmacists working in general practices prior to pharmacist integration. The TDF-informed qualitative interview study that followed identified the predominant behavioural determinants of GPs integrating pharmacists into their practices and found that GPs were broadly optimistic about pharmacists working in GP practices and the potential outcomes of them doing so. However, GPs were concerned about the impact of pharmacists on GPs' and other practice staffs'

workloads, funding the salary of a general practice pharmacist, and training for pharmacists to work in practices. In the subsequent cross-sectional survey study of GPs (*n* = 152), the majority (78%) indicated that they would participate in a hypothetical pilot study of having a practice-based pharmacist. Certain roles for pharmacists in practices (e.g. medication reviews) had higher levels of agreement (≥90% agreement) from GPs than other roles (<50% agreement) like independent prescribing. Again, concern was identified amongst GPs concerning the potential impact on workloads, indemnification of pharmacists, and the potential weakening of patient-GP relationships.

Evaluation of pharmacist-led application of STOPPFrail to nursing home residents (*n* = 99), found the most frequently identified potentially inappropriate medications (PIMs) were medications without a clear clinical indication (29.6%) and vitamin D (16.9%). Of the 349 clinically relevant deprescribing recommendations made by the pharmacist, 55% were implemented by GPs. There were significant post-review decreases in the number of prescribed medications, modified medication appropriateness index (MMAI), drug burden index (DBI), and anticholinergic cognitive burden (ACB) which remained significant at six months ($p<0.05$). There were no significant differences in falls, emergency department visits, non-elective hospitalisations, or quality of life (QoL). Finally, the cost avoidance evaluation of the intervention showed the intervention to be associated with significant cost savings (€24,827 - 251,903). The cost-benefit ratio remained positive in all scenarios examined in sensitivity analyses (1:11.8 - 1:67.6).

Conclusion

This thesis has made a significant original contribution to knowledge; it has identified key barriers and enablers to integrating pharmacists into practices and shown that there are clear benefits to doing so for patients, GPs, and the wider healthcare system. The embedding of theory into this research has laid the groundwork for future research which seeks to

integrate pharmacists into the general practice setting in a theoretically-informed manner, ultimately with the goal of increasing expertise and support within the general practice setting to optimise medications and improve health outcomes for patients.

Chapter 1. Introduction

1.1 Chapter description

This chapter gives an overview of the literature that informed my research. Firstly, I illustrate the current pressures being experienced in primary care, such as an ageing population, polypharmacy, caring for frail older adults in nursing homes, workforce constraints, and increased workload. Secondly, I describe the current structure, geographical distribution, funding of general practice, and role of GPs in managing medications in Ireland. Following this, I describe the evidence base for medication optimisation in primary care, the available deprescribing tools to aid optimisation, and the outcomes of both GPs and pharmacists applying them. Then, I detail the current pharmacist workforce in Ireland, their training, and their patient-facing roles. I subsequently focus on the subject of pharmacists in general practice, how their integration differs internationally, the clinical and economic outcomes associated with their roles in practices, training and funding models, and key stakeholder views. Finally, I present the hypothesis underscoring my research and an outline of the aims and objectives of this thesis.

1.2 Pressures in primary care

1.2.1 Ageing populations and multimorbidity

Advances in public health and modern medicine (e.g. surgical and medical interventions) have enabled patients to live longer, thus leading to a growing proportion of older adults globally. By 2030, one in six people in the world will be aged 60 years or over (1,2). In Ireland, the number of older adults continues to rise; between 2013 and 2022, the proportion of the population aged ≥65 years increased by 35.1% from 569,200 to 768,900 (3). The European Union (EU) average increase for the same period was 17.3%, as highlighted in **Figure 1** (3). Multimorbidity, commonly defined as the presence of ≥2 chronic medical conditions in an individual (4), has been found to be independently associated with increasing age,

socioeconomic deprivation, and female sex (5–7). The overall prevalence of multimorbidity may also be increasing; a study in England in 2012 found its prevalence to be 27.2% (6), which was higher than in previous studies involving similar populations, including a study from Scotland in 2007 (23.2% prevalence) (5), and another from the UK in 2008 (16% prevalence) (7). The number of comorbidities and the proportion of people with multimorbidity increases substantially with age; a large cross-sectional study by Barnett *et al*. which included 1,751,841 people found that half had at least one chronic medical condition by age 50, and that most were multimorbid by age 65, as shown in **Figure 2** (5).

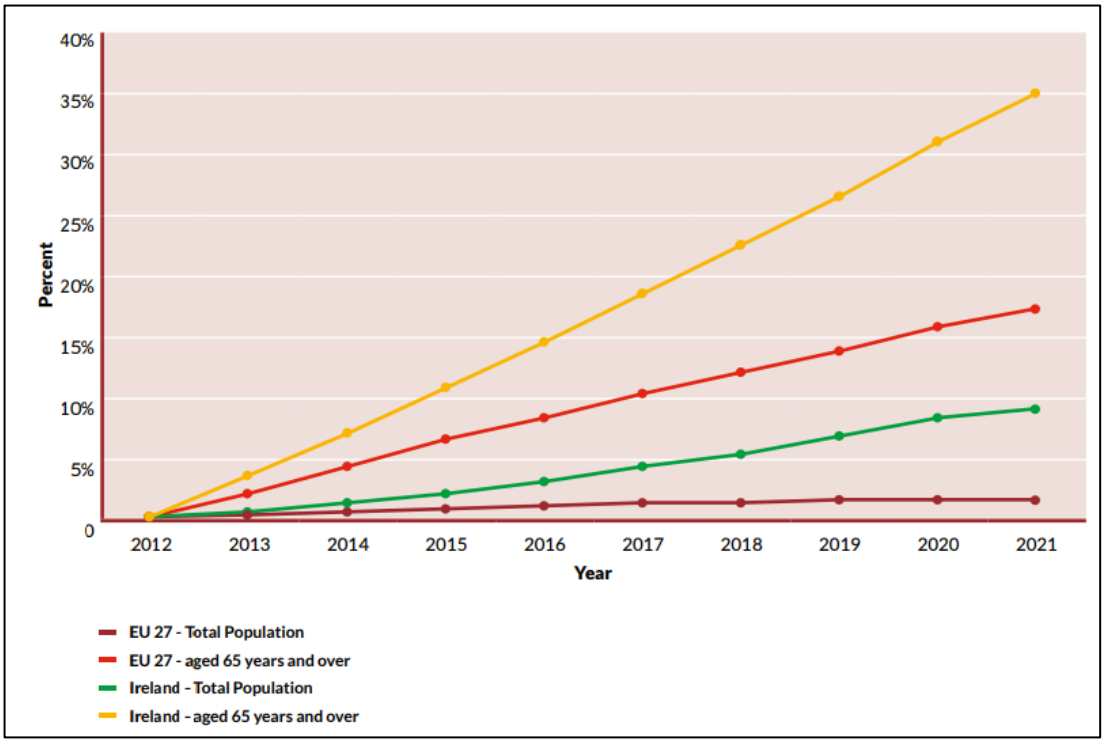


Figure 1: Cumulative percentage increase in population, all ages age 65+ for Ireland and EU-27, 2012 to 2021 (reproduced with permission) (3)

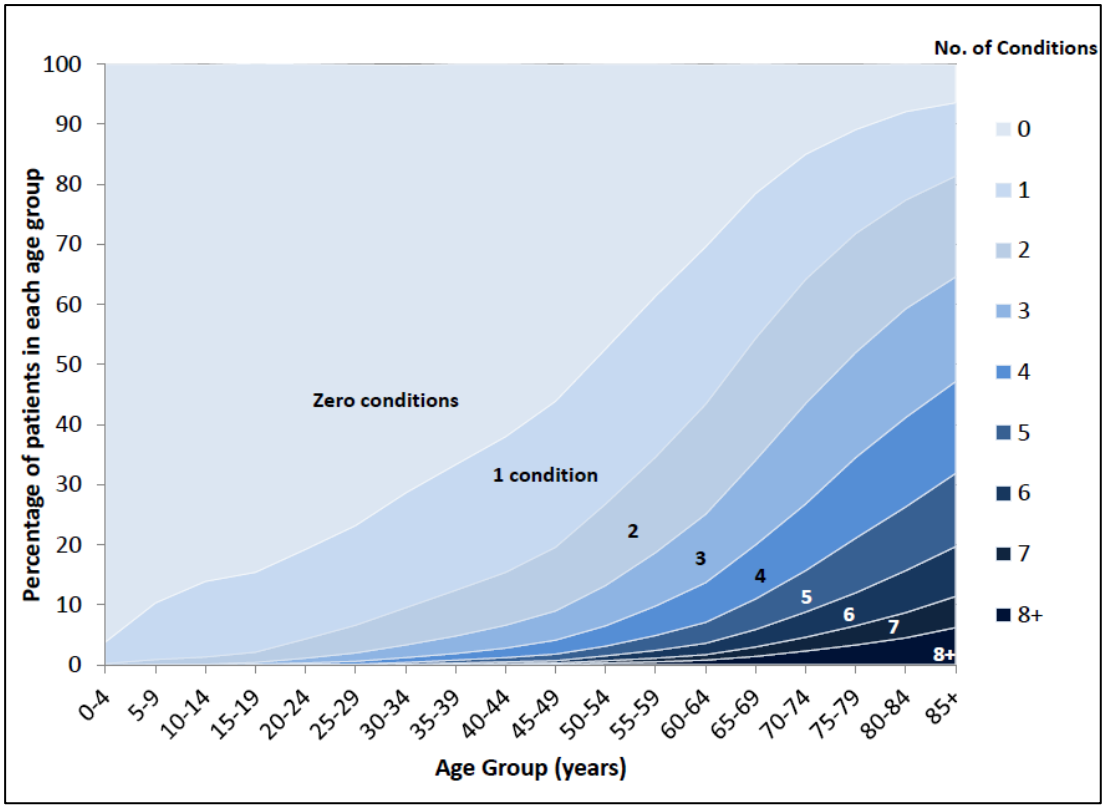


Figure 2: Number of chronic disorders by age-group (*n* = 1,751,841) from Barnett *et al*. (2012) (reproduced with permission) (5)

In light of population growth, rising numbers of older adults, as well as several other factors (such as access to care, healthcare inequalities, and geographic variability in healthcare services), the Irish government has resolved to reform the national healthcare system through Sláintecare, a ten-year programme intended to transform the health and social care services in Ireland (8). One of the objectives of Sláintecare is to transfer care away from the acute setting and back to community settings (9). As a result, the management of chronic disease (prescribing medications, monitoring, and patient education) in multimorbid older adults is increasingly being performed in primary care, by GPs independently, but also in conjunction with several medical specialists (10). Disease-specific guidelines are frequently applied by specialists to multimorbid patients without holistic consideration, which may lead to inappropriate prescribing that GPs are tasked with managing (11). Nonetheless, more consideration has been given to multimorbidity by guideline authors in recent years. For

example, recent guidelines for some chronic medical conditions such as diabetes and heart failure have included advice on managing the conditions in the context of other comorbidities (12,13); however, these guidelines mostly only advise clinicians to consider one comorbidity at a time along with the primary condition in focus (14). Additionally, the National Institute for Health and Care Excellence (NICE) has even published guidelines specifically on multimorbidity (15). Nonetheless, prescribing for those with multimorbidity in primary care remains complex and has been found to pose dilemmas for GPs, related to polypharmacy (commonly defined as the use of ≥5 medications daily) (16), treatment burden, and potentially inappropriate medications (PIMs) (11). Finally, multimorbidity has been linked to the prescription of more medications; a Scottish study which included 180,814 adults in primary care found that 20.8% and 1.1% of patients with two clinical conditions, were receiving 4-9 medications and ≥10 medications respectively, increasing to 47.7% and 41.7% in those with ≥6 clinical conditions (17).

1.2.2 Polypharmacy

Medications are the most common intervention in healthcare (18). With increasing morbidity, multiple medications are often required (1). A recent systematic review concluded that rates of polypharmacy globally are increasing over time; meta-regression showed that more recent studies were associated with a higher prevalence of polypharmacy (β estimate = 0.0175, p = 0.003) (19). Similarly, the most recently analysed pharmacy claims data has shown that the prevalence of polypharmacy in Ireland is increasing, especially amongst older adults. For example, between 1997 and 2012, polypharmacy among older adults increased from 17.8% to 60.4% in those aged ≥65 years (20). Polypharmacy is associated with an increased risk of drug-drug and drug-disease interactions, as well as medication-related harm, and makes prescribing in this patient cohort increasingly more challenging (21). In a study from the United States (US), outpatients taking ≥5 medications had an 88% increased risk of experiencing an adverse drug event (ADE), '*an event which*

results in unintended harm to the patient, and is related to the care and/or services provided to the patient, rather than to the patient's underlying medical conditions' (22), compared to those taking <5 medications (23). The growing prevalence of multimorbidity coupled with the use of single-condition focused treatment guidelines by multiple prescribers, the emergence of novel therapeutics, and the lack of deprescribing strategies are likely influencing the rise in polypharmacy (24,25).

Despite the risks posed by polypharmacy, it must be borne in mind that the use of multiple medications concomitantly is not always inappropriate and is often necessary to optimise patient outcomes (21). For example, applying disease-specific guidelines to a patient diagnosed with chronic obstructive pulmonary disease (COPD) and heart failure would easily result in the arbitrary threshold of five or more daily medications being exceeded (26). Polypharmacy therefore cannot always be thought of as a definitive indicator of inappropriate prescribing, but it is however consistently associated with an increased risk of *potentially* inappropriate prescribing (PIP) which can encompass a wide range of suboptimal prescribing practices, such as overprescribing, underprescribing, and misprescribing, and is ultimately where the potential risks outweigh potential benefits (27–29). Balancing these potential risks and benefits of using multiple medications concomitantly in multimorbid older adults presents a continuous challenge for GPs in primary care today (30).

1.2.3 Caring for older adults in residential care

Organisation for Economic Co-operation and Development (OECD) data from 2021 show that there were 42.1 beds in long-term care facilities per 1,000 people aged ≥65 years across OECD countries (31). By comparison, there were 43.1 beds available per 1,000 people aged ≥65 in Ireland (31). In 2021, there were 567 nursing home facilities in Ireland that provided over 31,842 beds (32,33). GPs are usually the primary providers of medical care to nursing homes in Ireland; a European-wide survey showed GPs are responsible for 75% of the

medical care in Irish nursing homes, compared to the European average of 69% (34). A recent study of 103 frail older adults from two publicly-funded nursing homes in Ireland highlighted high levels of multimorbidity and polypharmacy, showing a mean number of five comorbidities and 94.6% taking ≥5 regular medications. (35). This is higher than what has previously been reported in a systematic review examining the prevalence of polypharmacy in long-term care facilities, which found between 38-91% of residents were experiencing polypharmacy (36). Research has also shown that Irish nursing home residents' dependency (measured using the Barthel Index) is increasing, with 29.3% of surveyed residents in 2021 categorised as being maximum dependency (37). This is likely driven by increasing life expectancy, which by itself does not necessarily increase demand for nursing home care. Ill health and disability add to this dependency, both of which are correlated with age (38). This creates a significant workload for GPs, who are mandated by national guidance for delivering nursing home care, to conduct medication reviews for patients at least every three months (39).

There is also a high prevalence of frailty amongst nursing home residents (40). Frailty is considered a syndrome defined by a reduced physiological reserve and increased vulnerability to adverse outcomes, resulting from cumulative deficits of multiple systems (41–43). A systematic review estimated the pooled prevalence of frailty and prefrailty (an intermediate stage between frailty and non-frailty) amongst nursing home residents as 52.3% and 40.2% respectively (40). Frailty has been shown to be less prevalent in community-dwelling older adults; in the UK for example, a study found 17% of community-dwelling older adults to be frail (44). However, the prevalence of frailty has been found to vary according to the diagnostic classification used (45); for example, this could be according to i) physical frailty (e.g. the Fried Phenotype Model [the presence or absence of weight loss, exhaustion, weakness, low walking speed, and decreased physical activity]) (43), or ii) a deficit accumulation model (e.g. a frailty index [FI], based on the proportion of deficits present from

a setlist) (46). With reduced physiological reserve in several systems (e.g. cardiovascular, renal, and respiratory systems), a frail older adult is more susceptible to physiological stress arising from PIP (47). Cullinan *et al*. demonstrated that there is a significant correlation (*R* = 0.92) between FI score and PIP (48). Patients with higher FI scores were found to be more likely to experience an adverse drug reaction (ADR), i.e. a noxious and unintended response to a medication (48,49). Furthermore, FI scores have been shown to be a significant predictor of mortality (50). Despite this, many frail older adults continue to be prescribed medications that may be potentially harmful to them or that they frequently do not live long enough to realise the benefit of (51).

1.2.4 Workforce challenges and increased workload

The shortage of GPs is a worldwide phenomenon (52–55) and Ireland is currently facing a significant undersupply of GPs. A recent report from the Health Service Executive (HSE) predicts that there will be an additional 493-1,380 GPs required in Ireland by 2025 (56). Furthermore, GPs tend to practise in more metropolitan parts of Ireland like Cork, Dublin, and Galway – leaving more rural areas particularly at risk of GP shortages (57). The workload of GPs has increased in recent years; a large retrospective analysis of >100 million consultations in UK general practices between 2007 and 2014 showed that the annual consultation rate per person increased by 10.5% from 4.67 to 5.16 and the mean duration of consultations increased by 6.7% from 8.65 (95% CI 8.64–8.65) to 9.22 (95% CI 9.22–9.23) minutes (58). This finding is corroborated by a systematic review which found that primary care physician consultation length time has also increased steadily to over 20 minutes in the US between 1993 and 2012 (59). The workload of GPs in Ireland has recently intensified due to expanded free access to GP care with the advent of the free contraception scheme in 2022-2023 for women aged 17 to 30, free GP care for children aged ≤8 years, and an increase in the number of adults eligible for free GP visits. Drivers of the increased GP workload in recent years have been well described in a publication titled '*Understanding pressures in*

general practice' by the King's Fund in the UK (60). They include patient factors (e.g. need for rapid access to care, increasing patient expectations, and patient complexity such as multimorbidity and polypharmacy), supply-side issues (e.g. funding and workforce shortages), and system factors (e.g. the provision of new services) (60). The COVID-19 pandemic has also presented new challenges for GPs including changed work practices (e.g. increase in remote consultations and use of personal protective equipment), national vaccination campaigns, and prescribing of COVID-19 antiviral medications (61). As result of workforce constraints, increased workload, and the other factors highlighted above, it is unsurprising that GPs were found to have the highest rate of burnout (19.4%) in a systematic review of studies that examined tridimensional burnout amongst European physicians measured using the Maslach Burnout Inventory (62). However, action is being taken in Ireland to improve general practice capacity. The Irish College of General Practitioners (ICGP) and HSE have developed a programme which aims to increase the number of GP training places in 2024 to 350 from 258 and increase the number of places on the Non-EU GP Training Scheme from 50 to 250 by the end of 2024 (63).

1.3 General practice in Ireland

1.3.1 GP role, structure, and demographics

General practice in Ireland is responsible for "*the provision of comprehensive and continuing care to every individual seeking medical care irrespective of age, sex, and illness*" (64). GPs play a pivotal role in the provision of healthcare in Ireland, and they traditionally maintain long-term relationships with patients, offering continuous care throughout their lives (65). GPs are often the first point of contact for patients and their role mainly focuses on diagnosis, treatment, preventative care, health promotion, patient education, emergency care, and referral to medical specialists when necessary. This differs from other countries such as the US, where doctors who work within the primary care setting as generalists are more

commonly referred to as '*family physicians*', a subspeciality of primary care physicians who care for patients in the context of their community (66). Family physicians in the US also work less as gatekeepers of care compared to other countries such as Ireland and the UK (67). As of 2022, there were 4,319 GPs registered on the General Practice specialist division of the Irish Medical Council register (68). The most recent national survey on the structure of general practice by the ICGP in 2015 estimated that most GPs worked in '*urban*' or '*mixed urban and rural*' areas (79%), with the remainder (21%) working in more remote areas of Ireland (57). There has been a considerable increase in the proportion of female GPs in Ireland; in 1982, 12% of GPs were female, compared to 30% and 42% in 2005 and 2015 respectively (57). The national GP workforce is also ageing; in 2015 for example, 13% of GPs were found to be still in practice after the age of 64 compared to 3% in 2005 (57). The majority of GPs in Ireland in 2015 (82%) worked in group practices (i.e. practices with ≥2 GPs), with fewer GPs choosing to work as single-handed GPs (57). Ireland has seen an increase in the number of GPs working in primary care centres; in 2015, approximately 10% of GPs worked in such centres (57). These are purpose-built buildings that house several health and social care services in one site, e.g. GP, public health nurse, occupational therapy, physiotherapy, community pharmacy, and a range of other services (69).

1.3.2 Practice teams

General practice teams in Ireland are generally composed of GPs, GP trainees, practice nurses, administrative staff, practice managers, and medical interns/students (57). The ICGP's 2015 survey on the structure of general practice in Ireland showed that 92% of practices employed a practice nurse, 90% employed administrative staff, and 59% employed a practice manager (57). Local access to practices is occasionally available to other healthcare professionals, including public health nurses, speech and language therapists, social workers, physiotherapists, psychologists, occupational therapists, and podiatrists (70). Whilst GPs frequently interact with community pharmacists remotely through telephone or email

communication, pharmacists currently do not routinely work within general practice in Ireland. However, there are known examples of pharmacists working within general practices in Ireland, reported both anecdotally and in the literature (71).

1.3.3 Reimbursement

The Irish primary healthcare system involves a complex mix of public and private financing (72). GPs can be broadly divided into two groups in Ireland: those in private practice alone, and those in private practice who are also participating in the General Medical Services (GMS) Scheme. As of 2015, 89% of GPs were participating in the GMS Scheme (57). As of April 2023, the GMS Scheme was a means/income-tested state-run programme that provided health care to approximately 40% of the Ireland's population (73,74). This increased in September 2023, as another 215,000 people (approximately 4%) were made eligible for the GMS Scheme (75). Those eligible for the GMS Scheme are issued either a medical card (which entitles patients to certain health services for free, e.g. medications, GP visits, certain dental procedures) or a GP visit card (which entitles patients to free GP visits) by the State. All children ≤8 years old living in Ireland are eligible for a GP visit card. Therefore, all GMS Scheme-eligible patients are entitled to free GP consultations, while the remainder of the population – who are considered '*private patients*' – must pay the full cost of each consultation, which typically ranges from €45-65 (76).

GMS Scheme GPs are remunerated by the State through the Primary Care Reimbursement Services (PCRS) in several ways (77):

- Capitation: payments are received monthly from the PCRS based on the number of patients the GP cares for and their age profile.
- Special Type Consultations: services provided that are not included in the capitation agreement with the PCRS (e.g. out-of-hours services, minor surgical procedures, vaccinations, and electrocardiograms).

- Allowances and subsidies: e.g. locum payment contributions or indemnity allowance.

GPs can also claim additional reimbursement through the Structured Chronic Disease Prevention & Management Programme, comprised of three components (77):

- Opportunistic Case Finding (OCF), which aims to identify those with an undiagnosed chronic disease or at high risk of developing a chronic disease.
- Prevention Programme (PP), which focuses on preventing disease in those at high risk of cardiovascular disease and/or diabetes.
- Structured Chronic Disease Treatment Programme, which consists of two reviews per year for patients with certain chronic diseases.

1.3.4 Medication reviews as part of the chronic disease management programme in Ireland

The Structured Chronic Disease Prevention & Management Programme commenced in January 2020 prior to the COVID-19 pandemic (78). Since January 2022, the Structured Chronic Disease Treatment Programme has been available to all GMS-eligible adults aged ≥18 years diagnosed with certain chronic diseases (79). The chronic diseases included in the programme currently are type 2 diabetes, asthma, COPD, heart failure, ischaemic heart disease, cerebrovascular disease (stroke/transient ischaemic attack), and atrial fibrillation (79). Two free structured reviews are conducted with patients within every 12-month period they are enrolled on the programme (79). Each scheduled review with a patient is composed of two visits, a preliminary visit to a practice nurse, followed by a visit to a GP (79). One of the key components of the chronic disease management (CDM) programme is a medication review by a GP (79). A medication review is also part of the PP, which is available to adults aged ≥45 years at high risk of type 2 diabetes and/or cardiovascular disease and includes one structured review in every 12-month period (79).

1.4 Medication reviews for older adults in primary care

1.4.1 Outcomes of GP-led medication reviews in older adults in general practice

In light of GPs' ever-expanding role in medication management, much research internationally in recent years has evaluated the impact of GP-delivered medication reviews, with a particular focus on older adults prescribed several medications, as part of wider multimorbidity interventions in primary care (80–82). However, despite being situated within comprehensive interventions, none of the studies had a significant effect on their primary outcomes of quality of life (QoL) (80), medication appropriateness (81), or process indicators of intervention implementation (82). Three recent studies have evaluated the impact of GP-led medication reviews as part of wider interventions in older adults with multimorbidity in Ireland (83–85). The 'OPTImizing preSCRIbing for Older People in Primary care a clusTer-randomized controlled trial' (OPTI-SCRIPT) study comprised a multifaceted intervention which included academic detailing by a pharmacist to GPs on how they could review medications, GP-led medicines review assisted by pharmaceutical treatment algorithms that provided alternatives to PIMs, and tailored patient information leaflets (85). A total of 190 patients aged ≥70 years were recruited across 21 practices in the greater Dublin area (85). At follow-up, intervention group patients were significantly less likely to be prescribed 'PIP drugs' than control group patients (adjusted OR = 0.32; 95% CI, 0.15-0.70; p = 0.02) (85). However, proton pump inhibitors at maximum therapeutic dosage for >8 weeks were the only PIP drug class significantly reduced in intervention versus control group patients (adjusted OR = 0.30; 95% CI, 0.14-0.68; p = 0.04) (85). 'The Supporting Prescribing in Older Adults with Multimorbidity in Irish Primary Care' (SPPiRE) trial aimed to investigate the effect of a GP-delivered, individualised medication review in reducing polypharmacy and PIP in community-dwelling older adults aged ≥65 years with complex multimorbidity and significant polypharmacy (defined as taking ≥15 repeat medicines) (83). Across 51 practices, 404 patients were recruited. At six-month follow-up, there was a small but significant mean

reduction in 0.85 medications per person in the intervention group compared to the control group, but no significant effect on the incidence of PIP (83).

The other example is the 'MultimorbiditY COllaborative Medication Review And DEcision making' (MY COMRADE) study which was conducted in the Republic of Ireland (ROI) and Northern Ireland (84). The MY COMRADE intervention was an evidence-based, theoretically-informed intervention which aimed to support the conduct of medication reviews for patients with multimorbidity in primary care (84). The study assessed medication reviews conducted by two GPs in the ROI and by a GP and a practice-based pharmacist (PBP) in NI (84). The MY COMRADE intervention was found to be feasible to conduct within two different healthcare systems; however, the pairing of GP and pharmacist was highlighted as possibly more sustainable to implement in routine practice (84). This was attributed to the pharmacological expertise of PBPs and the time saved by the PBPs reviewing medications lists prior to meeting GPs to perform the collaborative reviews (84).

1.4.2 Explicit deprescribing tools for reviewing older adults' medications in primary care and the associated outcomes

A core part of reviewing medications is deprescribing, particularly in older adults, who are more likely to experience medication-related harm (86). Deprescribing has been defined as "*…the process of withdrawal of an inappropriate medication, supervised by a health care professional with the goal of managing polypharmacy and improving outcomes*" (87). There has been an increased focus on deprescribing, particularly in older adults, in both research and clinical practice in recent years. To demonstrate this from a research perspective, a search of the string '*deprescri**' AND '*aged**' on Pubmed® generates five results in 2013 compared to 1,266 in 2023 as of the 21st of January 2024. Deprescribing tools exist that may be explicit (criteria-based), implicit (require clinical judgement or assessment), or a combination of both (88). Several explicit deprescribing tools have been developed to aid in

the identification and deprescribing of PIMs in older adults including (but not limited to): Screening Tool of Older Persons Prescriptions in Frail adults with limited life expectancy (STOPPFrail) (89,90), The Norwegian General Practice–Nursing Home (NORGEP-NH) criteria (91), the List of Evidence-Based Deprescribing for Chronic Patients (LESS-CHRON) criteria (92), and the Screening Tool of Older Persons' Prescriptions (STOPP) criteria (93–95) – all of which were developed using Delphi methodology. STOPPFrail version two is a list of 25 explicit deprescribing criteria to identify PIMs in frail older adults with limited life expectancy, which was developed in Ireland 2015 and updated in 2020 (89,90). The NORGEP-NH criteria were produced in Norway in 2012, to identify PIMs in nursing home residents aged ≥70 years; eight of the 34 criteria pertain specifically to deprescribing, while the other 26 pertain to combinations of medications that should not be combined or medications that should not be prescribed for regular use (91). LESS-CHRON, a list of 27 deprescribing criteria, was created in Spain in 2017 to identify PIMs in patients with multimorbidity in certain clinical circumstances, e.g. metformin for type 2 diabetes when a patient has a low body mass index (92). The STOPP criteria, developed in Ireland, were first published in 2008 (65 STOPP criteria), with version two in 2015 (80 STOPP criteria), and version three in 2023 (133 STOPP criteria); these criteria identify PIMs in persons aged ≥65 years (93–95).

The clinical impact of the NORGEP-NH criteria has been evaluated in a cluster-randomised controlled trial (RCT) which included 217 nursing home residents from 14 nursing homes, whereby physicians utilised the criteria when performing medication reviews (96). At 12-week follow-up there were no significant differences in change in QoL scores or the number of regular medications between control and intervention nursing homes (96). Only a conference abstract reports the use of the LESS-CHRON criteria outside of the hospital setting in a group of 55 nursing home residents in Spain (97). Through pharmacist review of patients' medications, 39 instances of PIP were identified, of which 10 (26%) were accepted for deprescribing by the treating physician (97). The effect of the application of the STOPP-

START criteria in the nursing home setting has been evaluated in an RCT in Israel (98). The study included 359 patients, the STOPP-START criteria were applied by a pharmacist who made recommendations to the chief physician to reduce, stop, or start medications (98). The physician accepted 82.5% (202/251) of STOPP recommendations (98). By the 12-month follow-up, there was a significant difference (p<0.001) in PIM prevalence between the intervention and control groups (22.5% versus 54.1% prescribed ≥1 PIM), the average drug costs in the intervention group decreased by US $29 per participant per month (p<0.001), and the mean ± standard deviation [SD] number of falls over 12 months in the intervention group was significantly reduced (1.3 ± 2.4 at baseline versus 0.8 ± 1.3 at 12-month follow up; p = 0.006) (98). There were no significant differences found between intervention and control groups for functioning, QoL, and hospitalisations (98).

1.4.3 Current evidence base for STOPPFrail-guided deprescribing

Curtin *et al*. employed the use of STOPPFrail in an RCT with three months follow-up which involved a specialist registrar in geriatrics applying the criteria to the medications of adults aged ≥75 years with advanced frailty and polypharmacy (≥5 medications) transferring from hospital to long-term nursing home care (51). Most of the registrar's 205 deprescribing recommendations were accepted (87.8%; n = 180) by patients' physicians, and there was a significant difference in the monthly medication net ingredient costs of intervention versus control patients (mean ± SD difference $61.74 ± $26.60; 95% CI = 8.95-114.53; p = 0.02) (51). No significant differences between the intervention and control groups were found with respect to unplanned hospital admissions, falls, fractures, QoL, and mortality (51). Another interventional study which utilised STOPPFrail is detailed in a research letter, which describes a three-month prospective cohort study (n = 60) where STOPPFrail was applied by a geriatrics team to intervention group patients (n = 30) in a convalescent hospital in Hong Kong (99). Of the 119 PIMs identified for deprescribing, 109 (91.6%) were deprescribed. There was a significant (p<0.01) reduction in the mean ± SD number of prescribed medications (3.6 ± 1.9)

in the intervention group compared to the control group (0.4 ± 2.5) (99). There were no significant differences in unscheduled readmissions or mortality at three months when intervention and control group patients were compared (99). Finally, as of January 2024, no published study to my knowledge has utilised the STOPPFrail criteria as part of an intervention conducted in the primary care setting.

1.5 Pharmacists in Ireland

1.5.1 Numbers and demographics

As of the 1st of December 2023, there were 7,464 pharmacists registered with the Pharmaceutical Society of Ireland (PSI), the country's national pharmacy regulator (100). The number of registered pharmacists in Ireland has increased by 2,219 (42%) since 2013 (100). Most registered pharmacists in Ireland self-declared their practice area as community pharmacy (*n* = 4,970), followed by hospital pharmacy (*n* = 947); however, both estimates may be substantially higher than this as a considerable proportion of registered pharmacists (*n* = 935) do not specify their area of practice (100). The majority of pharmacists in Ireland are female (63.4%) and the modal age group is between 36 and 45 years (*n* = 2,484) (100). It was estimated by the OECD from 2021 data across 36 countries that the average number of pharmacists was 85 per 100,000 population (31). Ireland, in comparison, had 110 practising pharmacists per 100,000 population (i.e. 29.4% more) at that time (31).

1.5.2 Training

To become a registered pharmacist in Ireland, students must complete a four-year honours (BPharm or Bachelor of Science in pharmaceutical sciences) degree, followed by an additional year of post-graduate education/training to be awarded a Master of Pharmacy (MPharm) degree, and thereafter register with the PSI. There are three pharmacy schools in Ireland – located in Trinity College Dublin (TCD), the Royal College of Surgeons in Ireland (RCSI), and University College Cork (UCC). The syllabus is set by the PSI in their accreditation

standards for the 5-year integrated MPharm Programme (101). It is modelled after syllabi from Australia and Britain, but with adaptations suited to '*concerns and systems specific to Ireland*'. Key parts of the indicative syllabus that relate to patient care include (101):

- Normal and abnormal bodily function: anatomy, physiology, genetics, nutrition, biochemistry, immunology, microbiology, pathology, pathophysiology, and infective processes.
- Aetiology and epidemiology of diseases and the principles of their drug treatment.
- Symptom recognition and management, the principles of differential diagnosis, diagnostic methods and tests, and medical terminology.
- Disease management and pharmaceutical care planning, including application of clinical and prescribing guidelines, evidence-based decision making, and clinical medication review.

Prior to 2015 in Ireland, the model of pharmacy education was a '4 + 1' pharmacy degree, i.e. a four-year undergraduate pharmacy degree, followed by one year of practice-based training (102). Following the publication of the Pharmacy Education and Accreditation Reviews Report, a five-year integrated pharmacy degree was established in the three pharmacy schools in Ireland (103). Experiential learning placements are dispersed throughout the degree during years two, four, and five rather than at the end of the undergraduate degree (102). Experiential learning has been defined as '*…constructing knowledge and meaning from real-life experience*' (104). Academic institutions must provide experiential learning placement opportunities to students across the main practice settings of community, hospital, and industry (105). Students spend twelve months of the five-year degree partaking in experiential learning placements, with a minimum of eight months in a clinical patient-facing setting, i.e. typically a community pharmacy or a hospital pharmacy department (102).

1.5.3 Current patient-facing roles

As of December 2023, there were 1,908 community pharmacies located around Ireland, (106). It was estimated by the OECD from 2021 data across 28 countries that the average number of community pharmacies was 28 per 100,000 population (31). Ireland by comparison, had 38 per 100,000 population (i.e. 35.7% more) at that time (31). As previously acknowledged, most registered pharmacists (at least 67%, based on self-reported data from the PSI register) in Ireland work in community pharmacies (100). These pharmacists are typically referred to as '*community pharmacists*' or '*retail pharmacists*', and they provide a wide range of pharmaceutical services to local communities including (but not limited to): dispensing of prescription medications, counselling on optimal use of prescription and over-the-counter medications, vaccinations, health screenings, smoking cessation, preparing medication compliance aids, supply and review of medications for residential care facilities, emergency contraception consultations, and applying first aid (107).

The other common patient-facing pharmacist role in Ireland is that of a hospital pharmacist. These pharmacists work in public, private, or voluntary hospitals to help ensure the safe, rational, and cost-effective use of medications for patients (108). The role of a hospital pharmacist in Ireland generally consists of dispensing, procuring, and compounding medications, as well as providing medicines information and contributing to oversight activities such as membership of hospitals' drugs and therapeutics committees (108). Additionally, hospital pharmacists work on medical and surgical wards where they counsel patients and communicate with other healthcare professionals about the use of medications (including on ward rounds), reconcile patients' medications on care transitions, review the appropriateness of prescribed medications, and make endorsements to prescriptions to improve the safe and rational use of medications (108). Pharmacists in Tallaght University Hospital have the authority to change prescriptions during admission or at discharge as part of a '*collaborative prescribing*' model with physicians, and are referred to as Collaborative

Pharmaceutical Care At Tallaght University Hospital (PACT) pharmacists; this prescribing model is quite novel for Ireland and has been established based on local agreements, so is not a common practice nationwide (109). The majority of hospital pharmacists (approximately 76.6%) in Ireland hold postgraduate qualifications in clinical pharmacy, including Master of Science (MSc/M.Sc.) degrees such as the MSc in Clinical Pharmacy from UCC, the M.Sc. in Hospital Pharmacy from TCD, the MSc in Clinical Pharmacy Practice from Robert Gordon University, and the MSc in Advanced Clinical Pharmacy Practice from Queen's University Belfast (108).

1.6 General practice pharmacists

1.6.1 International development of general practice pharmacist roles

Pharmacists working alongside GPs or family physicians in the primary care setting is not a new concept, and dates back as far as 1974 based on reports in the literature (110). Roles for pharmacists in this setting at that time were described as '*the coordination and monitoring of patients' total drug therapy*', '*drug therapy management of selected patients with acute and chronic diseases*', and '*a resource person to the health care staff who require drug-related information*' (110). The context, however, in which pharmacists work with physicians varies between countries due to multiple factors such as: funding models for primary care, pharmacist and GP training, and scope of practice (111). This limits the transferability of pharmacist roles in practices across jurisdictions, which has created differences in timelines of role development, scope of pharmacists' practice, and ubiquity of pharmacist integration.

1.6.1.1 North America

In the US, there are several disconnected reports of pharmacists working in primary care offices of doctors (heterogeneously named general practitioners, family physicians, or primary care physicians) since the 1970s (112–116). However, pharmacists' presence in the

US primary care services in the setting of doctors' offices was formally acknowledged in a statement on the pharmacist's role in primary care from the American Society of Health System Pharmacists in 1999 (117). It is difficult to track the evolution and current status of the role through the literature given the heterogeneity of the US healthcare system due to the legal scope of practice for pharmacists being defined by state-specific laws (118). However, a research brief by Hawes *et al*. published in 2022 used a national provider database to determine that there were approximately 24,300 pharmacists (11% of all on the database) co-located with primary care providers in the community setting in the US (119). Pharmacists' roles in family physicians' offices today mainly consist of drug monitoring (e.g. lithium and amiodarone), chronic care management (e.g. COPD and type 2 diabetes), deprescribing, and population health initiatives (120).

Pharmacists have also been reported to work alongside family physicians in Canada since 2001 (121). However, it was after the Seniors Medication Assessment Research Trial (SMART) and Integrating Family Medicine and Pharmacy to Advance Primary Care Therapeutics (IMPACT) studies published in 2003 and 2008 respectively, that pharmacists began to become integrated into family physicians' offices in Canada more frequently (122,123). As a result of the IMPACT study, general practices began recruiting pharmacists in 2006 and the Ontario Ministry of Health briefly outlined a description for this new role for pharmacists in primary care; however, no systematic method was developed to guide role development for the more than 100 pharmacists recruited into general practices at the time (124). As a result, Jorgenson *et al*. developed guidelines for pharmacist integration into primary care teams in Canada that were published in 2013 (125), allowing the role to expand to other provinces. As of January 2019, according to the Ministry of Health in Quebec, 79% of the 333 general practices in the province had a working agreement with one or more embedded pharmacists (126). It is not clear exactly how widespread these pharmacist roles are across all Canadian provinces, but it is likely that these roles have grown since.

1.6.1.2 UK

Descriptions of pharmacists working in general practices in the UK date back to 1995 where a pharmacist performed medication reviews of patients prescribed ≥3 repeat medications and highlighted drug-related problems (DRPs) to two GPs (127). In 2012, The Royal College of General Practitioners (RCGP) in the UK highlighted the "*significant unexploited potential*" of community pharmacy (128). The '*Now or Never*' Report in 2013, by the Royal Pharmaceutical Society in the UK called for a significant rethink of the models of care through which pharmacy services are delivered, towards a model that utilises the full professional expertise and potential of pharmacists (129). As a result of individual general practices taking the initiative to create roles for pharmacists, systematic reviews which collated the evidence of the clinical impact of pharmacists in practices (130,131), the GP workforce 10-point plan outlined the launch of a national pilot of the role of a clinical pharmacist in general practice in the UK in 2015 (132).

National Health Service England (NHSE) invested £31 million to pilot 470 clinical pharmacists in over 700 practices in 2015 (133). Pharmacists in the pilot performed a wide range of activities, but tasks performed were mainly focused on outcomes related to medication optimisation (133). Examples of roles performed included:

- Complex medication reviews, especially for patients with long-term conditions (such as diabetes, hypertension, asthma, COPD, and mental illness).
- Medication reconciliation post discharge from hospital.
- Performing audits to assess national guidelines compliance.
- Provision of lifestyle advice (e.g. dietary advice and smoking cessation).
- Mentoring of less experienced pharmacists.

After the 2015 pilot concluded in the UK, pharmacists have continued to work in general practices as part of the five-year GP Contract Framework reform (134). The roles conducted

as part of the 2015 pilot continue to be carried out by pharmacists working in practices, with the addition of prescribing – which is a mandatory part of the primary care pharmacy education pathway (PCPEP) since 2019 (135). The prescribing component of the pathway may soon become obsolete with all pharmacists in the UK becoming prescribers at graduation from 2026 onwards (136). As of March 2023, 6,331 pharmacists work in general practices and/or groups of practices called primary care networks (PCNs) in England (137,138).

1.6.1.3 Australia and New Zealand

The role of pharmacists in general practices in Australia is a relatively new concept. Ackermann *et al*. were the first to propose that senior pharmacists be introduced to general practice multidisciplinary teams to focus on medication safety in Australia in 2010 (139). In the 2010-2011 budget, the Australian government ring-fenced 370 million Australian dollars for the development of a general practice superclinic program which included pharmacist services (140). Tan *et al*. published the first report of a pharmacist working within a general practice in 2012, where a pharmacist was integrated into a single practice to provide medication reviews for practice patients (141). In 2015, the Australian Medical Association in partnership with the Pharmaceutical Society of Australia released a proposal calling for pharmacists to be more widely integrated into general practice teams by establishing a funding program called the Pharmacist in General Practice Incentive Programme (142). Roles for pharmacists in practices in the proposal included (142):

- Medication management reviews conducted in practices, patients' homes, or residential aged care facilities.
- Patient medication advice to facilitate increased medication compliance and medication optimisation.
- Supporting GP prescribing.

- Liaising with outreach services and hospitals when patients with complex medication regimens are discharged from hospital.
- Updating GPs on new drugs.
- Quality or medication safety audits.

Since 2016, the Australian Government Primary Health Network Program, the Capital Health Network, and Australian Capital Territory's Primary Health Network, have funded the Pharmacists in General Practice program, which integrated pharmacists into 11 general practices (143). As of 2020, 13% of GPs in Australia reported that they work in practices employing pharmacists (144).

Proximal to Australia, in New Zealand, the integration of pharmacists in general practice is also considered to be in its early stages and is not commonplace nor uniform (145). A conference abstract from 2011 describes how one regional health board in New Zealand employed two clinical pharmacists to work in three general practices in 2011, to support and influence prescribing behaviours, address polypharmacy, and manage patients with complex regimens and/or adherence issues (146). A pilot study by Boyina *et al.* conducted between 2015 and 2018, which initially involved the integration of three pharmacists into three general practices in southern New Zealand, expanded to eight pharmacists working across 26 practices at the end of the study (147). A survey published in 2017 determined that only 31 (7% of respondents) of pharmacists in New Zealand worked in general practices (148), albeit the response rate of the survey was limited (approximate 16% response rate). Another survey published in 2019 of all registered pharmacists in New Zealand reported that 36 pharmacists self-identified as working in general practices, showing the slow growth of the role over time (145). The 2019 survey showed that pharmacist integration into practices appeared to progress in specific geographical regions of New Zealand, namely North Island. Pharmacists in the survey described their working day mainly consisting of quality

improvement tasks (e.g. audits), medication reviews, patient counselling, medication reconciliation, liaising with community pharmacies, and answering medicines information queries from practice staff (145). The study authors concluded that a guiding framework would be key in further stimulating role development by describing the role's scope and in having a formalised approach to the education, training, support, and funding of the role (145). The Pharmacy Council of New Zealand now currently lists '*pharmacists in general practice*' as a role for pharmacists in a webpage titled '*What is pharmacist practice*' (149). A toolkit has been created by the Clinical Advisory Pharmacists Association in New Zealand for service development of general practice-based clinical pharmacists to support the continued introduction of pharmacists into general practices in the country (150).

1.6.1.4 Europe (excluding Ireland)

Development of the general practice pharmacist role has been limited in Europe, but there has been published evidence of progress in some countries such as the Netherlands, Iceland, and Slovenia. Firstly, looking at the Netherlands, where only exceptional cases of pharmacists working in general practices can be found. For example, the role of a non-dispensing pharmacist (NDP) in general practice has been evaluated by Hazen *et al*. in the *'Pharmacotherapy Optimisation through Integration of a Non-dispensing pharmacist in a primary care Team*' (POINT) study (151). As part of this study, ten pharmacists worked full-time in ten general practices for 15 months and concurrently participated in a specifically designed training programme (151). NDPs in the study conducted face-to-face medication reviews, medication reconciliation for patients discharged from hospital, and consultations about specific drug-therapy problems (151). Efforts to integrate pharmacists into practices can also be found in Iceland, as described by Blondal *et al*. (152). Like the Netherlands, pharmacists do not generally work within general practice teams in Iceland. Therefore, the Blondal *et al*. research team integrated a single pharmacist into a primary care centre in

Reykjavik, where GPs referred patients aged ≥65 years for pharmaceutical care input for six months (152). The study pharmacist reviewed the medications of 50 patients during this time (152). The pharmacist's input was well received by the GPs, who expressed a preference to have access to a practice pharmacist on a daily basis in the future and found their input particularly useful for their patients with polypharmacy (152). Finally, in Slovenia, the Health Insurance Institute of Slovenia funded a pilot trial titled '*Pharmacist Consultant (non-prescriber)*' in 2012 (153). During the trial, four clinical pharmacists worked in GPs' offices and GPs could refer older adults with polypharmacy to the clinical pharmacists for a medication review (153). After conducting the reviews, pharmacists prepared reports for GPs' consideration which focused on: potential drug-drug interactions, possible adverse events, PIMs, medication adherence, and recommendations depending on patients' treatment goals (153). Following on from the pilot, the Slovenian government approved pharmacist-led medication reviews in general practice for reimbursement in one region in 2016, and in all regions in 2018 (153).

1.6.1.5 Ireland

In Ireland to date, progress on the development of the role of pharmacists in general practice has been limited. Only exceptional instances of pharmacist working within general practice teams can be found. The General Practice Pharmacist (GPP) Group in RCSI has run a small feasibility study of the role in four general practices purposively selected from the national Primary Care Clinical Trials Network Ireland (154). In these practices, a pharmacist joined practice teams for ten hours per week for six months to perform medication reviews, provide prescribing advice to GPs, conduct audits, and facilitate practice-based education (154). The GPP group from RCSI have also published a protocol for a cluster randomised trial of pharmacists in general practices in Ireland and the trial is currently still underway (155). A single four-doctor general practice in Dublin has also published a feasibility and cost

evaluation of an intervention involving a practice pharmacist being embedded in the practice performing holistic medication reviews (71). All patients prescribed ≥10 repeat medications per month were eligible for a holistic medication review with the pharmacist over a six-month period (71).

The most significant effort to date to integrate pharmacists into general practices in Ireland has been the Implementing Stimulating Innovation in the Management of Polypharmacy and Adherence Through the Years (iSIMPATHY) project which concluded in early 2023 (156,157). This project was funded by the EU with matched funding from the Department of Health in Ireland. Senior clinical pharmacists worked in GP practices as part of the project carrying out comprehensive person-centred medication reviews for those at higher risk of medication-related harm living in the community. Four senior clinical pharmacists were based in general practices in counties Donegal, Sligo, Cavan, Monaghan, Louth, and Leitrim. Pharmacists liaised with GPs post medication reviews, who then decided whether or not to implement suggestions made by the pharmacists. The medication reviews performed were holistic in nature, factored in individual patients' needs and preferences, and were guided by the principles outlined in the Scottish Polypharmacy Guidance (25).

1.6.2 Clinical and medication-related outcomes

A 2002 systematic review by Alison Fish and colleagues identified 16 RCTs of general practice-based pharmaceutical services in Australia, Canada, the US, and the UK (131). This review found that studies which evaluated the impact of general practice-based pharmacists mainly pertained to educational outreach (*n* = 8), and pharmacist-led medication reviews or pharmacist-provided prescribing advice (*n* = 8) (131). Studies that examined pharmacist led-medication reviews or pharmacist-provided prescribing advice to GPs showed statistically significant lowering of systolic and diastolic blood pressure (158–160), total cholesterol (161), and number of DRPs (127). However, the clinical significance of the magnitudes of the

differences between groups is unknown and no information was presented by the included studies on the effect of pharmacists in general practice on patients' morbidity and mortality (131).

The aforementioned SMART study published in 2003 from Canada was a cluster RCT of pharmacist integration into 24 general practices in Ontario, where pharmacists reviewed the medications of community-dwelling older adults prescribed ≥5 medications and then gave written recommendations to family physicians to resolve any DRPs (122). A total of 889 older adults were recruited to the study (122). Whilst pharmacists identified a mean of 2.5 DRPs per intervention patient and physicians implemented 72.3% (790/1,093) of recommendations, there were no statistically significant differences between the intervention and control groups with respect to number of medications, healthcare use, or costs (122). Similarly, Dolovich *et al*. published the IMPACT study in 2008, which involved embedding pharmacists into seven family medicine practice sites across Ontario, between 2004 and 2006, where they worked 2-3 days per week (123). Pharmacists in the IMPACT study had four major roles: medication review, healthcare provider education, system-level practice enhancement (e.g. optimising the repeat prescription process), and '*integration activities*' (aimed at enhancing the integration of the pharmacist into the practice) (123). Pharmacists reviewed 969 patients over the 2-year study period (123). Patients referred to study pharmacists for review had a mean ± SD age of 72 ± 11 years, a mean ± SD number of 4.8 ± 2.3 comorbidities, and took a mean ± SD of 7.0 ± 3.8 prescription medications. Of the referred patients, 93.8% had at least one DRP identified, 26.5% were deemed to be experiencing an ADR, and actual or potential drug interactions were identified in 12.1% of patients (123).

Tan *et al.* conducted an updated systematic review and meta-analysis of RCTs that evaluated the effectiveness of clinical pharmacist services delivered in primary care general practice

clinics in 2014 (130). Tan *et al.* identified 38 studies, most of which were conducted in the US (*n* = 18), the UK (*n* = 7), and Canada (*n* = 6), whilst four were conducted in Asia and three in South America (130). Twenty-nine of the studies recruited patients with specific medical conditions, most commonly cardiovascular disease (*n* = 15) and/or diabetes (*n* = 9), but five studies focused on recruiting adults or older adults experiencing polypharmacy which was heterogeneously defined as taking at least 2-5 regular medications (130). Pharmacists' interventions in these studies mostly consisted of medication reviews +/- other activities delivered collaboratively with GPs (*n* = 33) (130). Tan *et al.* concluded that pharmacists' interventions resulted in significant improvements in systolic blood pressure (mean decrease 5.72mmHg, range = 1.20-26.50mmHg from *n* = 10 studies), glycated haemoglobin (HbA1c) (mean decrease 0.88%, range = 0.80-1.3% from *n* = 5 studies), total cholesterol (mean decrease 31.96mg/dL, range = 15-40mg/dL from *n* = 2 studies), and 10-year Framingham Risk Score (mean decrease 1.83%, range = 0.30-2.40% from *n* = 2 studies) (130). Pharmacist interventions in practices were also shown to improve the quality of prescribing and medication appropriateness (130). Studies where pharmacists conducted medication reviews with only written or no communication with patients' primary care physicians were less likely to have positive outcomes (130). Multifaceted studies that included adherence assessment, lifestyle advice, medication initiation or adjustment, and monitoring in addition to medication reviews were more likely to demonstrate improved outcomes (130). Only one study included in the review, which focused on patients with left ventricular systolic dysfunction, assessed death and hospitalisations as primary outcomes (162). The study found no significant difference between groups in a composite outcome of death from any cause or hospital admission for worsening heart failure (35.8% of intervention group patients and 35.4% in the control group (hazard ratio 0.97, 95% CI 0.83–1.14; *p* = 0.72) (162).

A significant study not captured in the Tan *et al*. review, because it was conducted after its completion, was the Reducing Medical Admissions and Presentations Into Hospital through

Optimising Medicines (REMAIN HOME) study (163). This comprised a stepped wedge, cluster RCT, conducted in 2017-2018 to determine if integrating pharmacists into general practices reduced the number of unplanned re-admissions of patients recently discharged from hospitals (163). A total of 353 patients were recruited to the study (163). Study pharmacists in 14 practices performed medication reviews within seven days of hospital discharge on the medications of adult patients prescribed ≥5 medications or whose primary discharge diagnosis was heart failure or an exacerbation of COPD (163). Recommendations arising from the reviews were then provided to patients' GPs, who implemented them if they deemed them clinically appropriate (163). Pharmacists identified a mean ± SD of 4.0 ± 2.5 DRPs per patient, and GPs implemented a mean ± SD of 1.5 ± 1.2 pharmacist recommendations per patient (163). The study found that patients in intervention practices were statistically significantly less likely to present to an emergency department (incidence ratio = 0.69; 95% CI 0.48-0.99) but non-statistically significantly less likely (IR = 0.79; 95% CI = 0.52-1.18) to be re-admitted to hospital 12 months after their original discharge (163).

An independent evaluation of the NHSE clinical pharmacists in general practice 2015 pilot by the University of Nottingham was published in 2018 (133). Although the evaluation was not designed to assess quantitative changes in patients' health outcomes, the authors concluded that there was evidence of a wide range of working practices observed during the pilot which could impact on patient-centred outcomes, including patient understanding of long-term conditions and medications, patient adherence to prescribed medications, number of prescribing errors, hospital readmissions, and opioid use.

More recently, Croke *et al*. published a systematic review of controlled studies that evaluated the effectiveness and cost of pharmacist integration in general practices, to optimise prescribing and health outcomes in patients with polypharmacy (164). Whilst 23 studies were included, only nine involved the pharmacist being co-located in practices, eight

of which assessed effectiveness of pharmacist integration (164). The majority of these eight were conducted in the US (*n* = 4) and the UK (*n* = 2) (164). Five of the eight studies evaluated the impact on PIP, measured using PIP screening tools such as the STOPP/START criteria (164), four of which favoured the pharmacist integration group. The one remaining study found no effect when PIP was measured using the drug burden index (DBI); however, the authors reported missing data for DBI scores in both the pre and post periods (in 17% and 18% of patients) which may have impacted the results (165). Three studies measured the change in the number of medications prescribed and all three studies favoured the pharmacist integration groups, with a mean decrease ranging from 0.49-1.50 medications per patient (164). One of the studies reported a significant improvement in two domains of the Short Form 36 Health Survey questionnaire (mental health and vitality) for patients, but did not report data from other domains (166). Finally, the POINT study, which was included in this review, showed a significant reduction in medication-related hospitalisations compared to usual care (OR = 0.68 [95% CI = 0.57–0.82]) (165).

In comparison, the evidence for the clinical impact of pharmacists in general practices in Ireland is in its infancy. The feasibility study conducted by the GPP Group in RCSI found that pharmacists identified over 1,500 prescribing issues across 786 patients in four general practices over six months (154). Pharmacists' most successful intervention type post medication review was the deprescribing of PIMs, e.g. an antihyperglycemic where stringent glycaemic control was not necessary (154). Pharmacists' suggestions to deprescribe a PIM were accepted 59.8% of the time (154). Of the 96 patients aged ≥65 years with polypharmacy for which patient reported outcome measures (PROMs) data were collected, there were no changes in patients' treatment burden or attitudes to deprescribing following medication changes (154). There were conflicting findings regarding the impact on the 96 patients' QoL measured using the EQ-5D-5L instrument, where the composite measure decreased yet the visual analogue score (VAS) increased by a similar magnitude (154). Similarly, the clinical

impact of a pharmacist was evaluated in the single general practice study by Ó'Ciardha *et al*. (71). A total of 78 medication reviews were performed over the six months, where 198 PIP instances were identified and 127 (64.1%) were successfully actioned by the pharmacist and the GP (71). Expired indication was the modal category of PIP identified (33.8%), e.g. medications stopped in hospital that remained on the GP's medication list (71). Lastly, the iSIMPATHY Interim Report stated that the four project pharmacists had completed over 1,200 medication reviews as of February 2022 (156). An analysis of 524 completed reviews found that the mean number of medications taken by patients was 14 pre review and 12 post review (156). An average of 13.1 medication-related issues were addressed per patient reviewed, this included recommendations to optimise medications (e.g. dose decrease/increase), patient education, referrals to other services, monitoring etc. (156). Eighty percent of issues addressed were deemed to be significant as per the Eadon Classification (167), and thus would improve patient care (156). In 27 cases where patient-centred medication-appropriateness index (PC-MAI) had been assessed, it was reported that the mean summated PC-MAI reduced by 21.3 from 27 pre review to 5.7 post review (156).

1.6.3 Economic outcomes

The recent systematic review from Croke and colleagues has described the cost of integrating pharmacists into general practice, specifically regarding the optimisation of prescribing and health outcomes in patients with polypharmacy (164). Of the nine studies that reported co-located pharmacist integration, five detailed the costs of pharmacist integration (164). Three were conducted in the US, one in Scotland, and one in the Netherlands (164). Four of the studies reported non-significant cost differences with pharmacist integration (164). However, one US study published in 1991 reported significant cost savings (intervention total cost savings: €287.93; control total cost savings: -€1,295.93; intervention total cost avoidance: €1,588.39) (168). Whilst the European studies did not report significant cost differences with pharmacist integration, they have some important limitations to consider.

The Dutch study relied on cost reimbursement data from insurance companies, rather than actual expenditure that precisely covered the actual care provided (165). The Scottish study published in 2001 considered only the monthly medication costs when evaluating the cost of pharmacist integration and excluded cost savings generated by discontinuing medications not being taken by the patient (169). Conversely, the review conducted by Hayhoe *et al.* on the impact of integrating pharmacists into primary care teams on health systems indicators had more optimistic findings and concluded that pharmacists' integration was associated with a reduction in medication-related spending (i.e. increased prescribing of generic medications), overall primary and secondary care utilisation costs (i.e. less spending on laboratory tests, lower total cost for diabetes care, and reduced GP hours spent on medication reviews and repeat prescribing), and cost savings due to decreases in emergency department visits (170).

Overall return on investment could not be determined in the report on the NHSE's 2015 Clinical Pharmacist Pilot Study due to study sites not uniformly recording study costs (133). Furthermore, the report's authors concluded that a key number of benefits to the practice pharmacist role are difficult to measure quantitively in a rigorous manner (such as patient-reported improvements in overall health and long-term conditions), as well as being challenging to evaluate economically as the comparator will vary widely (133). However, Bush *et al.* concluded that the interventions of 5.4 whole time equivalent (WTE) practice pharmacists in one area in the UK saved the local National Health Service (NHS) budget £1 million over nine months in 2015 (171). Calculation of the cost of service provision was limited though, as it included only hours worked by the pharmacists; for example, it did not include time spent by GPs consulting with the pharmacist or increased administrative staff requirements to facilitate the pharmacists' presence (171). In Australia, a cost-benefit analysis was conducted of the aforementioned REMAIN-HOME study (163). Intervention costs and changes in costs for hospital and emergency department utilisation during the 12-

month follow-up period were estimated. The study authors determined the benefit-cost ratio to be 31:1 (163).

In Ireland, the GPP group estimated the cost of providing the intervention as part of their pilot study to be €54,080, based on pharmacists' and GPs' salaries and room rental costs within practices (154). They then determined that medication changes (i.e. dose reduced or discontinued medications) made during the study would result in cost savings of €57,000 assuming that changes persisted for 12 months post implementation (154). The single practice study by Ó'Ciardha *et al*. calculated the total cost of the pharmacist's salary for the study period (6 months) to be €10,055 and they did not factor in room rental or GP salary costs for time spent consulting with the pharmacist (71). Total net savings of €20,003 for the subsequent two years were projected following pharmacist integration due to the deprescribing of 127 medications, which would provide a saving of approximately €256 per patient reviewed by the pharmacist in the practice over a 2-year period (71). Finally, an economic analysis of 2,500 medication reviews performed during iSIMPATHY was recently conducted (172). Based on direct cost savings (deprescribed or dose reduced medications) combined with indirect cost savings (avoided ADRs), the authors estimated a net saving of €125,045-€338,407 per annum per pharmacist (172). Therefore, when a pharmacist is integrated into a practice, to deliver structured medication reviews with patients prescribed ≥10 regular medicines and/or PIP, a return of investment of €1.88 to €4.72 per euro spent is expected (172).

1.6.4 Training models

Various training models exist internationally to prepare pharmacists to work in the general practice setting. Firstly, in the UK, pharmacists must complete the PCPEP (135). This 18-month workplace-based training programme is run by the Centre for Pharmacy Postgraduate Education and designed to equip pharmacists with the skills to be able to practise safely in a

general practice setting (including prescribing). The five modules taught during the pathway are:

- **Module 1:** Induction (primary care essentials; safeguarding children and vulnerable adults; consultation skills; health equality, diversity and human rights; care homes).
- **Module 2:** Clinical pharmacy and its application in the primary care setting (case-based discussion and multisource feedback).
- **Module 3:** Clinical assessment skills (clinical examination and procedural skills).
- **Module 4:** Leadership and management (quality improvement project with peer feedback).
- **Module 5:** Choice of clinical and leadership learning to meet individual learning needs (case-based discussion; multisource feedback; consultation skills assessment; reflection on patient feedback).

Trainees in the PCPEP are clinically supervised by a senior clinical pharmacist and GP clinical supervisor. In addition, pharmacists must complete independent prescribing training at the end of the pathway to allow them to become independent prescribers, if they are not already credentialled to do so.

In Australia, a training pathway for general practice-based pharmacists has also been developed called '*GP Pharmacist Foundation Training*' (173). The training program includes 12 online modules and focuses on topics such as the role of the general practice pharmacist, general practice software, general practice billing and funding sources, different roles of general practice team members, medication management reviews, chronic disease management, consultation skills, and clinical audits (173). However, unlike the UK, this training is not necessarily completed as part of a workplace-based training programme. Notably though, the Pharmaceutical Society of Australia recommends completing or being

enrolled in the GP Pharmacist Foundation Training as one of the criteria for employers hiring GP pharmacists (174).

Hazen *et al*. in the Netherlands have also developed a training model for integrating NDPs into general practice teams, which, as mentioned earlier, was employed as part of the POINT study (151). To my knowledge, it has not been employed more widespread in the Netherlands since the study concluded. The model bears semblance to the UK's PCPEP and centres on an extensive 15-month workplace-based education programme (151). The main emphasis of this training programme is on patient-centred care (151). The programme's education framework focused on experiential learning with competencies and learning outcomes derived from the CanMEDS framework (151,175). Each pharmacist was supervised by at least one GP. Training days during the programme focused mainly on consultation skills training and clinical reasoning classes. The study authors concluded that the placement of a pharmacist into practices was key to the success of the integrative model as it allowed for everyday work interactions, including joint GP-pharmacist patient consultations, formal debrief sessions to discuss patients' treatment plans, and frequent encounters to discuss *ad hoc* patient queries (151). An overview of the model from Hazen *et al*. is illustrated below in **Figure 3**.

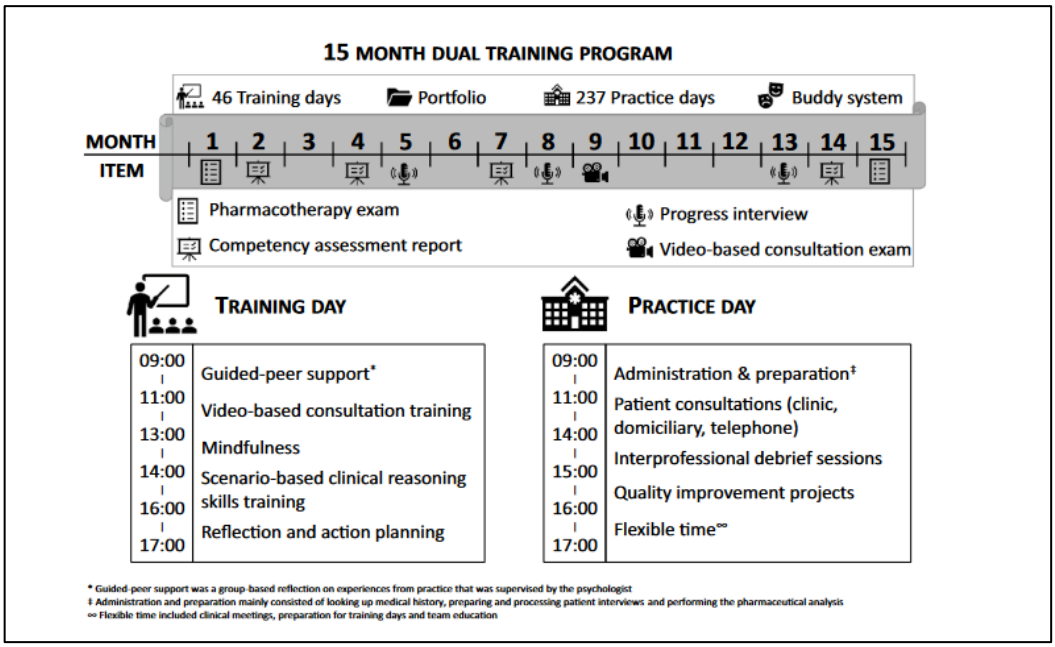


Figure 3: Overview of Hazen *et al*. 15-month dual training program for clinical pharmacists in general practice (permission granted to reproduce) (150)

In the US, pharmacists' roles and scope of practice vary from state to state as they are governed by the laws unique to each state (118). The most similar role to a general practice pharmacist in the US appears to be the '*ambulatory care pharmacist*'. According to the American Society of Health-System Pharmacists, ambulatory care pharmacy practice is "*…the provision of integrated, accessible healthcare services by pharmacists who are accountable for addressing medication needs, developing sustained partnerships with patients, and practicing in the context of family and community"* (176). To gain experience/training as an ambulatory care pharmacist, pharmacists apply to residencies in ambulatory care pharmacy. In the US, a pharmacy residency is a 2-year workplace-based postgraduate training programme with a clinical focus (177). The first year offers more generalised training, exposing pharmacists to a wide range of clinical scenarios and practice settings, while the second year places emphasis on a specific area of interest and helps a pharmacist to specialise in a particular field (177). According to the American Society of Health-System Pharmacists, pharmacists who practise in ambulatory care "*provide direct patient care*

services for patients with chronic illnesses, promote health and wellness, and participate in innovative patient visits including transitions in care, group visits, patient education classes, shared visits, and Medicare Wellness Visits" (176). Post-residency, pharmacists in the US may choose thereafter to obtain board certification in ambulatory care by sitting a specialty examination offered by the Board of Pharmacy Specialties (178).

In Ireland, there are currently no formal training pathways or programmes to prepare pharmacists to work within general practices. This is acknowledged in the GPP group's study, who said they provided pharmacists with a 'study intervention manual' which detailed the scope of activities to be delivered by the pharmacists, based on national guidance and previous research (154). In the Ó'Ciardha *et al*. study, no training or educational component was described (71). However, the study pharmacist utilised the '*7 steps to appropriate polypharmacy approach*' outlined in Scottish guidance for realistic prescribing in those with polypharmacy (25). The '*7 Step*' approach was also utilised in iSIMPATHY, in addition to pharmacists completing a 'substantial training package' and participating in shared learning across project jurisdictions (156). The iSIMPATHY project has made a polypharmacy training course available on the NHS Scotland website titled '*Evidence Based Polypharmacy Reviews and the 7 Step Process*' which provides material on optimising and rationalising medications based on the '*7 Step*' approach (179).

1.6.5 Funding models

In the UK, PCNs since July 2019 have been able to claim reimbursement from the NHS of 70% of the ongoing salary costs for one WTE pharmacist (two WTEs if the PCN covers a population of 100,000 or more) under a new Additional Roles Reimbursement Scheme (180). Therefore, PCNs are expected to cover the remaining 30% of salary costs themselves.

In the US, reimbursement for services provided by pharmacists in family physicians' offices, has many barriers – one of the most commonly cited being a lack of recognition of

pharmacists under Medicare, the federal health insurance programme in the US (181,182). However, reimbursement may be claimed for pharmacist services through Medicare via '*incident-to*' billing, where a patient is first seen by the physician or nurse practitioner and then referred to the pharmacist, who works within the family physician's office (181). For non-Medicare eligible patients in the US, specific contracts may be negotiated with private insurance companies for payment via different mechanisms, e.g. direct billing for medication therapy management or incorporating payment for pharmacist-based services into capitated payment models and or associated with pay-for-performance initiatives (183).

In Australia, funding for NDPs is provided through the '*Practice Stream*' of the Workforce Incentive Program (184). Under this programme, the Australian Government provides funding of up to $125,000 (AUS) per year to practices depending on the size of the practice measured in standardised whole patient equivalents, hours worked by the pharmacist, and the location of the practice (184). While pharmacists have been reported to work in practices in New Zealand, no widespread funding model appears to be in place (145,147,148). According to a survey by Haua *et al.*, pharmacists working in practices report heterogenous funding sources, including from district health boards, primary health organisations, practices themselves, and working part time in community pharmacy to supplement their salary from a primary health organisation (145).

1.6.6 Stakeholder views on general practice pharmacists

1.6.6.1 GPs' views

GPs' views on the role of pharmacists in general practice have been presented in a realist review by Anderson *et al*. (185). However, the review presented GPs' views amongst other topics and only included three studies that examined GPs' opinions on the matter, none of which assessed GPs' perceptions before pharmacist integration, i.e. prior to having worked alongside a pharmacist (141,152,186). The review's authors concluded that: 1) GPs were

more welcoming to the idea of pharmacists working in practices if they had worked with a pharmacist before; 2) GPs thought patients would accept pharmacist-provided services in general practice, but initial acceptance from GPs would be low, and that it would increase with further exposure; and 3) GPs said they wanted to have access to a pharmacist on a daily basis (185). GPs' views of the NHSE 2015 pilot have been extensively described in the University of Nottingham report (133). GPs were satisfied with the role and believed the role to be sustainable and most reported that they would keep their clinical pharmacist after the pilot funding expired (133). Although GPs in the pilot found the role to be expensive to their practices, they maintained that the financial benefits of the role should not be the main motivation for the development of the role, rather the medication expertise and potential of the role to enhance practice capacity should be the main drivers for role development (133).

GPs' views in Ireland who partook in the GPP group's pilot were sought in a study by James *et al*. (187). Four GPs were interviewed as part of the qualitative evaluation (187). All four GPs said that pharmacist-led medication reviews within practices increased their workloads, but that was not necessarily entirely negative (187). Strong interprofessional working relationships were reported between GPs and pharmacists. They also found the interactions they had with the pharmacists professionally rewarding (187). Pharmacists were also said to have encouraged the further development of GPs' knowledge and skills (187). Some GPs were unclear about the clinical responsibilities of pharmacists, i.e. their scope of practice and implications of this (187). Additionally, GPs' views who were part of iSIMPATHY have been described in their interim project report (156). GPs' impressions were described as overwhelmingly positive, welcoming of pharmacists' knowledge, communication skills, and capacity they brought to patient care and practices (156). However, GPs' time to engage with the practice pharmacist during the project was a challenge raised by several GPs (156).

1.6.6.2 Practice nurses' and administrative staff views

The opinions of general practice-based nurses on the role of pharmacists in general practice has also been elucidated in several studies (188–191). Nurses have been found to be broadly supportive of the role of pharmacists in practices (190). However, practice nurses have reported an initial lack of understanding about the roles and responsibilities of pharmacists in practices (189,191). Frustration has also been expressed at having to take time initially to orientate pharmacists to the general practice setting on top of nurses' existing workloads (189). After the initial settling-in period, nurses describe pharmacists in practices as a source of reassurance to staff regarding medications, and that they enabled further training like nurse prescribing (191). Nurses have expressed satisfaction with the amount of time pharmacists have to answer queries about medications, often in great detail (188,189,191). However, there have been some concerns amongst nurses that the presence of pharmacists in practices may de-skill them in the management of patients' medications (191).

Similar to practice nurses, administrative staff have been shown to be collectively supportive for roles for pharmacists in practices (188,191), and report positive and healthy professional relationships with pharmacists in practices (191). Administrative staff have also been shown to be unclear on the roles and responsibilities of pharmacists initially (191). A major benefit that practice administrative staff have reported is increased safety when triaging repeat prescription requests and other medication-related queries that come in from patients and hospitals, as administrative staff felt they were working outside their skillsets at times when managing such requests/queries (191). Practice managers reported concerns about having space to accommodate a pharmacist working in their practices regularly (188).

In Ireland, four practice nurses, administrative staff, and practice managers were interviewed as part of the GPP group's pilot study (187). Relationships between pharmacists and practice staff other than GPs were said to be less strong (187). Practice managers and administrative

staff mainly interacted with the pharmacists in relation to research study practicalities, i.e. patient recruitment (187). However, administrative staff did appreciate pharmacists assisting in answering queries coming from patients, hospitals, and community pharmacists concerning medications, which also had a knock-on effect in reducing GPs' workloads (187). Practice nurses reported having little professional contact with pharmacists; although one nurse found their different perspective in relation to a medicines information query useful (187). Conversely, the views of practice staff were not presented in the iSIMPATHY interim report (156).

1.6.6.3 General practice-based pharmacists' views

The views of pharmacists working in practices have also been sought in several studies (186,188,189,191–194). Pharmacists in practices share mainly positive experiences (188,191), which is enhanced by the presence of supportive staff with experience of working on multidisciplinary teams (188). Pharmacists reported that staff in practices were generally unsure of the roles and skillsets of pharmacists in practices at first, but this awareness improved over time (188,189). Pharmacists shared that they particularly liked working in the team-based environment of general practice (188,193,194), and that their relationships with GPs in practices were positive and collaborative (191,194).They also stated that they felt they got a broader, more holistic sense of the patient in general practice compared to community pharmacy, owing to having access to full medical notes, laboratory parameters, and social circumstances (188,191).

General practice pharmacists in the GPP group's study reported feeling valued and respected within practices (187). Like GPs, pharmacists found the process professionally rewarding and felt it helped to develop further their knowledge and skills (187). Pharmacists agreed their role within practices generally consisted of '*patient review, medication review, optimising prescribing, highlighting areas of potential interactions…liaising with local dispensing*

pharmacists'. However, some pharmacists also felt there was an opportunity for role expansion to include running disease management clinics (187). Findings were similar in interviews with iSIMPATHY pharmacists; all four project pharmacists noted their role had benefits to patients, in terms of their QoL, satisfaction, knowledge and understanding, and adherence, as well having a positive effect on patient safety (avoidance of ADRs) and the overall quality of patient care (156).

1.6.6.4 Patients' views

There has been considerable research around patients' views on pharmacists working in practices (188,191,195–198). Similar to practice nurses and administrative staff, patients have generally reported being initially confused about the role of a general practice pharmacist and how it differs from the role of their community pharmacist (188,191,196,197). This may be as a result of the perception by patients that services provided by pharmacists in practices are under-publicised (191,197). Patients mostly found their presence beneficial and report an increased understanding of their medications (188,197,199). Patients have also reported satisfaction with the amount of time permitted per appointment with pharmacists in practices, when compared to length of consultations with GPs or community pharmacists – who were perceived as too busy by patients to answer complex medication-related queries (188,191,195).

Patient uptake of pharmacist reviews in the GPP group's pilot study were low; those who did receive a review reported variations in their consultations with the pharmacist (187). Patients in more affluent areas tended to discuss medicines information and managing symptoms, versus those in less affluent areas where their conversions centred more on what their medications did and why they were taking them (187). Similar to what has been found internationally, patients did not clearly understand the role of a NDP in a general practice, but did find the interactions pleasant (187). Conversely, patient acceptability in iSIMPATHY

was high, most patients engaged with their review and displayed a high level of willingness to engage in shared decision-making around medication changes (156).

1.6.6.5 Community pharmacists' views

Community pharmacists have also reported being unclear of the role of practice-based pharmacists (200). They have found that communication from practices with a pharmacist to be much quicker due to the practice pharmacist acting as a point of liaison, as opposed to GPs who would historically have managed queries from community pharmacists (200). Views shared by community pharmacists in studies from the UK and Australia show community pharmacists fear that pharmacists performing roles like smoking cessation and medication use reviews may reduce the reimbursement received by community pharmacies (198,201). Conflicting community pharmacist perceptions on the impact on patient care exist, with pharmacists in one study reporting a low effect of practice-based pharmacists on patient care (198), whereas pharmacists in another study reported enhanced patient care owing to the faster processing of repeat prescriptions and increased patient safety (201).

A study in Ireland sought community pharmacists' perceptions of the potential role for pharmacists in practices and found that their views were primarily positive, with pharmacists' perceiving there would generally be a beneficial impact on patients, GPs, and community pharmacists (202). Although pharmacists stated the importance of having the role clearly defined, they predicted that this novel role for pharmacists in Ireland may increase professional satisfaction as there may be a greater utilisation of their clinical skills and less time spent on administrative tasks, for those who were to take up roles in practices (202). Pharmacists' perceptions were not totally positive though, with some mentioning a sense of role encroachment or a potential exacerbation of workforce issues in the community pharmacy sector in Ireland (202). A community pharmacist's views were sought as part of iSIMPATHY; they reported satisfaction with the project and felt the iSIMPATHY

pharmacists were an invaluable resource, who they could refer patients to when they were having problems with their medicines (156).

1.7 Chapter Summary

Ageing populations have resulted in an increased proportion of older adults with multimorbidity, polypharmacy, and more complex healthcare needs. Healthcare systems have placed greater emphasis in recent years on trying to care for patients in the primary care setting. As a result, GPs are facing mounting pressure to coordinate the increasing difficulty of managing complex medication regimens, which often includes medications started by several specialists. Older adults residing in nursing home facilities also form part of GPs' role – residents who often have high levels of frailty and dependency. Whilst deprescribing tools to rationalise the medications of frail older adults have been developed in recent years, such as the STOPPFrail criteria, evidence of their application in nursing homes is sparse, by both GPs and pharmacists alike.

Pharmacists in Ireland currently do not work routinely in the general practice environment, and mainly work in community pharmacies and hospitals. This is despite increasing evidence from other jurisdictions that pharmacist integration into general practices has been associated with beneficial patient, economic, and health systems outcomes – with high acceptance from several stakeholders, such as GPs, practice nurses, patients, and administrative staff. Efforts to integrate pharmacists into practices in Ireland to date have been limited and confined to distinct geographical regions and do not appear to have been informed by the views of key stakeholders like GPs. Furthermore, economic evaluations of the role of pharmacists in practices in Ireland have mainly focused on direct cost savings from deprescribed medications and has often not considered other potential costs savings, i.e. from prevented ADEs.

1.8 Methodological approach

1.8.1 Hypothesis

The basis of this research is that despite the wealth of evidence from some countries concerning GPs' views of pharmacist roles in general practices, this has not been synthesised in an organised manner and there is a distinct lack of knowledge concerning GPs' preconceptions and attitudes to pharmacist integration into general practice in countries where they have yet to be widely integrated. This key evidence gap may be contributing to the design and deployment of pharmacist roles and interventions without accounting for important nuances. Reproducible pharmacist interventions in general practice informed by these nuances, with economic data to confirm their continued viability, are required to encourage pharmacist integration into general practices.

1.8.2 Thesis aim and objectives

The overarching aim of this PhD thesis was to ascertain GPs' views on pharmacist services in general practice and identify the factors affecting the integration of a pharmacist into general practice, as well as to evaluate the effect of a pharmacist-delivered intervention in general practice and affiliated settings alongside its economic viability.

To achieve this aim, the following objectives were developed:

1. To perform a qualitative evidence synthesis (QES) to examine the views of GPs globally towards pharmacist services being performed in the general practice setting.

2. To explore in theoretically-informed, semi-structured interviews with GPs their perceptions of pharmacists working in general practices in Ireland.

3. To conduct a representative national survey to investigate possible differences in GPs' perceptions of pharmacists working in general practices in Ireland, based on GPs' characteristics.

4. To evaluate the clinical outcomes associated with a pharmacist performing medication reviews for frail older residents of general practice-affiliated nursing homes.

5. To evaluate the cost avoidance associated with providing pharmacist-led medication reviews for frail older nursing home residents.

1.8.3 Methodological framework

The Medical Research Council (MRC) framework for developing and evaluating complex interventions informed the design of my thesis (**Figure 4**) (203). The guidance on '*development*' was followed in order to meet the aim and objectives of this thesis. The MRC framework helped me to make appropriate methodological and practical decisions. It also informed the choice of an overall mixed methods approach, given the MRC authors' stance that a '*purely quantitative approach…is rarely adequate for complex intervention research, where qualitative and mixed methods designs might be necessary to answer questions beyond effectiveness*' (204).

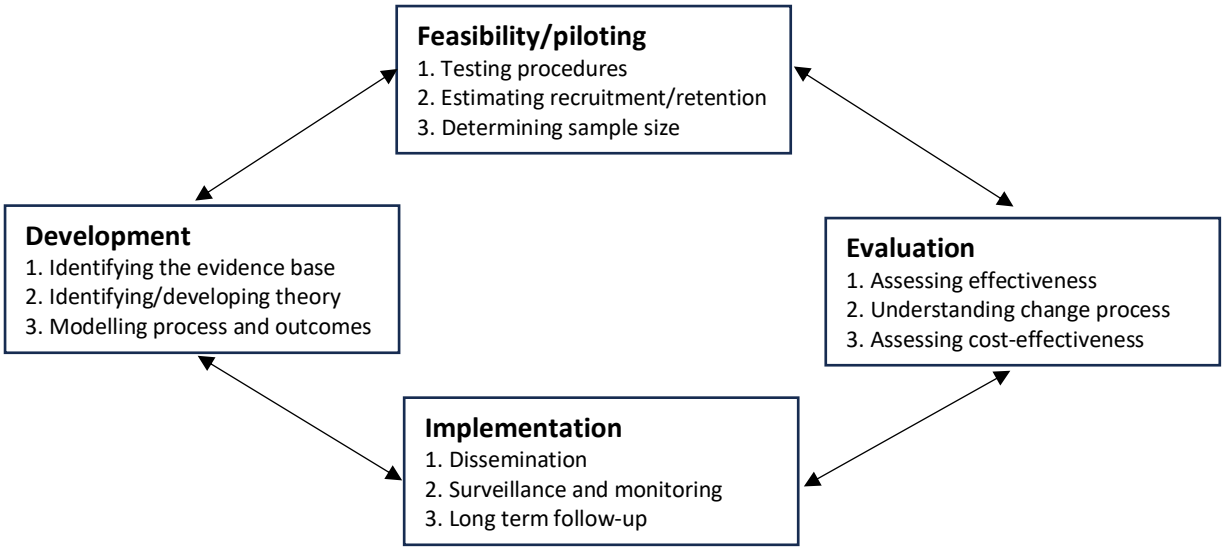


Figure 4: The Medical Research Council (MRC) framework for developing and evaluating complex interventions (reproduced with permission) (203)

1.8.3.1 Development phase

One phase of the MRC Framework centres on intervention development. The sub-sections of '*Identifying the evidence base*' and '*Identifying/developing theory*' of the development phase were explored as part of this thesis.

1.8.3.1.1 Identifying the evidence base

As outlined in Chapter 1, by reviewing the published literature it was found that the quantitative evidence on the topic of pharmacists working in general practices had been synthesised to a high standard and was relatively up-to-date, with the exception of their role in the optimisation of frail older adults' medications (130,164,205). In contrast to this, the qualitative evidence particularly with respect to GPs' views towards pharmacist integration into general practices, had yet to be collated and synthesised.

The existing evidence base for GPs' views and perceptions of pharmacists working in general practices was therefore first determined by systematically synthesising qualitative studies on this subject (Chapter 2). A lack of research on GPs' perceptions of pharmacist integration into practices prior to pharmacist integration was unearthed. The methodological approach to

this is described in detail in Chapter 2. Subsequently, the existing evidence identified was then supplemented by new evidence generated by two new studies. The first was a qualitative study with GPs that explored their perceptions of pharmacists working in general practices. This was a qualitative descriptive study which used conventional and directed content analysis to examine GPs' perceptions of working with pharmacists in general practices and identified the behavioural determinants of GPs' integrating pharmacists into practices. A detailed description of the methodology employed is detailed in Chapter 3. The second study was a mixed-methods, cross-sectional, survey that examined GPs' perceptions of pharmacists working in general practice and identified practices or GPs that may be best suited to pharmacist integration. Free text responses were analysed using Bruan and Clarke's reflexive thematic analysis (206). A thorough description of the methodology utilised in this study is reported in Chapter 4.

1.8.3.1.2 Identifying/developing theory

As advocated for by the MRC framework, best practice in complex intervention development should involve use of the best available evidence and appropriate theory in order to '*develop a theoretical understanding of the likely process of change*' (203). The incorporation of behavioural theory allows for the development of an understanding of the structural and psychological processes which are thought to regulate behaviour (251,252). The use of theory in intervention development has been described as advantageous for several reasons including: faster intervention development, optimal intervention design, and enhanced intervention generalisability (207,208).

An example of a theoretical framework for understanding the structural and psychological processes which are thought to regulate behaviour, and therefore enhance intervention development, is the Theoretical Domains Framework (TDF) (209). Now in its second iteration, the TDF, is a framework synthesised from 33 behaviour change theories and consists of 14 domains and 84 theoretical constructs that identify influences on health professionals'

behaviour related to the implementation of evidence-based recommendations (**Appendix 1**) (209). The TDF has been used previously to identify the behavioural determinants of pharmacist integration into other clinical settings (210). Other theories include Normalisation Process Theory (NPT), a theory which identifies the factors that promote or inhibit the routine incorporation of complex interventions into everyday practice (211). However, the constructs of NPT (coherence, cognitive participation, collective action, and reflexive monitoring) have been criticised for being difficult to interpret (212). By contrast the TDF is said to be more accessible to clinicians and researchers without a background in health psychology given the availability of guidance to support its use from investigation of implementation problems through to intervention development (213,214). Another theoretical framework which could have been utilised is the Consolidated Framework for Implementation Research (CFIR) (215,216). CFIR is a theoretical framework used to facilitate design, evaluation, and implementation of evidence-based interventions, it is composed of five domains (innovation, outer setting, inner setting, individuals, and implementation process), 48 constructs, and 19 subconstructs (216). However, given my focus was on individual behaviour change (GPs' integration of pharmacists into practice), the greater emphasis placed on organisational-level factors by CFIR deemed it a less appropriate choice than the TDF (216).

Therefore, the TDF was the chosen framework to develop a theoretical understanding of the likely process of change i.e. the determinants of GPs integrating pharmacists into general practices and was utilised in this thesis as part the design and analysis of the qualitative interview study (Chapter 3). While not one of the objectives or within the scope of this thesis, the use of the TDF will also create a platform for future research by allowing for the mapping of identified relevant TDF domains to the Behaviour Change Wheel (BCW) (**Figure 5**) to intervention functions (broad categories of strategies one can adopt to change behaviour) and behaviour change techniques (BCTs), which are the "*active component of an intervention*

designed to change behaviour" that may support behaviour change and enhance the integration of pharmacists into general practices (217–219).

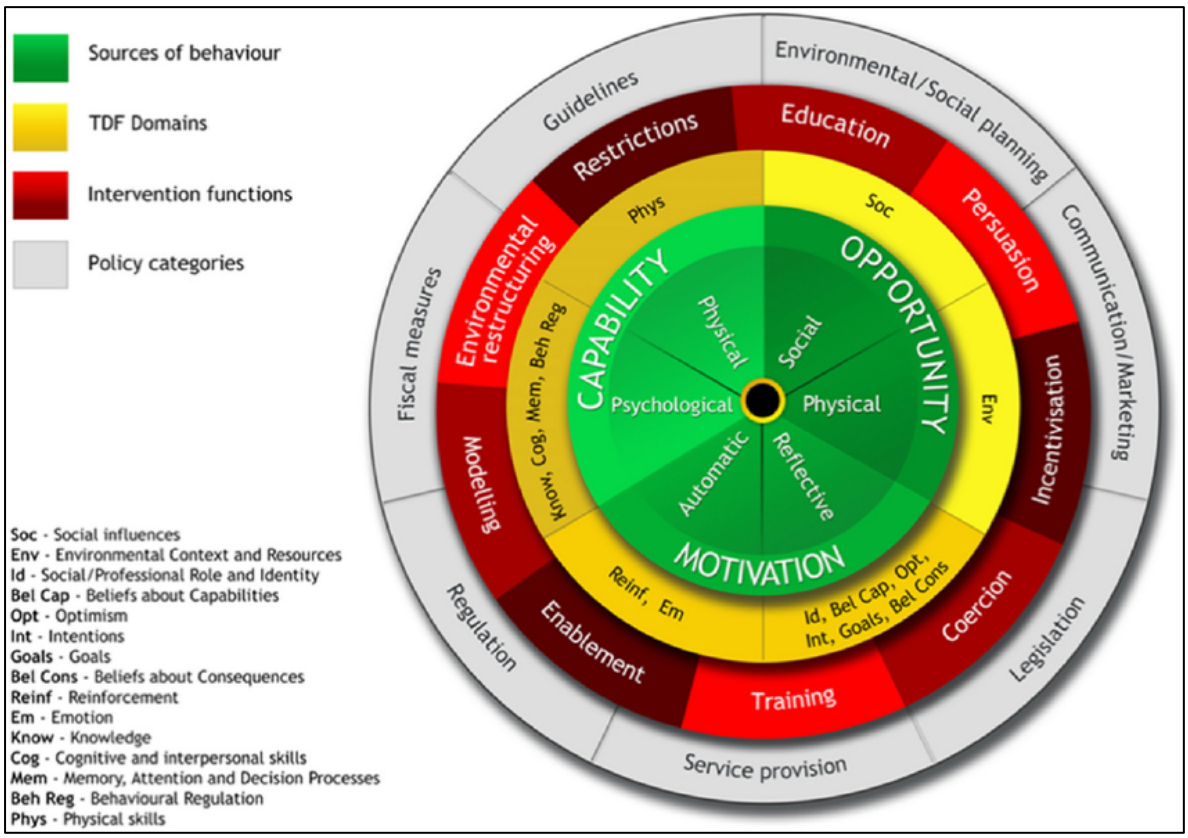


Figure 5: Mapping of the Theoretical Domains Framework to the Behaviour Change Wheel (Reproduced with permission) (220)

1.8.4 Research paradigm

This research was conducted from the perspective of pragmatic paradigm, meaning that the research design and methodology were a function of the aim and objectives of this thesis (221). The two dominant contrasting research paradigms are *positivism* (which centres on the belief in a single objective reality and values quantitative research methods) and *constructivism*, which champions the idea of no single objective reality and only subjective inquiry is possible through qualitative methods (222). By contrast, *pragmatism* rejects the forced dichotomy between qualitative and quantitative research methods and '*accepts philosophically, that there are singular and multiple realities that are open to empirical inquiry and orientates itself toward solving practical problems*' (223). The value ascribed to both qualitative and quantitative research by a pragmatic paradigm to produce relevant, high quality, and practical research, therefore informed the choice of a mixed methods approach to address the aim and objectives of this thesis (222,223).

1.8.5 Study design

As shown in **Figure 6**, this mixed methods thesis was structured as two arms, a mainly qualitative arm (Chapters 2,3 and 4) and a quantitative arm (Chapters 5 and 6). Within the arms, a sequential approach was employed whereby the findings from early chapters informed the design and objectives of the subsequent chapter(s) within the two arms (224). The sequential approach was followed by concurrent triangulation in the overarching discussion (Chapter 7), where the qualitative and quantitative data converged to provide a comprehensive analysis of the research problem (224). The advantage of this approach was twofold, firstly for ensuring logical development of chapters' methods and objectives by the findings of the former chapters informing the latter and secondly for confirming or complementing the findings from the opposing methodology (225).

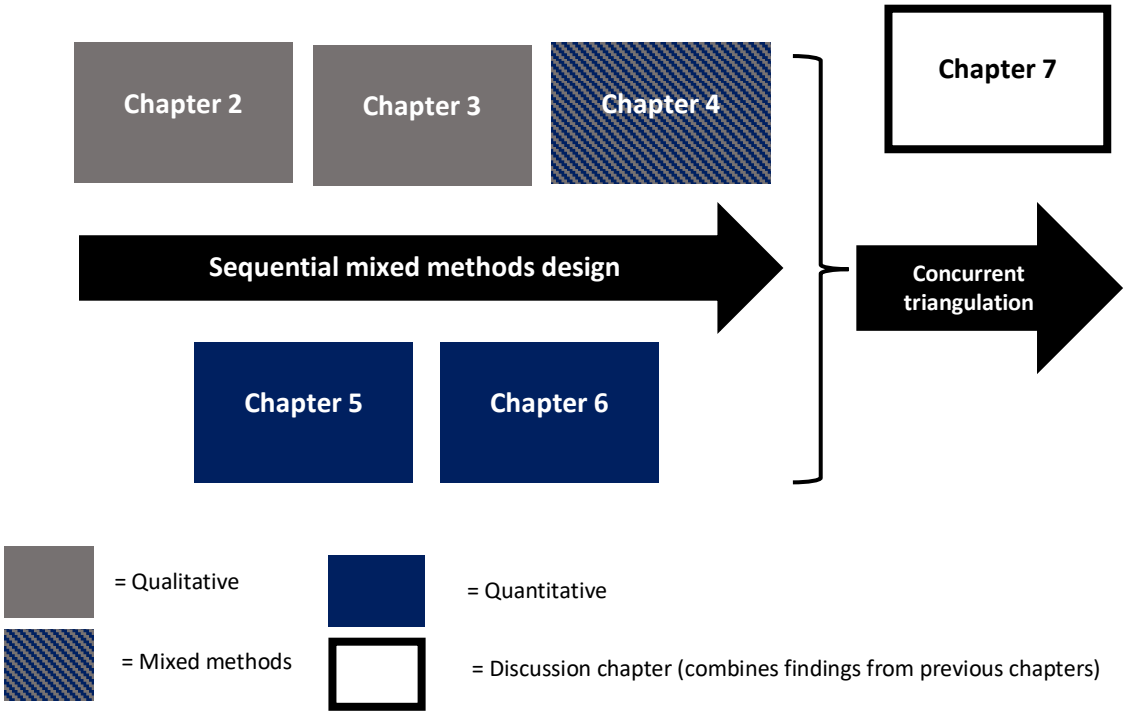


Figure 6: Mixed methods design of thesis

1.8.6 Thesis outline

Each of the five objectives outlined above are associated with a specific study chapter (Chapters 2-6), which are then followed by an overarching discussion chapter (Chapter 7) which synthesises all the evidence that may help inform the wider implementation of pharmacists in general practice. **Figure 7** details how the objectives are addressed through the individual studies undertaken in the PhD and how the studies combine to form the thesis.

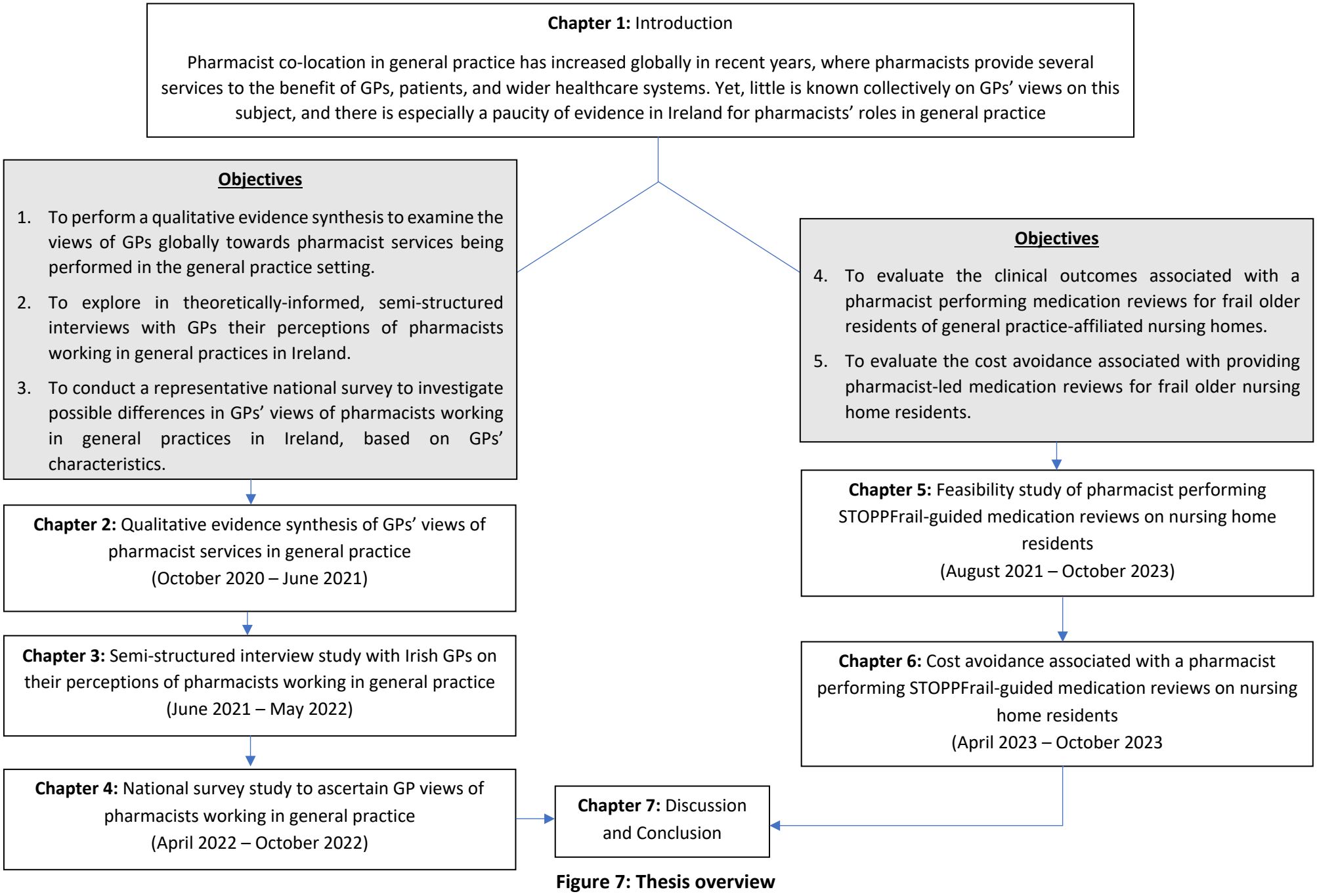


Figure 7: Thesis overview

Chapter 2. General practitioners' views of pharmacist services in general practice: a qualitative evidence synthesis

2.1 Chapter description

In Chapter 1, I highlighted the current pressures being faced by GPs in primary care and how pharmacists have been integrated into general practices as a result, which has demonstrated positive clinical and economic outcomes as well as acceptability from several stakeholders. However, as outlined in Chapter 1, synthesis of GPs' views on the role of pharmacists in general practice has been limited. As a result, in this chapter, I explore GPs' views towards pharmacists working in general practices, by synthesising the published qualitative evidence to identify the key considerations that should be taken when trying to optimise or develop pharmacist roles within general practices. An addendum is provided at the end of this chapter with a discussion of the updated search results.

The work of this chapter has been published as: *Hurley E, Gleeson LL, Byrne S, Walsh E, Foley T, Dalton K. General practitioners' views of pharmacist services in general practice: a qualitative evidence synthesis. Family Practice. 2022 Aug 1;39(4):735–46*. (226)

2.2 Abstract

2.2.1 Background

Pharmacist services in general practice are expanding worldwide, with evidence to show pharmacists' presence in general practice has financial, workload, and clinical benefits. Yet, little is known globally about GPs' views on pharmacists' presence in general practice.

2.2.2 Objective

To synthesise the qualitative research evidence on GPs' views of pharmacist services in general practice.

2.2.3 Methods

Eight electronic databases were searched from inception to April 2021 for qualitative studies that reported the views of GPs regarding pharmacist services in general practice. Data from included studies were analysed using thematic synthesis. The Confidence in the Evidence from Reviews of Qualitative research (CERQual) approach was used to assess the confidence in individual review findings.

2.2.4 Results

Nineteen studies were included, which captured the views of 159 GPs from eight different countries. Four analytical themes describing the factors that should be considered in the development or optimisation of pharmacist services in general practice, based on the views of GPs, were developed from the coded data and descriptive themes: (1) optimal environment for a pharmacist, (2) the ideal pharmacist characteristics, (3) complex stakeholder relationships, and (4) benefits of an effective pharmacist.

2.2.5 Conclusion

Based on the synthesis of GPs' views, I have created a conceptual model of factors that should be considered by policymakers, GPs, pharmacists, and other relevant stakeholders when developing or optimising pharmacist services in general practice going forward.

2.3 Introduction

Medication usage is the most common healthcare intervention globally (18), and continues to rise along with the increasing prevalence of chronic disease (227). The use of disease-specific guidelines by multiple physicians often results in multimorbid patients with complex medication regimens, which typically falls on the GP to coordinate (228,229). Managing such patients places increased demands on GPs, who are already strained by issues with staff recruitment and retention (60). To alleviate some of this pressure, pharmacists have been integrated into general practice in Europe, North America, Australia, and New Zealand, where they perform a range of activities like medication reviews and conducting medication reconciliation post hospitalisation (126,145,152,154,230–233). A systematic review looking at health systems indicators and pharmacist integration into primary care teams demonstrated pharmacists' potential to reduce GPs' workloads, medication costs, and emergency department visits (170). Furthermore, pharmacists in non-dispensing roles have led to improvements in several parameters associated with chronic disease states, including: blood pressure, glycaemic control, and blood lipid profiles (234).

With a growing prevalence of pharmacists in general practice, it is vital to attain the relevant stakeholder views on such pharmacist services. GPs' views are particularly pertinent given that pharmacist services in general practice in countries like England have shown significant growth, where GPs themselves have invested financially in the role (133). GPs are also considered to be local 'opinion leaders' within practices (235), and any apprehension from GPs is associated with a high likelihood of influencing other practice staff members (235–237). To date, GPs' views regarding pharmacist services in general practice have not been explored comprehensively or in any great depth. A realist review (185) presented findings on GPs' views amongst other topics. Findings in this review were from only three studies however (141,152,186), which were presented individually. Research around barriers and other seemingly important nuances were absent from the review (141,198,238). Given the

increasing prevalence of such pharmacist roles as well as more recent publications in this field, there is a clear need to collate the up-to-date evidence in this regard. Therefore, the aim of this review was to address this knowledge gap by synthesising, for the first time, the specific views of GPs of pharmacist services in general practice and use these findings to help optimise existing pharmacist services as well as to develop new pharmacist services in general practice.

2.4 Methods

The review protocol was registered in advance and is available at https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021224508. International prospective register of systematic reviews (PROSPERO) registration number: CRD42021224508.

2.4.1 Search strategy

The following electronic databases were searched from inception to 9th December 2020 for relevant studies: PubMed, EMBASE, The Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science, PsycINFO, CINAHL, ProQuest Dissertations and Theses, and OpenGrey. The search strategy was adapted to suit the search capabilities of each database, as shown in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses literature search extension (PRISMA-S) Checklist (**Appendix 2**). Only studies with full texts available in English were included, with no restrictions on publication date. The electronic search was re-run on 9th April 2021 to ensure the inclusion of all relevant publications. To identify further potentially eligible studies, the reference lists of included full texts were hand-searched, and citation searching of the included full texts was also conducted.

2.4.2 Inclusion and exclusion criteria

Peer-reviewed studies were eligible for inclusion if they utilised qualitative research methods to evaluate GPs' views of pharmacist services in the general practice setting. Given debates

in the literature about whether open comment questions are considered as truly qualitative data and in order to capture the most conceptually rich data, surveys with open comment sections were excluded (239,240). Studies were not included where GPs' views pertained to pharmacist services solely for academic detailing or in the management of specific conditions or medication classes. This may only have reflected the views/experiences of GPs when dealing with a specific type of patient or medication, which may not reflect the experiences/views of the day-to-day activities involved in GP-pharmacy collaboration in general practice. Where other stakeholders' views were addressed, studies were only included if the data relating to GPs alone could be extracted. Where studies used a mixed methods approach, the qualitative data only were extracted.

2.4.3 Study selection

The references retrieved from database searching were imported into Zotero® and duplicates removed. EH screened the titles of the remaining references to remove studies that were clearly not relevant to the review. All remaining titles and abstracts were then screened for inclusion independently by EH and LG. Thereafter, full-text articles were obtained and reviewed independently by EH and LG for inclusion. Any differences between the reviewers were resolved through discussion. Study characteristics were extracted by EH and cross-checked by LG, this included: first author, date, country, study aims, study design, setting, participant characteristics, and analysis approach.

2.4.4 Quality assessment

The quality assessment of full texts was performed independently by EH and LG using the Critical Appraisal Skills Programme (CASP) Qualitative Studies Checklist (241). The CASP Checklist was chosen owing to its ease of use and due to it being the most commonly used tool in qualitative evidence syntheses in Cochrane and World Health Organization (WHO) guidelines processes (242,243). Studies were not excluded based on the quality assessment

alone; it is possible that some studies' failure to meet some of the CASP Checklist requirements may be due to inadequate reporting, and inadequately reported studies may still provide meaningful contributions to the synthesis (244). However, the quality assessment was taken into consideration when the confidence in the review findings was assessed by EH using the CERQual approach, whereby findings generated were assigned a confidence grade of high, moderate, low, or very low (245). Four components contribute to the confidence grade for each finding: methodological limitations of the primary qualitative studies, relevance, coherence, and adequacy of data. Methodological limitations refers to '*the extent to which there are concerns about the design or conduct of the primary studies supporting a review finding*' (245). Relevance is '*the extent to which the body of data from the primary studies supporting a review finding is applicable to the context specified in the review question*' (245). Coherence is '*an assessment of how clear and cogent the fit is between the data from the primary studies and the review finding*' (245). Adequacy is '*the degree of richness and quantity of data supporting a review finding*' (245). Confidence in review findings refers to the likelihood that the review finding is a reasonable representation of the phenomenon of interest (245).

2.4.5 Synthesis

Full-text papers were imported into NVivo® 12 software to facilitate thematic synthesis – chosen for this QES due to its largely epistemologically neutral stance, which may be more suited to health services research (246,247). Thematic synthesis also tends to be more descriptive and accessible than other synthesis methods and the output more directly relevant to policymakers and practitioners (246). This thematic synthesis involved three key steps: line-by-line coding, inductively developing descriptive themes from the codes, and then creating analytical themes which move beyond the descriptive themes resulting in interpretive models, explanations, or hypotheses (246).

EH and LG independently performed line-by-line coding of all text in the results/findings section of each included full text (including themes, quotations, tables). A random 20% of the coded text was then reviewed by two practising GPs (authors TF and EW) to ensure codes were truly rooted in the text of the studies; although none of the pharmacist authors (EH, LG, SB, and KD) previously worked in general practice, this step was taken to minimise bias that may have stemmed from EH and LG unconsciously seeking positive perceptions of pharmacists in the texts. The codes identified were grouped and findings were synthesised from grouped codes to facilitate the generation of the descriptive themes, followed by the development of the overarching analytical themes and a conceptual model was developed through iterative discussion amongst the review team to depict not only how the analytical themes were interrelated, but also to create an interactive system that could be manipulated to aid development or optimisation of pharmacist services in general practice. The Enhancing transparency in reporting the synthesis of qualitative research (ENTREQ) statement (**Appendix 3)** guided results reporting in this study (248).

2.5 Results

2.5.1 Search results

The flow of studies throughout the synthesis is illustrated in **Figure 8**, with reasons provided for the exclusion of full texts reviewed (249). After the review of 39 full texts, a total of 19 studies were included in this QES, encompassing the views of 159 GPs from interviews and/or focus groups. The studies were conducted across eight countries, with the majority from Australia (*n* = 6) and the UK (*n* = 4). Eight studies assessed GPs' views during the employment of a pharmacist in their practices (115,116,186,189–191,250,251). Similarly, eight studies sought GPs' opinions after a pilot study of having a pharmacist in their practices (113,152,187,188,194,198,252,253). Only three included studies in this review assessed the view of GPs prior to the implementation of a pharmacist in general practice (140,193,238); of these, two explored the views of GPs amongst other stakeholders (140,193), and the other assessed the views of GPs from private practice only (238). Two out of 19 studies utilised theory in the design of their topic guides (187,253), and one used theory as a framework for the analysis of their data (188). Detailed study characteristics are summarised in **Table 1**.

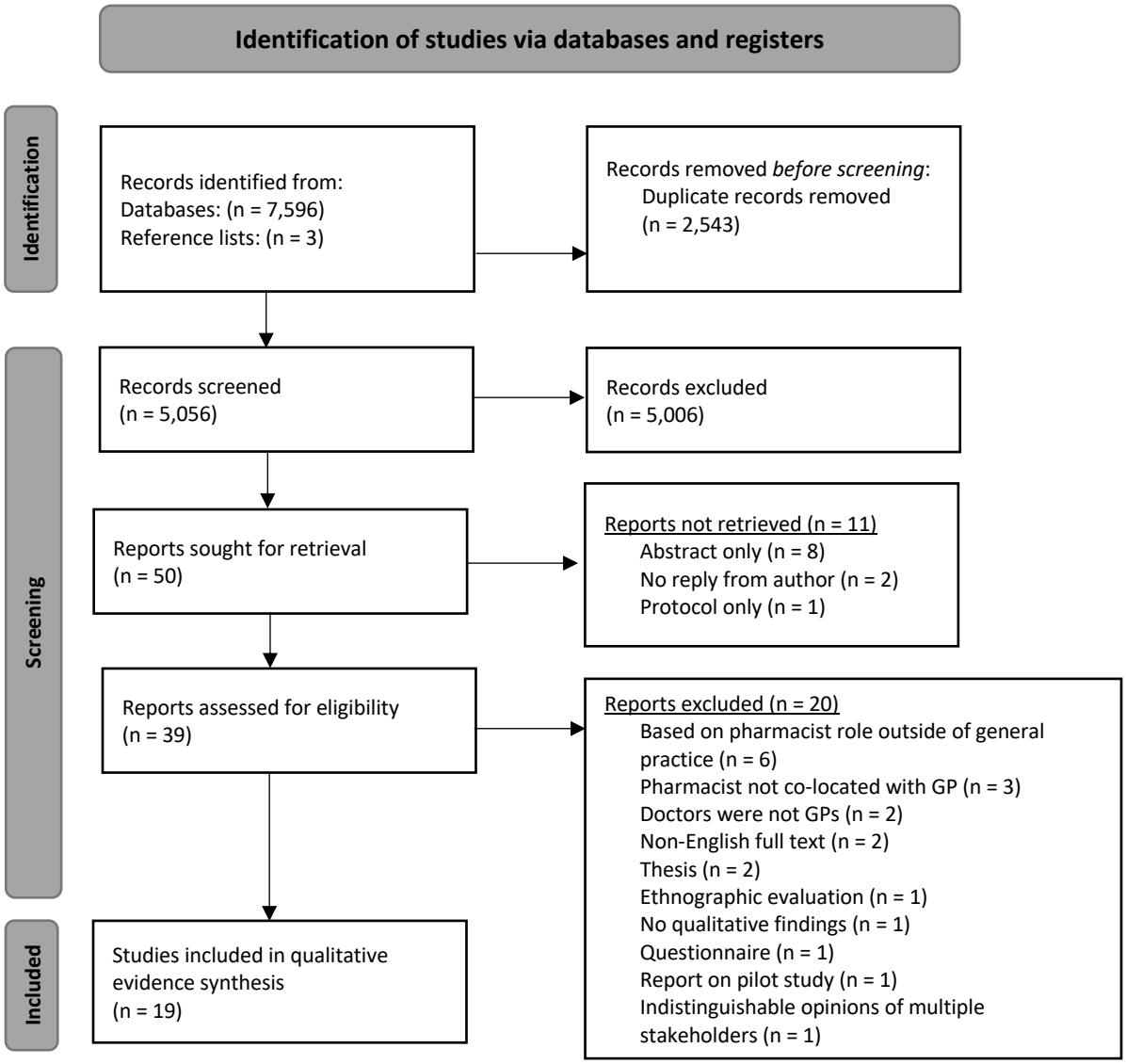


Figure 8: PRISMA flow diagram (249)

Table 1: Characteristics of included studies in the QES

Author (Year)	Country	Study aims	Methodology	Qualitative data collection method and sampling approach	Timing of data collection	Number of GPs in interviews and focus groups (n)	Data analysis approach
Bajorek *et al*. (2015) (129)	Australia	To explore the perspectives of GP super clinic staff on current and potential (future) pharmacist-led services provided in this setting.	Qualitative	Semi-structured interviews Purposive	During pharmacist employment in practice	GPs (3)	Thematic analysis
Benson *et al*. (2018) (253)	Australia	To conduct a preliminary process evaluation to inform the adaptation of the integrated pharmacist intervention.	Mixed methods	Semi-structured interviews Convenience	Post-trial of pharmacist in general practice	GPs (5)	Framework analysis
Blondal *et al*. (2017) (152)	Iceland	To introduce and study pharmacist-led pharmaceutical care into primary care clinics in Iceland in collaboration with GPs by presenting different setting structures.	Action research	Semi-structured interviews NS	Post-trial of pharmacist in general practice	GPs (5)	Thematic/content analysis
Deeks *et al*. (2018) (198)	Australia	To explore stakeholder perception about the role of the pharmacist and the benefits, enablers and barriers to implementation.	Mixed methods	Semi-structured interviews Purposive	Post-trial of pharmacist in general practice	GPs (4)	Thematic analysis
Duncan *et al*. (2020) (194)	England and Scotland	To explore GP and pharmacist perspectives on collaborative working within the context of optimising medications for patients with multimorbidity.	Qualitative	Semi-structured interviews Purposive	Post-trial of pharmacist in general practice	GPs (13)	Thematic analysis

Table 1: (Continued) Characteristics of included studies in the QES

Author (Year)	Country	Study aims	Methodology	Qualitative data collection method and sampling approach	Timing of data collection	Number of GPs in interviews and focus groups (n)	Data analysis approach
Freeman *et al*. (2012) (140)	Australia	To describe the opinions of local stakeholders in South-East Queensland on the integration of a pharmacist into the Australian general practice environment.	Qualitative	Semi-structured interviews Convenience	Theoretical views i.e. if pharmacists worked in practices	GPs (4)	Content analysis
Hampson *et al*. (2019) (250)	England	To explore the perspectives of GPs with experience of fully funding a pharmacist in general practice, focussing on the value that GPs place on the role of the pharmacist.	Qualitative	Semi-structured interviews Purposive	During pharmacist employment in practice	GPs (7)	Thematic analysis
James *et al*. (2020) (187)	Ireland	To explore the implementation of the General Practice Pharmacist (GPP) intervention (pharmacists integrating into general practice within a non-randomized pilot study in Ireland), the experiences of study participants and lessons for future implementation.	Descriptive qualitative	Semi-structured interviews Purposive	Post-trial of pharmacist in general practice	GPs (4)	Thematic analysis
Jorgenson *et al*. (2014) (189)	Canada	To evaluate the barriers and facilitators that were experienced as pharmacists were integrated into 23 existing primary care teams located in urban and rural communities in Saskatchewan, Canada.	Qualitative	Semi-structured interviews Purposive	During pharmacist employment in practice	Family physicians (3)	Thematic analysis
Kozminski *et al*. (2011) (113)	United States	To determine the acceptance and attitudes of family medicine physicians, clinical and nonclinical office staff, pharmacists, and patients during pharmacist integration into a medical home.	Qualitative	Interviews Purposive	Post-trial of pharmacist in general practice	Family medicine physicians (21)	Thematic analysis

Table 1: (Continued) Characteristics of included studies in the QES

Author (Year)	Country	Study aims	Methodology	Qualitative data collection method and sampling approach	Timing of data collection	Number of GPs in interviews and focus groups (n)	Data analysis approach
Lauffenburger *et al*. (2012) (116)	United States	To explore older adults' experiences working with a clinical pharmacist in managing medications, physician perspectives on the role of clinical pharmacists in facilitating medication management, and key attributes of an effective medication therapy management program and potential barriers.	Qualitative	Focus groups Purposive	During pharmacist employment in practice	Physicians (8)	Thematic analysis using natural language processing
Medgysei *et al*. (2020) (251)	Canada	To examine the perspectives of physicians who had a relatively long-standing relationship with a co-located pharmacist to identify barriers and facilitators to integrating a clinical pharmacist.	Qualitative	Semi-structured interviews Convenience	During pharmacist employment in practice	Physicians (8)	Inductive thematic analysis
Moreno *et al*. (2017) (115)	United States	To examine and explore physician opinions about the clinical pharmacist program and identify common themes among physician experiences as well as barriers to integration of clinical pharmacists into primary care practice teams.	Mixed methods	Semi-structured interviews Convenience	During pharmacist employment in practice	Primary care physicians (13)	Content analysis
Nabhani-Gebara *et al*. (2020) (190)	England	To investigate and map the experiences, thoughts and perceptions of pharmacists, physicians and nurses working in GP clinics throughout the South East of England,- with a focus specifically on interprofessional relationships, power dynamics, changing interprofessional roles, and barriers and facilitators to the integration of the pharmacist.	Mixed methods	Semi-structured interviews Purposive and snowball	During pharmacist employment in practice	GPs (9)	Thematic analysis

Table 1: (Continued) Characteristics of included studies in the QES

Author (Year)	Country	Study aims	Methodology	Qualitative data collection method and sampling approach	Timing of data collection	Number of GPs in interviews and focus groups (n)	Data analysis approach
Pottie *et al*. (2008) (252)	Canada	To explore family physicians' perspectives on collaborative practice 12 months after pharmacists were integrated into their family practices.	Qualitative	Semi-structured interviews Purposive	Post-trial of pharmacist in general practice	Family physicians (12)	Thematic analysis
Ryan *et al*. (2018) (191)	England	To explore the experiences of stakeholders in eight general practices in the Ealing GP Federation, West London, where pharmacy services have been provided for several years.	Qualitative	Semi-structured interviews Purposive	During pharmacist employment in practice	GPs (7)	Interpretive thematic analysis
Saw *et al*. (2017) (238)	Malaysia	To explore the views of private GPs in Malaysia on integration of pharmacists into private primary healthcare clinics.	Qualitative	Focus groups and semi-structured interviews Purposive and snowball	Theoretical views i.e. if pharmacists worked in practices	GPs (13)	Inductive thematic analysis
Tan *et al*. (2013) (188)	Australia	To explore general practice staff, pharmacist and patient experiences with pharmacist services in Australian general practice clinics within the Pharmacists in Practice Study.	Qualitative	Focus groups Purposive	Post-trial of pharmacist in general practice	GPs (9)	Inductive thematic analysis
Tan *et al*. (2014) (193)	Australia	To elicit the views of GPs and pharmacists on the integration of pharmacists into general practice in Australia.	Qualitative	Semi-structured interviews Convenience, purposive and snowball	Theoretical views i.e. if pharmacists worked in practices	GPs (11)	Framework analysis

GP: General practitioner; NS: Not specified

2.5.2 Quality appraisal of included studies

The quality appraisal results of the full texts are shown below in **Table 2**. The 19 studies generally satisfied the 10 criteria set out by the CASP tool for judging the methodological quality of qualitative studies. However, a lack of author reflexivity was found to be a common issue, with only 5/19 studies (26%) reporting the impact of the relationship between the researcher and the participant during the study (113,189,193,194,198). Data analysis was flagged as a methodological weakness for 11/19 studies (58%) where there was uncertainty regarding the data analysis strategy; for example, it was unclear in some studies who had transcribed and/or coded the data (115,152,186,191,193,194,238,250–253). There was also a justification lacking for the research design in 7/19 studies (37%) – for example, the choice of focus groups over semi-structured interviews (113,186,189,193,194,198,251).

Table 2: CASP quality appraisal of included studies

Author (Year)	Aims stated clearly?	Qualitative method appropriate?	Research design appropriate?	Recruitment strategy appropriate?	Data collected appropriately?	Relationship between researcher and participants considered?	Ethical issues considered?	Data analysis sufficiently rigorous?	Clear statement of findings?	Is the research valuable?
Bajorek *et al*. (2015)	Yes	Yes	No	No	Yes	No	Yes	No	Yes	Yes
Benson *et al*. (2018)	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes
Blondal *et al*. (2017)	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
Deeks *et al*. (2018)	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Duncan *et al*. (2020)	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes
Freeman *et al*. (2012)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Hampson *et al*. (2019)	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes
James *et al*. (2020)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Jorgenson *et al*. (2014)	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes
Kozminski *et al*. (2011)	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lauffenburger *et al*. (2012)	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes
Medgysei *et al*. (2020)	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Moreno *et al*. (2017)	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes
Nabhani-Gebara *et al*. (2020)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes

Table 2: (Continued) CASP quality appraisal of included studies

Author (Year)	Aims stated clearly?	Qualitative method appropriate?	Research design appropriate?	Recruitment strategy appropriate?	Data collected appropriately?	Relationship between researcher and participants considered?	Ethical issues considered?	Data analysis sufficiently rigorous?	Clear statement of findings?	Is the research valuable?
Pottie *et al*. (2008)	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes
Ryan *et al*. (2018)	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes
Saw *et al*. (2017)	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes
Tan *et al*. (2013)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Tan *et al*. (2014)	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes

2.5.3 Review findings

Four overarching analytical themes were identified to describe the factors that should be considered in the development or optimisation of pharmacist services in general practice based on GPs' views of pharmacist services in general practice. The conceptual model (**Figure 9**) depicts how these analytical themes are interrelated and outlines the 14 descriptive themes that helped form each analytical theme. An overview of the conceptual model is provided underneath **Figure 9**. A sample of illustrative quotations determined to be the most representative of the descriptive themes are presented in **Table 3**.

Under these descriptive themes, 54 individual findings were identified and are discussed below; of these, 12 findings were graded as high confidence, 21 as moderate confidence, 17 as low confidence, and four as very low confidence. Our level of confidence for each individual finding (in sections 2.5.3.1 to 2.5.3.4 of the results below) is outlined in **Table 4**.

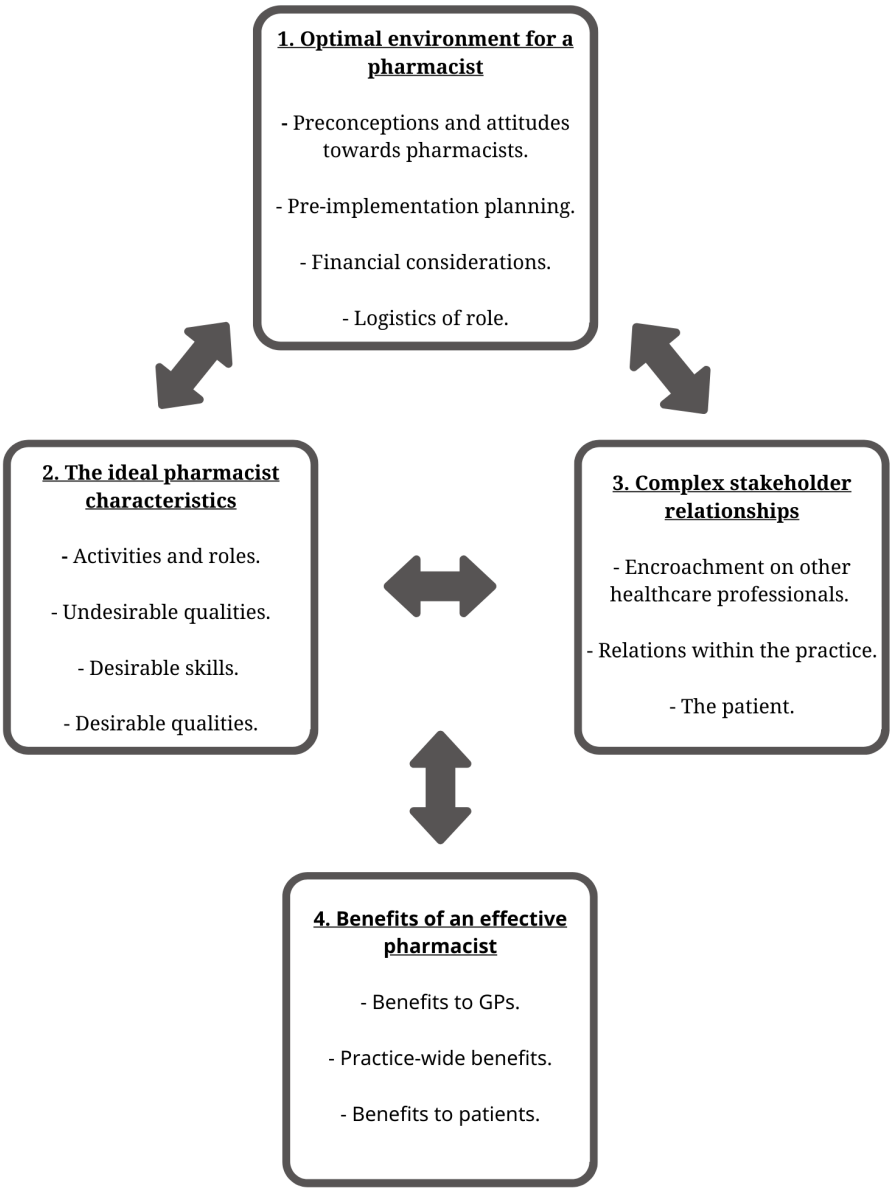


Figure 9: A conceptual model of factors that should be considered in the development or optimisation of pharmacist services in general practice based on the views of general practitioners.

Each analytical theme – numbered above, with the corresponding descriptive themes as bullet points underneath – should be considered when developing or optimising pharmacist services in general practice. The analytical themes 1,2,3 are interrelated (as indicated by the double-headed arrows) and represent targets for intervention or opportunities for modification in order to produce increased benefits from an effective pharmacist service. The benefits may then feed back (as indicated by the double-headed arrow) to the other factors and alter them (e.g. the benefit of reduced medication costs due to having pharmacists in general practice may stimulate further investment of government funding for additional pharmacist roles in this setting).

2.5.3.1 Optimal environment for a pharmacist

2.5.3.1.1 Preconceptions and attitudes towards pharmacists

For a pharmacist to become integrated into a practice, there ideally should be at least one enthusiastic GP who is actively supportive of the pharmacist and has an appreciation for their skillset (187,238,251,253). GPs felt they need to act as a 'visible champion' to explain or promote the pharmacist's role to ensure understanding in order to avoid any misconceptions and encourage buy-in from patients and other practice staff (251,253). The presence of a pharmacist in the practice was often a new experience for GPs and tended to come with a sense of initial apprehension, which may have been linked with either a previous bad experience with a pharmacist or a lack of awareness of their training; this may be overcome as GPs observe pharmacists working within the practice (140,152,187,193,238). GPs felt more comfortable with such pharmacist roles when they or their colleagues had a positive experience working with pharmacists in general practice (187,238,251). There were mixed opinions about the usefulness of pharmacists' prescribing recommendations in general (i.e. not specific to general practice settings); although they were mostly considered useful and well received, there were too many provided at times and some lacked significance (116,152,186,187,194,250). GPs were more receptive to the idea of pharmacists within their practice if there were allied healthcare professionals already working there (198).

2.5.3.1.2 Pre-implementation planning

For a pharmacist to be able to work effectively within a practice, they should have confidentiality-bound access to patients' electronic medical records (EMRs) as they may initially lack insight into the social and medical history of the practice patients (116,152,193,194,251). For a pharmacist to take up practice roles, GPs believed pharmacists should undergo additional ongoing training or accreditation (140,193,198,238). Any initial uncertainty about the pharmacist's role could be mitigated by ensuring that the role is well

defined ahead of time; however, role definition may vary from practice to practice and may require time to fully develop (113,116,140,152,190,193,238,250,251,253). Integration of a pharmacist may take time, GPs should anticipate this and plan to adjust their workflow to accommodate a pharmacist (187,191,251,252).

2.5.3.1.3 Financial considerations

A sustainable funding model should be subsidised by governments, who first have to be convinced of health systems benefits; asking GPs to fund pharmacist services in the practice themselves was considered unlikely to be feasible (116,140,187,193,198,238,250). Methods of reimbursement that would best support pharmacist services included remuneration for achieving set standards in quality measures and blended payment models (187,190,198,250). There was disagreement amongst GPs whether pharmacist services were cost effective; ultimately, GPs reported that the costs of employing a pharmacist have to be counterbalanced against savings generated, improved task efficiency, and other patient-related outcome measures (191,194,250,251). Furthermore, the decision to hire a practice pharmacist should be weighed up against hiring another GP or practice nurse (190,194).

2.5.3.1.4 Logistics of role

Physical space to accommodate pharmacists presented a barrier to the role in some practices (140,191,193,251). Co-location of pharmacists on site was crucial, so GPs can communicate face to face with them; however, GPs still felt it was important to receive some written communication as well (115,116,152,191,193,250–252). The optimal frequency of pharmacist presence in the practice was unclear. Everyday presence was likely to be optimal; however, some GPs preferred a part-time pharmacist or one pharmacist shared between multiple practices (113,187,188,191,193,250,253). Pharmacists should screen the practice's EMR to identify suitable patients for pharmacist services and schedule patient appointments either side of GPs' appointments (115,116,152,188,193,251).

2.5.3.2 **The ideal pharmacist characteristics**

2.5.3.2.1 **Activities and roles**

GPs had a clear positive perception and were highly satisfied with the role of pharmacist services in general practice, which were perceived as helpful by GPs (152,187–189,193,194,198,250–252). GPs viewed pharmacists as having an important educational role, as they can provide medication-focused education to patients and practice staff (115,140,152,187–189,191,251,252), and were considered notably useful in the management of complex patients (116,152,194,198,250–252). There were several activities that were deemed well suited to pharmacists performing in general practice, including: repeat prescribing (115,187,191,194), auditing (193), medication reconciliation (116,193,198,250), medication reviews (186,193,194,252), liaising with community pharmacists (191,252), care of older adults (116), and chronic disease management (187,191,250,252) – particularly diabetes (115,116,190,252).

2.5.3.2.2 **Undesirable qualities**

Some GPs were concerned pharmacists would be slower at performing the same tasks as GPs, follow guidelines too rigidly with an intolerance for uncertainty, struggle to think outside the box, tend to treat 'the numbers', and may be too technical and clerical (116,194). GPs in one study each from Australia and Malaysia found it difficult to see a separation from the role of the pharmacist as a dispenser of medication in a primary care setting (188,238).

2.5.3.2.3 **Desirable skills**

GPs valued pharmacists' extensive guideline-orientated knowledge of medications and their usage (113,115,116,152,186–188,191,193,194,250–252). Pharmacists in general practice should have adequate non-judgmental communication skills (115,116,187,188,193,198,250,253). Having a mix of previous hospital and community

experience was considered desirable for pharmacists in general practice (198), as was the skill of prioritising the prescribing recommendations provided (116).

2.5.3.2.4 **Desirable qualities**

A proactive pharmacist was desired for the role to be viable in a practice (113,189,190,193,198,252,253). GPs expressed a preference for pharmacists to be assertive, and passivity should be avoided (188,189). A pharmacist should be adaptable to suit the needs of an individual practice (113,193,250,252). The accessibility and availability of pharmacists in general practice was a desirable quality that acted as a facilitator to the role (115,116,188,191,193,198).

2.5.3.3 **Complex stakeholder relationships**

2.5.3.3.1 **Encroachment on other healthcare professionals**

Pharmacists may encroach on the role of the practice nurse, taking work away from them and leading to conflict in practices (140,190,198). Some GPs perceived that pharmacists in general practice encroached on their own role and, in some cases, threatened their role, especially when it came to maintaining control over prescribing decisions (140,191,193,194,238,252,253). Pharmacists in general practice may disrupt GP-patient or community pharmacist-patient relationships (193,251,253).

2.5.3.3.2 **Relations within the practice**

Pharmacists were seen as important team members, who work well in practice teams and enhance patient care (113,115,152,187,188,193,194,198,238,250–252). GPs wished for a close working relationship between themselves and the pharmacist, where there is a mutual understanding of each other's roles (116,188,189,238). GPs highlighted a need to build a trusting relationship with the pharmacist; this may take time, during which the GP may gradually become assured of the pharmacist's clinical knowledge (116,191).

2.5.3.3.3 **The patient**

GPs declared that pharmacists were generally well accepted by patients; however, some reported patient apprehension due to the pharmacist's presence in the practice (115,116,188,189,193,238,251–253). The apprehension was attributed to patients still being 'doctor centred' and this professional hierarchy may have blocked pharmacist input as patients were unwilling to change specialist-initiated medication; however, this apprehension was overcome by increasing patient-pharmacist interactions (186,194,238,253). Pharmacists may indirectly enhance patient-GP relationships by managing medication-related issues instead of GPs, leading to GPs having more time for patient-facing activities (191).

2.5.3.4 **Benefits of an effective pharmacist**

2.5.3.4.1 **Benefits to GP(s)**

Pharmacists acted as a resource for GPs, which gave GPs greater confidence and a sense of reassurance regarding medication-related issues, which increased the likelihood of patients accepting GPs' recommendations regarding their medications (115,187,188,191,250,252). Pharmacists may reduce GPs' workload overall, freeing up their time; however, pharmacists may increase GPs' administrative workload, particularly at the beginning (115,152,187,190,191,193,194,250–252). GPs found working with pharmacists in general practice professionally rewarding (187).

2.5.3.4.2 **Practice-wide benefits**

Pharmacist presence was a driver for quality and process improvement within the practice (152,187,193,250), with co-location improving the comprehensiveness of patients' EMRs (188,193). Pharmacists may elicit more efficient healthcare utilisation, as it was indicated that patients who experienced pharmacist involvement paid less frequent visits to the

practice (198,251). Practices in England benefitted from reductions in the amount spent from practice prescribing budgets (191).

2.5.3.4.3 **Benefits to patient(s)**

GPs described that patient care was enhanced by the presence of pharmacists in general practice (113,115,187,238,250–252). Pharmacists' presence may lead to decreases in the total number of medications taken by patients and an improvement in the overall appropriateness of medication regimens (191,198). Improvements in medication adherence occur secondary to additional counselling and reinforcement provided by the pharmacist around medication use (115,188,198,251). Patient safety is enhanced due to improvements in prescribing (187,191,194,250). Patients experience safer transitions of care – e.g. from secondary or tertiary back to primary care – owing to pharmacist involvement in medication reconciliation (198,252). Medication costs for patients were reported to decrease in one study from the US (115).

Table 3: Illustrative quotations

Descriptive theme	Quotations	Sources
Preconceptions/attitudes of GPs towards pharmacists	‘G*eneral practitioners stated that the intervention works best when general practitioners are enthusiastic and willing to collaborate.’* Author	(253)
	“They are doing consulting, examining, dispensing... What (is) the person(‘s) qualification?” GP	(238)
Pre-implementation planning	*“The interaction is only effective if medical records are viewed first.”* GP	(116)
	‘There were mixed views on the level of training pharmacists should receive prior to working in general practice. Most felt that clinical experience and additional, ongoing training would be essential.’ Author	(193)
Financial considerations	*‘Some form of government remuneration for pharmacist services was collectively reported by all groups as a funding model.’* Author	(140)
	“And I think that is the difficult question. Everyone is feeling massively overloaded and are they going to see it as do you spend that money on a doctor or a nurse practitioner who can see patients or do you spend it on a pharmacist and go off on a different way.” GP	(190)
Logistics of role	*“Having somebody in house, (it) is the corridor talk and it’s difficult to quantify how helpful that is because you can say, “Can I just pick your brains on something?” If he wasn’t here, in the building, I don’t think I would.”* GP	(191)
	‘Some GPs described the possibility that the thorough methodical approach of some pharmacists could tip the balance such that they were unable to complete the work at an appropriate pace to save GPs time or that they sometimes created additional work for the GPs which they viewed as unnecessary.’ Author	(250)

Table 3: (Continued) Illustrative quotations

Descriptive theme	Quotations	Sources
Activities/roles	*'Physicians also had numerous ideas for expanded roles for pharmacists, including the development of "physician education seminars" in which pharmacists could periodically educate physicians and clinic staff on current medication issues and new medication guidelines.'* Author	(115)
	"We initiate insulin now. We have been doing that more in the office now that [the pharmacist] has been teaching the patients on how to use the syringes and how to use their glucometer." GP	(252)
Undesirable qualities	*"I think that she [the pharmacist] would probably take twice or three times as long doing it as a GP."* GP	(194)
	"I'm happy that they are focusing more on consumers that patients are important not just the pills." GP	(152)
Desirable skills	*"I see the clinical pharmacist as having a special niche. Because of their detailed oriented training and medication management, they're much more fluent and immediately feel more comfortable with medicines."* GP	(116)
	'Interviewees felt that it was important that the practice pharmacist has input into patient care and that this was complementary and non-judgemental.' Author	(198)
Desirable qualities	*'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.'* Author	(253)
	"They need to be flexible and professional and adaptable and good communicators . . . All of the things we'd like all of our staff to be, or ourselves as well." GP	(193)

Table 3: (Continued) Illustrative quotations

Descriptive theme	Quotations	Sources
Encroach/threaten other healthcare professionals	*'One GP compared this perceived threat to professional boundaries and identity to that observed during the introduction of nurse practitioners, although they suggested that this sentiment might be stronger since everything a nurse can do a GP can probably do, whereas anything a pharmacist can do the GP probably can't.'* Author	(191)
	"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." GP	(152)
Relations within the practice	*"I think that medicine is a whole team approach, and the more team members there are, the better care the patient gets, so it's very good to have [the pharmacist] here."* GP	(113)
	"There is a need to build a relationship of mutual trust between the clinical pharmacist and the physician so that the clinical pharmacist can understand the goals and approaches to treatment and the physician can have some knowledge of the clinical pharmacist's skills." GP	(116)
The patient	*"Patients love it. I mean the responses of patients have been uniformly positive. They like the fact that somebody else is involved with their care. It makes them feel important. And it also sort of empowers them. I mean [the pharmacist] has a way of giving back to them how they want to fix things up a little bit better."* GP	(252)
	'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.' Author	(253)

Table 3: (Continued) Illustrative quotations

Descriptive theme	Quotations	Sources
Benefits to GP(s)	*"Everyone was getting incredibly stressed so we started to look around different ways that we could try and easy that burden so looked at things like nurse prescribers coming into the practice to work in these nurse practitioner clinics and a pharmacist to come in as well and that's where it came from and it has made an enormous difference to the workload. It is now much more manageable."* GP	(190)
	"So I got [the pharmacist] to look that up for me and really just to serve as a sounding board…. "Okay, is there anything here that you think could have been a problem?" And [the pharmacist] was very reassuring, and that was great because number one, it gave me peace of mind, but it also served as reinforcement to my own thinking." GP	(252)
Practice-wide benefits	*'One physician explained it as a more efficient use of health care resources because after a pharmacist consultation many of the patients did not return to the clinic as often as they would have otherwise.'* Author	(238)
	"It is real progress and a quality improvement that lifts up the operation of the primary care clinic." GP	(152)
Benefits to patient(s)	*"Complicated people, and sometimes when they come out of ... hospital or if they've visited two or three specialists, then each one of them has made a small change, and getting [the practice pharmacist] to go over all the – what they are actually, really taking now, as opposed to what my computer thinks they're taking – has been incredibly helpful."* GP	(198)
	"[Pharmacists] have helped to educate patients and reinforce the adherence to medications." GP	(115)

Table 4: Confidence in the Evidence from Reviews of Qualitative research (CERQual) summary of qualitative findings

Review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
1. OPTIMAL ENVIRONMENT FOR A PHARMACIST			
1.1 PRECONCEPTIONS AND ATTITUDES TOWARDS PHARMACISTS			
1. For a pharmacist to become integrated into a practice, there ideally should be at least one enthusiastic GP who is actively supportive of the pharmacist and has an appreciation for their skillset.	Low confidence	Minor concerns regarding methodological limitations, Moderate concerns regarding coherence, Moderate concerns regarding adequacy, and Minor concerns regarding relevance	(187,238,251,253)
2. GPs felt they need to act as a 'visible champion' to explain or promote the pharmacist's role to ensure understanding in order to avoid any misconceptions and encourage buy-in from patients and other practice staff.	Low confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Moderate concerns regarding adequacy, and Moderate concerns regarding relevance	(251,253)
3. The presence of a pharmacist in the practice was often a new experience for GPs and tended to come with a sense of initial apprehension, which may have been linked with either a previous bad experience with a pharmacist or a lack of awareness of their training; this may be overcome as GPs observe pharmacists working within the practice.	Moderate confidence	Minor concerns regarding methodological limitations, Moderate concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(140,152,187,193,238)
4. GPs felt more comfortable with such pharmacist roles when they or their colleagues had a positive experience working with pharmacists in general practice.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Moderate concerns regarding adequacy, and Minor concerns regarding relevance	(187,238,251)
5. There were mixed opinions about the usefulness of pharmacists' prescribing recommendations in general (i.e. not specific to general practice settings); although they were mostly considered useful and well received, there were too many provided at times and some lacked significance.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(116,152,186,187,194,250)
6. GPs were more receptive to the idea of pharmacists within their practice if there were allied healthcare professionals already working there.	Low confidence	Serious concerns regarding adequacy, and Moderate concerns regarding relevance	(198)

Table 4: (Continued) Confidence in the Evidence from Reviews of Qualitative research (CERQual) summary of qualitative findings

Review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
1.2 PRE-IMPLEMENTATION PLANNING			
7. For a pharmacist to be able to work effectively within a practice, they should have confidentiality-bound access to patients' EMRs as they may initially lack insight into the social and medical history of the practice patients.	**High confidence**	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, and Minor concerns regarding relevance	(116,152,193,194,251)
8. For a pharmacist to take up practice roles, GPs believed pharmacists should undergo additional ongoing training or accreditation.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding adequacy, and Moderate concerns regarding relevance	(140,193,198,238)
9. Any initial uncertainty about the pharmacist's role could be mitigated by ensuring that the role is well defined ahead of time; however, role definition may vary from practice to practice and may require time to fully develop.	**High confidence**	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, No/Very minor concerns regarding adequacy, and Minor concerns regarding relevance	(113,116,140,152,190,193,238,250,251,253)
10. Integration of a pharmacist may take time, GPs should anticipate this and plan to adjust their workflow to accommodate a pharmacist.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Moderate concerns regarding relevance	(187,191,251,252)
1.3 FINANCIAL CONSIDERATIONS			
11. A sustainable funding model should be subsidised by governments, who first have to be convinced of health systems benefits; asking GPs to fund pharmacist services in the practice themselves was considered unlikely to be feasible.	**High confidence**	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(116,140,187,193,198,238,250)
12. Methods of reimbursement that would best support pharmacist services included remuneration for achieving set standards in quality measures and blended payment models.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(187,190,198,250)

Table 4: (Continued) Confidence in the Evidence from Reviews of Qualitative research (CERQual) summary of qualitative findings

Review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
13. There was disagreement amongst GPs whether pharmacist services were cost effective; ultimately GPs reported that the costs of employing a pharmacist have to be counterbalanced against savings generated, improved task efficiency, and other patient-related outcome measures.	Moderate confidence	Moderate concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(191,194,250,251)
14. The decision to hire a practice pharmacist should be weighed up against hiring another GP or practice nurse.	Low confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Moderate concerns regarding adequacy, and Moderate concerns regarding relevance	(190,194)
1.4 LOGISTICS OF ROLE			
15. Physical space to accommodate pharmacists presented a barrier to the role in some practices.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(140,191,193,251)
16. Co-location of pharmacists on site was crucial, so GPs can communicate face to face with them; however, GPs still felt it was important to receive some written communication as well.	**High confidence**	Minor concerns regarding methodological limitations, and Minor concerns regarding relevance	(115,116,152,191,193,250–252)
17. The optimal frequency of pharmacist presence in the practice was unclear. Everyday presence was likely to be optimal; however, some GPs preferred a part-time pharmacist or one pharmacist shared between multiple practices.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding adequacy, and Moderate concerns regarding relevance	(113,187,188,191,193,250,253)
18. Pharmacists should screen the practice's EMR to identify suitable patients for pharmacist services and schedule patient appointments either side of GPs' appointments.	Moderate confidence	Minor concerns regarding methodological limitations, Moderate concerns regarding coherence, Minor concerns regarding adequacy, and Moderate concerns regarding relevance	(115,116,152,188,193,251)

Table 4: (Continued) Confidence in the Evidence from Reviews of Qualitative research (CERQual) summary of qualitative findings

Review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
2. THE IDEAL PHARMACIST CHARACTERISTICS			
2.1 ACTIVITIES AND ROLES			
19. GPs had a clear positive perception and were highly satisfied with the role of pharmacist services in general practice and were perceived as helpful by GPs.	**High confidence**	Minor concerns regarding methodological limitations, and Minor concerns regarding relevance	(152,187–189,193,194,198,250–252)
20. GPs viewed pharmacists as having an important educational role, as they can provide medication-focused education to patients and practice staff.	**High confidence**	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(115,140,152,187–189,191,251,252)
21. Pharmacists were considered notably useful in the management of complex patients.	**High confidence**	Minor concerns regarding methodological limitations, and Minor concerns regarding relevance	(116,152,194,198,250–252)
22. There were several activities that were deemed well suited to pharmacists performing in general practice, including: repeat prescribing, auditing, medication reconciliation, medication reviews, liaising with community pharmacists, care of older adults, and chronic disease management – particularly diabetes.	Moderate confidence	Minor concerns regarding methodological limitations, Moderate concerns regarding coherence, and Minor concerns regarding relevance	(115,116,186,187,190,191,193,194,198,250,252)
2.2 UNDESIRABLE QUALITIES			
23. Some GPs were concerned pharmacists would be slower at performing the same tasks as GPs, follow guidelines too rigidly with an intolerance for uncertainty, struggle to think outside the box, tend to treat 'the numbers', and may be too technical and clerical.	Low confidence	Minor concerns regarding methodological limitations, Moderate concerns regarding coherence, Moderate concerns regarding adequacy, and Moderate concerns regarding relevance	(116,194)
24. GPs in one study each from Australia and Malaysia found it difficult to see a separation from the role of the pharmacist as a dispenser of medication in a primary care setting.	Low confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Moderate concerns regarding adequacy, and Moderate concerns regarding relevance	(188,238)

Table 4: (Continued) Confidence in the Evidence from Reviews of Qualitative research (CERQual) summary of qualitative findings

Review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
2.3 DESIRABLE SKILLS			
25. GPs valued pharmacists' extensive guideline-orientated knowledge of medications and their usage.	**High confidence**	Minor concerns regarding methodological limitations, and Minor concerns regarding relevance	(113,115,116,152,186–188,191,193,194,250–252)
26. Pharmacists in general practice should have adequate non-judgmental communication skills.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(115,116,187,188,193,198,250,253)
27. Having a mix of previous hospital and community experience was considered desirable for pharmacists in general practice.	Very low confidence	Minor concerns regarding methodological limitations, Serious concerns regarding adequacy, and Serious concerns regarding relevance	(198)
28. Prioritisation of prescribing recommendations provided is a desirable skill.	Very low confidence	Minor concerns regarding methodological limitations, Serious concerns regarding adequacy, and Serious concerns regarding relevance	(116)
2.4 DESIRABLE QUALITIES			
29. A proactive pharmacist was desired for the role to be viable in a practice.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, and Minor concerns regarding relevance	(113,189,190,193,198,252,253)
30. GPs expressed a preference for pharmacists to be assertive, and passivity should be avoided.	Low confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Moderate concerns regarding adequacy, and Moderate concerns regarding relevance	(188,189)

Table 4: (Continued) Confidence in the Evidence from Reviews of Qualitative research (CERQual) summary of qualitative findings

Review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
31. A pharmacist should be adaptable to suit the needs of an individual practice.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(113,193,250,252)
32. The accessibility and availability of pharmacists in general practice was a desirable quality that acted as a facilitator to the role.	Moderate confidence	Minor concerns regarding methodological limitations, Moderate concerns regarding coherence, Moderate concerns regarding adequacy, and Minor concerns regarding relevance	(115,116,188,191,193,198)
3. COMPLEX STAKEHOLDER RELATIONSHIPS			
3.1 ENCROACHMENT ON OTHER HEALTHCARE PROFESSIONALS			
33. Pharmacists may encroach on the role of the practice nurse, taking work away from them and leading to conflict in practices.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding adequacy, and Moderate concerns regarding relevance	(140,190,198)
34. Some GPs perceived that pharmacists in general practice encroached on their own role and, in some cases, threatened their role, especially when it came to maintaining control over prescribing decisions.	**High confidence**	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, and Minor concerns regarding relevance	(140,191,193,194,238,252,253)
35. Pharmacists in general practice may disrupt GP-patient or community pharmacist-patient relationships.	Low confidence	Minor concerns regarding methodological limitations, Minor concerns regarding adequacy, and Moderate concerns regarding relevance	(193,251,253)
3.2 RELATIONS WITHIN THE PRACTICE			
36. Pharmacists were seen as important team members in practices, who work well in practice teams and enhance patient care.	**High confidence**	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, and Minor concerns regarding relevance	(113,115,152,187,188,193,194,198,238,250–252)

Table 4: (Continued) Confidence in the Evidence from Reviews of Qualitative research (CERQual) summary of qualitative findings

Review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
37. GPs wished for a close working relationship between themselves and the pharmacist, where there is a mutual understanding of each other's roles.	Low confidence	Minor concerns regarding methodological limitations, Moderate concerns regarding coherence, Minor concerns regarding adequacy, and Moderate concerns regarding relevance	(116,188,189,238)
38. GPs highlighted a need to build a trusting relationship with the pharmacist; this may take time, during which the GP may gradually become assured of the pharmacist's clinical knowledge.	Low confidence	Minor concerns regarding methodological limitations, Moderate concerns regarding adequacy, and Moderate concerns regarding relevance	(116,191)
3.3 THE PATIENT			
39. GPs declared that pharmacists were generally well accepted by patients; however, some reported patient apprehension due to the pharmacist's presence in the practice.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, and Minor concerns regarding relevance	(115,116,188,189,193,238,251–253)
40. The apprehension was attributed to patients still being 'doctor centred' and this professional hierarchy may have blocked pharmacist input as patients were unwilling to change specialist-initiated medication; however, this apprehension was overcome by increasing patient-pharmacist interactions.	Low confidence	Minor concerns regarding methodological limitations, Serious concerns regarding coherence, Minor concerns regarding adequacy, and Moderate concerns regarding relevance	(186,194,238,253)
41. Pharmacists may indirectly enhance patient-GP relationships by managing medication-related issues instead of GPs, leading to GPs having more time for patient-facing activities.	Very low confidence	Minor concerns regarding methodological limitations, Serious concerns regarding adequacy, and Serious concerns regarding relevance	(191)
4. BENEFITS OF AN EFFECTIVE PHARMACIST			
4.1 BENEFITS TO GP(S)			
42. Pharmacists acted as a resource for GPs, which gave GPs greater confidence and a sense of reassurance regarding medication-related issues, which increased the likelihood of patients accepting GPs' recommendations regarding their medications.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(115,187,188,191,250,252)
43. Pharmacists' presence may reduce GP workloads overall, freeing up their time; however, pharmacists may increase GPs' administrative workload, particularly at the beginning.	**High confidence**	Minor concerns regarding methodological limitations, and Minor concerns regarding relevance	(115,152,187,190,191,193,194,250–252)

Table 4: (Continued) Confidence in the Evidence from Reviews of Qualitative research (CERQual) summary of qualitative findings

Review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
44. GPs found working with pharmacists in general practice professionally rewarding.	Very low confidence	Minor concerns regarding methodological limitations, Serious concerns regarding adequacy, and Moderate concerns regarding relevance	(187)
4.2 PRACTICE-WIDE BENEFITS			
45. Pharmacist presence was a driver for quality and process improvement within the practice.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(152,187,193,250)
46. Co-location of pharmacists improved the comprehensiveness of patients' EMRs.	Low confidence	Minor concerns regarding methodological limitations, Moderate concerns regarding adequacy, and Moderate concerns regarding relevance	(188,193)
47. Pharmacists may elicit more efficient healthcare utilisation, as it was indicated that patients who experienced pharmacist involvement paid less frequent visits to the practice.	Low confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Moderate concerns regarding adequacy, and Moderate concerns regarding relevance	(198,251)
48. Practices in England benefitted from reductions in the amount spent from practice prescribing budgets.	Low confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Moderate concerns regarding adequacy, and Moderate concerns regarding relevance	(191)
4.3 BENEFITS TO PATIENT(S)			
49. GPs described that patient care was enhanced by the presence of pharmacists in general practice.	**High confidence**	Minor concerns regarding methodological limitations, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(113,115,187,238,250–252)
50. Pharmacists may lead to decreases in the total number of medications taken by patients and an improvement in the overall appropriateness of medication regimens.	Low confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Serious concerns regarding adequacy, and Moderate concerns regarding relevance	(191,198)

Table 4: (Continued) Confidence in the Evidence from Reviews of Qualitative research (CERQual) summary of qualitative findings

Review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
51. Improvements in medication adherence occur secondary to additional counselling and reinforcement provided by the pharmacist around the use of medications.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(115,188,198,251)
52. Patient safety is enhanced due to improvements in prescribing.	Moderate confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Minor concerns regarding adequacy, and Minor concerns regarding relevance	(187,191,194,250)
53. Patients experience safer transitions of care – e.g. from secondary or tertiary back to primary care – owing to pharmacist involvement in medication reconciliation where they can clarify and document medication changes.	Low confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Moderate concerns regarding adequacy, and Minor concerns regarding relevance	(198,252)
54. Medications costs for patients were reported to decrease in one study from the United States.	Low confidence	Minor concerns regarding methodological limitations, Minor concerns regarding coherence, Moderate concerns regarding adequacy, and Moderate concerns regarding relevance	(115)

Legend: CERQual – Confidence in Evidence from Reviews of Qualitative research, EMR – Electronic medical record, GP – General practitioner, GRADE – Grading of Recommendations, Assessment, Development, and Evaluations.

2.6 Discussion

2.6.1 Main findings

This QES is novel in that it is the first to focus specifically on synthesising GPs' views of pharmacist services in general practice. The four main analytical themes identified were i) the optimal environment for a pharmacist, ii) the ideal pharmacist characteristics, iii) complex stakeholder relationships, and iv) benefits of an effective pharmacist. These themes have been encapsulated in a conceptual model which should be considered by policymakers, GPs, pharmacists, and other relevant stakeholders when developing or optimising pharmacist services within the general practice setting.

2.6.2 Strengths and limitations

This review has explored GPs' views in depth across a range of geographical and cultural contexts. Its transferability is enhanced further by the utilisation of CERQual to illustrate our confidence in the findings - adding credibility, reliability, and transparency – and by the use of thematic synthesis so that the findings are more directly relevant both to policymakers and practitioners (246).

Although this review involved a comprehensive search strategy, a potential limitation could be the exclusion of studies that focused on GPs' views of pharmacist services in general practice only for certain medications or medical conditions. This may have excluded potentially useful GP views, but was done in order to better reflect the reality of pharmacist-GP collaboration in general practice, where a breadth of pharmacist services are provided to a wide variety of patients (133). This review also did not include studies that used surveys with open comment sections as their qualitative method. Although this may have resulted in the potential omission of nuanced GPs' views, previous research has highlighted that open comment sections at the end of surveys can lack context and conceptual richness due to the brevity of responses (239,240).

2.6.3 Comparison with existing literature

The views of other stakeholders regarding pharmacist services in general practice have been described in other primary qualitative studies – including patients, community pharmacists and other pharmacy staff, pharmacists working in general practice, as well as other practice staff (187,189,191,197,201,202,254). The findings of these studies are broadly in line with this review; one distinctive commonality between GPs in this review and other stakeholders was a need for role awareness and definition, in order to avoid issues like confusion between the role of the community pharmacist and the pharmacist in general practice (187,189,191,201,202). Other stakeholder views that mirrored this QES' findings included concerns around funding pharmacist roles in general practice, needing to build trust and a relationship with pharmacists over time, and generally having positive and productive interactions with pharmacists working in general practice (187,189,191,197,201,254).

While this QES found some initial uncertainty from GPs regarding the roles pharmacists could undertake in general practice and concerns with encroachment on their roles at the beginning or prior to pharmacist integration, pharmacists working in general practice in one study reported that demands on them within the practice were high, with frequent requests for pharmacist services in the practice from both patients and GPs (191). However, pharmacists in that study had been well established in the practice at the time of interviews. Therefore, while GPs may initially feel uncertain about such pharmacist roles, there is evidence that there is sufficient work available for pharmacists in general practice, which may accumulate over time as pharmacist services establish themselves fully in the practice, tipping the balance towards pharmacists in the practice feeling overburdened with work (191); this should be anticipated ahead of time to ensure adequate supports and staffing levels are in place to prevent pharmacist burnout.

Overall, while not identical to GPs' views, the perspectives of other stakeholders appear broadly similar to those of GPs with minor deviations, therefore reinforcing the transferability of this QES' findings.

2.6.4 Implications for research and practice

This QES will inform policymakers, academics, GPs, and pharmacists when developing, implementing, evaluating, and optimising pharmacist services in general practice. The findings may be particularly useful in countries where little to no prior research or practical work has been undertaken to develop pharmacist services in general practice. To give a practical example of applying one of the CERQual-assessed findings (**Table 4**): one high confidence finding was that GPs believe that such pharmacist services should be subsidised by governments as it would likely not be feasible for GPs to fund themselves; therefore, policymakers need to carefully consider a sustainable funding model going forward. This will be especially important in countries where such pharmacist roles have yet to gain traction, and where appropriate infrastructure and supports may not be in place. It may be prudent to emulate what has worked well in other countries regarding funding and acceptability of the role. In England, for example, a 2015 government-funded pilot scheme for pharmacists in general practice utilised a tapered funding model (where practices could apply for 60% of costs of employing pharmacists in year 1, 40% in year 2, and 20% in year 3), which was deemed acceptable by GPs due to its contribution to improved practice capacity, changes in workload, and medication optimisation and safety (133). Although this may provide a template, it may be more difficult to replicate in countries that are more reliant on private health insurance for healthcare reimbursement.

Pharmacists were seen by GPs in this QES as useful for managing complex patients; examples of this included diabetic patients, older adults, or those frequently hospitalised. This raises the question about other subsets of patients where pharmacists in general practice could

prove particularly useful. This QES has shown conflicting perspectives regarding pharmacists' impact on workload in the practice. This aligns with the findings from a systematic review on the impact of pharmacists on health systems indicators in general practice, whereby the number of GP appointments appeared to decrease but overall primary healthcare use increased due to patient visits to the practice pharmacist – with the outcomes of such visits potentially increasing GPs' workloads (170). Therefore, it may be beneficial to scrutinise this further and measure exactly in practice what is the actual impact of pharmacists on GPs' daily workloads with respect to time, rather than relying solely on GPs' subjective experiences of their workload.

As indicated previously in the results, no primary qualitative study has focused only on exploring GPs' views prior to implementation of pharmacist services, outside of a private practice setting. This gap in the literature could be addressed through interviews or focus groups to explore the views of GPs to identify further concerns, misconceptions, and opportunities with pharmacist roles in the general practice setting. The conceptual model developed in this QES (**Figure 9**) provides a framework that may inform the development of topic guides for further qualitative research studies. Furthermore, the conceptual model and review findings may also inform future feasibility studies in countries where the role is not well established as they allow study investigators to pre-empt and address some of the concerns and preferences of GPs ahead of time. For example, initial uncertainty regarding roles for pharmacists in general practice appeared almost ubiquitously throughout the included studies, even in countries like England where the role has become relatively widespread.

2.7 Conclusion

Although future pharmacist roles in general practice may need to be specifically tailored to individual countries or practices, this QES has demonstrated the importance of having a well-defined role to dispel this initial uncertainty. Furthermore, the findings of this novel evidence synthesis show important considerations for creating the optimal conditions to host a pharmacist in general practice and navigating the complex stakeholder relationships – ultimately to achieve benefits to GPs and their practices, health systems, and most importantly to patients.

2.8 Addendum

2.8.1 Updated search results and analysis

An updated search of the eight electronic databases was performed on the 6th of December 2023 for any potentially relevant articles published since April 2021, which was the date of the latest search prior to publication of the QES (226). This was done in order to determine if there were any major new findings that would significantly change the original QES' results. The analytic strategy of the original QES was continued where all text (including themes, quotations, tables) in the results or findings sections of each newly identified article was line-by-line coded using the codes developed during the original QES, whilst novel concepts were coded using new codes (246). A total of 3,256 records were identified. After duplicates were removed, 2,162 records were screened by their title and abstract, with 25 full-text articles assessed against the eligibility criteria. Ten new articles were identified from this updated search (200,255–263), meaning that there are now twenty-nine articles captured in the QES (**Figure 10**). Our qualitative study that fit the inclusion criteria which was published after the QES, was excluded from this update to avoid duplication of information, as its findings are given in detail in Chapter 3 (264).

The characteristics of the ten new studies are shown in **Table 5** below. Whilst three of the studies did not report the number of GPs who participated in interviews or focus groups (256,257,260), the remaining seven studies reported 56 GP participants between them. The studies included participants from six different countries: US (*n* = 3), Australia (*n* = 3), UK (*n* = 4), and Slovenia (*n* = 1). Most new articles assessed the views of GPs towards pharmacists in practices as part of their employment in the practice (*n* = 8). None of the newly identified studies assessed GPs' perceptions of pharmacists working in general practices pre pharmacist integration. Lastly, none of the studies utilised theory in the design of their topic guides or in the analysis of their data.

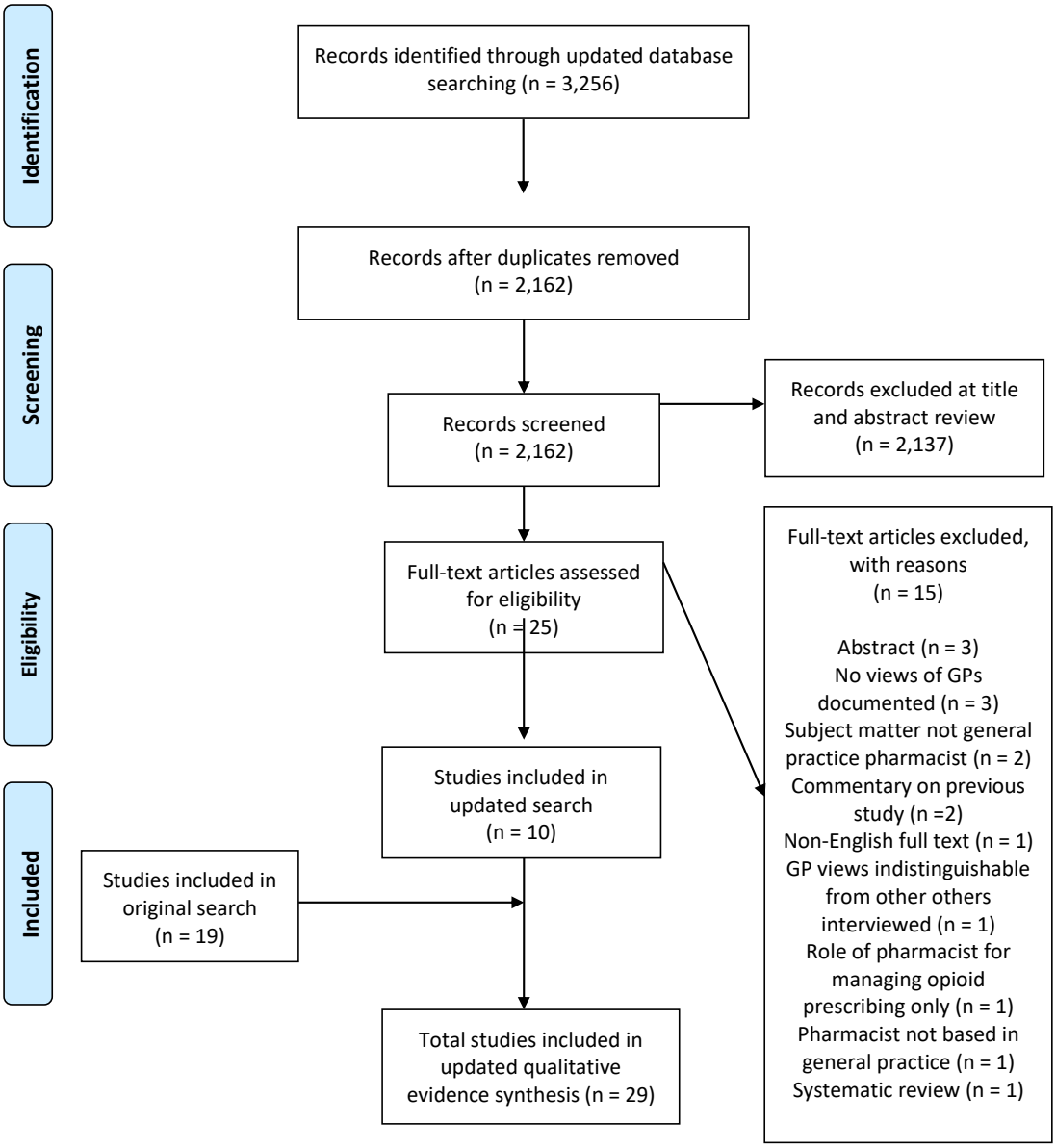


Figure 10: PRISMA flow diagram of updated search strategy results (249)

Table 5: Characteristics of studies located in the updated search of databases

Author (year)	Country	Study aims	Methodology	Qualitative data collection method and sampling approach	Timing of data collection	GPs in interviews and focus groups (*n*)	Data analysis approach
De Santiago *et al*. (2021) (261)	United States	To understand the perceived role and value of the clinical pharmacist in a southern Arizona concierge primary care practice by employees.	Qualitative	Semi-structured interviews All GPs who had worked with the pharmacist were interviewed	During pharmacist employment in practice	GPs (2)	Thematic analysis
Zogas *et al*. (2021) (260)	United States	To better understand how the challenges and misconceptions that arise during the process of defining team members' roles influence clinical pharmacy specialists' ability to optimise comprehensive medication management in primary care.	Qualitative	Semi-structured interviews Purposive	During pharmacist employment in practice	Primary care physicians (NS)	Thematic analysis
Akhtar *et al*. (2022) (259)	Australia and England	To measure expectations and perceptions about the general practice pharmacists' roles in England and Australia.	Qualitative	Semi-structured interviews Purposive	During pharmacist employment in practice	GPs (3)	Thematic analysis
Mann *et al*. (2022) (258)	England	This paper examines the experience of implementing the clinical pharmacist in general practice role.	Mixed methods	Semi-structured interviews and focus groups Purposive	Post trial of pharmacist in general practice	GPs (4)	Unclear

Table 5: (Continued) Characteristics of studies located in the updated search of databases

Author (year)	Country	Study aims	Methodology	Qualitative data collection method and sampling approach	Timing of data collection	GPs in interviews and focus groups (*n*)	Data analysis approach
Drovandi *et al*. (2022) (257)	Australia	To investigate enabling factors and barriers influencing integration of non-dispensing pharmacists within Aboriginal community-controlled health services delivering primary health care.	Mixed methods	Semi-structured interviews and focus groups Purposive	During pharmacist employment in practice	GPs (NS)	Thematic analysis
Jordan *et al*. (2022) (262)	Australia	The aim of this study was to explore the influence of an embedded GPP on the medication management for patients at risk of medication-related harm, from the perspectives of GPs, general practice personnel, patients and carers who participated in this pilot study.	Qualitative	Semi-structured interviews Purposive	During a pilot study of having pharmacist embedded in a single practice	GPs (10)	Thematic analysis
Gadd *et al*. (2023) (256)	United States	To describe patients' and providers' perceptions of an embedded clinical pharmacist in a private primary care clinic.	Mixed methods	Semi-structured interviews All physicians who had worked with the pharmacist were invited to interview	During pharmacist employment in practice	Family medicine practitioners (NS)	Unclear

Table 5: (Continued) Characteristics of studies located in the updated search of databases

Author (year)	Country	Study aims	Methodology	Qualitative data collection method and sampling approach	Timing of data collection	GPs in interviews and focus groups (*n*)	Data analysis approach
Hasan Ibrahim *et al*. (2023) (200)	Northern Ireland	To explore the views and experiences of GPs, practice-based pharmacists (PBPs), and community pharmacists about PBPs' integration into general practice and their impact on primary healthcare delivery.	Qualitative	Semi-structured interviews Purposive and snowball	During pharmacist employment in practice	GPs (11)	Thematic analysis
Nabergoj Makovec *et al*. (2023) (255)	Slovenia	To evaluate the perspective of GPs on the implementation of pharmacist-led medication review service in Community Health Care Centre Ljubljana, Slovenia.	Qualitative	Semi-structured interviews Consecutive sampling	During pharmacist employment in practice	GPs (24)	Inductive content analysis
Bartlett *et al*. (2023) (263)	Wales	To identify the first-hand experiences and perspectives among general practice teams of the ongoing processes and mechanisms that underpin effective integration and ensure the ongoing and sustained contribution of pharmacists in general practice.	Qualitative	Semi-structured interviews Purposive	During pharmacist employment in practice	GPs (2)	Thematic analysis – constant comparative approach

Legend: NS – Not specified, GPs – General Practitioners, PBPs – practice-based pharmacists.

2.8.2 Updated analysis results

Coded text was organised under the four overarching themes and subthemes already developed (**Figure 9**). For the purpose of the update, each of the overarching themes and subthemes will be presented sequentially, focusing on areas of agreement and/or nuanced or contradictory viewpoints identified across the new articles. Finally, I shall comment on how these findings impact on our previously developed conceptual model.

2.8.2.1 Optimal environment for a pharmacist

2.8.2.1.1 Preconceptions and attitudes toward pharmacists

Akin to the original QES, initial feelings of apprehension towards the role of a pharmacist were described by GPs in one study: "*At first, I was sceptical, and I will openly admit that. I thought that a pharmacist was a big liability…and a big expense... I wasn't so sure I would see the benefit*" (256). Similarly, GPs in a Slovenian study spoke about initial fears surrounding pharmacists having access to the practice's medical records *"...when they will see how good this is...every novelty is at first…why would anybody stick around my patient records ... but then ..."*" (255). Another study highlighted a mismatch between GPs' expectations for initial roles for pharmacists in practices versus what pharmacists were comfortable carrying out; i.e. GPs expected pharmacists to arrive, ready to conduct '*high level clinical tasks*' which was not the case (258). Conversely, GPs in one study initially perceived that the role of pharmacists in practices was a managerial one, focusing on compliance and audit, but realised over time that the role was much more clinical than their original perceptions (259).

2.8.2.1.2 Pre-implementation planning

Lack of training and a clear job description were re-enforced as barriers to the implementation of the pharmacist role in practices according to GPs in Australia and England

(259). Similarly, a study in Wales found that the process of integrating pharmacists was successful when practices have a '*…clear understanding of a pharmacist's expertise and had a distinct vision for their role'* (263). Considering medico-legal implications was described as an important factor when defining pharmacists' scope within practices; while important not to cross the line of competence, fear of medico-legal repercussions should not stop "*taking actions within their scope of practice due to limiting factors like role overlapping or indemnity insurance"* (259). GPs in England in another study described how they provided significant clinical mentoring to pharmacists in their practices initially, in order to realise returns at a later point (258). Similar to several studies in the original QES, GPs in Northern Ireland spoke about how the role tended to evolve and become clearer as time passed: "*I think it has become much clearer over time ... initially when the practice-based pharmacist was first introduced into the practice, we probably thought [of] some of the things that they could do and then after being with us, we were able to see more and more the value of them*" (200). However, there is a perception that irrespective of time, the role of a pharmacist in practices remains unclear to some GPs: '*Not to all GPs. I think there are some GPs who ... do not let them use their skills and their training to their full potential*' (200).

2.8.2.1.3 Financial considerations

GPs in Australia described a lack of dedicated funding to support pharmacist roles in practices from the government, meaning that roles were funded through proxy reimbursement sources (e.g. the home medication review service) (259). There was a belief amongst GPs that the role of a pharmacist in practices is expensive initially (256,258), but the expense is justified as financial benefits cannot and should not be the main motivation for the role (258).

2.8.2.1.4 Logistics of role

It was noted in one study that a lack of physical space to accommodate a pharmacist presented a challenge for GPs, who outlined how the pharmacist was often pushed out of rooms (257). In-person presence of the pharmacist in practices was described as being optimal (200,255), but also complemented by alternative communication strategies such as: practice instant messaging programmes (256), '*tagging*' the pharmacist in clinical notes (260), and via telephone and email (255). GPs in Northern Ireland described pharmacists' roles in practices as expanding and busy, but being constrained by workload pressures and time constraints, limiting further expansion beyond medication reconciliation and review (200). GPs in two studies delineated how they felt pharmacists in their practices had time to dedicate to in-depth medication reviews, which the GPs felt that they themselves did not have (255,260). To refer patients to the pharmacist creates additional workload, as described by one GP: "*You know, there is a lot of work with this. If you want to refer someone, it's additional workload ...*" (255). Reminders for GPs of the pharmacist's presence were mentioned as important initially to encourage more frequent utilisation of the pharmacist's role (255).

2.8.2.2 The ideal pharmacist characteristics

2.8.2.2.1 Activities and roles

GPs found pharmacists particularly helpful in the management of complex patients with polypharmacy and multimorbidity (255,256,263). GPs also described pharmacists as useful in the management of diabetes (260), heart failure (263), patients with hepatic/renal impairment (255), pregnant patients (255), those prescribed biological medications or chemotherapy (255), and patients who are prone to ADRs (255). GPs in one study described practice pharmacists' main roles as *'two main activities: medicines reconciliation of hospital discharge letters and outpatient letters, and medication reviews.* (200). GPs in the same study

later stated that pharmacists increasingly perform more advanced activities the longer they are in the role, like independent prescribing and managing chronic disease clinics (200). Other roles described as being performed by pharmacists included: answering medicines information queries (256,263), managing repeat prescription requests (200), notifying GPs of discontinued medications and changes in medications on the market (255), giving educational talks to practice staff (255), managing minor ailments (263), and providing advice on tapering medications (260).

Unlike the original QES, GPs in Australia in one study were not keen on pharmacists prescribing in practices, with the study authors stating *'…it is evident from the views of participants that it is not something that will happen in near future, as GPs are not very keen to agree on awarding prescribing annotation to pharmacists in Australia'* (259). Although pharmacists do prescribe in practices in England, GPs there also had some concerns about this as a role for pharmacists: *'GPs in England also showed reservations on prescribing role of general practice pharmacists, recommending close monitoring, supervision, and having strict protocols to ensure safe prescribing practices'* (259).

2.8.2.2.2 Undesirable qualities

No undesirable qualities were described in newly-identified studies.

2.8.2.2.3 Desirable skills

Desirable skills of pharmacists in practices mainly focused on their knowledge of medications (200,255,257,260,263). This finding is exemplified by a comment from one GP: *"the more complicated, multi-morbidity, complex polypharmacy, it's really handy to have a second pair of eyes and the knowledge about medication. [...] We are generalists and although we know medicines, we don't know them like the pharmacists know them"* (263). Apart from knowledge about medications, GPs also spoke about the need for practical clinical skills, like

measuring blood pressure and independent prescribing (200). Finally, communication skills were also cited as essential to the role of pharmacists in general practice; being able to communicate information concisely with the important points emphasised was described as crucial by GPs (200,255).

2.8.2.2.4 Desirable qualities

GPs said they valued the detail-orientated approach to pharmaceutical care by pharmacists in general practice (200,255). An example of this was seen when GPs commented on their thorough approach to medication reconciliation, getting information about over-the-counter medications and food supplements being taken by patients that GPs themselves admitted they do not often seek to elicit *"The CP [Clinical Pharmacist] asks them also about over the counter medications, food supplements, ... We usually don't ask about it and secondly, we don't know much about these medicines. The CP counsels them about it – what is reasonable and appropriate to use, what is not, if there are any interaction with regular prescription medicines"* (255). GPs appreciated that pharmacists in general practice were able to approach patient care from a different perspective (255). Finally, GPs highlighted the timeliness of pharmacists to communicate with them in practices *'The CP is really good at getting back in touch with me and going over notes and giving recommendations about what I should maybe consider the next time I see a patient'* (260).

2.8.2.3 Complex stakeholder relationships

2.8.2.3.1 Encroachment on other healthcare professionals

Research in England revealed calls from GPs for a review of pharmacists' roles in practices to ensure that healthcare professionals all fit nicely into the general practice framework to avoid roles overlapping, such as with practice nurses (259). There was a perception in one study that general practice pharmacists' involvement in patient care may increase the

likelihood of fractured care, with too many healthcare professionals being involved in the care of patients (260).

2.8.2.3.2 Relations within the practice

The relationships between pharmacists and GPs in one study was described as collegial in nature, as they worked as a team: "*It felt … less isolated … not just you, sitting in your room scribbling* away" (262). Time was described as an essential factor to build a trusting relationship between GPs and pharmacists in general practice (255,259). In turn, this trust and mutual respect for each healthcare professional's expertise and individual skill sets facilitates relationship building and collaborative work (200). Good professional working relationships within the practice were also said to be facilitated by full-time pharmacist positions, the inclusion of pharmacists in formal practice meetings, social activities, and designated time for GPs and pharmacists to communicate and meet regularly (200). With the passing of time and the development of collaborative working relationships, pharmacists were considered to be a core part of the general practice team: *"We see we can't survive without pharmacists; they are part of what we do"* (258).

However, one study provided evidence that pharmacists were not *always* considered as important team members (as indicated in the original subtheme), as it reported that relations can also be strained between pharmacists and GPs in practices: *"I don't think she was respected with what she was doing ... she was forced around and there were a few bad days for her where you know people were pushing her out of rooms and didn't value her work"* (257).

2.8.2.3.3 The patient

GPs reported that patients were generally receptive to the role of pharmacists in general practice, and that patients were particularly pleased with pharmacists' communication skills

and the amount of time allotted to spend with the practice pharmacist (255,259). GPs in one study said they felt patients were not clear on the difference between the pharmacist in the practice and their community pharmacist (200). Lastly, full-time positions were described as a major facilitator to relationship development between patients and pharmacists in practices (200).

2.8.2.4 Benefits of an effective pharmacist

2.8.2.4.1 Benefits to GP(s)

GPs viewed pharmacists in general practice as an invaluable source of medicines information (255,258,260): "*If we have questions about medications, interactions, changes, and alternatives. [...] You've got somebody who has a first-hand working knowledge of these medications as an expert*"(260). GPs also felt that pharmacists improved the safety of their prescribing, in particular by helping to avoid or manage drug-drug interactions (255,256,261,262). GPs stated in one study that practice pharmacists act as enablers to deprescribing discussions, as they initiate discourse on the subject or support what GPs have already said (263). Finally, GPs reported that their workloads were decreased due to pharmacists' presence, who were able to take on tasks previously performed by GPs, allowing GPs to see more patients (200,256,261).

2.8.2.4.2 Practice-wide benefits

GPs felt pharmacists' presence improved practice workflow by reducing task duplication and through their rapid response working as part of the practice team (200,258,259): *'…in general, participants agreed that the expertise of the pharmacist regarding medicines can be used to facilitate the workflow of general practice and support for all clinicians'* (259). Pharmacists in practices in Wales reportedly improved the accuracy and completeness of patients' notes (262). GPs in England involved in the national pilot scheme expressed

frustration at the inability to determine the true impact of pharmacists on practices, as key performance indicators were not collected consistently throughout the pilot (258). Lastly, a novel finding in one study was that pharmacists reportedly improved the continuity of care in practices when GP locums were present (257).

2.8.2.4.3 Benefits to patient(s)

The most frequent patient benefit cited by GPs of pharmacists in practices was increased safety (259–261): *"It's absolutely a safety issue to have clinical pharmacists available to primary care doctors"* (260). Secondly, GPs reported pharmacists' presence increased patient-reported satisfaction with their overall standard of care: *"Patients say great things about it, she takes the time for them, she really listens, and they get useful information"* (255). Finally, other benefits to patients referenced by GPs were increased medication adherence due to pharmacist-reinforcement of medications' administration, side effect profile, and a reduction of inappropriate polypharmacy (255).

2.8.3 Discussion

In total, ten new studies were included in our updated QES (an increase of over 50% in the number of studies since the last search), the findings of which mainly confirmed our original four overarching themes whilst also extending and enriching our subthemes. There has been a rapid increase in the number of publications in this research area, from a single publication in 2008 to ten studies being published between April 2021 to December 2023 - thus indicating an increased level of interest in this topic and its importance to healthcare. It was also notable how the majority of the new studies (n = 8/10, 80%) sought the views of GPs who worked with pharmacists employed in their practices, compared to (*n* = 8/19, 42%) studies in the original QES. The increased proportion of studies looking at GPs' views in the context of pharmacist employment rather than during research studies highlights the increasing presence of pharmacists as part of GPs' everyday practice. The newly identified studies only sought the views of GPs that had already worked or who were working with pharmacists in practices, again highlighting the continuing evidence gap of GPs' perceptions towards pharmacists working in practices prior to having worked alongside them. The updated search of GPs' views towards pharmacists working in practices provides GPs, pharmacists, policymakers, and researchers with additional considerations that must be taken into account when integrating pharmacists into practices, to maximise their effectiveness in the role and optimise patient and practice outcomes.

Considering the nuances that the newly identified studies captured, the review findings would need to be slightly revised to reflect GPs' views more comprehensively from the newly published research. However, the conceptual model shown in **Figure 9** likely does not require revision, as the nuances and contradictory viewpoints identified across the new studies still fit within the existing themes and subthemes of the original model. While formal guidance is in existence for updating a meta-ethnography (265), no such guidance has been developed for updating a thematic synthesis. However, a recent update of a QES by Rohwer *et al*.

utilised an approach whereby new codes were sought, and appraised whether findings confirmed, extended, enriched, or refuted existing themes and examined if the analysis impacted on the original conceptual model (266). A similar approach could be undertaken if a full update of the original QES is performed in future.

A limitation of this additional work is that due to time constraints, a single researcher conducted the updated searches and data extraction. For the same reason, no quality appraisal or CERQual assessment took place for this updated search. Therefore, it is possible the new studies may be methodologically flawed which may reduce the confidence in our individual review findings. The review findings were thus not revised as a result in order to preserve the methodological rigour that underpinned the original QES findings (i.e. which was achieved by having two independent researchers coding the data and assessing the quality of included studies). Therefore, I recommend that an updated QES be completed, including multiple reviewers, before disseminating any updated findings more widely.

Chapter 3. General practitioners' perceptions of pharmacists working in general practice: a qualitative interview study

3.1 Chapter description

Following on from Chapter 2, where GPs' views towards pharmacists working in general practice were synthesised, a conceptual model of factors that should be considered in the development or optimisation of pharmacist services in general practice was developed. This model was composed of four overarching interconnected themes: i) '*the optimal environment for a pharmacist*', ii) '*the ideal pharmacist characteristics*', iii) '*complex stakeholder relationships*', and iv*)* '*benefits of an effective pharmacist*'. However, as the QES showed, little primary qualitative research had been conducted on GPs' views prior to the integration of a pharmacist into their practice, i.e. assessing GPs' *perceptions* of the role of pharmacists working in practices prior to pharmacist integration. Therefore, in this chapter, I conducted semi-structured interviews based on the TDF, to identify the behavioural determinants of GPs integrating pharmacists into practices.

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3.2 Abstract

3.2.1 Background

Pharmacists are increasingly employed as part of general practice teams globally and their input has been associated with several clinical and economic benefits. However, there is a paucity of research focusing on GPs' perceptions of pharmacist integration into practices in countries where this novel role for pharmacists has yet to become commonplace.

3.2.2 Objective

To explore GPs' perceptions of integrating pharmacists into general practices and to identify the behavioural determinants of GPs integrating pharmacists into practices.

3.2.3 Methods

Semi-structured interviews were conducted with GPs practising in Ireland, who were sampled using a combination of purposive, convenience, and snowball sampling. Interviews were audio-recorded and transcribed *verbatim,* which then were analysed using conventional content analysis and directed content analysis employing the TDF.

3.2.4 Results

Seventeen GPs were interviewed between November 2021 and February 2022. Seven TDF domains were identified as predominant in influencing GPs' perceptions of pharmacist integration into general practices: '*Environmental context and resources*', '*Social professional role and identity*', '*Social influences*', '*Beliefs about consequences*', '*Beliefs about capabilities*', '*Skills*', and '*Knowledge*'. These perceptions were mostly positive, especially regarding patient outcomes, cost savings, and improving access to care. However, there were concerns about funding the role, affecting others' workloads, and pharmacists' training needs to work in practices.

3.2.5 Conclusion

This study's theory-informed insight provides a deeper understanding of GPs' perceptions of pharmacists working in general practice and behaviours which can be targeted to help optimise integration. These findings should be utilised in future service development to pre-empt and address GPs' concerns ahead of pharmacist integration, as well as to inform the development of general practice-based pharmacist roles going forward.

3.3 Introduction

Advances in public health and modern medicine have enabled patients with chronic diseases to live longer, thus leading to a growing proportion of older people with associated multimorbidity and subsequent polypharmacy (1). Management of chronic disease in multimorbid older adults has increasingly been performed in general practice, where GPs are tasked with coordinating prescribing from several medical specialists (10). The application of disease-specific guidelines by specialists to multimorbid patients without holistic consideration may lead to PIP, therefore increasing healthcare costs and pressures on GPs at a time when recruitment and retention of general practice staff is problematic (60,228).

In response to growing pressures on GPs and to both aid in managing complex medication regimens and encourage more cost-effective prescribing, pharmacists have been integrated into general practice in several countries, where they have demonstrated their value by performing numerous roles including medication reviews, medication reconciliation, managing repeat prescriptions, and providing medicines information (133,141,251,267). Regarding clinical outcomes, pharmacists' interventions in general practice have been associated with significant improvements in blood pressure, glycosylated haemoglobin, cholesterol, and cardiovascular risk (130). A recent systematic review looking at integrating pharmacists into general practice showed decreased patient appointments with GPs and emergency department visits, yet increased overall primary care use due to patient appointments with pharmacists (170).

Chapter 2 of this thesis described GPs' views on the matter (226), which highlighted that only three published studies addressed GPs' views regarding integrating pharmacists into practices prior to having worked alongside a pharmacist (140,193,238); two of these investigated GPs' views amongst patients, pharmacists, and practice managers (140,193), and the other only interviewed GPs working in private practices (238). Furthermore, in Chapter 2, only 12/54 findings were deemed to be of '*high confidence*' when assessed using

the GRADE-CERQual approach, emphasising the need to enhance data adequacy in this area of research. To date, no study has focused solely on exploring GPs' perceptions of pharmacists working in general practice outside of private practices, nor has any study used a theory-informed approach. The incorporation of behavioural theory into qualitative research allows for the development of an understanding of the structural and psychological processes which are thought to regulate behaviour (213,268). In addition, the use of theory is advocated by the MRC Framework for developing and evaluating complex interventions as a means to increase the likelihood of successful intervention implementation (203). Therefore, a theory-based qualitative study may better inform intervention design (e.g. integrating pharmacists into general practices) by having investigated potential implementation difficulties in a structured manner (269).

While there are many individual health psychology theories that could inform qualitative study design and later enhance intervention implementation, a more comprehensive approach may increase the likelihood of identifying more relevant factors influencing a specific behaviour (209,270). The TDF is one such tool, it is a validated framework, synthesised using 33 behaviour change theories and developed to identify influences on health professionals' behaviour related to the implementation of evidence-based recommendations (**Appendix 1**) and has been used previously to identify the behavioural determinants of pharmacist integration into other clinical settings (209,210). The TDF, now in its second iteration consists of 14 domains which contain 84 theoretical constructs related to behaviour change (209). The use of the TDF also allows for the future mapping of identified relevant domains to the Behaviour Change Wheel (BCW) to identify intervention functions and behaviour change techniques (BCTs), which are the "active component of an intervention designed to change behaviour" that may support behaviour change and enhance implementation (217).

The paucity of literature in this area is important to address, because having a pharmacist in general practice is a new concept in many countries, with studies of the role thus far limited to a handful of countries, but mainly Canada, the UK, and the US (130). Exploring GPs' perceptions is crucial to developing new models which incorporate pharmacists into general practice teams (226,235,271). Thereby, strengthening general practice teams and enhancing patient outcomes, improving access to care, and providing economic benefits (156,170,193). Thus, the aim of this study was firstly to explore GPs' perceptions towards pharmacists working in general practices and then to analyse these perceptions through the lens of the TDF to identify the behavioural determinants of GPs integrating pharmacists into practices.

3.4 Methods

3.4.1 Study design and context

This study employed a descriptive qualitative approach, as described by Sandelowski, as its methodological orientation (244,272). Ethics approval to conduct this study was granted by the Social Research Ethics Committee (SREC), UCC, Cork, Ireland (**Appendix 4**). The study was conducted with GPs working in the Irish general practice setting, the characteristics of which are described in **Table 6**.

Table 6: Structure of general practice in Ireland

• Most GPs work in urban or mixed urban and rural areas, with fewer GPs choosing to work in more remote areas of Ireland (57).
• The majority of GPs in Ireland as of 2015 (82%) work in group practices (i.e. practices with ≥2 GPs), with fewer GPs choosing to work as single-handed GPs (57).
• Ireland has seen an increase in the number of GPs working in primary care centres; as of 2015, approximately 10% of GPs work in primary care centres (57). These are purpose-built buildings that house several health and social care services from one site, e.g. GP, public health nurse, occupational therapy, physiotherapy, and a range of other services (69).
• Pharmacists do not routinely work in general practices in Ireland, with the exception of a handful of practices who employ a pharmacist privately (true number unknown).
• GPs can be divided into two groups in Ireland: those in private practice alone, and those in private practice who are also participating in the GMS Scheme. As of 2015, 89% of GPs were participating in the GMS scheme (57).
• The GMS Scheme is a means/income-tested state-run programme that provides health care to the population of Ireland (273). As of April 2023, the GMS Scheme is a means/income-tested state-run programme that provides health care to approximately 40% of the population of Ireland (73,74). Those eligible for the GMS scheme are issued a medical card or a GP visit card by the state.
• All children aged ≤8 years living in Ireland are eligible for a GP visit card.
• GMS-eligible patients are entitled to free GP consultations, while the remainder of the population – who are considered 'private patients' – must pay the full cost of each consultation.
• GMS GPs are remunerated by the state through the PCRS in several ways (77): ○ **Capitation** – payments are received monthly from the PCRS based on the number of patients the practice cares for and their age profile. ○ **Special Type Consultations** – are claimed by GPs provided to patients that are not included in the capitation agreement with the PCRS (e.g. out-of-hours services). ○ **Allowances and subsidies** – e.g. locum payment contributions or indemnity allowance.
• GPs can also claim additional reimbursement through the Structured Chronic Disease Prevention & Management Programme, which has three components (77): ○ **Opportunistic case finding –** aims to identify those with an undiagnosed chronic disease or at high risk of developing a chronic disease. ○ **Prevention programme –** focuses on preventing disease in those at high risk of cardiovascular disease and/or diabetes. ○ **Chronic disease management –** this programme consists of two reviews per year for patients with certain chronic diseases (e.g. atrial fibrillation and diabetes).

3.4.2 Participant sampling

A combination of purposive, convenience, and snowball sampling was used to recruit GPs. Fifteen professional contacts of two GP research team members (TF and EW) were sampled purposively using a standardised email (**Appendix 5**) sent by me with an attached information leaflet and consent form (**Appendix 6**) to determine interest in being interviewed. A purposive sampling strategy (**Table 7**) was used first to achieve a high level of variation with respect to participants' characteristics. In this strategy, gender and years practising as a GP were taken into account as they have been previously suggested to affect GPs' views of integrating pharmacists into practices (190,274), whilst all other factors were identified through consensus discussion amongst the research team. Then, once this sampling strategy was exhausted, GP trainers involved in a local GP training scheme were convenience sampled, the study consent form and information leaflet were circulated to all GP trainers (40 GPs) via an administrator of the email list. Interviewed GPs who had been recruited using the purposive or convenience sampling strategies were asked to give the research team's contact details to GPs who they thought would be interested in partaking (snowball sampling). GPs were not eligible to participate if they had previously worked with a pharmacist in general practice or if they had previously trained as a pharmacist. The Guest *et al.* method was used to determine thematic saturation and therefore sample size; base size was the number of interviews required to complete the sampling strategy outlined in **Table 7**, run length ('*number of interviews within which we look for, and calculate, new information'*) was two, and the new information threshold (level of paucity of new information accepted as indicative of thematic saturation) was ≤5% (275). The Guest *et al*. method was chosen over methods such as Information Power to more transparently assess and report on saturation and provide evidence for it beyond a declaration that it has been reached (275,276).

Table 7: Sampling strategy

GP Characteristic		Minimum number of GPs required in sampling strategy
Gender	Male	4
	Female	4
Years of post-qualification experience as a GP	0-9	2
	10-19	2
	≥20	2
Practice location	City centre	3
	Urban suburb	3
	Rural/Semi-rural	3
Number of GPs working in the practice	1	1
	2-5	3
	≥6	3
Part of primary care centre[±]	Yes	4
	No	4
Level of deprivation[‡] of electoral division[*] around practice	Disadvantaged	2
	Marginally below average	2
	Marginally above average	2
	Affluent	2

[±] **Primary care centre**: Primary care centres provide primary care services from one site. These services are all the health and social care services that are available in the community, outside of hospital, e.g. GP, public health nurse, home help, occupational therapy, physiotherapy, and a range of other services (69). [‡] **Level of deprivation** defined according to pobal.ie level of deprivation indices 2016 by Electoral division, there are seven levels in total based on factors like employment, age profile, and educational attainment (very affluent, affluent, marginally above average, marginally below average, disadvantaged, very disadvantaged, and extremely disadvantaged) (277). *** Electoral division:** A legally defined administrative area in the Republic of Ireland, generally comprising multiple townlands.

3.4.3 Data collection

Semi-structured interviews were conducted by EH using a topic guide (**Appendix 7**) that was iteratively developed based on the TDF (**Appendix 8**), the aforementioned QES in Chapter 2, and discussions amongst the research team (209). The topic guide was then piloted with two GP registrars working in separate practices not affiliated with the study team. Thereafter, minor amendments were made to the topic guide to increase its clarity. *A priori*, it was decided that these interviews would not be included in the study's results. GPs who agreed to be interviewed returned signed consent forms, and verbal consent was also acquired before interviews began. Thereafter, a telephone or video conference interview using Microsoft® Teams was arranged with GPs. GP demographics were obtained using a data collection form immediately prior to interviews commencing. Interviews were audio-recorded, transcribed *verbatim*, and thereafter de-identified.

3.4.4 Data analysis

All transcripts were uploaded to NVivo® 12 software to facilitate analysis (247). Phase one of analysis involved transcripts being read and re-read to ensure researcher familiarity. Phase two involved conventional content analysis by EH, which comprised open coding to inductively create non-hierarchical codes and thereafter categorising these to generate initial themes (278). Phase three consisted of a directed content analysis approach by EH, whereby the TDF constructs and domains acted as pre-determined codes (278). Although the use of the TDF in the design and analysis of qualitative studies has been criticised for being too constraining and for potentially overlooking important issues that do not fit within the TDF (279). The two-pronged analysis approach using conventional and directed context analysis was employed to mitigate against this (278). To better ensure reliability of coding, a second researcher (CH) independently identified themes and TDF domains from a sample of six transcripts. A random sample of ten of the coded transcripts were reviewed by two GP research team members (EW and TF) to help minimise any potential positivist bias from the

pharmacist researchers and to ensure predominant domains identified truly reflected the main issues raised by GPs. Three factors were considered during the consensus discussion when identifying predominant TDF domains: i) frequency of beliefs in domains (**Appendix 9**), ii) presence of conflicting beliefs, and iii) perceived strength of the beliefs impacting the integration of pharmacists into practices (280). Finally, each of the conventionally developed themes and their antecedent codes were categorised under one of the predominant TDF domains that best reflected the conventional theme and its codes.

3.4.5 Reporting

This study was reported in congruence with the Consolidated Criteria for Reporting Qualitative Studies (COREQ) guidelines (**Appendix 10**) (281).

3.4.6 Research team and reflexivity

At the time of conducing the interviews, I was a male PhD candidate with BPharm and MPharm degrees, who practised occasionally as a community pharmacist, and I had not conducted qualitative interviews before this study. I had previously interacted with some of the included GPs over telephone while working as a pharmacist, but otherwise was not personally known to any included GP. Reflexivity was preserved through a reflective log written during the interview and data analysis stages of this study. Professional biases were minimised by the multidisciplinary input in the design and analysis stages of this research by both pharmacists (EH, CH, KD, and SB) and GPs (TF and EW), as described above.

3.5 Results

A total of 17 GPs were interviewed between November 2021 and February 2022, all of whom were practising in County Cork in Ireland, with participant details shown in **Table 8**. Other participant details included i) age in years: median (range) 46 (35-66), and ii) percentage of GP's patients that were GMS patients: median (range) 70 (35-90). Ten, five, and two GPs were recruited via the purposive, convenience, and snowball sampling strategies respectively. Five of the recruited GPs were GP trainers. The mean interview length was 30 minutes (range: 17-41 minutes). The coding frequency of TDF domains is shown in **Appendix 9**. Seven TDF domains were identified as predominant in influencing GPs' attitudes towards pharmacists working in general practice. These predominant TDF domains are shown below with conventional themes underneath in descending order of prominence and are supported by illustrative quotations in **Table 9**, with supplementary quotations in **Appendix 11**. No conventional themes were identified that could not be aligned to the TDF. Due to the multidimensionality of GPs' quotations, it should be noted some quotations may map to more than one TDF domain.

Table 8: Demographics of GPs interviewed

GP Characteristic		Number of GPs interviewed
Gender	Male	7
	Female	10
Years of post-qualification experience as a GP	0-9	2
	10-19	10
	≥20	5
Practice location	City centre	3
	Urban suburb	6
	Rural/Semi-rural	8
Number of GPs working in the practice	1	1
	2-5	11
	≥6	5
Part of primary care centre[±]	Yes	6
	No	11
Level of deprivation of electoral division around practice	Disadvantaged	3
	Marginally below average	6
	Marginally above average	6
	Affluent	2

3.5.1 Predominant TDF Domains

3.5.1.1 Environmental context and resources

3.5.1.1.1 Current pressures in primary care

GPs said pharmacists may help to improve increasingly difficult working conditions caused by GP workforce shortages, time constraints, greater multimorbidity and polypharmacy, and growing complexity of medications. The primary-secondary care interface was highlighted as a potentially dangerous area, where errors are likely to occur on discharge prescriptions. Inequalities between public and private patients in terms of access to care were highlighted, with public patients reportedly having better access to primary care services. Some mentioned feeling financial pressure, as current GP funding consists of fees for services which are paid by patients and the government.

3.5.1.1.2 Resources required to support pharmacist integration

All GPs cited concerns regarding funding the role, perceiving that government funding would be essential to widely establish the role, and that the role may be more cost-effective for the government in larger practices. Space to accommodate pharmacists was thought to be a key barrier to their integration, albeit somewhat less of an issue for GPs practising in larger primary care centres. Other resources identified as important for integrating pharmacists included information technology (IT), administrative support, access to clinical notes, a clear clinical governance structure, having a designated GP or pharmacist mentor, and professional indemnity.

3.5.1.1.3 Role logistics will depend on individual practice environments

GPs were unclear whether a part-time or a full-time pharmacist role would be best. GPs in larger practices considered a full-time role more suitable. GPs in smaller practices considered a part-time role more feasible or suggested pharmacists possibly being shared between practices, and tended to suggest the potential for a pharmacist to log in remotely; conversely, GPs who favoured full-time roles stressed the importance of the pharmacist's physical presence on site to ensure accessibility.

3.5.1.2 Social professional role and identity

3.5.1.2.1 Optimising pharmacotherapy and service provision in general practice

Potential roles for pharmacists centred heavily around medicines optimisation; the most frequently suggested activities for pharmacists to perform included: medication review, medication reconciliation, and prescribing (including involvement in repeat prescribing). Less frequently cited activities suggested to optimise medication use included: device demonstration (e.g. inhalers and injections), formulary development, antimicrobial stewardship, audits, and providing medicines information. Notably, several GPs suggested pharmacist involvement in monitoring high-risk medications like methotrexate and lithium. GPs also mentioned that pharmacists could become involved in other roles in practices, such as advising on managing minor illnesses, vaccinations, health promotion activities like smoking cessation, and clinical measurement (e.g. blood pressure checks).

3.5.1.2.2 Role definition to minimise overlap with others' roles

The importance of a well-defined role was emphasised to minimise unnecessary overlap with others' roles and to ensure the role was understood and utilised to its full potential by all stakeholders. Defining the role was also deemed important to prevent confusion amongst patients, who may traditionally think pharmacists' principal role in primary care is to

dispense medications. While role definition is important, some GPs also noted roles for pharmacists may evolve over time.

3.5.1.2.3 Patient cohorts where pharmacists are particularly needed

Some GPs felt pharmacists may be useful in managing complex patients, giving the examples of older adults or those with cardiac and diabetic issues. GPs stated this was due to the complexity of their pharmacotherapy, changing guidelines, and growing numbers of medications. GPs also said pharmacists may be useful in supporting them when it comes to having difficult conversations with patients (e.g. about stopping/tapering medications causing dependence).

3.5.1.3 Social influences

3.5.1.3.1 Becoming part of the team and supporting each other

GPs thought it would not be too difficult to integrate pharmacists given the movement towards multidisciplinary teams in primary care. Pharmacists' ability to work as part of a team was perceived as crucial to encourage buy-in to the role from other staff. Pharmacists in practices may create a sense of support and reassurance when GPs are prescribing and would provide an additional safety net. This was evidenced by highlighting the support they get from community pharmacists, but GPs said support would be greater from pharmacists in practices. GPs felt they could mentor and support pharmacists introduced to their practice. It was suggested to have a support network for all pharmacists, and GPs with pharmacists in practices to avoid having to design and set up a service anew each time.

3.5.1.3.2 Existing societal norms and interprofessional tensions

Interviewees explained patients often do not like change and traditionally would see the general practice team as that of the GP and the practice nurse, and may be resistant to introducing a pharmacist. GPs mentioned interprofessional tensions, that may, for example,

stem from pharmacists beginning vaccination provision in Ireland and the associated reduction in GP reimbursement. It was noted that some GPs may feel threatened by the expansion of pharmacists' roles, especially regarding the ability to prescribe. Interviewees alluded to poor interdisciplinary relationships that some GPs have with community pharmacists, noting some were not receptive to pharmacist suggestions regarding their prescribing.

3.5.1.3.3 Modelling the role

GPs compared pharmacists in practices with nurse roles, with many distinctively noting the diabetes nurse specialist as a good exemplar for engaging with general practices; it was proposed that a similar logistical setup would work well, whereby a pharmacist provided specialist pharmaceutical care reviews and advice to several practices. GPs also said the Irish health service may become more like other countries' health services where pharmacists would be more integrated into general practice teams and ability to pay to access services would be less of an issue, which GPs felt is a barrier to providing optimal care currently.

3.5.1.4 Beliefs about consequences

3.5.1.4.1 Consequences for GPs

GPs believed integrating pharmacists into practices would make their prescribing more evidence-based. GPs were less clear about the potential impact of pharmacists on their workload and were concerned that pharmacists may increase their workload where they create additional actionable tasks for GPs. However, although more work may be created, GPs felt there would be merit to doing it, as it would likely enhance patient safety and encourage greater analysis of their prescribing decisions. GPs also said pharmacists may improve their sense of job satisfaction, due to a reduction in medication-focused duties. To

improve uptake of pharmacist integration, it would be useful to disseminate the evidence base and potential outcomes of having pharmacists in practices.

3.5.1.4.2 Consequences for patients and wider society

Interviewees cited pharmacists' potential to encourage safer prescribing and reduce medication errors, as well as encouraging more financially prudent prescribing – therefore reducing patient and government spend on medications. Furthermore, interviewees believed pharmacists may improve patients' medication adherence, along with enhancing their clinical outcomes – including the reduction of unnecessary polypharmacy, ADRs, and hospitalisations.

3.5.1.4.3 Consequences for the practice

GPs felt there is potential for pharmacists to improve practice efficiency. Pharmacists may decrease practice nurses' workload, but may need more administrative support to function in practices. Additional administrative support required may be counterbalanced by pharmacists triaging phone queries, thereby freeing up administrative staff time to support pharmacists in practices.

3.5.1.4.4 Consequences for community pharmacists

Interviewees mentioned that community pharmacists may be negatively impacted financially; if medications were rationalised by a pharmacist in general practice, resulting in fewer prescribed medications, then community pharmacists would receive reduced dispensing fees.

3.5.1.5 Beliefs about capabilities

3.5.1.5.1 Beliefs about GPs' capabilities

GPs highlighted their own limitations, raising concerns about their ability to improve current prescribing in general practice, particularly regarding antibiotic and benzodiazepine use. Similarly, GPs said despite their best intentions and capabilities, they can make errors and having a practice-based pharmacist may help to reduce these errors.

3.5.1.5.2 Beliefs about pharmacists' capabilities

GPs attested to pharmacists' competence, citing previous experiences of working with pharmacists, and said their views on pharmacists' ability to prescribe were influenced by their experiences with other non-medical prescribers. Some GPs mentioned where they felt there was a limited role for pharmacists; examples included diagnostics, complex multimorbid patients, acute emergency care, and complex psychiatry. For pharmacists to work in general practice, interviewees stated they must be able to cope with uncertainty, and be proactive in their roles, ideally not waiting for GPs to provide or organise work for them.

3.5.1.6 Skills

3.5.1.6.1 Further training required

GPs debated whether pharmacists needed additional training to work in general practices. Where GPs felt additional training was required, they gave examples such as internships in general practices during pharmacists' undergraduate training, software training, and further postgraduate education e.g. clinical skills such as checking blood pressure manually and prescribing. Conversely, some interviewees said GPs may need additional training to work with pharmacists with respect to being able to operationalise and optimise pharmacists' role and skillsets as part of practice teams.

3.5.1.6.2 Making the most of pharmacists' existing skillsets

Despite some GPs wanting additional training for pharmacists, many felt pharmacists were already highly skilled, and these skills need to be fully utilised. GPs said pharmacists should practise as generalists rather than specialists, and therefore need to be skilled in managing a variety of disease states. Of note, some GPs expressed a preference for pharmacists to have hospital experience.

3.5.1.6.3 Additional skills requirements

GPs mentioned interpersonal and communication skills as important for establishing trust with patients and for managing relationships with others on primary care teams. Some GPs said they felt it was more important for pharmacists to come equipped with interpersonal skills above clinical skills or knowledge because deficiencies in clinical skills/knowledge could be more easily addressed through further training. GPs also expressed a preference for pharmacists to be assertive in their communication.

3.5.1.7 Knowledge

3.5.1.7.1 GP awareness of pharmacists' knowledge of medications and training

GPs said pharmacists possess extensive knowledge of medications, including interactions, monitoring, and cost. GPs felt their own knowledge of medications was less extensive, citing limited training on pharmacology during their undergraduate degrees. Although clear on pharmacists' knowledge of medications, GPs were not very clear on other aspects of pharmacists' training.

3.5.1.7.2 Awareness of the role of pharmacists in general practice

Some GPs were aware of the evidence base for the role in the UK, where they had heard it worked well and has produced benefits. However, some GPs were unfamiliar with pharmacists' roles in practices and found it difficult to delineate the role from that of

community pharmacists. Therefore, interviewees believed it would be necessary for GPs, other practice staff, the government, and patients to be educated on the nature of the role and examples of where it has worked well and shown positive outcomes.

Table 9: Illustrative quotations

Conventional theme	Quotations
1. Environmental context and resources	
Current pressures in primary care	*"So, you need to look at things like 25% of Irish GPs are over the age of 60, so there are a significant number of retirements which are going to make the manpower issue worse."* [GP 11]
Resources required to support pharmacist integration	*"…but initially it would need to be HSE-funded, ehm… you know once it became if it became the norm and GPs could see the value of it to the practice then I would say that they would be happy to part-fund it and it would have to HSE-funded initially."* [GP 16]
Role logistics will depend on individual practice environments	*"…do you want a full-time or part time. I want enough of the resource to, to do the job right and if that's full-time, happy days."* [GP 10]
2. Social professional role and identity	
Optimising pharmacotherapy and service provision in general practice	*"I would love someone to do a drug review with me and see am I doing this right or am I doing this wrong."* [GP 17]
Role definition to minimise overlap with others' roles	*"So, I think it's really important that both…that all the health professionals have a really clear understanding of where everybody's boundaries and limitations are."* [GP 14]
Patient cohorts where pharmacists are particularly needed	*"I mean the demographics of my practice in particular would be an older practice. So, with multiple comorbidities, polypharmacy and those patients tend to be quite complicated and I think definitely maybe you know having input, having regular or scheduled input from pharmacy would be beneficial."* [GP 4]
3. Social influences	
Becoming part of the team and supporting each other	*"I don't want somebody who dials in remotely and who I pay you know a contract for services. I want somebody who is part of the team."* [GP 10]
Existing societal norms and interprofessional tensions	*"I think that obviously traditionally in Ireland when we do general practice its very much GP, practice nurse, and that's it."* [GP 5]
Modelling the role	*"I think maybe like the way the diabetes nurse specialist works. So she comes to our practice every three months and kind of does clinics, like maybe a more involved version of that."* [GP 2]
4. Beliefs about consequences	
Consequences for GPs	*"…more than anything else I would not want this pharmacist to be generating additional work for me. You know I don't want them doing a medication review and leaving me a list of queries ehm…you know I really want it to be sorted."* [GP 8]
Consequences for patients and wider society	*"….again, time consuming but you know it might keep patients out of hospital, it might prevent them getting infective exacerbations of their COPD, so I think that's an area that there's lots of work that could be done."* [GP 3]
Consequences for the practice	*"…I think that would make the logistics of ehm... the practice management a whole lot easier, well a whole lot more streamlined I suppose."* [GP 7]
Consequences for community pharmacists	*"I do appreciate from a retail pharmacist that actually this is not good news because actually if you, if you do, do it well and you reduce the number of medicines and you use the cheaper versions actually that's reducing their turnover and so you know no one else in the, in the financial world would be expected to deliver high-quality care and be penalised financially as a result which is what would happen for a pharmacist."* [GP 8]

Table 9: (Continued) Illustrative quotations

Conventional theme	Quotations
5. Beliefs about capabilities	
Beliefs about GPs' capabilities	*"…with the best will in the word, there are mistakes that are made and there are things that we could do better."* [GP 9]
Beliefs about pharmacists' capabilities	*"…once a person is kind of motivated and once they're an individual who gets into pharmacy school and who gets out the other end, is by definition they're motivated, they're highly educated."* [GP 7]
6. Skills	
Further training required	*"…there's a degree of training would be required above and beyond possibly normal pharmacy to, to actually go down that road. Just as there is for nurse practitioners to go down that road."* [GP 1]
Making the most of pharmacists' existing skillsets	*"But if you're in general practice you know are they, I suppose you're always trying to get people working to their skillsets the highest level of their skillset and not wasting their time with maybe jobs that someone else with a lower skillset could do."* [GP 2]
Additional skills requirements	*"…good teamwork anyway definitely because you have to be able to you know get on well with everybody in the practice, so the admin staff, the nursing staff… I suppose somebody who would be less paternalistic with patients…good sort of empathetic patient care and communication."* [GP 5]
7. Knowledge	
GP awareness of pharmacists' knowledge of medications and training	*"I'd often put this on my prescriptions: pharmacists are the medication experts. If you have any questions, please ask your pharmacist. By the time a pharmacist qualifies, they have five years of medicines under their belt and pharmacists' knowledge is encyclopaedic."* [GP 8]
Awareness of the role of pharmacists in general practice	*"They'd be like who are you? Are you a community pharmacist, do you dispense my medicines? I often find that kind of a thing will baffle the patient a bit."* [GP 12]

Legend: COPD – Chronic obstructive pulmonary disease, HSE – Health Service Executive.

3.6 Discussion

3.6.1 Main findings

This novel interview study investigated GPs' perceptions of pharmacists working in general practices who had not previously collaborated with pharmacists in their practices, distinguishing itself from previous research that primarily concentrated on the views of GPs exclusively providing care for private patients. GPs interviewed in this study were broadly optimistic regarding certain aspects of pharmacists working in practices and potential outcomes. However, GPs also displayed concerns about pharmacists' impact on others' roles and workloads, funding, and training pharmacists to conduct roles in practices. Therefore, this study provides a useful insight into GPs' concerns regarding pharmacist integration for policymakers, researchers, GPs, and pharmacists to refer to when developing pharmacist services in practices in regions where the role is yet to be established.

3.6.2 Strengths and limitations

A diverse sample was interviewed in terms of age, gender, experience, practice size and location, and level of deprivation of surrounding areas – therefore improving the findings' transferability. Although only one single-handed GP was interviewed, this is broadly in line with the prevalence of single-handed GPs in Ireland (57), but may limit transferability of the findings to this group. There may have been an element of volunteer bias amongst some of the GP participants (282), as five GPs who agreed to participate were GP trainers who are involved in training and educating GPs and two GPs contacted the research team to volunteer to partake in the research (snowball sampling) and therefore these seven GPs may have been more enthusiastic and interested in this research. As the interviewer was a pharmacist, some GPs may also have been affected by social desirability bias and may have been overly positive about the subject; however, this did not seem to pose a significant issue given the diverse opinions provided, whereby participants described both positive and

negative opinions of integrating pharmacists in practices. The research team included two practising GPs and four pharmacists, therefore bringing a breadth of experiences and perspectives to data analysis and its interpretation. Furthermore, using the TDF in this study to inform the topic guide and as part of the analysis was a key strength, as interview studies which utilise this framework typically unearth additional themes than those without a theoretical basis (283,284).

3.6.3 Comparison with existing literature

This study's findings share broad similarity with the QES reported in Chapter 2 regarding GPs' views on pharmacists in practices (226). However, a notable contrast was that the present study had conflicting viewpoints about pharmacist capabilities in managing complex patients, e.g. whereby GPs included multimorbid older patients here. This finding is at odds with the QES – where GPs described pharmacists as useful in managing complex patients – and a recent interim report from the iSIMPATHY Project in other parts of Ireland (156). Pharmacist-led medication reviews in practices performed during iSIMPATHY in patients with high complexity were reported as very acceptable to GPs, improved medication regimen appropriateness, and provided a significant return on investment (156). A feasibility study and subsequent qualitative evaluation has also recently been carried out in Ireland (154,187). GPs in the feasibility study reported an increase in their workloads secondary to pharmacists reviewing medications in their practices; however, as the reviews resulted in the identification and resolution of various issues, they felt the overall impact on workload was worthwhile (187). This mirrors the perceptions of GP interviewees in this study regarding the potential impact of pharmacists on their workloads. However, in contrast with this study's findings based on preconceptions, GPs in the other Irish studies emphasised the utility of pharmacists in the management of complex chronic diseases (187). Communicating evidence from general practice pharmacist initiatives in Ireland like these may be important to

reassure GPs who are concerned about pharmacists' capabilities to assist in care provision to complex patients (154,156).

Whilst this study, like the QES in Chapter 2 (226), found that some GPs were interested in pharmacists undergoing additional postgraduate training, a notable suggestion from the present study was to have internships in practices during pharmacists' undergraduate training. Hazen *et al.* designed a learning programme to train pharmacists to work in practices, and concluded that additional training is required to encourage role implementation (151). In England, where the role is established, there is formal pharmacist training via the PCPEP (135), which comprises workplace-based training in practices (including independent prescribing training) (135). Literature on undergraduate training in general practices for pharmacists remains limited other than the examples given; therefore, further research on this subject may help inform the development of training to support the development of pharmacists' roles in practices.

GPs in this study supported pharmacist prescribing within practices. This is positive given evidence that pharmacist prescribers have been shown to prescribe safely, appropriately, and improve service accessibility (285,286). Our finding is also in congruence with views already reported in the literature from GPs who worked with a pharmacist prescriber in their practice, which were mostly positive and supportive of pharmacist prescribing (287). In contrast, GPs working in private practices in a study by Saw *et al.* were less enthusiastic about expanded pharmacist roles (like prescribing), and commonly viewed pharmacists as '*medicines suppliers*' rather than '*patient-centred health professionals*' (238). A recent survey from Northern Ireland reported that whilst 47% of GPs had a prescribing practice-based pharmacist, 31% said their pharmacist only sometimes had confidence to make clinical decisions (288). So, although benefits of pharmacist prescribing in practices are clear and

both GPs and patients appear to be receptive, pharmacists must be appropriately equipped with clinical decision-making skills by providing them with adequate training and mentoring.

Lastly, a unique finding was GPs' interest in pharmacists' involvement in monitoring high-risk medications such as lithium and methotrexate. Studies which have evaluated pharmacists' roles in practices have not reported this explicitly, although it may form part of other tasks mentioned like '*conducting audits*' or managing '*requests for biochemistry*' (267,289). This is a useful finding given reports of sub-optimal monitoring of medications like lithium in Ireland; for example, one study found it was often not clear who was responsible for monitoring lithium and there was significant variation in the frequency of monitoring (290). Pharmacists' involvement in such monitoring could be advantageous given pharmacists undertaking this in the pharmacist-led information technology intervention for medication errors (PINCER) study in the UK showed significant improvements in monitoring warfarin, methotrexate, lithium, and amiodarone (291).

3.6.4 Implications for practice and research

This study offers an insight into GPs' perceptions regarding pharmacists working in practices, which included only GPs who had not worked with pharmacists in practices. These perceptions will be useful for policymakers, GPs, researchers, and pharmacists trying to integrate pharmacists into practices, and may prove particularly useful in countries where the role is not yet established. For example, given GPs' interest in further training for pharmacists to work in practices, undergraduate and postgraduate training opportunities specific to general practice should be developed to coincide with role development in countries where these roles are being implemented. Considering GPs' emphasis on the importance of role definition to prevent encroachment, and as GPs elucidated that patients and sometimes themselves may be unclear about pharmacists' training and roles in practices, an awareness campaign may be useful to inform patients and GPs about

pharmacists' roles in practices and to encourage acceptance of pharmacists in this setting as a social norm. The need for an awareness campaign is a sentiment also echoed in a recent interview study conducted in Ireland which sought pharmacists' perceptions of integrating pharmacists into general practices (202).

Despite questioning GPs about workload in this study, it is still not clear how pharmacists in practices will impact the workload of GPs, nurses, or administrative staff. Therefore, it would be useful to determine workload impact through future research, as this may currently be acting as a barrier to GPs engaging with the development of such pharmacist roles. GPs in this study highlighted that integrating pharmacists into practices may depend on individual GP and practice characteristics; therefore, it would be valuable to assess further how such characteristics may influence pharmacist integration and thereafter how future efforts to integrate pharmacists should be tailored accordingly to individual GPs and practices. Using the TDF in this study allows for the mapping of predominant TDF domains to the BCW to identify potentially suitable intervention types, thus increasing the likelihood that this study will inform more effective behaviour change interventions that aim to integrate pharmacists into practices in the future (214,292).

3.7 Conclusions

GPs interviewed in this study were broadly optimistic regarding aspects of pharmacists working in practices and potential outcomes, which appears to be very timely given current pressures in general practice. However, this study also reveals GPs' concerns about pharmacists' impact on others' roles and workloads, funding, and training pharmacists to conduct roles in practices. This research has created a greater understanding of GPs' perceptions of integrating pharmacists into general practices, which will better inform future general practice-based pharmacist interventions and roles, which aim to enhance patient care, outcomes, and financial savings to stretched healthcare systems.

Chapter 4. GPs' perceptions of pharmacists working in general practices: a mixed methods survey study

4.1 Chapter description

In Chapter 3, I explored GPs' perceptions of pharmacists working in general practice in Ireland and identified seven predominant TDF domains affecting GPs integrating pharmacists into general practices, which were: '*Environmental context and resources*', '*Social professional role and identity*', '*Social influences*', '*Beliefs about consequences*', '*Beliefs about capabilities*', '*Skills*', and '*Knowledge*'. However, there were several conflicting findings identified which needed to be explored further, such as roles for pharmacists in practices, potential impact on workloads, and funding. Therefore, in this chapter, I conducted a mixed-methods, cross-sectional survey based on the findings from Chapters 2 and 3 to i) explore the topic on a wider scale with a larger sample, ii) establish consensus on conflicting findings identified in Chapter 3, and iii) to determine characteristics of GPs or practices that may be particularly suited to general practice-based pharmacists.

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4.2 Abstract

4.2.1 Background

Pharmacists are increasingly incorporated into general practice teams globally and have been shown to positively impact patient outcomes. However, little research to date has focused on determining GPs' perceptions of practice-based pharmacist roles in countries yet to establish such roles.

4.2.2 Objectives

To explore GPs' perceptions towards integrating pharmacists into practices and determine if any significant associations were present between GPs' perceptions and their demographic characteristics.

4.2.3 Methods

In June 2022, a survey was disseminated to GPs in Ireland via post (*n* = 500 in Munster region), Twitter, WhatsApp, and an online GP support and education network. Quantitative data were captured through multiple option and Likert-scale questions, and analysed using descriptive and inferential statistics. Qualitative data were captured via free-text boxes, with the open comments analysed using reflexive thematic analysis.

4.2.4 Results

A total of 152 valid responses were received (24.6% response to postal survey). Overall, GPs welcomed the role of practice-based pharmacists and perceived that they would increase patient safety. Most agreed with practice pharmacists providing medicines information (98% [*n* = 142/145]) versus 23% (*n* = 33/145) agreeing with practice pharmacists prescribing independently. Most agreed they would partake in a practice pharmacist pilot (78.6% [*n* = 114/145]). The free-text comments described current pressures in general practice, current

relationships with pharmacists, funding and governance strategies, potential roles for pharmacists in general practice, and anticipated outcomes of such roles.

4.2.5 Conclusion

This study provides a deeper understanding of GPs' perceptions of integrating pharmacists into practices and the demographic characteristics associated with different perceptions, which may help better inform future initiatives to integrate pharmacists into practices.

4.3 Introduction

General practice is under increasing pressure due to ageing populations, increasing multimorbidity, initiatives to move care from hospitals to primary care, and rising public expectations (60). These challenges have been further compounded by difficulties with recruitment and retention of general practice staff (60). In an effort to combat the rising tide of pressure in general practice, pharmacist integration into practice teams has occurred in several counties like Australia, Canada, and New Zealand, but most notably in the UK (133,188).

Outcomes stemming from pharmacists' interventions in general practices have been reported in a systematic review from Tan *et al.,* who concluded that they lead to improvements in patients' blood pressure, HbA1c, cholesterol, and cardiovascular risk (130). Furthermore, a systematic review from Hayhoe *et al.* concluded that pharmacists' presence in practices had a positive impact on several healthcare utilisation outcomes, such as reduced emergency department visits, reduced visits to GPs, yet overall increased utilisation of primary care due to visits to pharmacists in practices (170). Lastly, a review from Croke *et al*. showed that integrating pharmacists into practices to optimise prescribing and health outcomes in patients with polypharmacy probably reduces PIP and number of medications, appears to be cost-effective, but had no clear effect on patient outcomes (164).

In primary care in Ireland, most pharmacists currently work in community pharmacies, where they dispense medication and provide healthcare advice; they are mainly funded by the sale of products rather than provision of services (294). GPs work in practices either by themselves or with other GPs or other allied healthcare professionals, and interact with community pharmacists by telephone or email to optimise patients' pharmacotherapy (57). Despite what is known of the outcomes of practice-based pharmacists, the role in Ireland – like many countries worldwide – is currently not established. There is a scarcity of studies

that aim to explore solely GPs' perceptions prior to attempts to integrate pharmacists into practices in order to pre-empt the concerns and considerations of GPs (226). It is also unknown if there are any characteristics of GPs or their practices that affect GPs' perceptions towards pharmacists' roles that could be considered to tailor a practice-based pharmacist's role to individual GPs and their practices. Therefore, in this study, I aimed to 1) explore GPs' perceptions around integrating pharmacists into practices utilising a theory-informed mixed-methods survey and 2) determine if any significant associations were present between GPs' perceptions and their demographic characteristics.

4.4 Methods

4.4.1 Study design and participants

A cross-sectional study utilising an electronic and paper-based survey was sent to general practitioners in Ireland. GPs were eligible to partake in the study if they were currently practising as a GP in Ireland and if they had not previously worked with a pharmacist in general practice before or trained as a pharmacist before becoming a GP.

4.4.2 Ethics

Ethics approval to conduct this study was granted by SREC, UCC (**Appendix 12**). Participants gave their consent to partake before completing the anonymous survey.

4.4.3 Construction of the survey

The survey (**Appendix 13**) was initially constructed based on the findings from the QES in Chapter 2 and a semi-structured interview study that utilised the TDF as part of its methods (209,226,264). The survey was then reviewed and further developed by consensus discussion amongst research team members, which consisted of three pharmacists (two practising) and two practising GPs. The survey was then piloted for face validity and time to complete by five independent practising GPs, after which slight modifications to the survey were made. The final survey consisted of several demographic, Likert Scale, multiple choice, ranking, binary,

and open comment questions across four sections. Section A of the survey focused on preconceptions and planning for having a pharmacist in practices e.g. beliefs about pharmacists' capabilities, funding models, and role logistics. Section B pertained to activities and roles for pharmacists in practices e.g. what roles pharmacists could perform, experience required for pharmacists to work in practices, and the impact of the pharmacist on others' roles. Section C explored the potential outcomes of pharmacists working in practices e.g. impact on others' workloads, patient outcomes, practice efficiency, economic outcomes, and asked if GPs would be willing to partake in a future hypothetical pilot study. Section D collected GPs' demographic characteristics and offered a final opportunity for GPs to comment their views on the prospect of pharmacists working in general practices in Ireland.

4.4.4 Survey dissemination

The survey was initially planned to be disseminated via post, due to a lack of access to other potentially more straightforward survey distribution channels to GPs previously used in Ireland, such as the ICGP's mailing list (295). Using the find a GP website from the HSE (https://www2.hse.ie/services/find-a-gp/) a list of 842 GPs in Munster Ireland was compiled on Microsoft Excel®. Whilst the Irish Medical Directory has been previously used by researchers to identify GPs to disseminate postal surveys to it was not accessible to the research team at the time of conducting this chapter (296). The decision was taken to focus on GPs in Munster given previous experience within the Department of General Practice in UCC of poor response rate outside Munster and the representativeness of GPs in Munster to GPs in Ireland generally (57). A sample size was calculated based on a potential census population of 842 with a margin of error of +/− 5%, 95% confidence level, and a response distribution of 50%. Due to resource constraints in UCC only 500 self-return envelopes were available to disseminate the postal survey in a single mailing. To adequately power the study the sample size required was 265 respondents. However, local experience within UCC with postal surveys to GPs had recently seen a response rate of approximately 20-30%, therefore

it was deemed unlikely that a single mailing of 500 postal surveys would result in 265 respondents. Therefore, to increase the number of responses the decision was taken to also convert the postal survey to an electronic version on Microsoft® Forms and disseminate it via GP Buddy (a national online GP support and educational network – https://www.gpbuddy.ie) via a post on the forum, GP fora on WhatsApp, and Twitter (**Appendix 14**). The survey was disseminated in June 2022 through the multiple channels outlined above. The postal survey was sent in a single mailing to a random sample of 500/842 GPs in the counties of Cork, Clare, Limerick, Tipperary, and Waterford in Munster Ireland (the 500 were selected using the RAND function in Microsoft Excel® from the list of 842 GPs), on the 5th of June 2022. A QR code linking to an electronic version of the survey was also placed on the front of the postal survey to give GPs the option to return their survey electronically until the 29th of July 2022.

4.4.5 Statistical analysis

Descriptive statistics were used to characterise the sample. Chi squared ($\chi 2$) and Fisher's Exact tests for independence were used to compare groups on categorical data. The survey items and demographics/other factors that were analysed in the tests of independence are specified in **Appendix 15**. Post-hoc analysis was performed using the z-test to compare column proportions; adjustment for multiple testing using the Bonferroni method was also conducted. Differences were considered statistically significant where $p<0.05$. Statistical Package for the Social Sciences (SPSS) version 28 was used to perform descriptive and inferential statistics (297). Statistics were calculated based on the valid response for each question if data were missing.

4.4.6 Analysis of qualitative data from open-ended questions

Responses to the open-ended questions were analysed using reflexive thematic analysis (206,298). This involved six steps: (1) familiarising ourselves with the data, (2) generating

initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report (298). Open-ended question data were exported from the survey platform to a Microsoft® Excel spreadsheet before being transferred to Microsoft® Word, where the comment function was used to code participants' responses. These six steps were carried out by one researcher (EH). Another team member (KD) also coded participants' responses to offer an additional perspective on patterns of meaning within the data. EH then reviewed KD's coding to reflect on any potential additional interpretations of the data that may not have occurred to him while coding.

4.4.7 Researcher reflexivity

At the time of conducting this study, I was a male PhD candidate with BPharm and MPharm degrees, who practised occasionally as a community pharmacist, and I had conducted and analysed qualitative interviews prior to this study. I had previously interacted with some of the included GPs over telephone while working as a pharmacist, but otherwise was not personally known to any GP respondent. Reflexivity was preserved through a reflective log written during the data analysis stages of this study. Professional biases were minimised by the multidisciplinary input in the design and analysis stages of this research by both pharmacists (EH, KD, and SB), GPs (TF and EW), as described above.

4.4.8 Reporting guidelines

This study was reported in compliance with the Consensus-Based Checklist for Reporting of Survey Studies (CROSS) (**Appendix 16**) (299).

4.5 Results

A total of 152 GPs responded to the survey, with participant characteristics presented in **Table 10**. Of the 500 postal surveys distributed, 123 GPs completed and returned the survey (24.6%), with 4 completing via the QR code. A further 25 participants completed the survey via the links on Twitter (*n* = 19), GP Buddy (*n* = 5), and WhatsApp (*n* = 1). The main characteristics of the sample corresponded to a recent report from the ICGP, and suggest a good representation of the group across gender, age, practice size, and location (57).

Table 10: Respondent demographics

Descriptor	*n* (%)
Gender:	
Female	77 (51.7%)
Male	70 (47%)
Prefer not to say	2 (1.3%)
Age range (in years):	
30-39	24 (16.9%)
40-49	48 (33.8%)
50-59	42 (29.6%)
60-69	24 (16.9%)
70-79	4 (2.8%)
Experience range (in years):	
0-9	22 (14.5%)
10-19	43 (28.3%)
20-29	41 (27%)
30-39	34 (22.4%)
40+	12 (7.9%)
Number of sessions* worked (per week):	
1-2	2 (1.4%)
3-4	8 (5.6%)
5-6	33 (22.9%)
7-8	63 (43.8%)
9-10	38 (26.4%)
GMS[±] contractor:	
Yes	126 (85.7%)
No	21 (14.3%)
GP Partner:	
Yes	112 (75.7%)
No	36 (24.3%)
Practice location:	
Inner city	16 (10.8%)
City suburb	34 (23%)
Town	72 (48.6%)
Village	26 (17.6%)
Practice part of a primary care centre[+]:	
Yes	34 (23.3%)
No	112 (76.7%)
Size of your practice:	
Small (<3,000 patients)	29 (19.7%)
Medium (3,000-10,000 patients)	98 (66.7%)
Large (>10,000 patients)	20 (13.6%)
Number of GPs working in practice:	
1 GP	28 (19%)
2 GPs	38 (25.9%)
3 GPs	43 (29.3%)
4 GPs	18 (12.2%)
≥5 GPs	20 (13.6%)
GP registrar in practice:	
Yes	51 (35.7%)
No	92 (60.5%)
Nurse in practice:	
Yes	138 (96.5%)
No	5 (3.5%)
Other healthcare professional in practice:	
Yes	27 (18.9%)
No	116 (81.1%)

*** Session:** A four-hour block of work.

[±] **GMS:** General Medical Services scheme is a means/income-tested state-run programme that provides access to medical and surgical services for persons for whom acquiring such services would present undue hardship in Ireland (273).

[+] **Primary care centre:** purpose-built buildings that house several health and social care services from one site (e.g. GP, public health nurse, occupational therapy, physiotherapy, and a range of other services) (69).

4.5.1 Quantitative results of the survey

4.5.1.1 Preconceptions and planning for the role

Figure 11 shows GPs' responses to Likert statements concerning preconceptions and planning for the role. GPs working in primary care centres were significantly more likely to agree (59% [*n* = 20/34] versus 26% [*n* = 28/110]) that they would have space to accommodate a pharmacist in their practices ($p<0.05$). A significant association was found between age and the response to '*I am familiar with the training/education that pharmacists undergo*', with disagreements from 14% (*n* = 4/28) aged ≥60 years versus 52% (*n* = 12/23) aged 30-39 years ($p<0.05$).

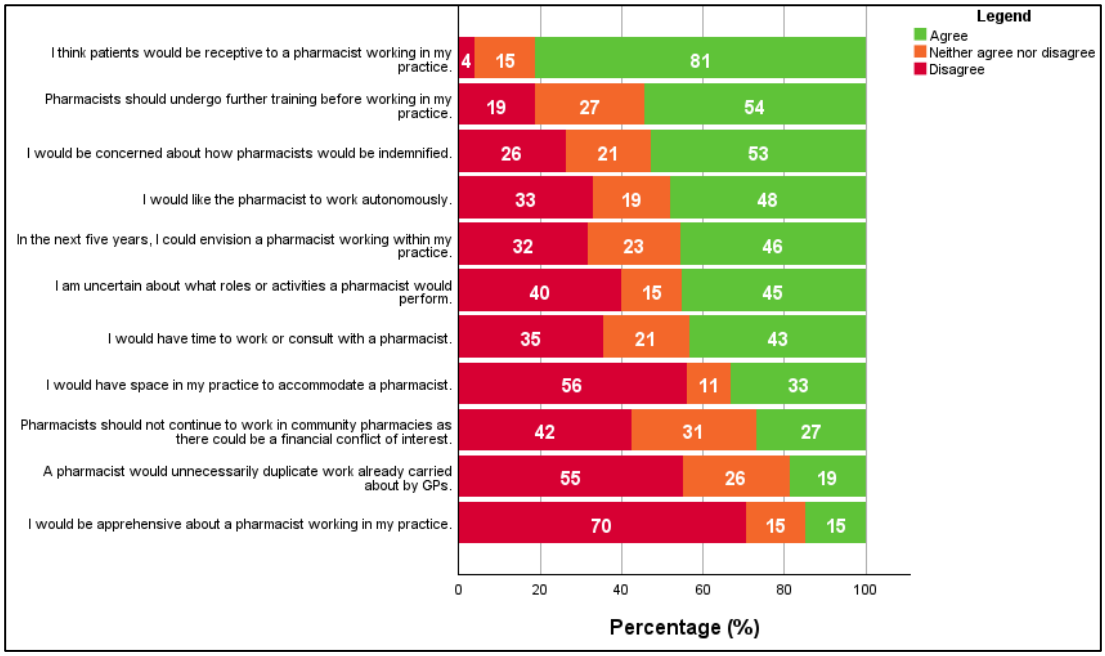


Figure 11: GPs' responses to Likert statements concerning preconceptions and planning for pharmacists' roles in general practices (percentage agreement shown in white figures)

When asked about funding, 84.6% (*n* = 126/149) thought the role being fully funded by the government was most feasible, 12.1% (*n* = 18/149) felt the role would only have to be partly funded by the government, and 0.7% (*n* = 1/149) said it could be patient contribution funded. Most respondents (74.5% [*n* = 111/149]) agreed that if the government funded the role, the

government-employed pharmacist should be shared between multiple practices, rather than practices hiring pharmacists and the government providing a grant for their salary (25.5% [*n* = 38/149).

Regarding frequency of pharmacist presence on site, 48.3% (*n* = 71/147) thought pharmacists should work in practices 1-2 days per week, 39.4% (*n* = 58/147) chose 1-2 days per month, 11.6% (*n* = 17/147) chose daily, and 0.7% (*n* = 1/147) were unsure of the optimal frequency. There was a significant association between practice size and optimal frequency of pharmacist presence in practices; 70% (*n* = 14/20) of GPs in large practices agreed pharmacists should be present 1-2 days per week compared to 45% (*n* = 43/95) and 40% (*n* = 11/27) in medium-sized and small practices respectively ($p<0.05$).

4.5.1.2 Roles and activities for pharmacists in general practice

Responses to Likert statements concerning roles and activities of pharmacists in general practice are shown in **Figure 12**. There was a significant association between practice size and agreement with the role of pharmacists conducting medication reviews; 11.5% (*n* = 3/26) of those in smaller practices disagreed, versus 0% (*n* = 0/20) and 1% (*n* = 1/96) in large and medium-sized practices respectively ($p<0.05$). There was a similar significant association between practice size and agreement with the role of '*liaising with community pharmacies*'; 12% (*n* = 3/25) in small practices disagreed with this role compared to 0% (*n* = 0/20) and 1.1% (*n* = 1/95) in large and medium-sized practices respectively ($p<0.05$).

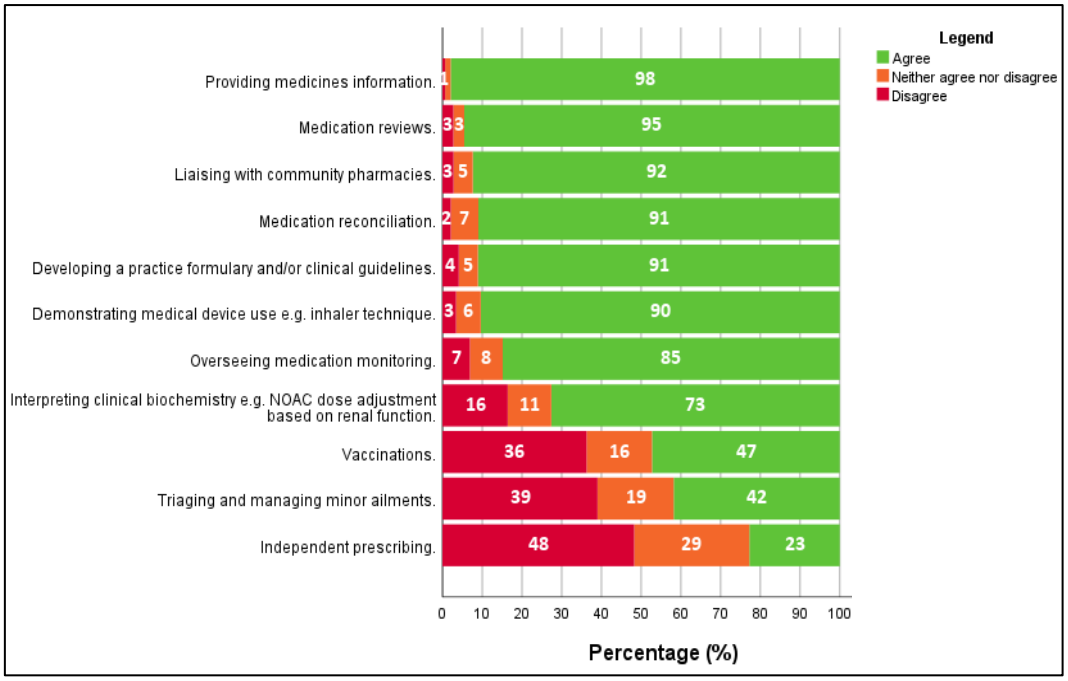


Figure 12: GPs' responses to Likert statements concerning potential roles or activities for pharmacists in general practices (percentage agreement shown in white figures)

There was a significant association between GPs' experience and agreement with pharmacists developing practice guidelines/practice formularies; 63% (*n* = 7/11) of GPs with ≥40 years of experience agreed with pharmacists conducting this role compared to 93% (*n* = 126/135) of GPs with <40 years' experience ($p<0.05$). Not having a practice nurse was significantly associated with GPs' views on pharmacists vaccinating in practices; 0% (*n* = 0/5) of those without a practice nurse agreed to this role compared to 50% (*n* = 67/133) with a practice nurse ($p<0.05$).

GPs' responses to the perceived impact on the roles and relationships of others in general practice are shown in **Table 11**. When GPs were asked about what experience they would most like to see a pharmacist come to their practice with, 59.3% (*n* = 79/133) ranked experience in general practice first, 35.5% (*n* = 47/133) community pharmacy first, and 5.3% (*n* = 7/133) hospital pharmacy first. The mean number of years of experience GPs said they would like to see pharmacists coming to general practice with was three years minimum (range 0-10 years).

Table 11: GPs' responses to Likert statements concerning the potential impact on the role and relationships of others in practices

	The role of the GP	The role of the practice nurse	The role of administrative staff	The role of the community pharmacist	GPs' relationships with patients	Practice nurses' relationships with patients	Community pharmacists' relationships with patients
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Negative impact.	11 (7.6)	9 (6.3)	8 (5.6)	15 (10.4)	8 (5.5)	7 (4.8)	12 (8.5)
No impact.	17 (11.7)	34 (23.8)	55 (38.2)	18 (12.5)	56 (38.6)	69 (47.6)	45 (31.7)
Positive impact.	117 (80.7)	100 (69.9)	81 (56.3)	111 (77.1)	81 (55.9)	69 (47.6)	85 (59.9)

4.5.1.3 Potential outcomes of pharmacists in general practice

GPs' responses to the perceived outcomes of pharmacists working in practices are shown in **Figure 13**. GPs' perceived impact on the workloads of others is shown in **Table 12**. Practice i) location in a primary care centre and ii) size were significantly associated with perceived impact on administrative staff workloads (p<0.05); i) 40.6% (n = 43/106) not in a primary care centre felt administrative staff workloads would be increased compared to 14.7% (n = 5/34) based in primary care centres; ii) 50% (n = 13/26) in small practices felt there would be an increase compared to 16% (n = 3/19) in large practices (p<0.05). Single-handed GPs (66.7% [n = 18/27]) were significantly more likely to predict an increase in administrative staff workload compared to GPs in group practices (25.4% [n = 29/114], p<0.05). GPs who worked more sessions anticipated there would be an increase in their workloads more often than GPs who work fewer sessions per week (p<0.05), as shown in **Figure 14**.

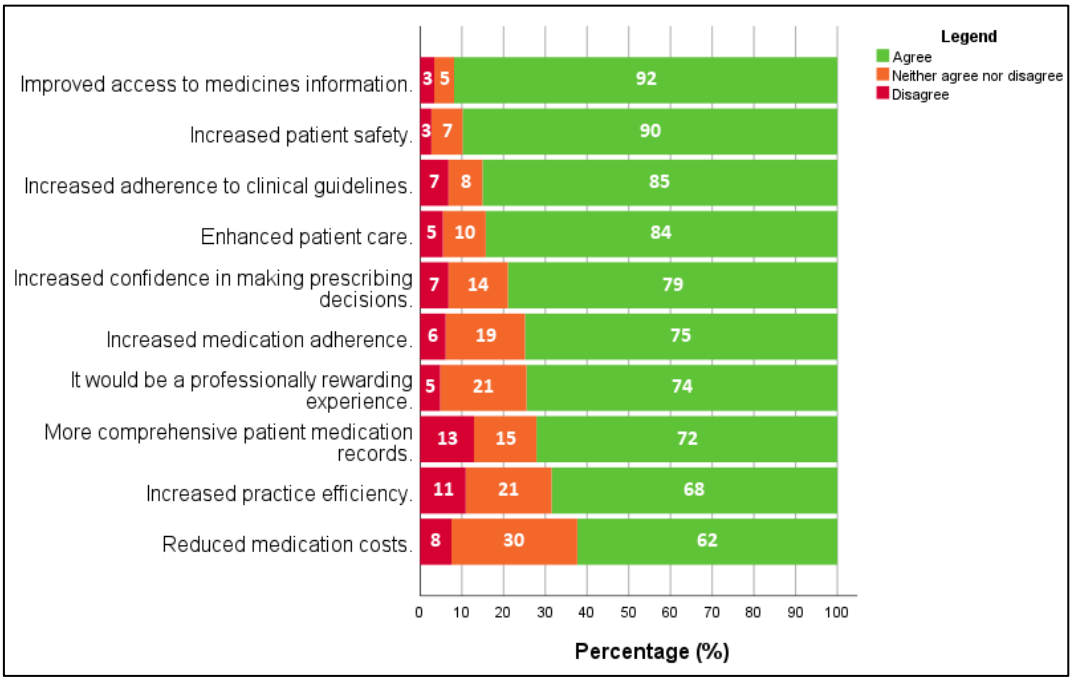


Figure 13: GPs' perceptions of potential outcomes of pharmacists in general practices (percentage agreement shown in white figures)

Table 12: GPs' perceived impact on the workloads of others

	GPs. *n* (%)	Practice nurses. *n* (%)	GP admin staff. *n* (%)	Community pharmacists. *n* (%)
Decreased workload	67 (46.5)	47 (32.4)	45 (31.0)	87 (61.7)
Increased workload	48 (33.3)	18 (12.4)	50 (34.5)	11 (7.8)
No effect on workload	29 (20.1)	80 (55.2)	50 (34.5)	43 (30.5)

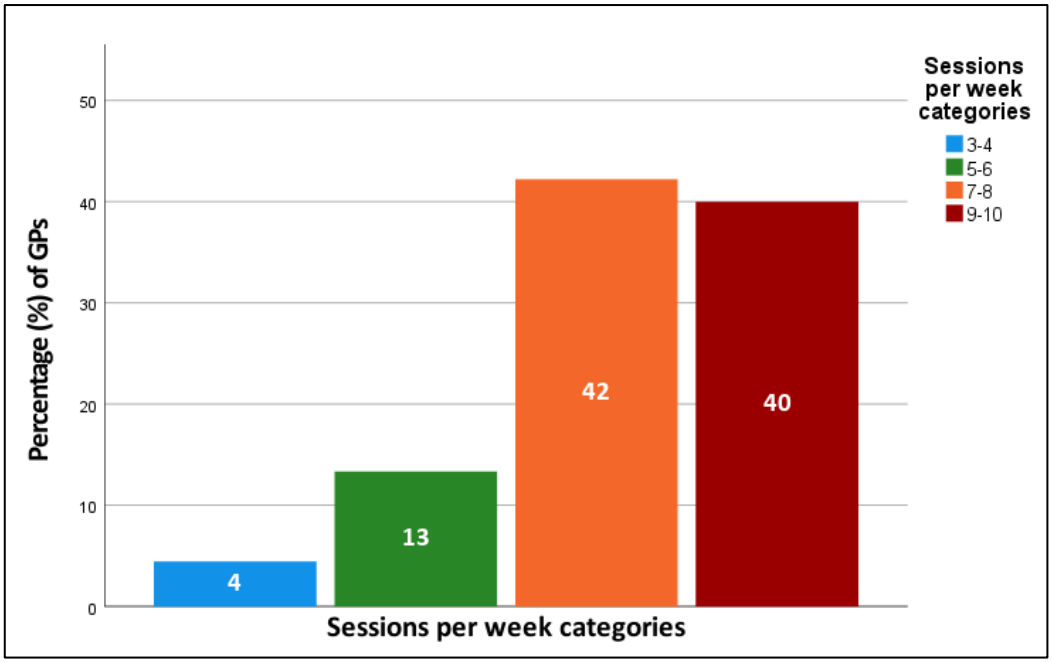


Figure 14: Number of sessions worked per week by GPs (*n* = 45), who anticipated pharmacists in practices will increase their workloads (percentage agreement shown in white figures). Note: Two GPs reported working 1-2 sessions per week but neither anticipated an increase in their workloads

When GPs were asked if the potential outcomes of pharmacists in practices justified the theoretical cost of employing them, 48.6% (*n* = 71/146) of GPs agreed, 24.7% (*n* = 36/146)

disagreed, and 26.7% (*n* = 39/146) neither agreed nor disagreed. GPs were significantly more likely to agree that having pharmacists in practices would provide value for money if they agreed (66.7% [*n* = 20/30] of GPs who agreed versus 36.8% [*n* = 25/68] of GPs who disagreed) with pharmacists prescribing independently ($p<0.05$), were not concerned about pharmacist indemnification (40.3% [*n* = 31/77] of GPs concerned about pharmacist indemnification versus 64.1% [*n* = 25/39] of GPs that were not concerned, $p<0.05$), and if they expected patients to be receptive to pharmacists (58.1% [*n* = 68/117] of GPs who thought patients would be receptive versus 0% [*n* = 0/6] of GPs who thought patients wouldn't be receptive $p<0.05$). Most GPs (78.6% [*n* = 114/145]) agreed they would be willing to participate in a future pilot study with a general practice-based pharmacist. Of the GPs who said they would not partake, 84% (n = 26/31) of them indicated earlier in the survey that they would not have space to accommodate a pharmacist within their practice. Nearly all GPs with <10 years of experience (96% [*n* = 21/22]) agreed to partake in a trial compared to just 54.5% (*n* = 6/11) of those with >40 years' experience ($p<0.05$). GPs who approved of pharmacists performing independent prescribing were significantly more likely to agree to partake in a pilot (93.3% [*n* = 28/30] of GPs who agreed with pharmacist independent prescribing versus 67.6% [*n* =46/68] of GPs who disagreed, $p<0.05$). Furthermore, GPs who agreed with pharmacist interpretation of clinical biochemistry in practices were significantly more likely to agree to take part in a pilot (84.5% [*n* = 87/103] of GPs agreed with pharmacist interpretation of clinical biochemistry versus 50% [*n* = 11/22] of GPs who disagreed, $p<0.05$).

4.5.2 Qualitative results of the survey

Comments in free text boxes were provided by 49.3% of survey participants (75/152). Reflexive thematic analysis of responses to open-comment questions led to the development of five overarching themes, described below and supported by representative quotations. Additional quotations are available in **Appendix 17**.

4.5.2.1 Theme 1 – Irish primary healthcare is suboptimal, and change is needed

GPs spoke about the extraordinary pressure faced in general practice in Ireland currently. They attributed this to several factors, including: practice staff shortages, time constraints, increasing variety and complexity of medications, medication shortages, and the bureaucracy of the public health system. GPs believed that the combination of all those factors creates a challenging work environment that makes achieving optimal prescribing in practices difficult. GPs believed change to the current suboptimal primary care system in Ireland is necessary and inevitable, but is unlikely to occur in the near future.

> *"GPs do not have adequate time to go through medications' effects or potential effects when prescribing."* **[GP 12]**
>
> *"Our problem is that there are not enough GPs."* **[GP 76]**
>
> *"We have a lot to go to get there..."* **[GP 23]**

4.5.2.2 Theme 2 – Pharmacists are as a useful resource and their role in primary care should be expanded

GPs cited the usefulness of having close doctor-pharmacist collaborations in other practice settings and jurisdictions, e.g. in hospitals and in the UK's NHS. They also referred to their own positive, mutually beneficial relationships with community pharmacists who regularly provide useful pharmaceutical care input to enhance patient care. GPs were overall very willing in the future to engage with a general practice-based pharmacist role, where

pharmacists should fully utilise their skillsets and expressed interest in participating in a pilot study of placing pharmacists in general practice.

> *"Would think it is a great initiative, have seen it working very well in a hospital setting."* **[GP 53]**
>
> *"Huge wealth of knowledge which may be untapped".* **[GP 89]**
>
> *"I think it's worth a pilot study and seems like a worthwhile idea to pursue."* **[GP 6]**

4.5.2.3 Theme 3 – Funding and governance of pharmacist roles in general practice

GPs were adamant they alone cannot and will not fund pharmacist roles. They believed that the government should fund pharmacist roles in practices because they will be the financial benefactors. The majority of GPs wanted to be autonomous and work with the pharmacist independently of the bureaucracy of the public health system; at the same time, GPs did not want to shoulder the additional responsibilities that come with employing another staff member (e.g. paying their salary and professional indemnity, organising maternity leave cover, and increased paperwork).

> *"I would not under any circumstance entertain paying a pharmacist to work in my practice. It would certainly have to be funded by the Health Service Executive if it was to roll out."* **[GP 84]**
>
> *"I am already overburdened (and underpaid) with the work of a small business owner, and would like to be a doctor."* **[GP 145]**
>
> *"I wish to maintain autonomy over who works in my surgery."* **[GP 99]**

4.5.2.4 Theme 4 – What the role of a pharmacist in general practice would look like

GPs gave several examples of the roles they would expect pharmacists in practices to perform, including: medication reviews, providing medicines information, medication

monitoring, chronic disease management, and addiction services. GPs said they particularly see a role for pharmacists in high-risk areas, for which they gave examples of hospital discharge prescriptions and repeat prescribing. Role logistics were debated in the comments with GPs weighing up the benefits of full-time versus part-time roles, having a dedicated pharmacist working in a single practice or a pharmacist shared between practices, and having a pharmacist working remotely for practices were all raised as possibilities. Some felt general practice-specific training may be required for pharmacists to work in practices. GPs also said they would value evidence or examples of where the role was already working well to give them an idea of what the role looks like and its potential outcomes.

"Pharmacist very helpful part of team for CDM reviews/medication review." **[GP 38]**

"Repeat prescribing/hospital prescriptions are higher risk, help would be great." **[GP 19]**

"Access to advice re medications needs to be full-time." **[GP 66]**

"Would need specific training". **[GP 72]**

4.5.2.5 Theme 5 – Anticipated outcomes from the role: generally positive, with some unknowns

GPs surmised about potential outcomes associated with pharmacists working in practices. For patients, GPs felt pharmacist presence would encourage patient adherence and improved patient outcomes. GPs thought that pharmacists would rationalise and standardise current prescribing practices and therefore save money spent on medications by the government. With respect to practices, GPs felt pharmacists may improve practice efficiency and improve the reputations of GPs. Although outcomes were broadly anticipated as positive, GPs still wondered about potential negative impacts on practice staff workloads, increased litigation, and potentially weakened GP-patient relationships.

"I would love to see primary care pharmacy formalised as a role to support both GPs + community pharmacists to better patient care and safety." **[GP 76]**

"The monetary benefit would be to the Health Service Executive medications bill." **[GP 17]**

"Working with a pharmacist would initially increase our workload, because of adjustment needed to be made." **[GP 151]**

"This develops over time over many 'low stake' consultations. Delegate these away to give us more time for the 'high stake' consultations and we don't have 'the relationship' which is often the 'secret sauce' in why GP works." **[GP 107]**

4.6 Discussion

4.6.1 Main findings

This novel mixed-methods survey study was the first to explore GPs' perceptions of working with pharmacists in practices without having previously worked alongside them. This study reveals that GPs in Ireland were broadly welcoming and optimistic about the future role of a general practice-based pharmacist. GPs felt the role should be government-funded. While most GPs found certain roles for pharmacists related to medication optimisation acceptable, they were less keen on independent pharmacist prescribing, vaccinating, or managing and triaging minor ailments in practices. While generally positive and welcoming towards the role, GPs had concerns regarding the potential impact of pharmacists in practices on the workloads of others, indemnification, and potential disruption to their relationships with patients.

4.6.2 Strengths and limitations

The survey content was based on the results of the QES in Chapter 2 and a TDF-informed interview study (Chapter 3); therefore, this study was able to explore the causal determinants of GPs' perceptions of pharmacist integration into general practice to better inform future interventions. While the survey utilised a multi-modal dissemination approach to enhance its reach and response rate, responses received via electronic routes were limited in number. The postal survey also included a novel element of a QR code on its front page to allow GPs to respond electronically to the survey, which is a strategy I am not aware has been previously employed or reported in the literature of survey studies with GP participants. While the postal survey's response rate of 24.6% is somewhat low, this is still within the range of reported response rates (18-78%) from other GP surveys in Ireland (300–302). However, the research team were constrained to posting the survey to a random sample of 500 GPs in Munster due to resource availability within UCC and lack of access to the ICGP's

mailing list, which would have been the preferred mode of survey dissemination. There are over 4,000 members of the ICGP in Ireland, i.e. the majority of GPs in Ireland, who receive research requests via the ICGP's mailing list (303). Previous survey studies that have utilised the ICGP's mailing list as the mode of survey dissemination have resulted in a large number of responses (304). While it would have been useful to disseminate our survey via the ICGP, it must be acknowledged that over-use of the mailing use as a strategy to disseminate research may lead to survey fatigue and reduce the utility of such a future distribution channel for future research. Nonetheless, it shows there is a gap in Ireland, with respect to a lack of accessible channels to distribute GP-focused research. Lastly, while Ireland's primary care system does appear similar across several domains to multiple other European countries (111), the results may not be as generalisable or transferable to some regions.

4.6.3 Findings in relation to other studies

The positive perception towards the role of a pharmacist in practices reported by GPs in this study was mirrored in a recent survey of GPs in Northern Ireland, who currently work with PBPs (288). However, the reticence of GPs towards practice pharmacists independently prescribing in our study is surprising given that 62.4% of the surveyed GPs in Northern Ireland reported that their PBPs were qualified as independent prescribers and 76.2% of these were prescribing for patients in general practices. GP reticence towards pharmacist prescribing has also been described elsewhere in the literature; for example, GPs working in private practices in a study by Saw *et al.* tended to view pharmacists as '*medicines suppliers*' and were less comfortable with expanded pharmacist roles like prescribing (238). Despite pharmacists with additional accreditation being able to prescribe medications under GP supervision since 2003 (supplementary prescribing) and independently since 2006 in the UK (305), no legislative changes or additional accreditations have been enacted in Ireland. Furthermore, it has been shown that pharmacist prescribers prescribe safely, appropriately, and improve service accessibility (285,306). GPs' reticence towards pharmacist prescribing

may negatively impact the potential clinical benefit of pharmacist roles in Irish general practices.

Concerns around funding pharmacists' roles in practices are common in the literature, namely in Malaysia and Australia (193,238). These concerns were apparent amongst our sample, who expressed preference for the role to be fully government funded. GPs were quite adamant in open comment responses about not funding the role themselves. GPs in Ireland have already reported fears around the financial viability of general practice, so it is very unlikely they would be able to support the salary of an additional healthcare professional (304). Moreover, as the GP respondents outlined, it is likely that the government would be the primary financial benefactor of the role, as there would be reduced expenditure on medications resulting from deprescribing or medication optimisation. Cost-effectiveness analyses of the role to date show that the cost of deprescribed medications is the main financial justification for the role so far (154,156). In the UK, where pharmacists have been successfully integrated into practices, government funding has been utilised to initiate and maintain pharmacist presence in practices (307). Perhaps other countries seeking to establish the role should therefore model this UK funding strategy given the evidence that GPs are not the main financial benefactors of the role (154,156).

GPs' willingness to partake in a pilot study was a welcome finding, given current GP workforce and workload issues in Ireland (56). Two initiatives, the iSIMPATHY project and a pilot study conducted by RCSI, have demonstrated the potential for a high return on investment, resolution of medication-related problems, effective interprofessional relationships, and significant acceptability to patients, practice staff, and GPs were described (154,156,187). The qualitative evaluation of RCSI's pilot study also showed GPs' concern regarding funding, infrastructure, and potential impact on workload, which is similar to this study's findings (187). However, RCSI's pilot study was small and included just four practices,

whist the iSIMPATHY project has been confined to select parts of the country. Given that the majority of practices in Ireland remain unexposed to general practice pharmacists, it would be prudent to consider how a similar national pilot would be implemented at a national level, akin to the UK's successful pilot in 2015 (133).

4.6.4 Implications

The potential workload impact of integrating pharmacists into practices must be more clearly deciphered in future research studies. Akhtar *et al.* have recently suggested that both qualitative and quantitative key performance indicators should be utilised to evaluate the overall impact of practice-based pharmacists, including reduced GP workload measured by their free hours, number and quality of medication reviews, reduced medication wastage, clinical audits, and patient satisfaction surveys (259). In addition, GPs in this study were not fully convinced of the value for money of the role. To date, studies in Ireland that have examined cost-effectiveness of the role have done so to a limited extent; focusing on attributing cost savings of the role solely to deprescribed medications (154,156). Future cost-effectiveness analyses should also consider cost savings associated with potentially improved prescribing, such as the avoidance of preventable ADEs and hospitalisations (308). Having more definitive evidence of such cost savings may make a more attractive endeavour for policymakers, GPs, and pharmacists.

Given that pharmacists in general practices may be potentially constrained by an inability to alter or initiate medications, policymakers, legislators, and higher education institutions in countries like Ireland should consider the development of pharmacist prescribing and the training thereof to better facilitate such roles in the future. For example, a certificate in prescribing for pharmacists to undertake may be useful, perhaps based on the six-month training for a certificate in prescribing that nurses in Ireland have been able to undertake since 2007 (309). In a recent Irish study exploring pharmacists' perceptions of such

integration into general practices, pharmacists have also identified this need for a pharmacist prescribing course to facilitate their prescribing in general practices (202). The GPs' reticence to pharmacist prescribing identified in this study must also be explored further. Perhaps a phased introduction of pharmacist prescribing would be more acceptable to GPs in Ireland, e.g. similar to the UK's approach: before independent prescribing, having supplementary prescribing dependent on a prior diagnosis and an agreed pharmacist-GP clinical management plan (305). Policymakers should also be cognisant of the need for adequate funding to support pharmacists' roles in practices and ensure that there is an adequate pharmacist workforce available to support these general practice roles through liaising with pharmacist regulatory bodies and higher education institutions.

4.7 Conclusions

GPs surveyed in this study were mostly optimistic and welcoming towards the idea of pharmacists working in practices. However, this study also revealed GPs' concerns about how pharmacist roles will be funded, indemnified, and impact on the workloads of others. This research has created a greater understanding of how GP and general practice characteristics impact on GPs' perceptions of integrating pharmacists into practices. This may help better inform future initiatives to integrate pharmacists into practices – ultimately with the goal of enhancing patient care, supporting GPs, and better utilising the skillsets of pharmacists to deliver the highest quality primary care models possible.

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

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Hurley, H. 2024. Exploring the potential impact of integrating pharmacists into general practice in Ireland. PhD Thesis, University College Cork.

Please note that Chapters 5 & 6 (pp. 173-218) are unavailable due to a request by the author.

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Chapter 7. Discussion

7.1 Chapter description

In this chapter, I provide a summary of my research, focusing on the novel findings and their interpretation in both the context of national and international research, followed by a description of the overall strengths and limitations of this thesis. Finally, I will consider the implications of this body of work for policymakers, practice, and future research.

7.2 Summary and interpretation of findings

The overarching aims of this PhD thesis were to: 1) synthesise GPs' views on pharmacist integration into general practice, 2) identify the factors affecting this integration, and 3) show the clinical and economic effects of a pharmacist-delivered intervention in general practice and affiliated settings. Chapter 1 identified that the majority of prior research on GPs' views of pharmacist integration into general practice focused on GPs' views in countries where pharmacists had already been integrated into practices, such as the UK, and this research had generally not been underpinned by a theoretical framework. Limited research to date has evaluated pharmacist-led deprescribing of the medications of frail older adults in general practices and affiliated settings, such as nursing homes. Furthermore, the outcomes assessed in previous evaluations of pharmacist interventions in general practice have been inconsistent; when evaluated economically, they have mainly attributed cost savings to deprescribed medications only.

Chapter 2 reported a QES of GPs' views regarding pharmacist services in general practice; based on this, the developed model illustrates the factors to be considered in the development or optimisation of pharmacist services in general practice. Twenty-nine studies were included in this QES – 19 from the original synthesis and 10 from the updated search. The model developed is comprised of four overarching interconnected themes: (i) *Optimal environment for a pharmacist*; (ii) *The ideal pharmacist characteristics*; (iii) *Complex*

stakeholder relationships; and (iv) *Benefits of an effective pharmacist* (**Figure 9**). The model highlights the important interactions between the pharmacist *in situ*, the practice environment itself, and others working in or attending the practice as patients, in order to realise the benefits of the role. The model may prove useful in the initial design of a pharmacist role within practices but may also provide valuable insight as a diagnostic tool if the expected benefits of the role are not being produced. The model and accompanying text prompts clinicians (be it the pharmacist or the GP, for example) to consider issues such as: (a) is the pharmacist carrying out roles that meet local practice needs, (b) do patients understand the pharmacist's role, and (c) is additional training required for the pharmacist to navigate the practice software?

In order to improve the utility of the QES to policymakers, the CERQual approach was used to appraise confidence in the review findings (245). Of the 54 review findings, 12 were graded as '*high confidence*', meaning that I believe it is highly likely that they reflect a reasonable representation of the phenomenon of interest. One particularly notable '*high confidence*' review finding pertained to the type of patient that could most benefit from pharmacist input in practices: *Pharmacists were considered notably useful in the management of complex patients.* GPs described '*complex patients*' as older adults, patients who are frequently hospitalised, and those with diabetes. This finding aligns with a recent systematic review which examined the effectiveness of pharmacists within general practice to optimise prescribing and health outcomes in primary care patients with polypharmacy, which showed moderate evidence for a reduction in inappropriate prescribing and numbers of medications and low evidence for a reduction in ADEs (164). Focusing on these patient cohorts to increase the likelihood of showing meaningful benefits to health systems may be key to attracting government funding, as indicated by another one of our '*high confidence*' findings in Chapter 2: *A sustainable funding model should be subsidised by governments, who first have to be convinced of health systems benefits*.

Stepping away from the contents of the QES findings themselves and considering the level of confidence assigned to findings, 21/54 (39%) findings were given a confidence rating of '*low*' or '*very low*' – often due to '*moderate*' or '*serious*' concerns about data adequacy, i.e. regarding the '*degree of richness and quantity of data supporting a review finding*' (245). This highlighted the need for further primary qualitative research, particularly – as identified in the introduction and the QES – with respect to determining GPs' perceptions who had not already worked with pharmacists in practices and who provide care to both public and private patients. Of note, only three studies included in the QES utilised theory as part of the design of their topic guides or analyses of GPs' views. The use of theoretical frameworks, such as the TDF, in qualitative research has been shown to increase the number of themes identified and likelihood of informing evidence-based interventions (213,283,284). Therefore, Chapter 2 identified important research gaps in addition to providing a greater understanding of GPs' views in advance of conducting the research in subsequent chapters.

In Chapter 3, one of these research gaps was filled by conducting semi-structured interviews with GPs in Ireland who had not previously worked alongside pharmacists in general practice. Using a topic guide informed by the evidence from Chapter 2 and the TDF, GPs' perceptions were sought to identify the key behavioural determinants influencing pharmacist integration into general practices. Seven TDF domains were identified as predominant across the 17 interview transcripts: '*Environmental context and resources'*, '*Social professional role and identity*', '*Social influences*', '*Beliefs about consequences*', '*Beliefs about capabilities*', '*Skills*', and '*Knowledge*'. While a recent systematic review had employed the TDF to analyse the modifiable barriers and facilitators to pharmacist integration into ward-based multidisciplinary teams (210), no primary qualitative study had utilised the TDF as a lens to analyse the GPs' views towards pharmacist integration into general practice settings. Two predominant TDF domains reported in Chapter 3 that were not identified in the systematic review examining pharmacist integration into ward-based teams were '*Beliefs about*

consequences' and '*Beliefs about capabilities'*. The identification of these two TDF domains as predominant domains may be due to the novelty of the role of a pharmacist in general practice in Ireland, as the role and outcomes of a ward-based pharmacist have been well established for some time (393). The impact of a pharmacist in general practices in Ireland is relatively unknown; therefore, the potential consequences generated significant interest and debate amongst GPs in this study, who surmised about the possible impact on themselves, patients, pharmacists, other practice staff, and wider society. As for '*Beliefs about capabilities*', this TDF domain may be more predominant in the general practice setting than a hospital where healthcare professionals generally have access to a broad range of medical specialists for multidisciplinary input and resources, like laboratory monitoring and imaging modalities. Without access to the aforementioned resources in general practice where more lone working may be required, individual competence and capabilities may be more relevant. It could therefore be interpreted that GPs who have not previously worked alongside pharmacists in practices are particularly concerned about the outcomes and capabilities of pharmacists working in practices. Providing information to GPs on these key areas may be pivotal to successful integration of pharmacists into general practices going forward.

Additionally, of particular interest in Chapter 3's qualitative study was the corroboration of international evidence from Chapter 2 that GPs themselves are not able and/or willing to wholly fund pharmacist roles within practices and that government funding would likely be required to establish wider implementation of the role in Ireland. This is unsurprising given that the only jurisdiction that has integrated pharmacists widely into practices is the UK, where PCNs can claim up to 70% of the costs of employing one WTE pharmacist or two WTE pharmacists if the PCN covers a population of 100,000 or more (307).

The mixed views of GPs towards the potential impact of pharmacists in practices on their workloads reported in Chapter 2 were also voiced by GPs in Chapter 3. Although GPs felt there would be a decrease in others' workloads in practices due to pharmacists performing some medication-focused roles (e.g. liaising with community pharmacies, reviewing medications, and reconciling medications post hospital discharge), they felt there could be an increase in "*actionable tasks*" secondary to pharmacists performing those roles. This was an interesting perception from GPs, as there is limited evidence in practice of increased workloads (394). On the contrary, the integration of pharmacists qualified as independent prescribers into general practices has reportedly been associated with a drastic decrease in GPs' workloads (226). The evaluation of the NHS 2015 pilot predominantly reported decreases in GP workloads. Where integrated pharmacists were independent prescribers, GPs particularly described more manageable caseloads across practices, a more functional work environment, and improved GPs' QoL (133). It is evident therefore that to mitigate against the increase in "*actionable tasks*" of GPs in Ireland, secondary to the integration of pharmacists, consideration should be given to the development of legislation and education/training to enable pharmacist prescribing in Ireland.

In Chapter 4, the findings of Chapters 2 and 3 were used to devise a mixed-methods survey to 1) establish the prevailing perceptions of GPs in Ireland towards the integration of pharmacists into practices and 2) to identify associations between GPs' perceptions and their demographic characteristics. Five overarching themes were developed based on reflexive thematic analysis of the open comment sections: (i) '*Irish primary healthcare is sub-optimal, change is needed*', (ii) '*Pharmacists are a useful resource and their role in primary care should be expanded*', (iii) '*Funding and governance of pharmacist roles in GP*', (iv) '*What the role of the pharmacist in general practice would look like*', and (v) '*Anticipated outcomes, generally positive but still some unknowns*'. Within the theme '*Funding and governance of pharmacist roles in GP*', there was a notable conflict of opinion amongst GPs concerning governance of

the role, with some GPs wanting to retain control over who worked in the practice, while others did not want to be overburdened with the responsibilities of being the employer of a pharmacist. The need for GP-led control and governance of pharmacists working in practices may come from the possible historical perceived hierarchy of GPs over community pharmacists. Previous research with GPs in Ireland showed that some GPs perceived pharmacists as having a '*shop keeper*' role within primary care and GPs have expressed a strong opposition to the previous expansion of pharmacists' roles due to role encroachment (294,396). Conversely, not wanting to take on the additional responsibilities of being a pharmacist's employer is understandably a concern given the novelty of the role in Ireland, lack of guidelines, peer support, and professional indemnity for pharmacists working in general practice. However, guidance does exist to support GPs considering employment of pharmacists in their practices developed by the Primary Care Pharmacy Association in the UK, which could be extrapolated and adapted to assist GPs in Ireland who wish to integrate a pharmacist into their practices, whilst also considering the model described in Chapter 2 (397).

Another valuable but surprising insight gained from GPs was the contrast between their high levels of approval (i.e. >90% agreement) for more roles for pharmacists in practices like medication reviews, liaising with community pharmacies, and medication reconciliation versus roles like independent prescribing, triaging and managing minor ailments, and vaccinating. Independent prescribing by pharmacists had particularly low levels of agreement amongst GP participants (23%). This was perhaps surprising given that the previous chapter identified concerns amongst GPs regarding potential additional "*actionable tasks*" arising from pharmacists working in practices. Perhaps the use of the term '*independent prescribing*' in the survey was too great of a leap, and instead another term could have been used (e.g. '*collaborative prescribing*', '*supplemental prescribing*', or simply '*prescribing*') – either instead or alongside '*independent prescribing*'. Starting with

supplemental prescribing, for example, would align more with how pharmacist prescribing was initially introduced in the UK in 2003, before giving pharmacists the ability to prescribe independently in 2006 (305). The current lack of indemnity and legislation to support pharmacist prescribing in Ireland may also have played a part in the low agreement by GPs with pharmacists independently prescribing. As things currently stand, if hypothetically a pharmacist were to suggest to start/change/stop a medication within the general practice setting in Ireland, the clinical and legal responsibility would primarily reside with the GP who must authorise any changes to prescribed medications – thereby increasing GPs' liability. To counter this in the UK, an indemnity scheme underwritten by the state was launched in 2019 where clinical pharmacists working in practices or PCNs providing NHS services were insured by the scheme, which also covered GPs and other practice staff (398). Therefore, the development of practice pharmacist roles where pharmacists are prescribers needs to be concurrently supported by the availability of specific indemnification for practice pharmacists as well as legislation and training that empowers pharmacists to prescribe, such that pharmacists can prescribe independently within practices and share the clinical and legal responsibility for prescribing with GPs.

Finally from Chapter 4, it was encouraging for the future of the role of a practice-based pharmacist in Ireland to see that 78% of the GPs surveyed said they would be willing to partake in a future pilot study of integrating a pharmacist into their practices. Although one could argue that is it still notable that over one in five GPs were not willing to partake in a pilot, there are several possible explanations for this. One reason for GPs not wanting to partake in a pilot study would be due to a lack of space to accommodate pharmacists within practices, as 84% of GPs who said they would not partake also indicated in the survey that they would not have space to accommodate a pharmacist within their practices. Lack of space to accommodate pharmacists has been previously identified as a major barrier in research which sought GPs' and other stakeholders' views of integrating pharmacists into GP

practices (140,187,193). This may present less of a challenge in Ireland going forward, given the gradual reduction of single-handed GPs that work alone in premises attached to their residence alongside the increase in purpose-built practices for GPs and integration of practices into primary care centres (57).

In Chapter 5, the impact of a pharmacist intervention in nursing homes linked to five general practices was reported. This consisted of a pharmacist performing STOPPFrail-guided medication reviews on frail older nursing home residents with a poor one-year survival prognosis. At baseline, I revealed that PIM prevalence in this cohort was high, with 94% of participants prescribed at least one PIM, which highlights the need for greater pharmaceutical care input in this patient cohort here in Ireland. Pharmacist input during the study was well received, with 55% of deprescribing recommendations implemented – which is slightly higher than the implementation rate reported in the recent Pharmacists in Residential Aged Care Facilities (PiRACF) study in Australia, which reported an overall 47.5% implementation rate of pharmacist recommendations by GPs (354). The implementation rate might have been further improved in our study by the full delivery of recommendations in person. Recommendations were delivered remotely to one GP via teleconference; although they were accepted by the GP over teleconference, some recommendations were found to have not been implemented at the follow-up visit. Evidence from the literature would support the enhanced implementation rate of pharmacist recommendations when delivered in person rather than remotely (352,399,400). The intervention resulted in a significant improvement in medication appropriateness, anticholinergic and sedative burden, and avoided significant expenditure. Meanwhile, there was no significant improvement in several other outcomes such as: QoL, hospitalisations, emergency department visits, and falls; while one may perceive this at face value for this to appear disappointing, it is quite reassuring to prove the safety of a pharmacist-led deprescribing intervention in general practice, which did not worsen these outcomes. It may also have

been difficult to detect significant changes in these outcomes given the frailty and estimated limited life expectancy of older adults included in our study. Frail older adults may often not be transferred to hospital for intensive medical intervention due to patient or next-of-kin preferences expressed in advanced care directives. Cardwell *et al*. similarly showed that embedded pharmacists in general practices had no significant negative impact on patients' QoL (154). Another contributory factor may have been the duration of follow-up in both studies, so perhaps a longer duration may be required to detect significant changes in these clinical outcomes.

Another insight gained from Chapter 5 related to the most frequent PIM type in this patient cohort, which were medications without clear clinical indications – accounting for nearly one third of recommendations in this study. This reinforces the recent findings from a cross-sectional point prevalence study in Ireland by Heinrich *et al*., who found that 60% of frail older nursing home were prescribed at least one medication without a clear clinical indication (35). This, however, is not a universal finding across studies which aim to assess STOPPFrail-defined PIM prevalence, with studies in other jurisdictions showing high-dose proton pump inhibitors and H_2 receptor antagonists prescribed for ≥8 weeks to be the most prevalent PIM (18-41%) (344,345). The lack of documented indications for medications is problematic and, in this study, it resulted in the initial generation of many deprescribing recommendations which were not clinically relevant as the prescriber later clarified the indication. Additionally, even if there was still no clear clinical indication after meeting with GPs, there were several instances where GPs were reluctant to discontinue a medication because the patient had been admitted to the nursing home on the medication and GPs were concerned about the consequences of discontinuing it. Having an accurate and complete medical and medication history for patients has been shown to be a key enabler of deprescribing (401). The prevalence of prescribed medications without clear indications in Ireland may be explained by the lack of a national shared care record and unique patient

identifier, meaning that patients' records are currently fragmented in disparate electronic and paper based-systems (402). Therefore, this makes it difficult for GPs and pharmacists to make sense of indications for prescribed medications that patients may accumulate over a lifetime across different health settings and prescribers. Furthermore, the future introduction of a prescription requirement for clinical indications for medications may further ameliorate the situation. A systematic review has recently shown that indication documentation has the potential to improve appropriate prescribing and reduce prescribing errors (403). The future requirement of indications on prescriptions is a possibility, as it is listed as part of the Health Information and Quality Authority's (HIQA's) National Standard on information requirements for national community-based electronic prescribing. Such an initiative may enhance pharmacists' medication reviews in future across healthcare settings in Ireland, not just in general practice.

Finally, in Chapter 6, the cost avoidance associated with the pharmacist-led deprescribing intervention reported in Chapter 5 was assessed. Significant cost savings associated with pharmacist-led application of STOPPFrail to the medications of frail older nursing home residents – savings which remained substantial in all scenarios, even when varying the values of the different parameters in the calculations (e.g. pharmacist salary). Of note, a cost-benefit ratio of 33:2:1 was reported in Chapter 6, which is higher than other studies that have sought to evaluate cost avoidance of pharmacist interventions (372,373,382). No other study that evaluated the cost avoidance of a pharmacist-led intervention in a nursing home setting could be located in the literature, highlighting the novelty of this work. The high prevalence of PIMs identified in Chapter 5 (94% of patients were prescribed at least one PIM) emphasises the need for pharmacist input into nursing home patients' medications in Ireland, and this chapter confirms the financial impact of such pharmacist input. This study only evaluated the cost avoidance associated with deprescribing recommendations coming from a single pharmacist across six nursing homes, so there would be value in examining the

cost-effectiveness of multiple pharmacists involved in such deprescribing across a larger number of general practice-affiliated nursing homes as a part of a cluster RCT.

Chapter 6 also identified PIMs in frail older nursing home residents which may have a higher probability of causing an ADE. The study found that long-term oral NSAIDs, anti-diabetic agents, antipsychotics used for behavioural and psychological symptoms of dementia, and antihypertensives were always rated as either a '*medium*' or '*high*' probability of causing an ADE, whilst PIMs without a clear clinical indication were the most frequent PIM to be assigned a '*medium*' or '*high*' probability of causing an ADE. It is difficult again to draw comparisons with other studies, as this is the first study to our knowledge to utilise the Nesbit *et al*. approach to assigning the pADE occurring to STOPPFrail-defined PIMs prescribed to frail older nursing home residents (380). However, in community-dwelling older adults, the most common classes of medications implicated in ADRs have been shown to be cardiovascular medications (e.g. antihypertensives and diuretics) and medications acting on the central nervous system (e.g. analgesics and antidepressants) (317). By comparison, the most common classes of medications implicated in ADRs in hospitalised older adults have been found to be: (i) diuretics, (ii) benzodiazepines, (iii) opiates, (iv) antihypertensives, and (iv) NSAIDs (404). Therefore, this study offers a novel insight into the classes of medications which are likely to cause ADEs in frail older adults in nursing home facilities and thus offers a guide to clinicians when trying to assign priority when there is a possibility for multiple medications to be deprescribed simultaneously in this patient cohort.

7.3 Strengths and limitations

This section provides an overview of the strengths and limitations of this thesis research overall. The strengths and limitations of the individual studies have been described in the previous chapters.

The main strength of this research is its multidisciplinary nature. I am a pharmacist with experience in community and hospital pharmacy and therefore brought my own clinical and methodological perspective to the research. I kept a reflective log throughout my research to document the rationale behind decisions taken to maintain reflexivity and reflect on my own biases and assumptions that come with the perspective I brought to the research coming from a pharmacy background. My PhD was supported by a multidisciplinary team of supervisors and collaborators, which included: pharmacists, GPs, a health economist, a statistician, nurses, a nursing home resident, and a relative of an older adult residing in a nursing home – all of whom, through their expertise and insights, strengthened and expanded the scope of this research.

Secondly, this research was underpinned by a commitment to rigour and transparency. As evidence for this, the qualitative research was informed by a comprehensive framework, the TDF, to systematically identify the social and behavioural determinants of GPs integrating pharmacists into practices. In addition, every study was reported in congruence with best practice reporting guidelines, as recommended by the Enhancing the QUAlity and Transparency Of health Research (EQUATOR) Network, which ensured reliable reporting throughout this doctoral research (405). For example, in Chapter 2 alone, several resources were utilised to aid rigour and transparency: 1) the PRISMA-S Checklist to report our search strategy and flow of studies throughout, 2) the ENTREQ Statement to report the synthesis itself, and 3) the GRADE-CERQual approach to evaluate the confidence in the review findings and the evidence underpinning them – which also aided the utility and accessibility of the

findings to clinicians and policymakers (245,248,406). To attest to the rigour of this research, three of the chapters have been published in peer-reviewed journals (Chapters 2,3 and 4) (226,264,293), whilst the other two chapters have been submitted and are currently undergoing review in peer-reviewed journals at the time of submitting this thesis (Chapters 5 and 6).

A further strength was the use of multiple or mixed methods throughout this body of research. Firstly, the complementary use of qualitative and quantitative research, whereby the results from one chapter informed or helped to explain the findings from another chapter. For example, the qualitative findings from Chapters 2 and 3 helped to inform the design of the survey instrument in Chapter 4. Additionally, the clinical and economic outcomes in Chapters 5 and 6 were able to corroborate or refute some of the GPs' views in Chapters 3 and 4, e.g. <50% of GPs in the survey study in Chapter 4 agreed the potential outcomes of pharmacists in practices justified the theoretical cost of employing them and in Chapter 6 that was evidently shown to be case; when tested in sensitivity analyses, robust cost savings are expected from a pharmacist-led intervention within general practice-affiliated settings.

Lastly, this research has produced several novel contributions to the literature with respect to the role of pharmacists within general practices and affiliated settings as described in each of the individual chapters. A strength of this body of doctoral research was the dissemination strategy of these novel findings, at a local, national, and international level. A particularly important component of the national dissemination was an oral presentation on a policy brief based on our research findings at the Irish Department of Health's Research Conference '*Evidence for Reform - Where research meets policy*' held in Dublin in November 2023. Presenting this doctoral research to policymakers, clinicians, and researchers involved in Ireland's healthcare system increased the likelihood of impacting policy change and

influencing the integration of pharmacists into practices in Ireland. In addition, all of the published chapters (Chapter 2-4) have been published open access to encourage broader dissemination.

Invariably, there are limitations to this research which must be acknowledged. The generalisability of the quantitative research may be limited for example by the participant sample size in both Chapter 4's survey (*n* = 152; response rate = 24.6%) and in the STOPPFrail intervention (*n* = 99). In both chapters, recruitment of participants/respondents was difficult, possibly due to limited time for GPs to engage with research, which was exacerbated by additional work pressures placed on them during the emergency response to the COVID-19 pandemic that took place during the earlier years of this research. There was a particularly significant time commitment required of GPs to partake in the intervention study. They were responsible for assessing patient eligibility, obtaining patient or patient proxy consent/assent, receiving pharmacist deprescribing recommendations, and implementing them where applicable. However, despite modest sample sizes, statistically significant differences were shown in both the survey and intervention studies.

Along a similar vein, criticism could be made about the generalisability of the qualitative research in Chapter 3 due to the research being carried out with local stakeholders. However, it has been highlighted in the literature how applying statistical-probabilistic generalisability to qualitative research is problematic (407). Qualitative research must be viewed through a different lens; one way to consider generalisability is to consider the transferability of qualitative research findings, that is if readers '*…believe that research overlaps with their own situation and/or they can intuitively transfer the findings to their own action*' (407). It is possible that GPs in other jurisdictions or other parts of Ireland may read the findings of Chapters 3 and 4 and not find the local context of the study applicable to their own situation (transferability). However, I believe the transferability of this research was maximised

through the inclusion of a diverse sample of GPs in Chapter 3 and 4, by using the sampling strategy (**Table 7**) in Chapter 3, where I ensured a range of GPs were included, factoring in gender, experience, practice size, and GPs from practices with differing socioeconomic profiles of patients. The local context of the study (i.e. the Irish primary healthcare system) was also described in sufficient detail to increase the probability of an international reader (e.g. a GP from another country) finding the research applicable to their own situation. On a related point, the intervention was conducted in partnership with GPs in close proximity to the university (UCC) where STOPPFrail was created, which one could argue may have had an influence on the uptake of deprescribing recommendations as GPs were more familiar with the tool than those in other parts of Ireland. However, this is unlikely given a significant amount of deprescribing recommendations (45%) were not implemented by GPs and the implementation rate bears semblance to other studies conducted in similar settings (354).

7.4 Implications

7.4.1 Implications for policy

From this research, it is clear there are significant potential benefits for patients, GPs, and healthcare systems associated with integrating pharmacists into general practices and affiliated settings. Our qualitative research in Chapters 3 and 4 showed that GPs in Ireland are feeling overwhelmed when it comes to managing the increasing complexity of medications in general practice and would welcome the presence of a pharmacist to aid them in doing so. However, it is evident from the findings in Chapters 2-4 that government funding will likely be needed to support both the integration and retention of pharmacists in practices, as GPs felt it was ultimately the government who would benefit financially from pharmacists being present in practices – due to decreased expenditure on medications and increased patient safety which may reduce presentations to out-of-hours doctors' services and hospitals. This was the case in the UK, where government funding was needed to establish and then maintain the role of pharmacists in practices (133). If policymakers are to plan to establish pharmacist roles in practices in Ireland, then undoubtably some investment from the government will be needed, as there is no evidence to suggest that it is feasible for GPs to fund the roles themselves. In the absence of other examples, the funding model adopted in the UK could reasonably be emulated here in Ireland, whereby 70% of the wages could be funded by the public health service in Ireland, the HSE, perhaps in a similar mechanism to the way practice nurses, secretaries, and practice managers wages are subsidised via practice support subsidies (408).

Another key finding from Chapters 2-4 was the need for a defined and well-disseminated role description to minimise overlap with other healthcare professionals' roles in practices and to differentiate practice pharmacists from community pharmacists to minimise confusion amongst patients. It may therefore be prudent for the ICGP and PSI in Ireland to

collaboratively develop a pragmatic set of core competencies and roles for practice-based pharmacists in Ireland and to disseminate these to GPs, pharmacists, and patients. Furthermore, based on the findings of Chapters 2-4, policymakers should consider the development of pharmacist prescribing through legislative changes. It was clear in Chapter 3 that not permitting pharmacists to prescribe within their roles in practices may be detrimental to the role and significantly increase GPs' workloads, as GPs may be left with many recommendations to implement after pharmacists review patients' medications. Relatively low levels of agreement from GPs with pharmacists independently prescribing shown in Chapter 4 are likely due to the fact that pharmacists are not currently legally recognised as prescribers; this means there is no professional indemnity available for a pharmacist to prescribe within GP practices, thus placing the legal burden solely on GPs, who would have to implement any prescribing recommendations that may come from a practice-based pharmacist. The Department of Health in Ireland in July 2023 released a statement on establishing an expert taskforce to support the expansion of pharmacist roles: "*This will include, but not be limited to, empowering pharmacists to assess and prescribe for common minor ailments* ***within a community pharmacy setting*** *and to use their expertise to operate as independent prescribers"* (409). Although there is no mention of the development of general practice-based role for pharmacist in the statement, it potentially paves a way for the development of pharmacist prescribing in primary care setting and may enhance the scope of general practice-based pharmacist roles in Ireland in the future. However, policymakers must ensure appropriate professional indemnity is available if legislating for pharmacist prescribing in Ireland to prevent unequal sharing of legal responsibility for clinical decision-making.

Regarding the intervention performed by a pharmacist based in general practices in Chapter 5, it was shown that the pharmacist-led medication reviews were able to significantly reduce PIMs and both the sedative and anticholinergic burdens, while preserving patients' QoL.

Currently, the National Standards for Residential Care Settings for Older People in Ireland developed by HIQA do not have an explicit requirement for pharmacist involvement in medication reviews, nor is there any mention of considering patients' frailty status when reviewing patients' medications (39). Both may be useful additions to the guidance to improve the rational use of medications in frail older nursing home residents in Ireland and support the development of general practice-affiliated pharmacist roles. Lastly, in Chapter 6, significant cost avoidance was shown to be possible because of pharmacist-led medication reviews within general practices and affiliated nursing homes. This research demonstrated that a significant amount of cost savings may be achieved outside of reduced expenditure on medications due to prevented ADEs and a potential subsequent decrease in visits to out-of-hours doctors' services and hospitals. When considering the allocation of funding and weighing up the costs versus benefits of pharmacists in practices in Ireland, policymakers should reflect on the potential cost savings shown in this study.

7.4.2 Implications for practice

The views of GPs captured in Chapters 2-4 of this thesis provide several useful findings for GPs, practice managers, and pharmacists who may wish to develop pharmacist services within a practice. Chapters 2-4 identify key resources required to support the presence of a pharmacist within practices (e.g. professional indemnity, IT, training, space, and a support network of practices that employ a pharmacist). Secondly, Chapters 3 and 4 highlighted the optimal logistics for the role within practices in Ireland; for example, it was identified what roles were generally perceived as appropriate for pharmacists to carry out within practices and it was noted that GPs working in smaller practices seem to have a preference for a part-time pharmacist. Chapter 4 revealed that large, urban, primary care centres that have several GPs employed concurrently may be the practices which are best suited to the integration of pharmacists. Therefore, the utility of Chapters 2-4 for practitioners will be in the design of pharmacist services in general practices. GPs and practice managers may refer to them to

firstly identify whether their practices are good candidates for pharmacist integration, secondly to evaluate if they have the necessary resources *in situ* to support their presence and lastly in the design of the role within the practice (i.e. the day-to-day logistics with a clearly delineated role description for a pharmacist working in the practice).

Chapter 3 highlighted an implication which may be relevant for the development of pharmacy practice at the undergraduate and postgraduate training level, which was the potential need to develop experiential learning placements for pharmacists within the general practice setting. Pharmacy student placements in general practice are commonplace in the UK (410) and an interprofessional workplace learning programme has been found to provide increased opportunities for clinical pharmacists to add value in general practices in a recent study from the Netherlands (411). As mentioned previously, postgraduate pharmacists in the UK also complete the PCPEP to gain further skills to allow them to practise competently within practices (135). Therefore, to better support the development of practice pharmacist roles in Ireland and similar countries yet to integrate pharmacists into general practices, it may be prudent for pharmacy schools in partnership with the schools of medicine to consider the co-design and co-development of experiential learning placements for pharmacy students in general practices, drawing inspiration from similar programmes in the UK and the Netherlands (410,411).

Chapters 3 and 4 also showed that GPs perceived pharmacist integration into general practices would have a positive impact on several patient outcomes. For example, in Chapter 3, GPs predicted pharmacists in practices would reduce unnecessary polypharmacy and encourage safer prescribing. Furthermore, in Chapter 4, 84% and 90% of GPs agreed that pharmacists in practices would enhance patient care and improve patient safety respectively (i.e. most GPs perceived this). This was corroborated by Chapters 5's findings, which provide real-world evidence that pharmacist input in general practices and affiliated settings can

have a positive impact on patient outcomes (e.g. increased medication appropriateness, a reduction in PIMs, and both anticholinergic and sedative burdens). Additionally, Chapter 6 highlighted the significant avoided medication-related harm due to a pharmacist-led intervention in general practices and affiliated nursing homes. A similar trend is observed considering potential economic outcomes of pharmacist integration into general practices. In Chapter 3, GPs perceived that pharmacists in practices would encourage more financially prudent prescribing and reduce spend on medications. Relatedly, the majority of GPs (62%) in Chapter 4 agreed pharmacist integration into practices would lead to reduced medication costs. Chapter 6 confirmed this to be case, whereby the economic evaluation of the pharmacist-led intervention in practices showed considerable cost savings. Therefore, the previously unexploited potential for pharmacists in countries yet to widely integrate pharmacists into general practices and affiliated settings presents an exciting opportunity, to improve patient outcomes and generate significant cost savings for healthcare systems.

Finally, Chapters 5 and 6 also have implications for practice in terms of pharmacist-led management of older adults' medications in general practices and affiliated settings. PIM prevalence was high across frail older nursing home residents, particularly for vitamin D supplements, anti-diabetics, antihypertensives, and antipsychotics. These medication classes represent areas where greater attention may be required where frailty is identified to ensure that older adults' medications are aligned with their treatment goals. Furthermore, the most commonly identified PIM was medications without a clear indication; the most common classes of medications identified here were antidepressants, loop diuretics, and PPIs. Having clearly documented indications for these classes of medications is paramount to ensure that they are appropriately prescribed and not continued for longer than they are indicated. For example, an antidepressant for a first episode of major depressive disorder, which, if continued long term, may increase the risk of a patient experiencing an ADE with limited evidence of clinical benefit (412). The integration of pharmacists may help to improve

indication documentation; the majority of GPs in Chapter 4 (72%) agreed that pharmacists in practices would improve patient medication record comprehensiveness. Integrating pharmacists into general practice teams, documenting indications on prescriptions, and being vigilant for ensuring indications are recorded when patients are admitted to nursing homes may all aid in reducing the inappropriate prescription of these classes of medications and provide significant cost savings to the public healthcare system.

7.4.3 Implications for future research

A concern flagged across chapters 2-4 was a fear that pharmacists in general practices would increase GPs' workloads. However, the evidence in the literature on workload impact is mixed. Zermansky *et al*. found pharmacist integration had no impact on GP workloads (394), Bush *et al*. estimated that 5.4 WTE pharmacists saved GPs more than 647 hours over a 9-month period (171), whilst the evaluation of the 2015 Clinical Pharmacists in General Practice Pilot in the UK found some GPs reported an increase in their workloads (133). Meanwhile, Stone and Williams concluded that having independent prescribing pharmacists in general practices can drastically decrease the workloads of GPs (395). Therefore, given this thesis' findings alongside the current mixed evidence in the literature, it may be useful to determine the impact on GPs' workloads of integrating pharmacists into practices (in Ireland or elsewhere) by conducting a time and motion study, i.e. involving a scientific method for recording time spent on a variety of tasks (413). This could be explored further by comparing one study arm with independent prescribing pharmacists and one arm without.

Chapters 3 and 4 utilised theory in the form of the TDF in their assessment of GPs' perceptions of pharmacists working in general practices. Future research may involve building on the use of theory, by mapping the predominant TDF domains identified in Chapter 3 that influence GPs integrating pharmacists into their practices to the BCW (217). The BCW allows a systematic approach for applying behavioural theory to complex

intervention development; mapping the predominant TDF domains would allow for the identification of suitable intervention functions, i.e. broad categories of ways an intervention can change behaviour and policy options (217). Subsequently, fine-grained techniques known as BCTs to operationalise their functions should be identified (219). This can be achieved by mapping the predominant TDF domains to BCTs in the mapping table produced by Cane *et al*. and a matrix developed by Michie *et al*. (218,219). Finally the Acceptability, Practicability, Effectiveness/cost-effectiveness, Affordability, Safety/side effects, Equity (APEASE) Criteria could be used to evaluate the chosen BCTs to select the most feasible and appropriate ones (214).

Future efforts to evaluate pharmacist-led interventions in the general practice setting involving frail older adults in nursing homes should consider employing a randomised controlled design. As per the hierarchy of evidence pyramid, RCTs represent the highest quality of evidence and lowest risk of bias of study designs (414). An RCT would therefore build on the non-randomised uncontrolled work of this thesis and further strengthen the evidence base in this research area. As part of such an RCT in future, it may be useful to have several pharmacists conduct the intervention to examine the impact of differing levels of pharmacist experience on study outcomes, as the intervention in this thesis only utilised a single pharmacist. Secondly, such an RCT should be adequately powered to detect significant differences between treatment groups for key outcomes, such as those identified in the core outcome sets for studies that aim to optimise medication use in older adults (326–328). Lastly, as highlighted in Chapter 6, there is a paucity of research on cost savings associated with pharmacist-led interventions in nursing homes, and importantly no estimate of the cost of an ADE in an older adult residing in a nursing home. Future research in this area of cost avoidance may be improved by the availability of country-specific, accurate estimations of ADE cost in the nursing home setting akin to the estimate for an ADE in hospitalised adults by Rottenkolber *et al*. (383).

7.5 Conclusion

This thesis is a novel, theoretically-informed body of research that adds to a rapidly growing body of evidence for pharmacists working alongside GPs in their practices. This doctoral research was conducted in response to the rising prevalence of multimorbidity and polypharmacy in our population (particularly in older adults), alongside healthcare reforms which seek to increase the management of patients in the community setting – placing additional pressure on GPs. The expansion of pharmacists' roles is timely and inevitable given such challenges, as we seek to better manage the increasingly complex needs of our populations within the primary care setting.

The overarching aims of this thesis were successfully achieved: to 1) synthesise GPs' views on pharmacist services in general practice and identify factors affecting the integration of pharmacists into general practices and 2) to show the clinical and economic effects of a pharmacist-led intervention in general practices. To achieve these aims, a mixed-methods approach was used to explore and evaluate how pharmacists can be best integrated into practices and what are the potential outcomes of doing so. This comprised a qualitative evidence synthesis, a qualitative interview study, a cross-sectional survey, a prospective multi-centre intervention study, and a cost avoidance analysis.

This doctoral research has made a significant original contribution to knowledge; it has identified key barriers and enablers to integrating pharmacists into practices and shown that there are clear benefits to doing so – for patients, GPs, and the wider healthcare system. The embedding of theory into this thesis – in the form of the TDF – has also laid the groundwork for future research which seeks to integrate pharmacists into the general practice setting in an evidence-informed manner, ultimately with the goal of increasing expertise and support within the general practice setting to optimise medications and improve health outcomes for patients.

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Appendices

Appendix 1: Theoretical Domains Framework (version 2)

Domain (definition[1])	Constructs
1. Knowledge (An awareness of the existence of something)	Knowledge (including knowledge of condition /scientific rationale) Procedural knowledge Knowledge of task environment
2. Skills (An ability or proficiency acquired through practice)	Skills Skills development Competence Ability Interpersonal skills Practice Skill assessment
3. Social/Professional Role and Identity (A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting)	Professional identity Professional role Social identity Identity Professional boundaries Professional confidence Group identity Leadership Organisational commitment
4. Beliefs about Capabilities (Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use)	Self-confidence Perceived competence Self-efficacy Perceived behavioural control Beliefs Self-esteem Empowerment Professional confidence
5. Optimism (The confidence that things will happen for the best or that desired goals will be attained)	Optimism Pessimism Unrealistic optimism Identity
6. Beliefs about Consequences (Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation)	Beliefs Outcome expectancies Characteristics of outcome expectancies Anticipated regret Consequents
7. Reinforcement (Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus)	Rewards (proximal / distal, valued / not valued, probable / improbable) Incentives Punishment Consequents Reinforcement Contingencies Sanctions

Appendix 1: (Continued) Theoretical Domains Framework (version 2)

8. Intentions (A conscious decision to perform a behaviour or a resolve to act in a certain way)	Stability of intentions Stages of change model Transtheoretical model and stages of change
9. Goals (Mental representations of outcomes or end states that an individual wants to achieve)	Goals (distal / proximal) Goal priority Goal / target setting Goals (autonomous / controlled) Action planning Implementation intention
10. Memory, Attention and Decision Processes (The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives)	Memory Attention Attention control Decision making Cognitive overload / tiredness
11. Environmental Context and Resources (Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour)	Environmental stressors Resources / material resources Organisational culture /climate Salient events / critical incidents Person x environment interaction Barriers and facilitators
12. Social influences (Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours)	Social pressure Social norms Group conformity Social comparisons Group norms Social support Power Intergroup conflict Alienation Group identity Modelling
13. Emotion (A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event)	Fear Anxiety Affect Stress Depression Positive / negative affect Burn-out
14. Behavioural Regulation (Anything aimed at managing or changing objectively observed or measured actions)	Self-monitoring Breaking habit Action planning

Appendix 2: PRISMA-S Checklist (406)

Checklist Item	Description
Information sources and methods	
Database name	The following electronic databases were searched: Pubmed, Embase (EBSCOhost), Cochrane Central Register of Controlled Trials, Web of Science, PsycINFO (EBSCOhost), CINAHL (EBSCOhost), Open Grey, and Proquest Dissertations and Theses.
Multi-database searching	Not applicable, searches were run on databases individually.
Study registries	Not applicable.
Online resources and browsing	Not applicable.
Citation searching	Reference lists of all included full text articles were manually screened to identify additional studies. Furthermore, citation searching was also performed on the database 'Google Scholar' to search for articles that had cited our included full texts to capture further relevant research.
Contacts	The corresponding author of the following studies was contacted to obtain clarification on aspects of studies or to obtain full text papers: (186,251,255,415–428). **Responses:** • Published full text paper under a different title: (415,421,428). • Published as part of thesis: (422). • No full text English paper published: (416). • Abstract only, no full text published: (417,420,423,427). • No reply: (418,419,424,426). • Email address provided not functioning: (425). • Supplied full text paper as could not access through pay-wall: (251,255) . • Provided clarification on full text paper: (186).

Appendix 2: (Continued) PRISMA-S Checklist (406)

Checklist Item	Description
Other methods	None to report.
Search strategies	
Full search strategies	**Date search performed: 08/12/2020** Pubmed (2,347 results): 1. (((pharmacist* OR pharmacy service* OR pharmaceutical ADJ care OR pharmaceutical ADJ service* OR pharmacy OR clinical ADJ pharmac* OR clinical pharmacy service* OR general practice pharmacist* OR non?dispensing pharmacist*) AND 2. (general practitioner* OR general practice* OR GP OR family practi* OR primary care physician* OR family physician* OR medical home* OR patient?centered medical home* OR primary healthcare clinic* OR primary healthcare practice OR primary healthcare cent* OR primary healthcare OR primary care?clinic* OR primary care?practice* OR primary care cent* OR primary care)) AND 3. (interview* OR qualitative OR focus?group*)) AND 4. (experience* OR view* OR opinion* OR thought* OR idea* OR perception* OR perspective*) Embase (1,912 results): #1 (pharmacist* OR 'pharmacy service*' OR 'pharmaceutical care' OR 'pharmaceutical service*' OR pharmacy OR 'clinical pharmac*' OR 'clinical pharmacy service*' OR 'general practice pharmacist*' OR 'non?dispensing pharmacist*') AND [humans]/lim #2 ('general practitioner*' OR 'general practice*' OR gp OR 'family practi*' OR 'primary care physician*' OR 'family physician*' OR 'medical home*' OR 'patient?centered medical home*' OR 'primary healthcare clinic*' OR 'primary healthcare practice' OR 'primary

	healthcare cent*' OR 'primary healthcare' OR 'primary care?clinic*' OR 'primary care?practice*' OR 'primary care cent*' OR 'primary care') AND [humans]/lim #3 (interview* OR qualitative OR focus?group* AND [humans]/lim #4 (experience* OR view* OR opinion* OR thought* OR idea* OR perception* OR perspective*) AND [humans]/lim #5 #1 AND #2 AND #3 AND #4 <u>Cochrane (CENTRAL, trials only) (591 results):</u> #1 pharmacist* #2 pharmacy service* #3 pharmaceutical care #4 pharmaceutical service* #5 pharmacy #6 clinical pharmac* #7 clinical pharmacy service* #8 general practice pharmacist* #9 non?dispensing pharmacist* #10 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 #11 general practitioner* #12 general practice* #13 GP* #14 family practice*

	#15	primary care physician*
	#16	family physician*
	#17	medical home*
	#18	patient?centered medical home*
	#19	primary healthcare
	#20	primary healthcare clinic*
	#21	primary healthcare cent*
	#22	primary healthcare practice*
	#23	primary care
	#24	primary care clinic*
	#25	primary care cent*
	#26	primary care practice*
	#27	#11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26
	#28	qualitative
	#29	interview*
	#30	focus group*
	#31	#28 OR #29 OR #30
	#32	experience*
	#33	thought*

	#34 idea* #35 opinion* #36 view* #37 perception* #38 perspective* #39 #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 #40 #10 AND #27 AND #31 AND #39 <u>Web of Science (1,396) results:</u> 1. TOPIC: (pharmacist* OR pharmacy service* OR pharmaceutical ADJ care OR pharmaceutical ADJ service* OR pharmacy OR clinical ADJ pharmac* OR clinical pharmacy service* OR general practice pharmacist* OR non?dispensing pharmacist*) AND 2. TOPIC: (general practitioner* OR general practice* OR GP OR family practi* OR primary care physician* OR family physician* OR medical home* OR patient?centered medical home* OR primary healthcare clinic* OR primary healthcare practice OR primary healthcare cent* OR primary healthcare OR primary care?clinic* OR primary care?practice* OR primary care cent* OR primary care) AND 3. TOPIC: (interview* OR qualitative OR focus?group*) AND 4. TOPIC: (experience* OR view* OR opinion* OR thought* OR idea* OR perception* OR perspective*) **Date search performed: 09/12/2020**

	PsycINFO (262 results): 1. pharmacist* OR pharmacy service* OR pharmaceutical ADJ care OR pharmaceutical ADJ service* OR pharmacy OR clinical ADJ pharmac* OR clinical pharmacy service* OR general practice pharmacist* OR non?dispensing pharmacist* AND 2. general practitioner* OR general practice* OR GP OR family practi* OR primary care physician* OR family physician* OR medical home* OR patient?centered medical home* OR primary healthcare clinic* OR primary healthcare practice OR primary healthcare cent* OR primary healthcare OR primary care?clinic* OR primary care?practice* OR primary care cent* OR primary care AND 3. interview* OR qualitative OR focus?group* AND 4. experience* OR view* OR opinion* OR thought* OR idea* OR perception* OR perspective* CINAHL (447 results): 1. pharmacist* OR pharmacy service* OR pharmaceutical ADJ care OR pharmaceutical ADJ service* OR pharmacy OR clinical ADJ pharmac* OR clinical pharmacy service* OR general practice pharmacist* OR non?dispensing pharmacist* AND 2. general practitioner* OR general practice* OR GP OR family practi* OR primary care physician* OR family physician* OR medical home* OR patient?centered medical home* OR primary healthcare clinic* OR primary healthcare practice OR primary healthcare cent* OR primary healthcare OR primary care?clinic* OR primary care?practice* OR primary care cent* OR primary care AND 3. interview* OR qualitative OR focus?group*

	AND 4. experience* OR view* OR opinion* OR thought* OR idea* OR perception* OR perspective* <u>Proquest Dissertations and Theses (201 results):</u> 1. noft (pharmacist* OR pharmacy service* OR pharmaceutical ADJ care OR pharmaceutical ADJ service* OR pharmacy OR clinical ADJ pharmac* OR clinical pharmacy service* OR general practice pharmacist* OR non?dispensing pharmacist*) AND 2. noft(general practitioner* OR general practice* OR GP OR family practi* OR primary care physician* OR family physician* OR medical home* OR patient?centered medical home* OR primary healthcare clinic* OR primary healthcare practice OR primary healthcare cent* OR primary healthcare OR primary care?clinic* OR primary care?practice* OR primary care cent* OR primary care) AND 3. noft(interview* OR qualitative OR focus?group*) AND 4. noft(experience* OR view* OR opinion* OR thought* OR idea* OR perception* OR perspective*) <u>Open Grey (57 results):</u> 1. (pharmacist* OR 'pharmacy service*' OR 'pharmaceutical care' OR 'pharmaceutical service*' OR pharmacy OR 'clinical pharmac*' OR 'clinical pharmacy service*' OR 'general practice pharmacist*' OR 'non?dispensing pharmacist*') AND 2. ('general practitioner*' OR 'general practice*' OR gp OR 'family practi*' OR 'primary care physician*' OR 'family physician*' OR 'medical home*' OR 'patient?centered medical home*' OR 'primary healthcare clinic*' OR 'primary healthcare practice' OR 'primary healthcare cent*' OR 'primary healthcare' OR 'primary care?clinic*' OR 'primary care?practice*' OR 'primary care cent*' OR 'primary care')

	AND 3. (interview* OR qualitative OR focus?group*) AND 4. (experience* OR view* OR opinion* OR thought* OR idea* OR perception* OR perspective*) **Date search performed: 09/04/2021 – Repeated the above search, using the same strategies as above from date of last search.** Pubmed - 147 Embase (EBSCOhost) - 144 Cochrane (CENTRAL, trials only) - 37 Web of Science - 40 PsycINFO (EBSCOhost) - 2 CINAHL (EBSCOhost) - 12 Open Grey - 0 Proquest Dissertations and Theses (Proquest) – 0

Checklist Item	Description
Limits and restrictions	Searches were only conducted in the English language for reasons of feasibility; if studies were identified in other languages in the search results, they were excluded later on in the review process if no full English text was available. No geographical location or date restrictions were applied to the searches, they were searched from inception up to the date the search was conducted on.
Search filters	None used.
Prior work	The search strategy of a previous systematic review was consulted when designing the above search strategies of this systematic review, to help with selecting synonyms for terms to optimise the number of records retrieved (130).
Updates	Searches were repeated on the 09/04/2021 to capture further relevant studies published since the first searches. No further relevant studies were captured in the updated search.
Dates of searches	A comprehensive literature search was initially run on 8th-9th December 2020 and then re-run on 9th April 2021.
Peer review	
Peer review	The search strategy was initially developed by the first author (EH) and then peer-reviewed as a live document on Microsoft® Teams by four senior supervisors (KD, TF, EW, and SB). Revisions were proposed in an iterative review process of the search strategy, discussed between the supervisors and EH, and implemented as required.
Managing records	
Total Records	A total of 7,213 citations were retrieved from the eight databases searched on 8th-9th December 2020. The repeated search on 9th April 2021 retrieved 382 citations. See PRISMA Flow Diagram (**Figure 8**).
Deduplication	Duplicates were removed by the first author EH, using Zotero's duplicate identification feature, and then records were screened manually by individually reviewing all remaining records to ensure all duplicates were removed.

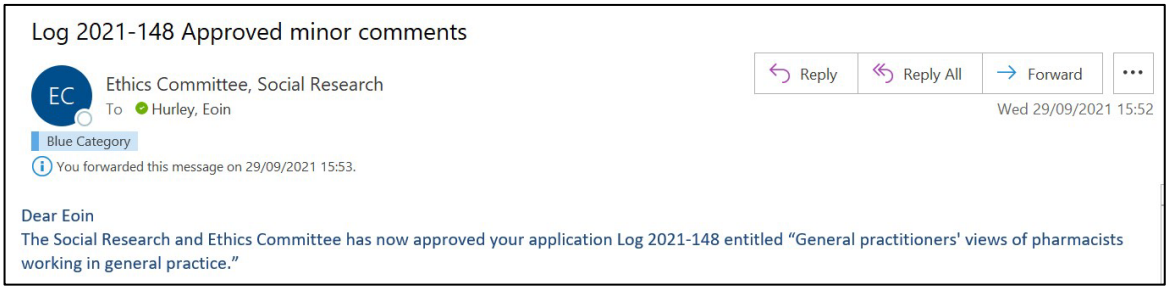
Appendix 3: Enhancing transparency in reporting the synthesis of qualitative research (ENTREQ) Statement **(248)**

Item	Guide and description	Location
Aim	State the research question the synthesis addresses.	Chapter 2, Introduction.
Synthesis methodology	Identify the synthesis methodology or theoretical framework which underpins the synthesis and describe the rationale for choice of methodology.	Chapter 2, Methods, Inclusion and exclusion criteria.
Approach to searching	Indicate whether the search was pre-planned or iterative.	Chapter 2, Methods, Search strategy.
Inclusion criteria	Specify the inclusion/exclusion criteria.	Chapter 2, Methods, Inclusion and exclusion criteria/
Data sources	Describe the information sources used and when the searches were conducted; provide the rationale for using the data sources.	Chapter 2, Methods, Search strategy.
Electronic search strategy	Describe the literature search.	Appendix 2.
Study screening methods	Describe the process of study screening and sifting.	Chapter 2. Methods, Study selection.
Study characteristics	Present the characteristics of the included studies.	Chapter 2, Results, Table 1.
Study selection results	Identify the number of studies screened and provide reasons for study exclusion.	Chapter 2, Results, Figure 8.
Rationale for appraisal	Describe the rationale and approach used to appraise the included studies or selected findings.	Chapter 2, Methods, Synthesis.
Appraisal items	State the tools, frameworks and criteria used to appraise the studies or selected findings.	Chapter 2, Methods, Quality assessment and Synthesis.
Appraisal process	Indicate whether the appraisal was conducted independently by more than one reviewer and if consensus was required.	Chapter 2, Methods, Quality assessment and Synthesis.

Appendix 3: (Continued) Enhancing transparency in reporting the synthesis of qualitative research (ENTREQ) Statement (248)

Item	Guide and description	Location
Appraisal results	Present results of the quality assessment and indicate which articles, if any, were weighted/excluded based on the assessment and give the rationale.	Chapter 2, Methods, Quality assessment and Results, Quality appraisal of included studies.
Data extraction	Indicate which sections of the primary studies were analysed and how were the data extracted from the primary studies?	Chapter 2, Methods, Synthesis.
Software	State the computer software used, if any.	Chapter 2, Methods, Synthesis.
Number of reviewers	Identify who was involved in coding and analysis.	Chapter 2, Methods, Synthesis.
Coding	Describe the process for coding of data.	Chapter 2, Methods, Synthesis.
Study comparison	Describe how were comparisons made within and across studies.	Chapter 2, Methods, Synthesis.
Derivation of themes	Explain whether the process of deriving the themes or constructs was inductive or deductive.	Chapter 2, Methods, Synthesis.
Quotations	Provide quotations from the primary studies to illustrate themes/constructs, and identify whether the quotations were participant quotations or the author's interpretation.	Chapter 2, Results, Review findings, Table 4.
Synthesis output	Present rich, compelling, and useful results that go beyond a summary of the primary studies.	Chapter 2, Results, Review findings.

Appendix 4: Ethical approval for Chapter 3



Log 2021-148 Approved minor comments

EC

Ethics Committee, Social Research

To Hurley, Eoin

Reply | Reply All | Forward | ...

Wed 29/09/2021 15:52

Blue Category

You forwarded this message on 29/09/2021 15:53.

Dear Eoin

The Social Research and Ethics Committee has now approved your application Log 2021-148 entitled "General practitioners' views of pharmacists working in general practice."

Appendix 5: Email sent to potential participants

I am a pharmacist conducting an interview study titled **'General practitioners' views of pharmacists working in general practice'** as part of my PhD studies in University College Cork, under the supervision of Dr Kieran Dalton (Pharmacist) (kieran.dalton@ucc.ie), Professor Stephen Byrne (Pharmacist) (stephen.byrne@ucc.ie), Dr Elaine Walsh (GP) (elaine.walsh@ucc.ie), and Dr Tony Foley (GP) (tonyfoley@ucc.ie).

The aim of this study is to explore general practitioners' views on pharmacists working within the general practice setting without having previously worked with a pharmacist in general practice, and I am contacting you to identify if you would be interested in participating in a one-to-one interview with me as part of this study, which would be audio-recorded. If you have already worked with a pharmacist in general practice (either here in Ireland or in another country), you are not eligible to participate.

Participation would involve taking part in a one-to-one interview with me via videoconference using Microsoft Teams or over the telephone – of which, the first option would be preferable as it would likely benefit both parties to see one another during the interview. However, if this is not possible or you would prefer to conduct the interview over the telephone, that is fine with me. The interview is expected to take 20 - 25 minutes to complete.

If you are happy to participate, then we can organise a day and time to conduct the interview that would be suitable for you. If conducted via Microsoft Teams, I will send you a link inviting you to participate in the interview at the scheduled time.

To this email, I have attached the study's information sheet and consent form to provide you with more details. If you choose to participate, I would ask that you either:

i) email me back with a signed consent form – e.g. this can be a photo of your signature embedded in the document.
or
ii) print off the form attached, fill it in (provide name, date, signature, and tick the box), and send a scanned copy back to my email

I hope that I have provided all of the relevant details. However, if you would like more information before making a decision on participation, please don't hesitate to ask. You can let me know at your convenience if you would be happy to participate in an interview for this study.

Kind regards,

Eoin Hurley MPSI (Pharmacist and PhD Candidate in University College Cork)

Appendix 6: Information leaflet and consent form

Thank you for considering taking part in this research project. The purpose of this information sheet is to inform you what the project is about and in doing so enable you to make an informed choice on participation.

The researchers involved in the project are Eoin Hurley (pharmacist and UCC PhD Candidate) and his supervisors Dr Kieran Dalton and Professor Stephen Byrne from the Pharmaceutical Care Research Group, School of Pharmacy, UCC, and Dr Elaine Walsh and Dr Tony Foley from The Department of General Practice, UCC. The purpose of the study is to assess the views of general practitioners in Ireland regarding pharmacists working in general practice. We are seeking the views of general practitioners who have not already worked with a pharmacist in general practice; if you have already done this (either here in Ireland or in another country), you are not eligible to participate. Should you choose to participate, you will be asked to take part in an interview via videoconference or telephone call with Eoin Hurley (researcher). You will be asked some demographic questions about you and your practice. You will be asked about your views on pharmacists working in general practice and any issues you may see arising from a pharmacist taking up a role within your practice. This interview will be audio-recorded, and is expected to take approximately 20 - 25 minutes to complete.

Participation in the project is completely voluntary. Should you choose to participate, you can choose not to answer specific questions, provide demographic information, or you can decide to withdraw from the study within one week, after which your interview audio recording will be transcribed and the audio recording deleted to anonymise your data and it will not be possible to withdraw your data from the study. You maintain the right to withdraw from the study even after the interview has taken place before the interview has been transcribed.

All information you provide will be confidential and your anonymity will be protected throughout the study. Your interview recording will be transcribed, and the recording will be deleted from the audio recording to anonymise your interview. The anonymous data will be stored on the UCC OneDrive System and subsequently on the UCC Network File Store. The data will be stored for a minimum of 10 years after study completion (in line with UCC's Code of Research Conduct) and will be deleted from the system after that time has elapsed.

The study has obtained ethical permission from UCC Social Research Ethics Committee. The anonymised data will only be made available to the researchers Eoin Hurley, Professor Stephen Byrne, Dr Tony Foley, Dr Elaine Walsh, and Dr Kieran Dalton (contact details for the research team are available below), but may be made available to other researchers conducting research in a similar area only if this has been approved by an appropriate ethics committee. The information you provide will contribute to a PhD thesis and may contribute to research publications and/or conference presentations.

We do not anticipate any negative outcomes from participation in the study. Any queries can be directed to us via email:
Mr Eoin Hurley (eoin.hurley@ucc.ie) or Dr Kieran Dalton (kieran.dalton@ucc.ie).

Consent Form

I …….. agree to participate in Eoin Hurley's research study.

The purpose and nature of the study has been explained to me in writing.

I am participating voluntarily.

I give permission for my interview with Eoin Hurley to be audio-recorded.

I understand that I can withdraw from the study, without repercussions, at any time, whether before it starts or while I am participating.

I understand that I can withdraw permission to use the data within one week of the interview, in which case the material will be deleted.

I understand that anonymity will be ensured in the write-up by disguising my identity.

I understand that my interview content will be used to contribute to a PhD thesis.

I understand that disguised extracts from my interview may be quoted in any subsequent publications and conference presentations if I give permission below:

Please tick <u>one</u> box:
I agree to quotation/publication of extracts from my interview ☐
I do not agree to quotation/publication of extracts from my interview ☐

PRINT NAME: Date:
Signature:

Appendix 7: Final version of topic guide for Chapter 3

1. What do you think of the idea of pharmacists working in general practice?
2. Specifically, what roles would you perceive a pharmacist performing in the general practice environment?
3. Specifically, what roles would you not perceive a pharmacist performing in the general practice environment?
4. What impact would you anticipate that a pharmacist would have on the roles of other general practice staff members?
5. What influence, if any, do you think a pharmacist in general practice could have on your prescribing decisions?
6. What are some influences/factors that may make it easier for a pharmacist to integrate into general practice?
7. What are some influences/factors that may make it difficult for a pharmacist to integrate into general practice?
8. What resources do you think general practices need to support a pharmacist's role?
9. How should patients be identified and referred to the pharmacist?
10. What sort of hours do you think the pharmacists should be available?
11. How do you think services conducted by an integrated pharmacist could be funded?
12. What additional training (if any) do you think pharmacists would require to work in general practice?
13. What attributes/characteristics would pharmacists require to successfully work in general practice?
14. How do you think other members of the general practice team (practice nurses/practice managers etc.) would feel about pharmacists working in general practice?
15. What are your thoughts on the viability of pharmacists working in general practice in Ireland in the future?
16. Hypothetically, would you be willing in the future to take part in a pilot study of having a pharmacist working within your practice (at no cost to the practice)?
17. That basically brings us to the end of the interview. Is there anything else that you would like to add or anything else that you would like to expand on?

Appendix 8: Mapping the topic guide to the Theoretical Domains Framework

TDF Domain	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Q.7	Q.8	Q.9	Q.10	Q.11	Q.12	Q.13	Q.14	Q.15	Q.16	Q.17
1. Knowledge	N/A					√	√					√	√				N/A
2. Skills	N/A				√	√	√					√	√				N/A
3. Social/professional role and identity	N/A	√	√	√	√	√	√										N/A
4. Beliefs about capabilities	N/A				√	√	√					√					N/A
5. Optimism	N/A					√	√								√		N/A
6. Beliefs about Consequences	N/A			√	√	√	√								√		N/A
7. Reinforcement	N/A					√	√										N/A
8. Intentions	N/A					√	√									√	N/A
9. Goals	N/A					√	√		√	√					√	√	N/A
10. Memory, attention and decision processes	N/A				√	√	√		√								N/A
11. Environmental context and resources	N/A					√	√	√			√						N/A
12. Social influences	N/A			√	√	√	√							√			N/A
13. Emotion	N/A					√	√							√			N/A
14. Behavioural regulation	N/A				√	√	√									√	N/A

Legend: N/A – Not applicable.

Appendix 9: Frequency of coded domains from the Theoretical Domains Framework

The table below shows the frequency of coding for each of the TDF domains by the primary researcher (EH), of which the first seven domains were considered to be predominant in influencing GPs' perceptions of pharmacist integration into general practices. Three factors were considered during the consensus discussion when identifying predominant TDF domains: i) frequency of beliefs in domains, ii) presence of conflicting beliefs, and iii) strength of beliefs affecting behaviours regarding integration (213).

Domain	Number of transcripts where domain was coded	Frequency of coding in transcripts
Environmental context and resources	17	406
Social professional role and identity	17	383
Social influences	17	302
Beliefs about consequences	17	221
Beliefs about capabilities	17	190
Skills	17	163
Knowledge	17	111
Goals	17	86
Memory, attention and decision processes	16	44
Optimism	17	42
Emotion	9	14
Behavioural regulation	7	11
Reinforcement	6	9
Intentions	0	0

Appendix 10: COREQ Checklist (281)

Domain 1: Research team and reflexivity			
Personal characteristics			
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group?	EH conducted the interviews.
2.	Credentials	What were the researcher's credentials (e.g. PhD, MD)?	At the time of undertaking the interviews, EH's credentials were BPharm, MPharm, MPSI.
3.	Occupation	What was their occupation at the time of the study?	EH is an Irish registered pharmacist, who was undertaking a PhD in clinical pharmacy research when this study was conducted.
4.	Sex	Was the researcher male or female?	Male.
5.	Experience and training	What experience or training did the researcher have?	EH completed a module in University College Cork entitled 'Qualitative Inquiry', which provides researchers with knowledge and skills in the application of qualitative research methods. EH had not conducted qualitative interviews before this study.

Appendix 10: (Continued) COREQ Checklist (281)

Domain 1: Research team and reflexivity			
Relationship with participants			
6.	Relationship established	Was a relationship established prior to study commencement?	The interviewer had interacted briefly with four of the interviewed GPs over the phone in a professional capacity while working as a community pharmacist previously. Some GPs interviewed were known in a professional capacity to research team members EW and TF, who are practising GPs.
7.	Participant knowledge of the interviewer	What did the participants know about the researcher (e.g. personal goals, reasons for doing the research)?	EH had disclosed to all participants that he was a pharmacist undertaking this study as part of his PhD, prior to conducting the interviews.
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? (e.g. bias, assumptions, reasons and interests in the research topic)	EH is a registered pharmacist who was conducting this study as part of his PhD exploring the expansion of the role of the pharmacist in primary care in Ireland. This information was disclosed to participants ahead of the interview.

Domain 2: Study design			
Theoretical framework			
9.	Methodological orientation and theory	What methodological orientation was stated to underpin the study (e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis)?	This study employed a descriptive qualitative approach as described by Sandelowski as its methodological orientation (244,272).
Participant selection			
10.	Sampling	How were participants selected (e.g. purposive, convenience, consecutive, snowball)?	Participants were identified and recruited through a combination of purposive, convenience, and snowball sampling. Professional contacts of two GP study team members (TF and EW) were purposively sampled to fulfil a minimum number of GPs across various different characteristics (**Table 7**). GP trainers involved in a local GP training scheme were convenience sampled, the study consent form and information leaflet were circulated to all GP trainers via an administrator of the email list. Once a GP completed an interview, they were requested to ask other GP colleagues if they would be interested in being interviewed and to give them the research team's contact details (snowball sampling).

Appendix 10: (Continued) COREQ Checklist (281)

Domain 2: Study design			
11.	Method of approach	How were participants approached (e.g. face-to-face, telephone, mail, email)?	Six participants were recruited via the email to GP trainers on the local GP training scheme, six participants who were professional contacts of the research team were purposively emailed by EH, four participants were recruited by the snowball sampling approach outlined above, and one participant was contacted via phone call to the practice.
12.	Sample size	How many participants were in the study?	17.
13.	Nonparticipation	How many people refused to participate or dropped out? Reasons?	None.
Setting			
14.	Setting of data collection	Where were the data collected (e.g. home, clinic, workplace)?	Ten interviews were conducted via videoconference using Microsoft® Teams and seven were carried out by telephone. Participants were mainly located in the practice or at home at the time of interview. One participant was interviewed over the phone while sat in their car and one participant was interviewed via videoconference while in an airport.

Appendix 10: (Continued) COREQ Checklist (281)

Domain 2: Study design			
15.	Presence of nonparticipants	Was anyone else present besides the participants and researchers?	No.
16.	Description of sample	What are the important characteristics of the sample (e.g. demographic data, date)?	Participant characteristics are shown in Table 8. Other characteristics include i) age in years: median (range) 46 (35-66), and ii) percentage of GP's patients that are GMS patients: median (range) 70 (35-90). All interviews were conducted between November 2021 and February 2022.
Data collection			
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	A topic guide (with prompts where appropriate) was developed based on the findings from Chapter 2, the TDF, and the knowledge and experience of the research team. The TDF is a validated framework that synthesises 33 behaviour change theories and is comprised of 14 domains based on 84 theoretical constructs related to behaviour change (209). The topic guide was pilot tested with two independent practising GP registrars. The topic guide was then iteratively refined during the study where appropriate to ensure that themes were explored in subsequent interviews.

Appendix 10: (Continued) COREQ Checklist (281)

Domain 2: Study design			
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many?	No.
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data?	All interviews were audio-recorded. The recordings were stored securely and were subsequently deleted once the interviews were transcribed.
20.	Field notes	Were field notes made during and/or after the interview or focus group?	Field notes were recorded during each interview, and were used to refine topic guides and inform data analysis.
21.	Duration	What was the duration of the interviews or focus group?	The average interview length was 30 minutes (range: 17-41 minutes).
22.	Data saturation	Was data saturation discussed?	The Guest *et al.* method was used to determine thematic saturation; base size was the number of interviews required to complete the sampling strategy outlined in **Table 7**, run length was two, and the new information threshold was ≤5% (275).
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	Only one GP requested this, who reviewed the transcript with no further comments.

Appendix 10: (Continued) COREQ Checklist (281)

Domain 3: Analysis and findings			
Data analysis			
24.	Number of data coders	How many data coders coded the data?	Two (EH and CH).
25.	Description of the coding tree	Did authors provide a description of the coding tree?	Non-hierarchical conventional codes were initially categorised, and subsequently developed into themes. Each of the themes and their antecedent codes were then categorised under one of the predominant TDF domains identified during the directed content analysis.
26.	Derivation of themes	Were themes identified in advance or derived from the data?	Conventional content analysis consisted of open coding to inductively create initial, non-hierarchical codes. These initial codes were subsequently categorised to generate themes. Directed content analysis was then employed whereby the transcripts were deductively coded using the TDF to identify the domains present.
27.	Software	What software, if applicable, was used to manage the data?	NVivo version 12.
28.	Participant checking	Did participants provide feedback on the findings?	No.

Appendix 10: (Continued) COREQ Checklist (281)

Domain 3: Analysis and findings			
Reporting			
29.	Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	Yes.
30.	Data and findings consistent	Was there consistency between the data presented and the findings?	Quotations which support the findings are presented in **Table 9**, with supplementary quotations available in **Appendix 11**.
31.	Clarity of major themes	Were major themes clearly presented in the findings?	Major themes are clearly presented as the seven predominant TDF domains in the results section.
32.	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Subthemes are presented as our conventional themes under each of the seven predominant TDF domains in the results section.

Legend: GMS – General Medical Services, GP – General practitioner, TDF – Theoretical Domains Framework

Appendix 11: Supplementary quotations for Chapter 3

Conventional theme	Quotations
1. Environmental context and resources	
Current pressures in primary care	*"You know let's say for example with the type 2 diabetes, ehm...the, the explosion of you know medications and various ehm...classes of drugs that have become available personally, I find it difficult to keep up with that"* [GP 7] *"At the primary-secondary care interface how, how complex and dangerous that is for patients and you've somebody attending two or three or four different outpatient departments and medicines are being changed left, right, and centre and…the discharge letters we get are often very poor."* [GP 8] *"Yeah, you know and like that again you're back into that divide if they're GMS* it's easy to say well look actually we're gonna book you in now for bloods the next day and we'll go through the next three problems. If they're private, you know they don't wanna do that ehm *tuts* and you know they don't wanna pay to come back."* [GP 2]
Resources required to support pharmacist integration	*"…but if the pharmacist is actively seeing patients and you know sitting down with patients and doing drug reviews with the patient then yes you need another you know I'm thinking of space in our practice you'd need another room for the pharmacist and you know so then the secretaries would have to be booking in appointments so there would be…it would create an admin role there."* [GP 16] *"The insurance thing is a big thing you know, that they have indemnity themselves as a clinician and that they have ehm…the practice is indemnified for their activity."* [GP 10]
Role logistics will depend on individual practice environments	*"…and they could even dial in remotely, you know they don't…you know this is the new thing the remote working, which might even be more efficient."* [GP 2] *"I would think some sort of part time sessional where a pharmacist is shared between a number of practices."* [GP 11] *"You know, and it would be great that they'd only be down the corridor whereas would I lift the phone and ring the community pharmacist? I probably wouldn't actually I probably would just end up looking up the BNF."* [GP 15]
2. Social professional role and identity	
Optimising pharmacotherapy and service provision in general practice	*"Well, if it's a six-month repeat prescription, maybe the pharmacist reviews it with the GP, rather than the secretary or practice manager with the GP you know or the nurse with the GP, in which case you could be reducing the work for the nurses, the admin."* [GP 1] *"I think the most obvious ones are ehm...in the management of diabetes, there would be a significant explanatory role there, giving of advice, using of, of devices and that type of thing."* [GP 11] *"Obviously you've all your methotrexate people coming in every three months for their bloods. I mean the pharmacist could nearly take that over, you know the nurse would do the bloods and the pharmacist would do a review a week later maybe."* [GP 2] *"So, it would up to pharmacists maybe to ballot on what they want to be involved in. They could absolutely be doing blood pressures and weights and vaccines."* [GP 9] *"You know I suppose one of the things I'd like to see them doing more is perhaps you know looking at health promotion, you know could we have pharmacists doing nicotine replacement prescribing."* [GP 3]

Appendix 11: (Continued) Supplementary quotations for Chapter 3

Conventional theme	Quotations
Role definition to minimise overlap with others' roles	*"But also that there's that communication so I think there would need to be a lead-in time, ehm...introductions to all the team members."* [GP 9] *"Maybe with time then it could evolve, but even if that started that way. Which might be we only do this the first year. You know we're hoping to increase it to x and y in year two and maybe x, y, and z in year three you know. You know maybe it's not everything all at once. You know and that could expand with time."* [GP 2]
Patient cohorts where pharmacists are particularly needed	*"You've blood pressure people. I mean cause it's gotten so much tighter now, you know before it was a bit looser how tight you had to keep it, but now it's nearly gone down to the 130..ehm systolic so like that's quite tight for a lot of people actually and then they're bordering a bit too low, then go dizzy and try to you know so actually I think the cardiology stuff and the diabetes, there'd be a big role for them in that."* [GP 2] *"I mean a lot of these people are elderly patients. They've declining liver and ehm...renal function and there's huge potential for drug-drug interactions, and I think there's a big role for pharmacists in the whole area of deprescribing."* [GP 15] *"…the other one I would like the pharmacist to deal with is the benzos, opiates, and Z-drugs you know that is a you know…and doing it on a shared decision-making role. I would love to give you that. That's a really tough job."* [GP 8]
3. Social influences	
Becoming part of the team and supporting each other	*"So, the day of the renaissance man, the expert, the doctor who knows it all, that day is well gone like."* [GP 15] *"I think that a pharmacist in that setting to back up the GP, particularly in terms of antibiotic stewardship, would be fabulous. You know and then the patient is saying but doctor such and such stopped that and you're only the GP. You know if you had that person, that backup even the support in terms of that."* [GP 6] *"So, they [community pharmacists] provide a lot of the things that we're talking about now. They do provide already as part of their role but probably it would be better to have somebody just dedicated to general practice part of their role. You'd be more helpful to me."* [GP 13] *"There might be a collegiate group say between five practices with the pharmacist or potentially between different pharmacists and different GPs so that not each practice is reinventing the wheel each time, so that we can quickly learn from each other."* [GP 11]
Existing societal norms and interprofessional tensions	*"…some of the older GPs are against kind of primary care models, Now, I don't want to be ageist, not all older GPs are against change but some older GPs are against change."* [GP 2] *"It's definitely going to be an adjustment. I think the person, the people there's going to be the most adjustment for is the nursing staff because you know there's a very established ehm...you know the practice nurse, there's a very established kind of setup there between the GPs and the nurses."* [GP 6] *"…GPs will feel threatened by the arrival of pharmacists. Along the lines of it's none of your business. You're talking about two different disciplines that have worked largely in parallel with some overlap to now and you're asking them to work together and to enmesh and effectively become the one service or two parts of the one service, and that would be threatening on both sides."* [GP 11] *"…I think GPs are worried that pharmacists are taking a little bit of you know the vaccinations and things like that. You know it's all a bit of a turf war really is what I'd say."* [GP 17] "*…it [vaccinations] was an income stream for practices… The government essentially halved the fee that we got paid for it, you know and that caused a lot of antipathy towards pharmacists…but you know, I think unfortunately the relationships between pharmacists and GPs are often not good and often they expect that they'll get a fairly hostile response*." [GP 8]

Appendix 11: (Continued) Supplementary quotations for Chapter 3

Conventional theme	Quotations
Modelling the role	*"You know if we're in a perfect NHS system, I think I would be driving on going 'this is just wonderful', but we're not. This idea of primary care teams is wonderful Eoin, but I can't…like again, as you said, we're 10 years behind…I can't see all these changes happening, which I think would be absolutely for the benefit of patients. I'd love to actually to work in the NHS system where everything is free."* [GP 16] *"…with the diabetic nurse is that it's completely externally financed by the HSE+, so we…that person is not employed by the practice, she's a HSE+ employee and ehm that certainly works you know."* [GP 4]
4. Beliefs about consequences	
Consequences for GPs	*"I think from the point of view of the doctors, it would increase their ehm...enjoyment of their job immensely. Doctors don't like doing repeat prescriptions. They don't like at the end of their day having 20 or 30 prescriptions that they're responsible for."* [GP 10] *"…what's the viability of it in the general practice setting that's non-economic? I think it's really about bringing GPs along the road of understanding and co-operation and belief and putting a lot of effort into showing them that It's to their advantage."* [GP 11] *"…are they in line with current guidance, particularly NICE guidance or SIGN guidance? So his sort of evi…knowledge base in terms of guidance, ehm licensing etc is probably much more up to date then a lot of ours"* [GP 3]
Consequences for patients and wider society	*"…and I think if you think of patient safety and the more people you have going through ehm...you know a list of medications and making sure they're right for that particular patient, can only as I said be a good thing ehm...and can only reduce ehm adverse effects for medications as well."* [GP 9] *"Well, I think there would be a huge role, maybe you know I would think on a nationwide basis where pharmacists could come in and they could look at what we're prescribing and they could say well look a more economic solution would be…or whatever they may have…they would be far more…I guess pharmacists are more, more pharmacoeconomically ehm…orientated than we are."* [GP 15] *"I would imagine that a pharmacist if they had input would…be able to implement measures that would improve compliance you know."* [GP 4]
Consequences for the practice	*"…if the clinical pharmacist was able to do certain duties that the nurse would normally do, that would be helpful to the nurse from a time point of view but also could look at could also help then with the clinical reviews with the doctor for the chronic disease patients."* [GP 5] *"Ehm I think they would need admin support they can't operate in isolation."* [GP 10] *"GPs, we'll prescribe the wrong thing or won't realise there's this interaction or whatever, so maybe it would positively reduce the amount of phone calls to GPs to check things out I don't know maybe."* [GP 5]
5. Beliefs about capabilities	
Beliefs about GPs' capabilities	*"…and you're looking at the prescription and you're going they're aww, they're on those benzos a long time now…"* [GP 2] *"…I think our prescribing in Ireland is very, is all over the place really and we, we prescribe an awful lot of antibiotics here."* [GP 3]

Appendix 11: (Continued) Supplementary quotations for Chapter 3

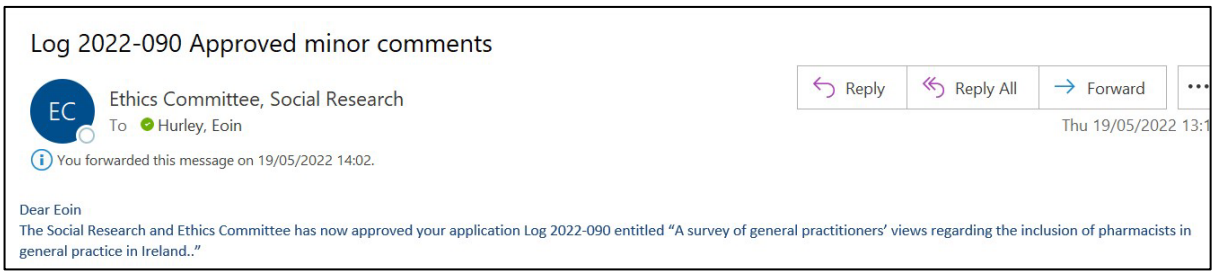
Conventional theme	Quotations
Beliefs about pharmacists' capabilities	*"I don't think so… I mean judging by the kind of pharmacists we've a lot of competent pharmacists now from what I can see. They're all very clued in and they're all very pleasant to deal with and friendly."* [GP 15] *"My experience of…non-doctor prescribers is that they're extremely cautious and they only prescribe a narrow range of medications, when things…when everything ticks a box in terms of they have a checklist of when they can prescribe and I think you're likely to prescribe more to be honest rather than less like do you know."* [GP 13] *"But the complexity of our work is actually quite, it has become quite complex. So you know I mean if there's a patient with multimorbidity that we've been managing, ehm I'm not sure how comfortable I would be with a pharmacist you know kind of taking over the role of the GP in that setting, particularly in complex multimorbidity."* [GP 6] *"I think...some GPs...I...well...I don't wanna be casting my own judgements onto other GPs, but I think there's a little bit of sort of shopkeeper kind of syndrome that can go on sometimes in general practice."* [GP 4] *"The pharmacist definitely needs to be proactively…the pharmacist is a professional. I mean he has to work professionally; he picks out his patients you know in collaboration with the GP. You'll say look this is the ones that I'd like to start on with first and are you happy with that but absolutely he or she needs to be working off her own steam."* [GP 16] *"Like, you have to be able…you know you can't force people to go do things that they don't want, like if they're 90 and they're happy, you know you can't force people, once people understand and are able to consent, ehm and have capacity, so a huge part of GP is actually just learning to live with uncertainty. Because you can't go around panicked ehm and anxious all the time, you'll you know just burn out. You just have to be able to go home and sleep at night. Ehm, so you want a pharmacist who's able for that like. If you're very by the book and the rules, GP will not suit you."* [GP 2] *"…and I suppose somebody who would be less paternalistic with patients maybe, so good sort of empathetic patient care and communication do you know. Patients are often quite vulnerable when they're there you know."* [GP 5]
6. Skills	
Further training required	*"I think the answer to that is you know the practice would need additional training. The GP would need… Yeah! Because like so that would be like me, that would be like you bringing your car to the mechanic and then telling the mechanic how to service it."* [GP 10] *"…it's very interesting. I could see it being absolutely very useful for a general practice and I think you know that kind of on-the-job, on-the-job, training or, or, or on-the-job learning is invaluable, you could create a curriculum."* [GP 7]
Making the most of pharmacists' existing skillsets	*"Okay, so first of all, their skill. They're not just coming into us from ehm…graduation. So, if they had been in the hospital for a while, and could add more, unless it's a training scheme that we're doing, if it's a training scheme and we're getting paid for it and you're allocating more time that would make it one bit easier, but if we're not doing it as a training scheme then they would have to be skilled and have spent time in hospital before they would come into general practice."* [GP 16] *"I don't want somebody who will say I can do the COPD# pharmacology and therapeutics and talk to them, but I can't do the atrial fibrillation that's no good, you know."* [GP 8]
Additional skills requirements	*"…I think they need a bit more oomph and perhaps you guys coming through will have more power to say look, this is off license."* [GP 3] *"…they would have to be up to speed with the diseases that they were, if they were helping with the chronic disease management, they would have to be up to speed with the various different diseases that we study, and they would have to be up to speed with the latest studies, you know on journal articles, best practice, and clinical guidelines for prescribing."* [GP 16]

Appendix 11: (Continued) Supplementary quotations for Chapter 3

Conventional theme	Quotations
7. Knowledge	
GP awareness of pharmacists' knowledge of medications and training	*"I suppose we didn't study therapeutics very much in college, I mean we had maybe one module or something."* [GP 9] *"I suppose my problem is I don't know a huge amount about pharmacy training. So, I suppose that's where my limit of knowledge is or my gap in my knowledge 'cause I don't know exactly what kind of stuff that ye learn."* [GP 12]
Awareness of the role of pharmacists in general practice	*"…and I think I'd support it. There's a lot of evidence internationally that would support it too. There's significant advantages to patients, there's advantages to GPs, there's advantages to primary care health economics, there's a significant safety support, so there's kind of what not to like really."* [GP 11] *"Oh, I'm unfamiliar yeah. I've never heard of pharmacists working in general practice."* [GP 15]

***GMS:** General Medical Services †**HSE:** Health Service Executive ‡**COPD:** Chronic Obstructive Pulmonary Disease

Appendix 12: Ethical approval for Chapter 4



Log 2022-090 Approved minor comments

EC

Ethics Committee, Social Research

To Hurley, Eoin

Reply | Reply All | Forward | ...

Thu 19/05/2022 13:1

You forwarded this message on 19/05/2022 14:02.

Dear Eoin

The Social Research and Ethics Committee has now approved your application Log 2022-090 entitled "A survey of general practitioners' views regarding the inclusion of pharmacists in general practice in Ireland.."

Appendix 13: Survey instrument used in Chapter 4

Coláiste na hOllscoile Corcaigh, Éire
University College Cork, Ireland

A SURVEY OF GENERAL PRACTITIONERS' VIEWS REGARDING THE INCLUSION OF PHARMACISTS IN GENERAL PRACTICE IN IRELAND

Section A	Preconceptions & planning for the role
Section B	Activities and roles within general practice
Section C	Potential outcomes of pharmacists in general practice
Section D	Demographic information & final comments

SURVEY INSTRUCTIONS:

This survey should take 7-10 minutes to complete.

All information collected will be anonymous and cannot be linked back to individual GPs.

There are no right or wrong answers and all answers are useful.

We are interested in your personal views, not what you think we want to hear.

You may return this survey to the research team using the self-addressed envelope provided. Alternatively, if you would like to complete and return the survey electronically, you may do so by scanning the QR code above. We encourage you to share this QR code with other GPs in your practice and other GP colleagues in Ireland.

INFORMED CONSENT SECTION: If you have read the information sheet and agree to take part in this study, please tick 'Yes' below and continue the survey.

Do you consent to participate in this study? Yes ☐ No ☐

SECTION A: PRECONCEPTIONS & PLANNING FOR THE ROLE

This section focuses on your views and experiences of pharmacists in Ireland to date and potential considerations you may have when thinking about the inclusion of a pharmacist into your 'practice'.

When asked about your 'practice' in the survey, this refers to the practice you work most hours in per week).

1. Regarding pharmacists in their current roles in Ireland, please select the most appropriate response to each of the following statements:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
• Previous interactions I've had with pharmacists have been mostly positive.	☐	☐	☐	☐	☐
• I find pharmacists' interventions regarding prescribing useful.	☐	☐	☐	☐	☐
• I am familiar with the training/education that pharmacists undergo.	☐	☐	☐	☐	☐
• Pharmacists have a good knowledge of pharmacology and therapeutics.	☐	☐	☐	☐	☐

2. Regarding the possibility of a pharmacist working in your practice, please select the most appropriate response to each of the following statements:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
• I am uncertain about what roles or activities a pharmacist would perform.	☐	☐	☐	☐	☐
• Pharmacists should not continue to work in community pharmacies as there could be a financial conflict of interest.	☐	☐	☐	☐	☐
• I would be apprehensive about a pharmacist working in my practice.	☐	☐	☐	☐	☐
• In the next five years, I could envision a pharmacist working within my practice.	☐	☐	☐	☐	☐
• Pharmacists should undergo further training before working in my practice.	☐	☐	☐	☐	☐
• I would be concerned about how pharmacists would be indemnified.	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
• I would have time to work or consult with a pharmacist.	☐	☐	☐	☐	☐
• I would like the pharmacist to work autonomously.	☐	☐	☐	☐	☐
• I think patients would be receptive to a pharmacist working in my practice.	☐	☐	☐	☐	☐
• A pharmacist would unnecessarily duplicate work already carried about by GPs.	☐	☐	☐	☐	☐
• I would have space in my practice to accommodate a pharmacist.	☐	☐	☐	☐	☐

3. Select the option that you think would be <u>the most feasible</u> for funding the role of a pharmacist in your practice? (€64,947/year – equivalent to average NHS salary)

HSE funded.	Partly HSE funded.	Fully practice funded.	Patient contribution funded.	Other, please specify:
☐	☐	☐	☐	_____

4. What do you think is the optimal frequency to have a pharmacist on site in your practice?

Daily.	Twice weekly.	Once weekly.	Once every two weeks.	Once monthly.	Once every three months.
☐	☐	☐	☐	☐	☐

Other, please specify:

_____

5. **If the role was HSE funded, which of the following would you prefer? (please explain your rationale in the free-text box)**

The practice hires the pharmacist and the HSE provides a grant to cover the salary.	The HSE employs the pharmacist and the pharmacist visits multiple practices.
☐	☐

SECTION B: ACTIVITIES AND ROLES WITHIN GENERAL PRACTICE

This section focuses on the roles that a pharmacist may perform in your practice, the potential impact of these on other staff members' roles, and the experience required by a pharmacist to carry them out.

6. For each of the following roles, please select your level of agreement that it would be appropriate for a pharmacist to carry them out in your practice.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
• Medication reviews.	☐	☐	☐	☐	☐
• Medication reconciliation.	☐	☐	☐	☐	☐
• Liaising with community pharmacies.	☐	☐	☐	☐	☐
• Providing medicines information.	☐	☐	☐	☐	☐
• Demonstrating medical device use e.g. inhaler technique.	☐	☐	☐	☐	☐
• Interpreting clinical biochemistry e.g. NOAC dose adjustment based on renal function.	☐	☐	☐	☐	☐
• Vaccinations.	☐	☐	☐	☐	☐
• Independent prescribing.	☐	☐	☐	☐	☐
• Overseeing medication monitoring.	☐	☐	☐	☐	☐
• Developing a practice formulary and/or clinical guidelines.	☐	☐	☐	☐	☐
• Triaging and managing minor ailments.	☐	☐	☐	☐	☐

7. **What prior experience would you like to see a pharmacist bring to your practice? (Place 1 in the box under the most important area of experience, 2 under to the second most important area and so on. Do not place the same number in more than one box).**

Community pharmacy	Hospital pharmacy	General practice	Research
☐	☐	☐	☐

8. **What do you perceive is the minimum amount of postgraduate experience required for a pharmacist to take up a role within your practice?**

_____

9. **Indicate the extent to which you think that a pharmacist in general practice may positively or negatively impact on each of the following roles and relationships of others.**

	Strongly negative impact.	Negative impact.	No impact.	Positive impact.	Strongly positive impact
• The role of the GP	☐	☐	☐	☐	☐
• The role of the practice nurse	☐	☐	☐	☐	☐
• The role of administrative staff	☐	☐	☐	☐	☐
• The role of the community pharmacist	☐	☐	☐	☐	☐
• GPs' relationships with patients	☐	☐	☐	☐	☐
• Practice nurses' relationships with patients	☐	☐	☐	☐	☐
• Community pharmacists' relationships with patients.	☐	☐	☐	☐	☐

SECTION C: POTENTIAL OUTCOMES OF PHARMACISTS IN GENERAL PRACTICE

This section focuses on assessing your views on the potential outcomes, both positive and negative, of having a pharmacist in your practice.

10. Regarding workload, indicate the extent to which you think that a pharmacist in general practice would increase or decrease the workload for each of the following.

	Significantly decreased workload	Decreased workload	No effect on workload	Increased workload	Significantly increased workload
• GPs.	☐	☐	☐	☐	☐
• Practice nurses.	☐	☐	☐	☐	☐
• Practice administrative staff.	☐	☐	☐	☐	☐
• Community pharmacists.	☐	☐	☐	☐	☐

11. Regarding potential outcomes of having a pharmacist in your practice: select the extent to which you agree that the following would be a potential outcome of having a pharmacist in your practice.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
• Improved access to medicines information.	☐	☐	☐	☐	☐
• Increased confidence in making prescribing decisions.	☐	☐	☐	☐	☐
• Increased adherence to clinical guidelines.	☐	☐	☐	☐	☐
• Increased practice efficiency.	☐	☐	☐	☐	☐
• More comprehensive patient medication records.	☐	☐	☐	☐	☐
• Increased patient safety.	☐	☐	☐	☐	☐
• Enhanced patient care.	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
• Increased medication adherence.	☐	☐	☐	☐	☐
• Reduced medication costs.	☐	☐	☐	☐	☐
• It would be a professionally rewarding experience.	☐	☐	☐	☐	☐

12. If I considered the theoretical potential outcomes of having a pharmacist within my practice against the cost of employing them (€64,947/year – equivalent to average NHS salary in England), I think a pharmacist would provide value for money overall.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
☐	☐	☐	☐	☐

13. Hypothetically, would you be willing in the future to take part in a pilot study of having a pharmacist working within your practice (at no cost to the practice)?
(If you answer no, please indicate why in the free-text box below).

Yes	No
☐	☐

SECTION D: DEMOGRAPHIC INFORMATION & FINAL COMMENTS

This final section of the survey is gathering some information about you and the practice you work in.

14. What is your gender?

Female	Male	Other:	Prefer not to say
☐	☐	_____	☐

15. Please state your age in years:

_____

16. How many years have you been practising as a GP?

_____

17. How many sessions on average do you work as a GP per week?

_____

18. Are you a GMS contractor (i.e. have a GMS number as a prescriber)?

Yes	No
☐	☐

19. Are you a GP partner?

Yes	No
☐	☐

20. How would you describe the location in which your practice is situated?

Inner City	City suburb	Town	Village
☐	☐	☐	☐

21. Is your practice premises located in a primary care centre?

Yes	No
☐	☐

22. How would you describe the size of your practice?

Small	Medium	Large
(<3,000 patients)	(3,000-10,000 patients)	(>10,000 patients)
☐	☐	☐

23. Average number of GPs employed in your practice on a given day?

1 GP	2 GPs	3 GPs	4 GPs	≥5 GPs
☐	☐	☐	☐	☐

24. Are there any other health and social care professionals currently <u>within</u> your practice? Please tick all that apply.

Practice nurse	GP registrar	Other, please specify all:
☐	☐	_____
		_____

25. Please include any other thoughts or comments you have regarding your views on including pharmacists within general practice in Ireland.

Thank you for your participation in this survey.

You may contact the primary researcher, Eoin Hurley, via email (eoin.hurley@ucc.ie) if you have any queries about this research. Please consider sharing the QR code containing the link an electronic version of this survey with your GP colleagues/peers.

Appendix 14: Survey dissemination strategies

1. GP Buddy post:

Title of GP Buddy post: A anonymous survey of general practitioners' views regarding the inclusion of pharmacists in general practice in Ireland.

An anonymous postal survey was recently distributed to assess GPs' views on pharmacists working in general practices. GPs who didn't receive the survey can click the link to participate.

Survey Link

Note: We were limited in word count by GP buddy, to a maximum of 30 words.

2. GP WhatsApp message:

Start of message

Hi all,

I have been asked by researchers from the Department of General Practice and School of Pharmacy in UCC to post the following message to this group:

Researchers from the Department of General Practice and School of Pharmacy in UCC are conducting a survey to assess GPs' views on pharmacists working in general practices.

Whilst some practices received this survey by post, you can follow this link to anonymously provide your views.

Survey Link

End of message

3. Tweet and survey link:

Twitter account: @eoinhurleyMPSI

Tweet 1:
Attention #GPs in Ireland!

Researchers @Pharmacy_UCC & @UCC_GP are studying GPs' views of #pharmacists working in general practice in #Ireland

If you haven't received our postal survey & would like to share your views anonymously, please complete our survey here:

Survey Link



The above image accompanied tweet 1

Tweet 2 (sub-tweet):

Ethical approval has been received for this study from the Social Research Ethics Committee in University College Cork.

Appendix 15: Chi-squared/Fisher's Exact analyses conducted to assess for significant differences in the responses based on demographics and other factors

Survey item (the numbers inside the brackets adjacent to each item indicate the demographic or other factor on the right)	**Demographics and other factors**
I would have space in my practice to accommodate a pharmacist. (9,12)	1. Gender 2. Age 3. Experience 4. Sessions per week 6. GMS contractor 7. GP partner 8. Practice location 9. Primary care centre 10. Practice size 11. Number of GPs in practice 12. Other healthcare professionals in practice 13. I would have space in my practice to accommodate a pharmacist. 14. Level of agreement with independent prescribing as a role. 15. Level of agreement with concern about indemnification of pharmacists in practices. 16. Level of agreement that patients would be receptive to pharmacists in practices. 17. Level of agreement with pharmacists overseeing medication monitoring.
I would be apprehensive about a pharmacist working in my practice. (11,12)	
I would have time to work or consult with a pharmacist. (9,11)	
I am uncertain about what roles or activities a pharmacist would perform. (2,3,10)	
I would be concerned about how pharmacists would be indemnified. (7)	
I am familiar with the training/education that pharmacists undergo. (2,3)	
For each of the following roles, please select your level of agreement that it would be appropriate for a pharmacist to carry them out in your practice: • **minor ailments.** (2,3,8,10) • **independent prescribing.** (2,3,8,10) • **medication reviews.** (10) • **vaccinations.** (12) • **liaising with community pharmacies.** (10) • **developing practice guidelines/practice formularies.** (3)	

Appendix 15: (Continued) Chi-squared/Fisher's Exact analyses conducted to assess for significant differences in the responses based on demographics and other factors

Survey item (the numbers inside the brackets adjacent to each item indicate the demographic or other factor on the right)
Regarding workload, indicate the extent to which you think that a pharmacist in general practice would increase or decrease the workload for each of the following: • **GPs.** (4,8, 9,10,11,12) • **Practice nurses.** (8,9,10,11) • **Practice administrative staff.** (4,8,9,10,11)
Select the option that you think would be the most feasible for funding the role of a pharmacist in your practice? (€64,947/year – equivalent to average NHS salary). (2,6,7,8,12)
What do you think is the optimal frequency to have a pharmacist on site in your practice? (9,10)
If I considered the theoretical potential outcomes of having a pharmacist within my practice against the cost of employing them (€64,947/year – equivalent to average NHS salary in England), I think a pharmacist would provide value for money overall. (7,9,10,14,15,16)
Hypothetically, would you be willing in the future to take part in a pilot study of having a pharmacist working within your practice (at no cost to the practice)? (2,3,9,13,14,17)

Legend: GPs – General practitioners, NHS – National Health Service

Appendix 16: Checklist for Reporting Of Survey Studies (CROSS)

Section/topic	Item	Item description	Location
Title and abstract			
1. Title and abstract	1a	State the word "survey" along with a commonly used term in title or abstract to introduce the study's design.	Title
	1b	Provide an informative summary in the abstract, covering background, objectives, methods, findings/results, interpretation/discussion, and conclusions.	Abstract
Introduction			
2. Background	2	Provide a background about the rationale of study, what has been previously done, and why this survey is needed.	Introduction
3. Purpose/aim	3	Identify specific purposes, aims, goals, or objectives of the study.	Introduction
Methods			
4. Study design	4	Specify the study design in the methods section with a commonly used term (e.g., cross-sectional or longitudinal).	Methods, Study design and participants.

Appendix 16: (Continued) Checklist for Reporting Of Survey Studies (CROSS)

Section/topic	Item	Item description	Location
5. Data collection methods	5a	Describe the questionnaire (e.g., number of sections, number of questions, number and names of instruments used).	Methods, Construction of the survey.
	5b	Describe all questionnaire instruments that were used in the survey to measure particular concepts. Report target population, reported validity and reliability information, scoring/classification procedure, and reference links (if any).	Methods, Study design and participants and Construction of the survey.
	5c	Provide information on pretesting of the questionnaire, if performed (in the article or in an online supplement). Report the method of pretesting, number of times questionnaire was pre-tested, number and demographics of participants used for pretesting, and the level of similarity of demographics between pre-testing participants and sample population.	Methods, Construction of the survey.
	5d	Questionnaire if possible, should be fully provided (in the article, or as appendices or as an online supplement).	**Appendix 13.**
6. Sample characteristics	6a	Describe the study population (i.e., background, locations, eligibility criteria for participant inclusion in survey, exclusion criteria).	Methods, Study design and participants. Results**, Table 10**.
	6b	Describe the sampling techniques used (e.g., single stage or multistage sampling, simple random sampling, stratified sampling, cluster sampling, convenience sampling). Specify the locations of sample participants whenever clustered sampling was applied.	Methods, Survey dissemination.
	6c	Provide information on sample size, along with details of sample size calculation.	Methods, Survey dissemination.

Appendix 16: (Continued) Checklist for Reporting Of Survey Studies (CROSS)

Section/topic	Item	Item description	Location
	6d	Describe how representative the sample is of the study population (or target population if possible), particularly for population-based surveys.	Methods, Survey dissemination.
7. Survey administration	7a	Provide information on modes of questionnaire administration, including the type and number of contacts, the location where the survey was conducted (e.g., outpatient room or by use of online tools, such as SurveyMonkey).	Methods, Survey dissemination.
	7b	Provide information of survey's time frame, such as periods of recruitment, exposure, and follow-up days.	Methods, Survey dissemination.
	7c	Provide information on the entry process: –>For non-web-based surveys, provide approaches to minimize human error in data entry. –>For web-based surveys, provide approaches to prevent "multiple participation" of participants.	Methods, Statistical analysis, Analysis of qualitative data from open-ended questions and **Appendix 14.**
8. Study preparation	8	Describe any preparation process before conducting the survey (e.g., interviewers' training process, advertising the survey).	Methods, Construction of the survey.

Appendix 16: (Continued) Checklist for Reporting Of Survey Studies (CROSS)

Section/topic	Item	Item description	Location
9. Ethical considerations	9a	Provide information on ethical approval for the survey if obtained, including informed consent, institutional review board [IRB] approval, Helsinki declaration, and good clinical practice [GCP] declaration (as appropriate).	Methods, Ethics and **Appendix 12 and 13**.
	9b	Provide information about survey anonymity and confidentiality and describe what mechanisms were used to protect unauthorized access.	Methods, Ethics and **Appendix 12 and 13.**
10. Statistical analysis	10a	Describe statistical methods and analytical approach. Report the statistical software that was used for data analysis.	Methods, Statistical analysis.
	10b	Report any modification of variables used in the analysis, along with reference (if available).	Methods, Statistical analysis.
	10c	Report details about how missing data was handled. Include rate of missing items, missing data mechanism (i.e., missing completely at random [MCAR], missing at random [MAR] or missing not at random [MNAR]) and methods used to deal with missing data (e.g., multiple imputation).	Methods, Statistical analysis.
	10d	State how non-response error was addressed.	Methods, Survey dissemination.
	10e	For longitudinal surveys, state how loss to follow-up was addressed.	N/A.
	10f	Indicate whether any methods such as weighting of items or propensity scores have been used to adjust for non-representativeness of the sample.	N/A.
	10g	Describe any sensitivity analysis conducted.	Methods, Statistical analysis.

Appendix 16: (Continued) Checklist for Reporting Of Survey Studies (CROSS)

Section/topic	Item	Item description	Location
Results			
11. Respondent characteristics	11a	Report numbers of individuals at each stage of the study. Consider using a flow diagram, if possible.	Results.
	11b	Provide reasons for non-participation at each stage, if possible.	N/A.
	11c	Report response rate, present the definition of response rate or the formula used to calculate response rate.	Results.
	11d	Provide information to define how unique visitors are determined. Report number of unique visitors along with relevant proportions (e.g., view proportion, participation proportion, completion proportion).	Results.
12. Descriptive results	12	Provide characteristics of study participants, as well as information on potential confounders and assessed outcomes.	Results, **Table 10** and **Appendix 15.**
13. Main findings	13a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates along with 95% confidence intervals and p-values.	Results.
	13b	For multivariable analysis, provide information on the model building process, model fit statistics, and model assumptions (as appropriate).	N/A.
	13c	Provide details about any sensitivity analysis performed. If there are considerable amount of missing data, report sensitivity analyses comparing the results of complete cases with that of the imputed dataset (if possible).	N/A.

Appendix 16: (Continued) Checklist for Reporting Of Survey Studies (CROSS)

Section/topic	ItemItem description		Location
Discussion			
14. Limitations	14	Discuss the limitations of the study, considering sources of potential biases and imprecisions, such as non-representativeness of sample, study design, important uncontrolled confounders.	Discussion, Strengths and limitations.
15. Interpretations	15	Give a cautious overall interpretation of results, based on potential biases and imprecisions and suggest areas for future research.	Discussion, Main findings, Implications.
16. Generalizability	16	Discuss the external validity of the results.	Discussion, Findings in relation to other studies.
Other sections			
17. Role of funding source	17	State whether any funding organization has had any roles in the survey's design, implementation, and analysis.	Thesis acknowledgements and noted in published article.
18. Conflict of interest	18	Declare any potential conflict of interest.	None, noted in published article.
19. Acknowledgements	19	Provide names of organizations/persons that are acknowledged along with their contribution to the research.	Thesis acknowledgements.

Appendix 17: Supplementary quotations from participants' responses to open comment questions

Theme 1: Irish primary healthcare is suboptimal, and change is needed
"Vital cog to improve + decommercialize our expensive prescribing habits." **[GP 23]**
"Repeat prescribing is a key part of general practice. There is a gap in safety netting when it is done as part of the routine working day." **[GP 43]**
"My belief is that we need more GPs." **[GP 57]**
"I think anything that can be done to assist GPs in managing the challenges of adequate service provision must be considered." **[GP 20]**
"*Just a frustrating scenario that could be avoided - product out of stock --> "ring your GP to prescribe something else.*" **[GP 3]**
"*The cost saving on unnecessary and unneeded medication in the long-term would pay for the service.*" **[GP 101]**
"*Increased instructions from hospital re GP to initiate drugs.*" **[GP 123]**
"*We can delegate, in theory, a lot of tasks but invariably they land on our desk eventually and often duplicate work.*" **[GP 15]**
"*Only stipulation for me would be same pharmacist - not usual HSE run clinics where new person weekly.*" **[GP 37]**
"*…with absolutely minimal HSE interference and minimal bureaucracy.*" **[GP 84]**

Appendix 17: (Continued) Supplementary quotations from participants' responses to open comment questions

Theme 2: Pharmacists are as a useful resource and their role in primary care should be expanded
"Works well in Northern Ireland and NHS." **[GP 39]**
"Hospitals have already scaled up this collaboration." **[GP 96]**
"…in some third world countries, pharmacists are the sole healthcare providers in some areas." **[GP 143]**
"I worked in the NHS in the UK for 10+ years and heard of many colleagues with positive experiences there with GP pharmacists." **[GP 101]**
"I don't see the value in pharmacists undertaking vaccination with GP practices - their skills are not being used to the greatest extent with this role." **[GP 13]**
"I would also advocate expanding the role of the community pharmacist + making more medications available OTC." **[GP 49]**
"Pharmacist roles should be expanded." **[GP 77]**
"Have had excellent pharmacist who I am sure would be delighted to." **[GP 111]**
"I value being able to pick phone up to local pharmacist even a few times a day for advice - no delay/ great help." **[GP 106]**
"Of our two nearest pharmacists, if one calls it is because of a potential error and they will already have the solution." **[GP 24]**
"Pharmacists have been my most closely supportive profession over many years of practice also I've always felt that working even more closely could only be of benefit." **[GP 71]**
"I have good working relationships with my local pharmacists so maybe that's why I am unsure if it would add to my practice." **[GP 43]**
"I believe in rural practice (which is primarily my own experience) there is generally great support from local community pharmacists who we work with on an informal team." **[GP 41]**
"Some are fantastic for advice on any matter.... probably pick their brains too often." **[GP 148]**
"I find repeated discussions with my community pharmacy colleagues to be of great value and support." **[GP 67]**
"Would be worth exploring." **[GP 32]**

Appendix 17: (Continued) Supplementary quotations from participants' responses to open comment questions

Theme 3: Funding and governance of pharmacist roles in general practice.
"HSE employed, not the practice." **[GP 11]**
"Happy to have a pharmacist employed by the HSE which is then outsourced to GP such as the diabetic nurse." **[GP 73]**
"I would preferably have access to HSE community pharmacists who could advise on medicines/techniques/med reviews who we could refer to ad-hoc. " **[GP 22]**
"If pharmacist employed by HSE the role could be well defined and there would be uniformity of pharmacist services in GP [general practice]*."* **[GP 132]**
"The practice would be responsible for all aspects of employment such as indemnity, sick leave, mat leave etc and would not be financially feasible." **[GP 54]**
"Not interested in having more employees." **[GP 61]**
"Wonderful idea but need to clarify who will pay them and employ them - am not interested in taking on another employee." **[GP 87]**
"I don't want the responsibility of employing another staff member." **[GP 41]**
"Community pharmacy should be consulted." **[GP 99]**
"Probably unaffordable/unrecruitable." **[GP 82]**
"You would have more autonomy in what you want the pharmacist to do in your practice if you hire them directly. If it is just a visiting pharmacist, I don't think it would work as well." **[GP 13]**
"Needs to be appropriately funded. Current HSE rate does not reflect risk assoc. with role v community rates." **[GP 58]**
"…the funding must include funding for the GP time with the pharmacist." **[GP 148]**
"If a pharmacist is in the practice, then have to fund the time to interact with the pharmacist." **[GP 48]**
"To employ a pharmacist privately it is difficult to see how some GPs would cover the cost of employment." **[GP 75]**
"The process must be totally HSE funded." **[GP 135]**

"Not feasible to have a full-time pharmacist at one practice, not necessary and not financially viable." **[GP 47]**

"If there is a disagreement between pharmacist and GP or local pharmacist who decides?" **[GP 78]**

"I think the pharmacist whilst working within the Primary Care team/ with the GP they should also have independence from it." **[GP 2]**

"Allows pharmacist to work with private patients as well as GPs." **[GP 17]**

"…and some GPs might feel challenged and insecure re deficiencies in their pharmacology/therapeutics knowledge base." **[GP 49]**

Appendix 17: (Continued) Supplementary quotations from participants' responses to open comment questions

Theme 4: What the role of a pharmacist in general practice would look like
"Independent prescribing a potential area if operated in a particular area." **[GP 127]**
"I would see that a pharmacist would help with rationalising prescribing." **[GP 58]**
"I see pharmacists' role in practices as primarily tackling polypharmacy and ""problem"" prescribing." **[GP 58]**
"Continuous basis doing medication reviews with feedback to GPs + community pharmacist or six monthly as part of CDM." **[GP 82]**
"Then providing a practice formulary for patient prescribing would be very helpful." **[GP 58]**
"Would encourage guidelines + practice policies for prescribing." **[GP 38]**
"? value of practice placement for a final year pharmacy student as an initial step in this initiative to assess potential for this role." **[GP 98]**
"New pharmacist would need some experience prior to entering general practice or else incorporated into a training scheme perhaps." **[GP 100]**
"NOAC and renal function INR and warfarin." **[GP 28]**
"If they were seeing the CDMs for medication review this again should be done in real time with the patient present." **[GP 91]**
"I would be interested to see how it works in reality." **[GP 47]**
"I would be interested to hear the experience of pharmacists employed in general practice in Scotland." **[GP 29]**
"Would value info on how pharmacists are employed in primary care in other European countries with successful primary care." **[GP 141]**
"They should be a standard part of the team." **[GP 71]**
"Would imagine a dedicated general practice pharmacist would be of value." **[GP 133]**
"Role similar to DIG nurse specialist (DM Interest Group) would work perfectly." **[GP 19]**
"I would see pharmacists in a therapeutic overseer/adviser role - might be best used in specific targeted situations." **[GP 83]**

"…but if they are reviewing prescriptions etc then they would need to be there for some part of each day to do it in real time." **[GP 98]**

"I think it would be hugely beneficial to have pharmacists attached to practices throughout the country." **[GP 42]**

"Smaller practices would be disadvantaged as HSE would likely send pharmacist to big group practices." **[GP 79]**

"I can't see my size of practice providing full-time hours for a pharmacist." **[GP 64]**

"We are a small practice so would not require a full-time pharmacist." **[GP 51]**

"…BZD deprescribing programmes in conjunction with addiction services." **[GP 119]**

"I do not think that a pharmacist would be needed full-time in a single practice and hence attachment to a number of practices is more sensible." **[GP 45]**

"He/she would reach saturation in terms of work if working for a specific practice." **[GP 61]**

"To be more efficient to work in multiple surgeries." **[GP 50]**

"Pharmacist role would be with polypharmacy patients which are mostly elderly and GMS." **[GP 6]**

"Not happy visiting other practices, we work as private contractors and there are competition issues." **[GP 11]**

"Drug reconciliation and interdisciplinary communication e.g. - discharged patients from hospital, can be very problematic." **[GP 92]**

Appendix 17: (Continued) Supplementary quotations from participants' responses to open comment questions

Theme 5: Anticipated outcomes from the role: generally positive, with some unknowns
"…has potential for large savings + rational prescribing." **[GP 101]**
"…but it could pay for itself (GMS/DPS savings) --> like drug budgeting in the past." **[GP 28]**
"Reduce drug costs to HSE." **[GP 47]**
"Would reduce medication cost." **[GP 18]**
"Payment would be the biggest issue and not sure how they'd generate income." **[GP 102]**
"Polypharmacy reduction". **[GP 144]**
"Triaging and managing minor ailments will depend on indemnity." **[GP 38]**
"Insurance is a huge issue. Increased risk of litigation due to discontinued meds." **[GP 94]**
"…increase my knowledge to boot!!" **[GP 27]**
"Would provide access to evidenced information rather than the commercially driven information from reps." **[GP 23]**
"Would most importantly be a professionally rewarding experience." **[GP 48]**
"Good idea - all learn from each other." **[GP 58]**
"but it would depend on interaction between staff + Drs + nurses but I would welcome it." **[GP 94]**
"In a group practice it is important that the pharmacist would gel with the rest of the staff." **[GP 73]**
"Already flooded with work. No time to add increased management." **[GP 37]**
"Doing it after the prescription is sent etc will only cause work." **[GP 109]**
"Too often non-GP professionals just leave a list of more to do's for GPs without realising this work is additional to everything else." **[GP 138]**

"There is a fear that it may undermine our relationships with local community pharmacists." **[GP 12]**

"Also the one benefit of GP for patients is 'The relationship'." **[GP 48]**

"The single most beneficial factor in a given patient's health over their lifetime is their relationship with their GP. It is a therapeutic relationship and is independent of the use of medication. Anything that interferes with this e.g. pharmacist in the practice is detrimental to all concerned." **[GP 95]**

"The practice would benefit from efficiency, education." **[GP 61]**

"…in my opinion the saving to the HSE with regards prescriptions and safe practice would exceed the payment requirements." **[GP 80]**

"…very useful for patients to be able to talk to pharmacist about their prescription, when to take for best effect etc." **[GP 86]**

"It would improve…patient safety." **[GP 40]**

"Reduce medication adverse outcomes and hospitalisations." **[GP 142]**

"This is for the benefit of patients and also cost saving for HSE." **[GP 28]**

"whilst simultaneously providing better patient outcomes and care." **[GP 41]**

"Reduce interactions in multipharmacy." **[GP 85]**

"To have another HCP looking at this would be very beneficial for doctors and patients." **[GP 31]**

"Practice nurse/ AP more appropriate to triage and manage minor ailments." **[GP 99]**

Legend: AP – Advanced Paramedic, BZD – benzodiazepine, CDM – Chronic Disease Management, DIG – Diabetes Interest Group, DM – Diabetes Mellitus, DPS – Drug Payment Scheme, GMS – General Medical Services, GP – General practitioner, HCP – Healthcare Professional, HSE – Health Service Executive, NHS – National Health Service, OTC – Over the counter.

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Hurley, H. 2024. Exploring the potential impact of integrating pharmacists into general practice in Ireland. PhD Thesis, University College Cork.

Please note that Appendices 18-27 (pp. 338-354) are unavailable due to a request by the author.

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